

Certificate  
Extended Certificate  
Diploma

# Specification

## BTEC FIRST CONSTRUCTION AND BUILT ENVIRONMENT

**From September 2018**

BTEC Level 1/Level 2 First Certificate in Construction and Built Environment

BTEC Level 1/Level 2 First Extended Certificate in Construction and Built Environment

BTEC Level 1/Level 2 First Diploma in Construction and Built Environment



**Pearson  
BTEC Level 1/Level 2  
First Certificate  
in Construction and the  
Built Environment**

**Pearson  
BTEC Level 1/Level 2  
First Extended Certificate  
in Construction and the  
Built Environment**

**Pearson  
BTEC Level 1/Level 2  
First Diploma in  
Construction and the  
Built Environment**

**Specification**

First teaching September 2018

Issue 6

## **Edexcel, BTEC and LCCI qualifications**

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This specification is Issue 6. We will inform centres of any changes to this issue. The latest issue can be found on our website.

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ISBN 978 1 446 93611 5

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**Summary of Pearson BTEC Level 1/Level 2 Certificate, Extended Certificate and Diploma in Construction and the Built Environment Issue 6 changes**

<b>Summary of changes made between previous issue and this current issue</b>	<b>Page/section number</b>
TQT for the Certificate has changed to 320. TQT for the Extended Certificate has changed to 480. TQT for the Diploma has changed to 640.	Page 6

<b>Summary of changes made between Issue 3 and Issue 5</b>	<b>Page/section number</b>
All legislation/regulation dates removed.	Throughout
The wording in <i>Section 8 Internal assessment</i> subsection <i>Dealing with malpractice</i> has been updated to clarify suspension of certification in certain circumstances.	Page 39
The external assessment length for <i>Unit 1: Construction Technology</i> has changed from one hour to one hour and 15 minutes and the number of marks has changed from 50 to 60. Unit 1 resit opportunities row added to table: 'All learners registered from Sept 2018 can resit the external assessment once.'	Pages 41 and 64
<i>Section 10 Awarding and reporting the qualifications</i> The wording under <i>Calculation of qualification change</i> has been updated.	Page 44
The wording under <i>Section 10 Awarding and reporting for the qualifications</i> subsection <i>Calculation of the qualification grade</i> has been updated to clarify current practice in ensuring maintenance and consistency of qualification standards.	Page 47
<b>Unit 1: Construction Technology</b> <i>Learning aims and unit content</i> Topics B.1, B.2, C.1, C.2 and C.3 Application of maths added.	Pages 61, 62, 63
<b>Unit 6: Exploring Carpentry and Joinery Principles and Techniques</b> <i>Assessment Guidance</i> Learning aim B – 1st paragraph 'records, and completion of a quality control sheet' added. For 2B.P3: 'This can be evidenced throughout the practical activity via a teacher observation record.' replaced with 'This criterion can be evidenced by a risk assessment template completed by the learner.'	Page 116
<b>Unit 7: Exploring Brickwork and Blockwork Principles and Techniques</b> <i>Assessment Guidance</i> Learning aim B – 1st paragraph 'records, and completion of a quality control sheet' added. For 2B.P3: 'This criterion can be evidenced by a risk assessment template completed by the learner' added.	Page 126

Summary of changes made between Issue 3 and Issue 5	Page/section number
<p><b>Unit 8: Exploring Painting and Decorating Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph ‘records, and completion of a quality control sheet’ added to last sentence.</p> <p>For 2B.P3: ‘This criterion can be evidenced by a risk assessment template completed by the learner’ added.</p>	Page 136
<p><b>Unit 9: Exploring Plumbing Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph ‘records, and completion of a quality control sheet’ added to last sentence.</p> <p>For 2B.P3: ‘This criterion can be evidenced by a risk assessment template completed by the learner’ added.</p>	Page 148
<p><b>Unit 10: Exploring Electrical Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph ‘records, and completion of a quality control sheet’ added to last sentence.</p> <p>For 2B.P3: ‘This criterion can be evidenced by a risk assessment template completed by the learner’ added.</p>	Page 159
<p><b>Unit 11: Sustainability in Construction</b></p> <p><i>Learning aims and unit content</i></p> <p>Topic A.3 Social issues of construction</p> <p>A3.2 last bullet – ‘Contractors’ changed to ‘Constructors’.</p> <p>Topic B.1 Designing for sustainability</p> <p>‘BRE (Building Research Establishment) technical guides’ added to second to last bullet point.</p>	Pages 166, 169
<p><b>Unit 12: The Construction Industry</b></p> <p><i>Learning aims and unit content</i></p> <p>Topic A.1 Construction career pathways</p> <p>‘Coordinator’ changed to ‘Constructors’.</p>	Page 174
<p><b>Unit 13: Exploring Roofing Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph ‘records, and completion of a quality control sheet’ added.</p> <p>For 2B.P3: ‘This criterion can be evidenced by a risk assessment template completed by the learner’ added.</p>	Pages 190, 191
<p><b>Unit 14: Exploring Wall and Floor Tiling Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph, ‘records, and completion of a quality control sheet’ added to second to last sentence.</p>	Page 201

Summary of changes made between Issue 3 and Issue 5	Page/section number
<p><b>Unit 15: Exploring Plastering and Dry Lining Principles and Techniques</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 1st paragraph ‘records, and completion of a quality control sheet’ added to last sentence.</p> <p>For 2B.P3: ‘This criterion can be evidenced by a risk assessment template completed by the learner’ added.</p>	Page 211
<p><b>Unit 16: Carpentry and Joinery Operations</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 2B.P3 through to 2B.M4: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p> <p>Learning aim C – 2C.P6 through to 1C.7: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p>	Pages 226, 227, 228
<p><b>Unit 17: Brickwork and Blockwork Operations</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim C – 2C.P6 through to 2C.D3: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p>	Pages 244, 245
<p><b>Unit 18: Painting and Paperhanging Operations</b></p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 2B.P3 through to 1B.4: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p> <p>Learning aim C – 2C.P6 through to 1C.7: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p>	Pages 259, 260, 261
<p><b>Unit 19: Plumbing Operations</b></p> <p><i>Learning aims and unit content</i></p> <p>Topic B.1 Materials used for plumbing operations</p> <p>First bullet changed to ‘22 mm’ from ‘20 mm’.</p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 2B.M4 and 2B.D2: ‘observation report including a quality control sheet’ added to last sentence for each assessment criteria.</p>	Page 268, 275
<p><b>Unit 20: Electrical Operations</b></p> <p><i>Learning aims and unit content</i></p> <p>Topic A.2 IET Wiring Regulations updated to the ‘Current Edition’.</p> <p><i>Assessment Guidance</i></p> <p>Learning aim B – 2B.P4 through to 1B.5L: ‘observation record including a quality control sheet’ added to last sentence for each assessment criteria.</p>	Pages 278, 287

Summary of changes made between Issue 3 and Issue 5	Page/section number
<b>Unit 22: Tendering and Estimating</b> <i>Learning aims and unit content</i> Topic A.2 'Standard Method of Measurement 7th Edition (SMM7)' removed.	Page 309
<b>Unit 23: Exploring Surveying</b> <i>Learning aims and unit content</i> Topic A.3 'Standard Method of Measurement 7th Edition (SMM7)' removed.	Page 320
<b>Unit 24: Exploring Civil Engineering</b> <i>Learning aims and unit content</i> Topic A.2 'Institution of Civil Engineers (ICE) code of practice for sustainable waste' removed. 'L21 for Management of health and safety at work regulations 1999' removed. L144 Managing health and safety in construction for CDM updated to L153. 'Best practice in Sustainable Drainage (HR Wallingford)' replaced with 'SuDS manual (CIRIA)'.	Pages 334, 335
<b>Unit 25: Exploring Building Services Engineering</b> <i>Learning aims and unit content</i> Topic A.1 IET Wiring Regulations – '17th Edition' updated to '18th Edition'.	Page 350
<b>Unit 27: Construction Work Experience</b> <i>Learning aims and unit content</i> Topic A.3 'Criminal Records Bureau (CRB)' changed to 'Disclosure and Barring Service (DBS)'. <i>Assessment Guidance</i> Fourth paragraph – 'CRB' changed to 'DBS'.	Pages 372, 377

If you need further information on these changes or what they mean, please contact us via our website at: [qualifications.pearson.com](http://qualifications.pearson.com).



# Welcome to your BTEC First specification

For more than 25 years, BTECs have earned their reputation as well-established, enduringly effective qualifications. They have a proven track record in improving motivation and achievement among young learners. Additionally, BTECs provide progression routes to the next stage of education or to employment.

## Key principles of the BTEC Firsts

To support young people to succeed and progress in their education, we have drawn on our consultation and embedded four key design principles into the BTEC Firsts.

### 1 Standards: a common core and external assessment

Each Level 2 BTEC First qualification has an essential core of knowledge and applied skills. We have introduced external assessment appropriate to the sector. This provides independent evidence of learning and progression alongside the predominantly portfolio-based assessment.

### 2 Quality: a robust quality-assurance model

Building on strong foundations, we have further developed our quality-assurance model to ensure robust support for learners, centres and assessors.

We will make sure that:

- every BTEC learner's work is independently scrutinised through the external assessment process
- every BTEC assessor will take part in a sampling and quality review during the teaching cycle
- we visit each BTEC centre every year to review and support your quality processes.

We believe this combination of rigour, dialogue and support will underpin the validity of the teacher-led assessment and the learner-centric approach that lie at the heart of BTEC learning.

### 3 Breadth and progression: a range of options building on the mandatory units, contextualised English and mathematics

**Mandatory units**, developed in consultation with employers and educators, give learners the opportunity to gain a broad understanding and knowledge of the vocational sector.

**Optional specialist units** focus more closely on a vocational area, supporting progression to a more specialised Level 3 vocational or academic course or to an Apprenticeship.

Opportunities to develop skills in English and mathematics are indicated in the units where appropriate. Where appropriate to the sector, learners will practise these essential skills in naturally occurring and meaningful contexts.

#### **4 Recognising achievement: opportunity to achieve at Level 1**

The BTEC Firsts will continue to provide for the needs of learners who are aiming to achieve a Level 2 qualification. However, we have recognised that for some learners achieving this standard in all units in one to two years may not be possible. Therefore, the qualifications have been designed as Level 1/Level 2 qualifications with grades available at Level 2 and at Level 1 Pass.

#### **Improved specification and support**

We asked what kind of guidance you, as teachers and tutors, need. As a result, we have streamlined the specification to make the units easier to navigate, and we provide enhanced support in the accompanying *Delivery Guide*.

**Thank you**

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# Purpose of this specification

The purpose of this specification, as defined by Ofqual, is to set out:

- the objectives of each qualification in the suite
- any other qualification that a learner must complete before taking a qualification
- any prior knowledge, skills or understanding that the learner is required to have before taking the qualifications
- units that a learner must complete before a qualification can be awarded, and any optional routes
- any other requirements that a learner must have satisfied before they can be assessed, or before a qualification can be awarded
- the knowledge, skills and understanding that will be assessed as part of the qualifications (giving a clear indication of their coverage and depth)
- the method of any assessment and any associated requirements relating to it
- the criteria against which learners' level of attainment will be measured (such as assessment criteria)
- any specimen materials (supplied separately)
- any specified levels of attainment.

## Qualification titles and Qualification Numbers

Qualification title	<b>Pearson BTEC Level 1/Level 2 First Certificate in Construction and the Built Environment</b>
Qualification Number (QN)	<b>600/7048/1</b>

Qualification title	<b>Pearson BTEC Level 1/Level 2 First Extended Certificate in Construction and the Built Environment</b>
Qualification Number (QN)	<b>601/0258/5</b>

Qualification title	<b>Pearson BTEC Level 1/Level 2 First Diploma in Construction and the Built Environment</b>
Qualification Number (QN)	<b>601/0259/7</b>

These qualifications are on the Regulated Qualifications Framework (RQF).

Your centre should use the Qualification Number (QN) when seeking funding for your learners.

The qualification title, units and QN will appear on each learner's final certificate. You should tell your learners this when your centre recruits them and registers them with us. Further information on certification is in our *UK Information Manual*, available on our website: [qualifications.pearson.com](http://qualifications.pearson.com)

# 1 What are BTEC Firsts?

BTEC First qualifications were originally designed for use in colleges, schools and the workplace as an introductory Level 1/Level 2 course for learners who want to study in the context of a vocational sector. The knowledge, understanding and skills learned in studying a BTEC First will aid progression to further study and prepare learners to enter the workplace.

These qualifications are intended primarily for learners in the 14–19 age group, but they may also be used by other learners who wish to gain an introductory understanding of a vocational area. When taken as part of a balanced curriculum, there is a clear progression route to a Level 3 course or an Apprenticeship.

BTECs are vocationally-related qualifications, where learners develop knowledge and understanding by applying their learning and skills in a work-related context. They are popular and effective because they enable learners to take responsibility for their own learning and to develop skills that are essential for the modern-day workplace. These skills include: teamworking; working from a prescribed brief; working to deadlines; presenting information effectively; and accurately completing administrative tasks and processes. BTEC Firsts motivate learners and open doors to progression to further study and responsibility in the workplace.

## Objectives of the BTEC First suite

The BTEC First suite will:

- enable you, as teachers, tutors and training providers, to offer a high-quality vocational and applied curriculum that is broad and engaging for all learners
- help you to secure a balanced curriculum overall, so that learners in the 14–19 age group have the opportunity to apply their knowledge, skills and understanding in the context of future development
- provide learners with opportunities to link education and the world of work in engaging, relevant and practical ways
- enable learners to enhance their English and mathematical competence in relevant, applied scenarios
- support learners' development of transferable interpersonal skills, including working with others, problem solving, independent study, and personal, learning and thinking skills
- provide learners with a route through education that has clear progression pathways to further study or an Apprenticeship.

## Breadth and progression

These qualifications have a core of underpinning knowledge, skills and understanding, and a range of options to reflect the breadth of pathways within a sector. This gives learners the opportunity to:

- gain a broad understanding and knowledge of a vocational sector
- investigate areas of specific interest
- develop essential skills and attributes prized by employers, further education colleges and higher education institutions.

This suite of qualifications provides opportunities for learners to progress to either academic or more specialised vocational pathways.

## Progression from Level 1

These qualifications have been designed to provide progression from the following qualifications, which contain sector-relevant content at Level 1:

- Pearson BTEC Level 1 Certificate in Construction and the Built Environment
- Pearson BTEC Level 1 Diploma in Construction and the Built Environment.

These qualifications are also designed to provide progression from the following qualifications:

- Pearson BTEC Level 1 Certificate in Vocational Studies
- Pearson BTEC Level 1 Diploma in Vocational Studies.

See our website for further details.



## 2 Key features of the BTEC First suite of qualifications

The BTEC Level 1/Level 2 First qualifications:

- have a range of sizes in the suite
- are Level 2 qualifications; learners who do not achieve at Level 2 may achieve a grade of Level 1 Pass
- have smaller sizes in the suite primarily aimed at learners aged 14 years and over, while the Extended Certificate and Diploma have been designed for those aged 16 years and over
- are available on the Regulated Qualifications Framework (RQF)
- present knowledge in a work-related context
- give learners the opportunity to develop and apply skills in English and mathematics in naturally occurring, work-related contexts
- provide opportunities for synoptic assessment through applying skills, knowledge and understanding gained to realistic or work-related tasks, such as projects and work experience, and to deepen learning through more specialist units.

The Pearson BTEC Level 1/Level 2 First **Award**:

- has mandatory and optional specialist units
- has 25 per cent of the qualification that is externally assessed. Pearson sets and marks these assessments
- is graded from Level 2 P to Level 2 D\*. Learners who do not achieve at Level 2 may achieve a grade of Level 1 Pass. Learners whose level of achievement is below Level 1 will receive an Unclassified (U) result.

The Pearson BTEC Level 1/Level 2 First **Certificate**:

- has mandatory and optional specialist units
- has 25 per cent of the qualification that is externally assessed; Pearson sets and marks these assessments
- is graded from Level 2 PP to Level 2 D\*D\*. Learners who do not achieve at Level 2 may achieve a grade of Level 1 Pass. Learners whose level of achievement is below Level 1 will receive an Unclassified (U) result.

The Pearson BTEC Level 1/Level 2 First **Extended Certificate**:

- has mandatory and optional specialist units
- has 16.67 per cent of the qualification that is externally assessed; Pearson sets and marks these assessments
- is graded from Level 2 PP to Level 2 D\*D\*. Learners who do not achieve at Level 2 may achieve a grade of Level 1 Pass. Learners whose level of achievement is below Level 1 will receive an Unclassified (U) result.

The Pearson BTEC Level 1/Level 2 First **Diploma**:

- has mandatory and optional specialist units
- has 12.5 per cent of the qualification that is externally assessed; Pearson sets and marks these assessments
- is graded from Level 2 PP to Level 2 D\*D\*. Learners who do not achieve at Level 2 may achieve a grade of Level 1 Pass. Learners whose level of achievement is below Level 1 will receive an Unclassified (U) result.

## Total qualification time (TQT)

For all regulated qualifications, Pearson specifies a total number of hours that it is expected learners will be required to undertake in order to complete and show achievement for the qualification: this is the Total Qualification Time (TQT).

The TQT value indicates the size of a qualification.

Within this, Pearson will also identify the number of Guided Learning Hours (GLH) that we expect a centre delivering the qualification will need to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, such as lessons, tutorials, online instruction and supervised study.

In addition to guided learning, other required learning directed by tutors or assessors will include private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

Qualifications can also have a credit value, which is equal to one tenth of TQT, rounded to the nearest whole number.

## Qualification sizes for BTEC Firsts in the Construction and the Built Environment sector

This suite of BTEC Level 1/Level 2 Firsts for the Construction and the Built Environment sector is available in the following sizes:

	GLH	TQT
First Award	120	160
First Certificate	240	320
First Extended Certificate	360	480
First Diploma	480	640

## **Types of units in the qualifications**

The BTEC First qualifications have mandatory units and optional specialist units. See *Section 4 Qualification structures* for more detailed information. For these qualifications, learners will need to complete all the mandatory units and, where appropriate, a selection of optional specialist units. This is to ensure that all learners have broad and balanced coverage of the vocational sector.

### **Mandatory units**

Mandatory units are designed to cover the body of content that employers and educators within the sector consider essential for 14–19-year-old learners. These units support the remainder of the learning needed for these qualifications. There will be both internal- and external assessment.

### **Optional specialist units**

The remaining units in these qualifications are sector-specific, optional specialist units. These units focus on a particular area within the vocational sector and give learners an opportunity to demonstrate knowledge, skills and understanding.



**Pearson BTEC  
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First Certificate,  
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### 3 Pearson BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma in Construction and the Built Environment

#### Rationale for the Pearson BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma in Construction and the Built Environment

##### Aims

The aims of all qualifications in the BTEC First suite in Construction and the Built Environment are to:

- inspire and enthuse learners to consider a career in the Construction and the Built Environment sector
- give learners the opportunity to gain broad knowledge and understanding of, and develop skills in, the Construction and the Built Environment sector
- support progression to specialised Level 3 qualifications in Construction and the Built Environment, or to an Apprenticeship
- give learners the potential opportunity, in due course, to enter employment in a wide range of job roles.

Specific aims of the **BTEC First Certificate** in Construction and the Built Environment are to:

- add breadth to learners' knowledge and understanding of the Construction and the Built Environment sector as part of their career progression and development plans
- support learners who have had some achievement in their Key Stage 4 programme and who wish to 'top up' their Level 2 achievement to progress to employment or other qualifications.

Specific aims of the **BTEC First Extended Certificate** in Construction and the Built Environment are to:

- build on learner achievement and interest developed through related Level 1 or Level 2 qualifications in Construction and the Built Environment, including the Pearson BTEC Level 1/Level 2 First Award and Certificate in Construction and the Built Environment
- allow learners to specialise or to deepen their understanding through the provision of a broad range of optional specialist units
- provide a comprehensive and challenging programme of study related to Construction and the Built Environment that is particularly suited to post-16 learners who have the relevant interest and aptitude to progress in the sector
- give learners the potential opportunity to progress to employment or to employment in a wide range of job roles across the Construction and the Built Environment sector, for example junior technician posts or in the various construction trades.

Specific aims of the **BTEC First Diploma** in Construction and the Built Environment are to:

- allow learners to further specialise by including units that require 60 Guided Learning Hours of study
- give learners opportunities to develop transferable skills related to study and vocational application that provide a platform for success both within Construction and the Built Environment and elsewhere.



## The provision for study in the BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma

### BTEC First Certificate and Extended Certificate

These qualifications are built on four **mandatory units** that form the fundamental knowledge and understanding of construction principles. These mandatory units appear in all sizes of the BTEC Level 1/Level 2 First qualifications in construction. The qualifications include a choice from additional **Optional specialist units**, thereby providing an opportunity to develop a broader understanding of the construction sector, i.e. the opportunity to acquire knowledge, understanding and practical skills identified by employers as the fundamental building blocks for future competence in the workplace. All the units can be viewed in the *Summary of units in the BTEC Level 1/Level 2 First in Construction and the Built Environment* in *Annexe D*.

### The Pearson BTEC Level 1/Level 2 First Diploma

In addition to the mandatory and optional specialist units in the Certificate and Extended Certificate, the Diploma included further units with a greater level of depth and specialism, so allowing learners to follow in more depth areas of specific interest or to link units to give greater depth of vocational understanding.

### Mandatory units

The mandatory units underpin the fundamental knowledge and understanding of the construction and built environment sector.

*Unit 1: Construction Technology* – this unit covers the different forms of construction that can be used for low-rise offices, retail units and homes. Learners will develop an understanding of the structural performance required for low-rise construction, and explore how substructures and superstructures are constructed. This unit will be externally assessed.

*Unit 2: Construction and Design* – in this unit learners will develop a broad understanding of the construction industry, the sort of projects it undertakes, and the contribution it makes to wider society. Learners will also look at how client needs can shape the design of a building, and develop their own design ideas to a given brief.

*Unit 3: Scientific and Mathematical Applications for Construction* – in this unit learners will apply scientific and mathematical knowledge, understanding and skills to practical construction contexts. Learners will develop an understanding of the scientific principles affecting the performance of construction materials, and develop skills to perform mathematical calculations in construction contexts.

*Unit 11: Sustainability in Construction* – this unit has been included as a mandatory unit within this qualification as it has been highlighted by employers and stakeholders as a key element in the sector. In this unit learners will develop a broader understanding of the important topic of sustainability and how construction can have an impact on the environment. They will also examine techniques that can be used within construction projects to reduce the impact on the environment and improve the long-term sustainability of a project. This unit will be externally assessed.

The additional mandatory units in the Diploma include:

*Unit 4: Construction Processes and Operations* – in this unit learners will develop further knowledge of the processes and operations used in low-rise construction projects, the sequencing of construction work and how the properties of construction materials affect their specification and use.

*Unit 12: The Construction Industry* – in this unit learners will examine the roles and responsibilities of different jobs within the industry and investigate the career pathways available to them.

Other units develop learners:

- ability to draw together and apply learning:
  - Unit 21: Maintenance and Adaptation of Buildings.
- ability to apply knowledge and demonstrate analysis through external assessment:
  - Unit 11: Sustainability in Construction.

### Optional specialist units

The optional specialist units offer centres flexibility to tailor the programme to the local area and give learners the opportunity to pursue more specialist interests. These units may be selected to:

- extend knowledge and understanding developed in mandatory units:
  - for example, by being able to plan, design and cost construction and the built environment-related projects
- deepen and enhance practical application of vocational skills:
  - for example, by undertaking any of the 'exploring' or 'operations' units, to develop the skills needed and demonstrating ability to work in the sector
- provide synopticity:
  - for example, by undertaking construction work experience learners will gain direct experience of the construction and the built environment industry in action, giving them the opportunity to apply the learning they have gleaned from other units and to develop knowledge, skills and understanding further within different construction environments. By undertaking construction work experience, learners will develop important skills, qualities and attributes that are required to add value to job applications and secure future employment
- develop general work-related skills:
  - for example, by gaining knowledge of safety and security procedures in construction environments, and learning how to communicate effectively and clearly.

### Endorsed titles

There are no pathways in the Pearson BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma in Construction and the Built Environment.

### Assessment approach

The Pearson BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma in Construction and the Built Environment include two externally-assessed units. This will help learners as they progress either into higher levels of vocational learning or to related academic qualifications.

The remaining units are internally assessed. Internal assessment allows learners to develop a wider range of skills and provides evidence towards meeting the unit assessment criteria. Evidence for assessment can be generated through a range of activities, including role play, practical performance and verbal presentations. This assessment is assessed internally according to the regulations in *Section 8*.

Delivery strategies should reflect the nature of work in the Construction and the Built Environment sector by encouraging learners to research and carry out assessment in the workplace, or in simulated working conditions, wherever possible. It will be beneficial to learners to use local examples, wherever possible, and for your centre to engage with local employers for support and input. This allows a more realistic and motivating basis for learning and can start to ensure that learning serves the needs of local areas.

Learners should be encouraged to take responsibility for their own learning and achievement, taking account of the industry standards for behaviour and performance.

## Progression opportunities

The BTEC Level 1/Level 2 First Certificate, Extended Certificate and Diploma in Construction and the Built Environment provide the knowledge, skills and understanding for Level 2 learners to progress to:

- other Level 2 vocational qualifications and related competence-based qualifications for the Construction and the Built Environment sector
- Level 3 vocational qualifications, such as BTEC Nationals, specifically the Pearson BTEC Level 3 National in Construction and the Built Environment.

## English and mathematics

English and mathematics are essential for progression to further education and employment.

The BTEC First Certificate, Extended Certificate and Diploma in Construction and the Built Environment support the development of English and mathematics knowledge and skills. Opportunities to develop skills are indicated within unit assessment criteria grids. These will give learners the opportunity to enhance and reinforce skills related to these areas in naturally occurring relevant contexts.

## Developing employability skills

One of the main purposes of BTEC qualifications is to help learners to progress, ultimately, to employment. Employers require learners to have certain technical skills, knowledge and understanding, but they also require employees to demonstrate employability skills. These skills enable learners to adapt to the roles needed to survive in the global economy and enhance their effectiveness in the workplace.

Employability skills include: self-management, teamworking, business and customer awareness, problem solving, communication, basic literacy and numeracy, a positive attitude to work, and the use of IT.

Throughout the **BTEC First suite** in Construction and the Built Environment, learners should develop a range of employability skills, engage with employers and carry out work-related activities. These opportunities are signposted in the *Suggested assignment* outlines at the end of each unit.

Within the BTEC First Diploma in Construction and the Built Environment, the mandatory synoptic unit requires learners to bring together the knowledge, skills and understanding they have gained from other units of study and choose a subject-related project topic of interest to them. Learners will then plan, carry out and reflect on their project using and developing key skills, such as independent investigative research, data processing and analysis, which are valued by employers and support progression to Level 3 qualifications.

For example, learners can develop:

- project/self-management and independent-learning skills – through units such as *Unit 21: Maintenance and Adaptation of Buildings*, where learners will work independently to plan and carry out a construction-related project

- communication skills – through units such as *Unit 28: Communications for Construction and the Built Environment*, which requires learners to work with, produce and review their own written documents for use in construction and the built environment contexts, and to use and review their verbal communication skills in one-to-one and group construction-related contexts
- business and customer awareness skills, as assessments are set in a vocational context. For example, many questions within *Unit 1: Construction Technology* external assessment will be set in real-world, vocational contexts. Also within *Unit 2: Construction and Design* learners will gain understanding of how the needs of a client will affect the design of the construction project.

## **Stakeholder support**

These qualifications reflect the needs of employers, further and higher education representatives and professional organisations. Key stakeholders were consulted during the development of these qualifications.

## 4 Qualification structures

The BTEC First suite of qualifications includes the:

- Award – 120 GLH
- Certificate – 240 GLH
- Extended Certificate – 360 GLH
- Diploma – 480 GLH.

Some units for the BTEC First suite appear only in certain qualification sizes. The *Summary of units* table (see *Annexe D*) lists each unit in the suite and how it is used in the individual qualifications.

The qualification structures show the permitted combinations for the qualifications.

If a learner has already achieved a BTEC Level 1/Level 2 First Award in the same sector, they may carry forward their unit results for use in the larger qualifications. It is the responsibility of the centre to ensure that the required number of guided learning hours and correct unit combination are adhered to.

The qualification structures for the Certificate, Extended Certificate and Diploma are listed on the following pages.

## Qualification structure for the Pearson BTEC Level 1/Level 2 First Certificate in Construction and the Built Environment

The Pearson BTEC Level 1/Level 2 First Certificate in Construction and the Built Environment is taught over 240 guided learning hours (GLH). It has mandatory and optional specialist units.

Learners must complete the four mandatory units, and a choice of optional specialist units to reach a total of 240 GLH.

If a learner has already achieved a BTEC Level 1/Level 2 First Award qualification, they may carry forward their unit results for use in larger BTEC Level 1/Level 2 First qualifications within the same sector.

Please see the Pearson website for the structure of the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment qualification.

This BTEC First Certificate has units that your centre assesses (internal) and units that Pearson sets and marks (external).

<b>Pearson BTEC Level 1/Level 2 First Certificate in Construction and the Built Environment</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Assessment method</b>	<b>GLH</b>
1	Construction Technology	External	30
2	Construction and Design	Internal	30
3	Scientific and Mathematical Applications for Construction	Internal	30
11	Sustainability in Construction	External	30
<b>Optional specialist units</b>			
4	Construction Processes and Operations	Internal	30
5	Construction Drawing Techniques	Internal	30
6	Exploring Carpentry and Joinery Principles and Techniques	Internal	30
7	Exploring Brickwork and Blockwork Principles and Techniques	Internal	30
8	Exploring Painting and Decorating Principles and Techniques	Internal	30
9	Exploring Plumbing Principles and Techniques	Internal	30
10	Exploring Electrical Principles and Techniques	Internal	30
12	The Construction Industry	Internal	30
13	Exploring Roofing Principles and Techniques	Internal	30
14	Exploring Wall and Floor Tiling Principles and Techniques	Internal	30
15	Exploring Plastering and Dry Lining Principles and Techniques	Internal	30

	<b>Optional specialist units <i>continued</i></b>		
22	Tendering and Estimating	Internal	60
23	Exploring Surveying	Internal	60
24	Exploring Civil Engineering	Internal	60
25	Exploring Building Services Engineering	Internal	60
26	Exploring Facilities Management	Internal	60

## Qualification structure of the Pearson BTEC Level 1/Level 2 First Extended Certificate in Construction and the Built Environment

This qualification is taught over 360 guided learning hours (GLH). It has mandatory and optional specialist units.

Learners must complete the four mandatory units, and a choice of optional specialist units to reach a total of 360 GLH.

Please see the Pearson website for the structure of the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment qualification.

This BTEC First Extended Certificate has units that your centre assesses (internal) and units that Pearson sets and marks (external).

<b>Pearson BTEC Level 1/Level 2 First Extended Certificate in Construction and the Built Environment</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Assessment method</b>	<b>GLH</b>
1	Construction Technology	External	30
2	Construction and Design	Internal	30
3	Scientific and Mathematical Applications for Construction	Internal	30
11	Sustainability in Construction	External	30
<b>Optional specialist units</b>			
4	Construction Processes and Operations	Internal	30
5	Construction Drawing Techniques	Internal	30
6	Exploring Carpentry and Joinery Principles and Techniques	Internal	30
7	Exploring Brickwork and Blockwork Principles and Techniques	Internal	30
8	Exploring Painting and Decorating Principles and Techniques	Internal	30
9	Exploring Plumbing Principles and Techniques	Internal	30
10	Exploring Electrical Principles and Techniques	Internal	30
12	The Construction Industry	Internal	30
13	Exploring Roofing Principles and Techniques	Internal	30
14	Exploring Wall and Floor Tiling Principles and Techniques	Internal	30



	Optional specialist units		
15	Exploring Plastering and Dry Lining Principles and Techniques	Internal	30
16	Carpentry and Joinery Operations <sup>1</sup>	Internal	60
17	Brickwork and Blockwork Operations <sup>2</sup>	Internal	60
18	Painting and Paperhanging Operations <sup>3</sup>	Internal	60
19	Plumbing Operations <sup>4</sup>	Internal	30
20	Electrical Operations <sup>5</sup>	Internal	30
22	Tendering and Estimating	Internal	60
23	Exploring Surveying	Internal	60
24	Exploring Civil Engineering	Internal	60
25	Exploring Building Services Engineering	Internal	60
26	Exploring Facilities Management	Internal	60

<sup>1</sup> Unit 6: *Exploring Carpentry and Joinery Principles and Techniques* is a compulsory prerequisite for Unit 16: *Carpentry and Joinery Operations*.

<sup>2</sup> Unit 7: *Exploring Brickwork and Blockwork Principles and Techniques* is a compulsory prerequisite for Unit 17: *Brickwork and Blockwork Operations*.

<sup>3</sup> Unit 8: *Exploring Painting and Decorating Principles and Techniques* is a compulsory prerequisite for Unit 18: *Painting and Paperhanging Operations*.

<sup>4</sup> Unit 9: *Exploring Plumbing Principles and Techniques* is a compulsory prerequisite for Unit 19: *Plumbing Operations*.

<sup>5</sup> Unit 10: *Exploring Electrical Principles and Techniques* is a compulsory prerequisite for Unit 20: *Electrical Operations*.

## Qualification structure of the Pearson BTEC Level 1/Level 2 First Diploma in Construction and the Built Environment

Learners will take a total of 11–13 units to complete this qualification. The number of units taken is dependent on the size of optional units selected, and the combination of all units should total 480 guided learning hours (GLH).

These units will include:

- seven mandatory units (totalling 240 GLH)
- four–six optional specialist units (totalling 240 GLH).

The footnotes show where an 'exploring' unit must be taken if the learner is taking the same craft specialism's 'operations' unit. 'Exploring' units may be taken on their own.

This BTEC First Diploma has units that your centre assesses (internal) and units that Pearson sets and marks (external).

Pearson BTEC Level 1/Level 2 First Diploma in Construction and the Built Environment			
Unit	Mandatory units	Assessment method	GLH
1	Construction Technology	External	30
2	Construction and Design	Internal	30
3	Scientific and Mathematical Applications for Construction	Internal	30
4	Construction Processes and Operations	Internal	30
11	Sustainability in Construction	External	30
12	The Construction Industry	Internal	30
21	Maintenance and Adaptation of Buildings	Internal	60
Optional specialist units			
5	Construction Drawing Techniques	Internal	30
6	Exploring Carpentry and Joinery Principles and Techniques	Internal	30
7	Exploring Brickwork and Blockwork Principles and Techniques	Internal	30
8	Exploring Painting and Decorating Principles and Techniques	Internal	30
9	Exploring Plumbing Principles and Techniques	Internal	30
10	Exploring Electrical Principles and Techniques	Internal	30
13	Exploring Roofing Principles and Techniques	Internal	30
14	Exploring Wall and Floor Tiling Principles and Techniques	Internal	30
15	Exploring Plastering and Dry Lining Principles and Techniques	Internal	30
16	Carpentry and Joinery Operations <sup>1</sup>	Internal	60

	<b>Optional specialist units <i>continued</i></b>		
17	Brickwork and Blockwork Operations <sup>2</sup>	Internal	60
18	Painting and Paperhanging Operations <sup>3</sup>	Internal	60
19	Plumbing Operations <sup>4</sup>	Internal	30
20	Electrical Operations <sup>5</sup>	Internal	30
22	Tendering and Estimating	Internal	60
23	Exploring Surveying	Internal	60
24	Exploring Civil Engineering	Internal	60
25	Exploring Building Services Engineering	Internal	60
26	Exploring Facilities Management	Internal	60
27	Construction Work Experience	Internal	30
28	Communications for Construction and the Built Environment	Internal	30

<sup>1</sup> Unit 6: *Exploring Carpentry and Joinery Principles and Techniques* is a compulsory prerequisite for Unit 16: *Carpentry and Joinery Operations*.

<sup>2</sup> Unit 7: *Exploring Brickwork and Blockwork Principles and Techniques* is a compulsory prerequisite for Unit 17: *Brickwork and Blockwork Operations*.

<sup>3</sup> Unit 8: *Exploring Painting and Decorating Principles and Techniques* is a compulsory prerequisite for Unit 18: *Painting and Paperhanging Operations*.

<sup>4</sup> Unit 9: *Exploring Plumbing Principles and Techniques* is a compulsory prerequisite for Unit 19: *Plumbing Operations*.

<sup>5</sup> Unit 10: *Exploring Electrical Principles and Techniques* is a compulsory prerequisite for Unit 20: *Electrical Operations*.

## 5 Programme delivery

Pearson does not define the mode of study for BTEC qualifications. Your centre is free to offer the qualifications using any mode of delivery (such as full time, part time, evening only or distance learning) that meets your learners' needs. As such, those already employed in the Construction and the Built Environment sector could study this qualification on a part-time basis, using industry knowledge and expertise gained from the workplace to develop evidence towards meeting the unit assessment criteria.

Whichever mode of delivery is used, your centre must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists who are delivering the units. This is particularly important for learners studying for the qualifications through open or distance learning.

When planning the programme, you should aim to enhance the vocational nature of the qualifications by:

- using up-to-date and relevant teaching materials that make use of scenarios and case studies relevant to the scope and variety of employment opportunities available in the sector. These materials may be drawn from workplace settings, where feasible. For example, you can use promotional materials that have been developed by the Construction and the Built Environment
- giving learners the opportunity to apply their learning through practical activities to be found in the workplace through volunteering, for example
- including employers in the delivery of the programme. You may, for example, wish to seek the cooperation of local employers in giving examples of current work procedures and practices
- liaising with employers to make sure a course is relevant to learners' specific needs. You may, for example, wish to seek employers' help in stressing the importance of English and mathematical skills, and of wider skills in the world of work.

### Resources

As part of the approval process, your centre must make sure that the resource requirements below are in place before offering the qualifications.

- Centres must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualifications.
- Staff involved in the assessment process must have relevant expertise and/or occupational experience.
- There must be systems in place to ensure continuing professional development for staff delivering the qualifications.
- Centres must have appropriate health and safety policies in place relating to the use of equipment by learners.
- Centres must deliver the qualifications in accordance with current equality legislation.

Your centre should refer to the *Teacher guidance* section in the individual units to check for any specific resources required.

## Delivery approach

Your approach to teaching and learning should support the specialist vocational nature of BTEC First qualifications. These BTEC Firsts give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature.

Instruction in the classroom is only part of the learning process. You need to reinforce the links between the theory and practical application, and make sure that the knowledge base is relevant and up to date by using teaching methods and materials that allow learners to apply their learning to actual events and activities within the sector. Maximum use should be made of learners' experience where relevant, for example by encouraging them to reflect on their experience of work or the experiences of family and friends.

One of the important aspects of your approach to delivery should be to instil in learners who have a limited experience of the world of work, insight of the daily operations that are met in the vocational area being studied. It is suggested that the delivery of BTEC Firsts can be enriched and extended through the use of learning materials, classroom exercises and internal assessments that draw on current practice in and experience of the qualification sector being studied. This may include:

- vocationally specific workplace case-study materials
- visiting speakers and the assistance of local employers
- visits to local workplaces
- inviting relevant experts or contacts to come to speak to learners about their involvement in the construction and the built environment sector
- visits to employers in the construction and the built environment
- asking a local employer to set learners a problem-solving activity to be carried out in groups
- referring to trade journals, magazines or newspaper articles relevant to the sector.

## Personal, learning and thinking skills

Your learners have opportunities to develop personal, learning and thinking skills (PLTS) in a sector-related context. See *Annexe A* for detailed information about PLTS, and mapping to the units in this specification.

## English and mathematics knowledge and skills

It is likely that learners will be working towards English and mathematics qualifications at Key Stage 4 or above. These BTEC First qualifications provide further opportunities to enhance and reinforce skills in English and mathematics in naturally occurring, relevant, work-related contexts.

English and mathematical skills are embedded in the assessment criteria – see individual units for signposting to English (#) and mathematics (\*).

## Functional Skills at Level 2

Your learners can use opportunities in their learning programme to develop and practise Functional Skills. *Annexe B* sets out where units and learning aims are of particular relevance for learners being prepared for assessment in Functional Skills in English, mathematics and/or ICT at Level 2. There may also be other opportunities to develop functional skills in programmes, for example through group work, research, employment-related activities and work experience.

## 6 Access and recruitment

Our policy regarding access to our qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all those wishing to access the qualifications.

These are qualifications aimed at Level 2 learners. Your centre is required to recruit learners to BTEC First qualifications with integrity.

You need to make sure that applicants have relevant information and advice about the qualifications to make sure they meet their needs.

Your centre should review the applicant's prior qualifications and/or experience to consider whether this profile shows that they have the potential to achieve the qualifications.

For learners with disabilities and specific needs, this review will need to take account of the support available to the learner during the teaching and assessment of the qualifications.

### Prior knowledge, skills and understanding

Learners do not need to achieve any other qualifications before registering for a BTEC First.

These qualifications can be taken as stand-alone qualifications or can extend the achievement that learners have demonstrated through the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment qualification. Learners do this by taking additional units (see the *Information Manual* for further details) to make up the requisite number of Guided Learning Hours, ensuring the correct unit combination is adhered to, to fulfil the rules of combination. See *Section 4 Qualification structures*.

Please see the Pearson website for the structure of the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment qualification.

## Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Pearson's equality policy requires all learners to have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner.

We are committed to making sure that:

- learners with a protected characteristic (as defined by equality legislation) are not, when they are undertaking one of our qualifications, disadvantaged in comparison with learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational qualifications*.

Details on how to make adjustments for learners with protected characteristics are given in the document *Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units*.

Both documents are on our website.

## Special consideration

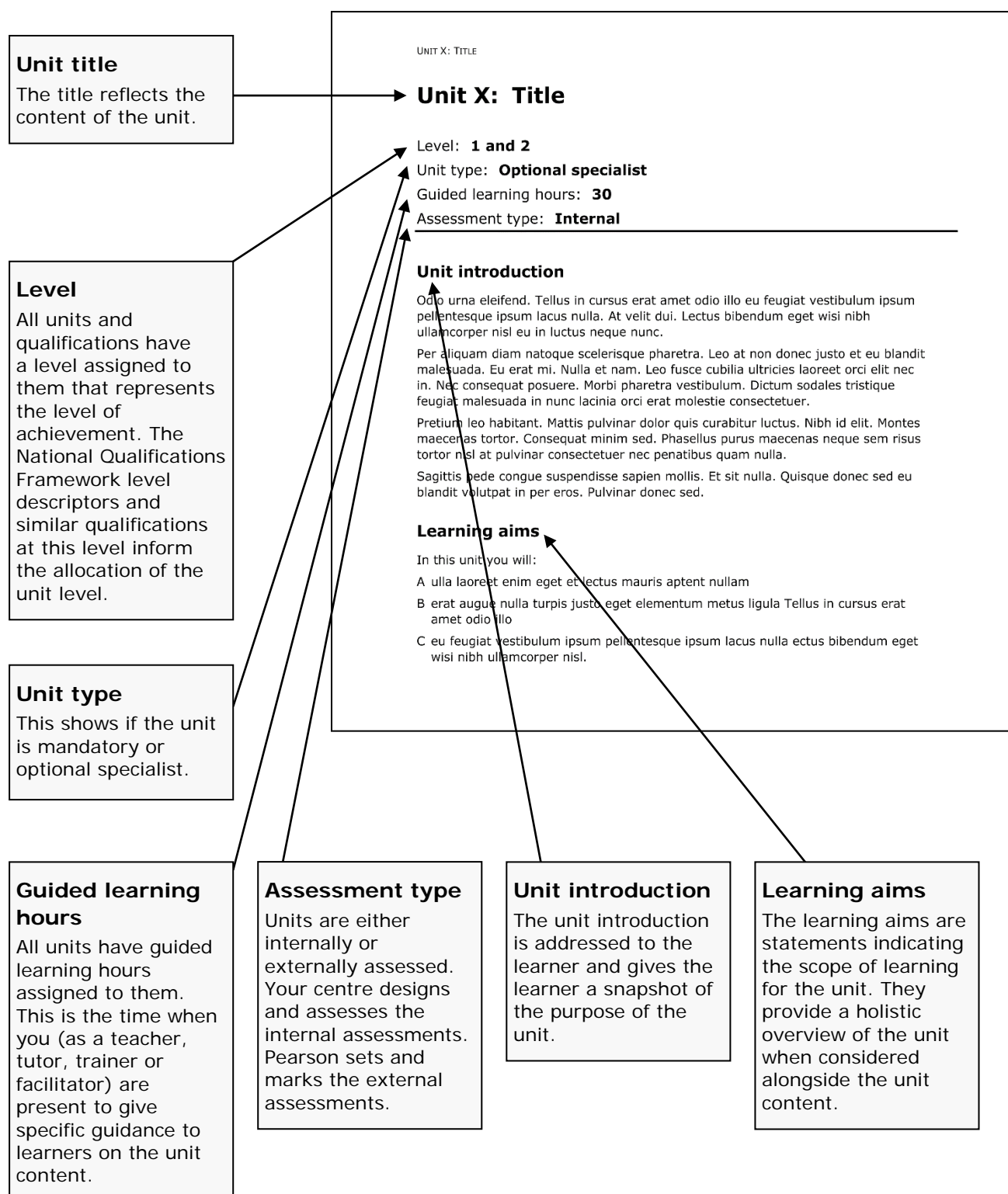
You must operate special consideration in line with the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational qualifications* and the *Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units*.

You can provide special consideration only in the time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy.



## 7 The layout of units in the specification

Each unit is laid out using the headings given below. Unit X below is for **illustrative purposes only**.



UNIT X: TITLE	
<b>Learning aims and unit content</b>	
<b>What needs to be learnt</b>	
<b>Learning aim A: Elit elit libero felis ligula ut</b>	
<b>Topic A.1 Neque magna consectetur scelerisque nec in ut orci arcu:</b>	
In cursus ac sem in urna:	
<ul style="list-style-type: none"> <li>erat dignissim eros sed</li> <li>ornare condimentum condimentum</li> <li>quis risus dui</li> <li>lutate magnis pede dui nibh aliquam</li> <li>scelerisque nec in ut orci arcu.</li> </ul>	
Elit elit libero felis ligula ut:	
<ul style="list-style-type: none"> <li>ac sem in urna assa in a mauris</li> <li>mattis dui interdum vitae aptent</li> <li>etiam nec nullam dum dui adipiscing</li> <li>adipiscing tellus at orci ut</li> <li>orem in nullam amet interdum commodo.</li> </ul>	
Vulputate magnis pede:	
<ul style="list-style-type: none"> <li>dolor quis curabitur luctus ibh id elit ontes maecenas tortor</li> <li>onsequat minim sed hasellus purus maecenas neque sem</li> <li>risus tortor nisl at pulvinar consectetur</li> <li>magnis pede dui nibh aliquam.</li> </ul>	
<b>Topic A.2 Phasellus purus maecenas neque sem risus tortor nisl at pulvinar consectetur:</b>	
<ul style="list-style-type: none"> <li>eleifend ellus in cursus erat</li> <li>amet odio illo eu feugiat vestibulum ipsum</li> <li>pellentesque ipsum lacus nulla velit du ectus bibendum eget</li> </ul>	

## Learning aims and unit content

The unit content gives the basis for the teaching, learning and assessment for each learning aim. Topic headings are given, where appropriate.

Content covers:

- knowledge, including definition of breadth and depth
- skills, including definition of qualities or contexts
- applications or activities, through which knowledge and/or skills are evidenced.

Content should normally be treated as compulsory for teaching the unit. Definition of content sometimes includes examples prefixed with 'e.g.'. These are provided as examples and centres may use all or some of these, or bring in additional material, as relevant.

## Assessment criteria

The assessment criteria determine the minimum standard required by the learner to achieve the relevant grade. The learner must provide sufficient and valid evidence to achieve the grade.

UNIT X: TITLE			
<b>Assessment criteria</b>			
Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Enim lorem et elit libero felis ligula ut</b>			
1A.1 Amet interdum commodo sed facilisis.	2A.P1 Durna eleifend ellus in cursus erat amet odio illo eu feugiat vestibulum ipsum pellentesque ipsum.	2A.M1 A lacus nulla velit dui ectus.	2A.D1 Ultrices ultrices ut cursus ac sem in urna assa in a mauris mattis ut. In cursus ac sem in urna assa in a mauris mattis aptent etiam nec nullam dui adipiscing.
1A.2 Iorem in nullam amet interdum commodo. empot sed facilisis.	2A.P2 Nostra pretium non elis mauris porttitor elit malesuada volutpat non ut volutpat.	2A.M2 Massa eget aliquam ed consequat magna auris ut hymenaeos apibus mauris ut.	
<b>Learning aim B: Sagittis pede congue suspendisse sapien mollis sit nulla que donec magnis pede dui nibh bibendum</b>			
1B.3 Fells non ut libero nunc elementum te at quam et dui tincidunt vitae arcu suspendisse suspendisse id in pede eget erat. #	2B.P3 Enim lorem et llt elit libero felis ligula ut ectus donec non id vitae lacus augue. #	2B.M3 Integer erat dignissim eros sed ornare condimentum condimentum quis risus dui ulputate magnis pede dui nibh aliquam. #	2B.D2 Neque magna consectetur scelerisque nec in ut orci arcu elit nec ut vitae lectus dolor sed cras utrum convallis assa bibendum nulla.
1B.4 Per aliquam diam scelerisque pharetra.	2B.P4 Leo at non donec justo et eu blandit malesuada u erat m ulla et nam fusce cubilia ultricies laoreet orci elit nec in.		

## Teacher guidance

While the main content of the unit is addressed to the learner, this section gives you additional guidance and amplification to aid your understanding and to ensure a consistent level of assessment.

**Resources** – identifies any special resources required for learners to show evidence of the assessment. Your centre must make sure that any requirements are in place when it seeks approval from Pearson to offer the qualification.

UNIT X: TITLE

## Teacher guidance

### Resources

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- cursus erat amet
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### Assessment guidance

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Nulla laoreet enim eget et lectus mauris aptent nullam. Erat augue nulla turpis justo eget elementum metus ligula.

Odio urna eleifend. Tellus in cursus erat amet odio illo eu feugiat vestibulum ipsum pellentesque ipsum lacus nulla. At velit dui. Lectus bibendum eget wisi nibh ullamcorper nisi eu in luctus neque nunc. Ultrices ultrices ut. In cursus ac sem in urna. Massa in a mauris mattis dui interdum vitae aptent etiam nec nullam. Interdum dui adipiscing adipiscing tellus at. Ut orci ut. Lorem in nullam amet interdum commodo. Tempor sed facilisis. Nostra pretium non. Felis mauris portitor. Velit malesuada volutpat non ut volutpat.

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Per aliquam diam natoque scelerisque pharetra. Leo at non donec justo et eu blandit malesuada. Eu erat mi. Nulla et nam. Leo fusce cubilia ultricies laoreet orci elit nec in. Libero nunc elementum.

**Assessment guidance** – gives examples of the quality of work needed to differentiate the standard of work submitted. It also offers suggestions for creative and innovative ways in which learners can produce evidence to meet the criteria. The guidance highlights approaches and strategies for developing appropriate evidence.

**Suggested assignment outlines** – gives examples of possible assignment ideas. These are not mandatory. Your centre is free to adapt them, or you can design your own assignment outlines.

UNIT X: TITLE

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance, and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Scenario	Assessment evidence
1A.1, 1A.2, 2A.P1, 2A.P2, 2A.M1, 2A.D1	The local community magazine is running an article to introduce learners to the essential role played by the public services in protecting the community. You have been asked to write the article. You will research selected 'communities' and what their individual needs are. Use your research to support your article, which must provide an analysis of how two contrasting selected public services have worked to protect the communities you identified. You must consider the advantages gained through public services working together.	They types of evidence that you will produce include: • a magazine article that addresses the way in which two contrasting public services work to protect the community, and the advantages and disadvantages of public services working together • individual preparation notes to support your article, including research notes, interviews, questionnaires etc. • illustrations, where relevant, to support the article.

## 8 Internal assessment

### Language of assessment

Assessment of the internal and external units for this qualification will be available in English. All learner work must be in English. This qualification can also be made available through the medium of Welsh, in which case learners may submit work in Welsh and/or English.

A learner taking the qualification may be assessed in British or Irish Sign Language where it is permitted for the purpose of reasonable adjustment.

### Summary of internal assessment

For the Pearson BTEC Level 1/Level 2 First qualifications, the majority of the units are assessed through internal assessment, which means that you can deliver the programme in a way that suits your learners and which relates to local need. The way in which you deliver the programme must also ensure that assessment is fair and that standards are nationally consistent over time.

To achieve this, it is important that you:

- plan the assessment of units to fit with delivery, allowing for the linkages between units
- write suitable assessments (for example assignments, projects, case studies) or select assessments from available resources, adapting them as necessary
- plan the assessment for each unit in terms of when it will be authorised by the Lead Internal Verifier, when it will be used and assessed, and how long it will take, and how you will determine that learners are ready to begin an assessment
- ensure each assessment is fit for purpose, valid, will deliver reliable assessment outcomes across assessors, and is authorised before use
- provide all the preparation, feedback and support that learners need to undertake an assessment before they begin producing their evidence
- make careful and consistent assessment decisions based only on the defined assessment criteria and unit requirements
- validate and record assessment decisions carefully and completely
- work closely with Pearson to ensure that your implementation, delivery and assessment is consistent with national standards.

### Assessment and verification roles

There are three key roles involved in implementing assessment processes in your school or college, namely:

- Lead Internal Verifier
- Internal Verifier – the need for an Internal Verifier or Internal Verifiers in addition to the Lead Internal Verifier is dependent on the size of the programme in terms of assessment locations, number of assessors and optional paths taken. Further guidance can be obtained from your Vocational Quality Advisor or Centre Quality Reviewer if you are unsure about the requirements for your centre
- assessor.

**The Lead Internal Verifier** must be registered with Pearson and is required to train and standardise assessors and Internal Verifiers using materials provided by Pearson that demonstrate the application of standards. In addition, the Lead Internal Verifier should provide general support. The Lead Internal Verifier:

- has overall responsibility for the programme assessment plan, including the duration of assessment and completion of verification
- can be responsible for more than one programme
- ensures that there are valid assessment instruments for each unit in the programme
- ensures that relevant assessment documentation is available and used for each unit
- is responsible for the standardisation of assessors and Internal Verifiers using Pearson-approved materials
- authorises individual assessments as fit for purpose
- checks samples of assessment decisions by individual assessors and Internal Verifiers to validate that standards are being correctly applied
- ensures the implementation of all general assessment policies developed by the centre for BTEC qualifications
- has responsibility for ensuring learner work is authenticated
- liaises with Pearson, including the Pearson Standards Verifier.

**Internal Verifiers** must oversee all assessment activity to make sure that individual assessors do not misinterpret the specification or undertake assessment that is not consistent with the national standard in respect of level, content or duration of assessment. The process for ensuring that assessment is being conducted correctly is called internal verification. Normally, a programme team will work together with individuals being both assessors and Internal Verifiers, with the team leader or programme manager often being the registered Lead Internal Verifier.

Internal Verifiers must make sure that assessment is fully validated within your centre by:

- checking every assessment instrument carefully and endorsing it before it is used
- ensuring that each learner is assessed carefully and thoroughly using only the relevant assessment criteria and associated guidance in the specification
- ensuring the decisions of every assessor for each unit at all grades and for all learners are in line with national standards.

**Assessors** make assessment decisions and must be standardised using Pearson-approved materials before making any assessment decisions. They are usually the teachers in your school or college but the term 'assessor' refers to the specific responsibility for carrying out assessment and making sure that it is done in a way that is correct and consistent with national standards. Assessors may also draft or adapt internal assessment instruments.

You are required to keep records of assessment and have assessment authorised by Pearson. The main records are:

- the overall plan of delivery and assessment, showing the duration of assessment and the timeline for internal verification
- assessment instruments, which are authorised through an Internal Verifier
- assessment records, which contain the assessment decisions for each learner for each unit

- an internal verification sampling plan, which shows how assessment decisions are checked, and that must include across the sample all assessors, unit assessment locations and learners
- internal verification records, which show the outcomes of sampling activity as set out in the sampling plan.

## Learner preparation

Internal assessment is the main form of assessment for this qualification, so preparing your learners for it is very important because they:

- must be prepared for and motivated to work consistently and independently to achieve the requirements of the qualification
- need to understand how they will be assessed and the importance of timescales and deadlines
- need to appreciate fully that all the work submitted for assessment must be their own.

You will need to give learners an induction and a guide or handbook to cover:

- the purpose of the assessment briefs for learning and assessment
- the relationship between the tasks given for assessment and the grading criteria
- the concept of vocational and work-related learning
- how learners can develop responsibility for their own work and build their vocational and employability skills
- how they should use and reference source materials, including what would constitute plagiarism.

## Designing assessment instruments

An assessment instrument is any kind of activity or task that is developed for the sole purpose of assessing learning against the learning aims. When you develop assessment instruments you will often be planning them as a way to develop learners' skills and understanding. However, they must be fit for purpose as a tool to measure learning against the defined content and assessment criteria to ensure your final assessment decisions meet the national standard.

You should make sure that assessment tasks and activities enable learners to produce valid, sufficient, authentic and appropriate evidence that relates directly to the specified criteria within the context of the learning aims and unit content. You need to ensure that the generation of evidence is carefully monitored, controlled and produced in an appropriate timescale. This will help you to make sure that learners are achieving to the best of their ability and at the same time that the evidence is genuinely their own.

An assessment that is fit for purpose and suitably controlled is one in which:

- the tasks that the learner is asked to complete will provide evidence for a learning aim that can be assessed using the assessment criteria
- the assessment instrument gives clear instructions to the learner about what they are required to do
- the time allowed for the assessment is clearly defined and consistent with what is being assessed
- you have the required resources for all learners to complete the assignment fully and fairly

- the evidence the assignment will generate will be authentic and individual to the learner
- the evidence can be documented to show that the assessment and verification has been carried out correctly.

You may develop assessments that cover a whole unit, parts of a unit or several units, provided that all units and their associated learning aims are fully addressed through the programme overall. A learning aim **must** be covered completely in an assessment. Learning aim coverage must not be split between assignments. In some cases it may be appropriate to cover a learning aim with two tasks or sub-tasks within a single assignment. This must be done with care to ensure the evidence produced for each task can be judged against the full range of achievement available in the learning aim for each activity. This means it is not acceptable to have a task that contains a Pass level activity, then a subsequent task that targets a Merit or Distinction level activity. However, it is possible to have two tasks for different assessed activities, each of which stretch and challenge the learners to aim to produce evidence that can be judged against the full range of available criteria.

When you give an assessment to learners, it must include:

- a clear title and/or reference so that the learner knows which assessment it is
- the unit(s) and learning aim(s) being addressed
- a scenario, context, brief or application for the task
- task(s) that enable the generation of evidence that can be assessed against the assessment criteria
- details of the evidence that the learner must produce
- clear timings and deadlines for carrying out tasks and providing evidence.

Your assessment tasks should enable the evidence generated to be judged against the full range of assessment criteria; it is important the learners are given the opportunity for stretch and challenge.

The units include guidance on appropriate approaches to assessment. Central features of vocational assessment are that it should be:

- current, i.e. it reflects the most recent developments and issues
- local, i.e. it reflects the employment context of your area
- flexible, i.e. it allows you as a centre to deliver the programme, making best use of the vocational resources that you have
- consistent with national standards, with regard to the level of demand.

Your centre should use the assessment guidance within units along with your local resource availability and guidance to develop appropriate assessments. It is acceptable to use and adapt resources to meet learner needs and the local employment context.

You need to make sure that the type of evidence generated fits with the unit requirement, that it is vocational in nature, and that the context in which the assessment is set is in line with unit assessment guidance and content. For many units, this will mean providing for the practical demonstration of skills. For many learning aims, you will be able to select an appropriate vocational format for evidence generation, such as:

- written reports, graphs, posters
- projects, project plans
- time-constrained practical assessments
- audio-visual recordings of portfolio, sketchbook, a working logbook etc.
- presentations.

## Authenticity and authentication

You can accept only evidence for assessment that is authentic, i.e. that is the learner's own and that can be judged fully to see whether it meets the assessment criteria.

You should ensure that authenticity is considered when setting assignments. For example, ensuring that each learner has a different focus for research will reduce opportunities for copying or collaboration. On some occasions it will be useful to include supervised production of evidence. Where appropriate, practical activities or performance observed by the assessor should be included.

Learners must authenticate the evidence that they provide for assessment. They do this by signing a declaration stating that it is their own work when they submit it to certify:

- the evidence submitted for this assignment is the learner's own
- the learner has clearly referenced any sources used in the work
- they understand that false declaration is a form of malpractice.

Your assessors should assess only learner evidence that is authentic. If they find through the assessment process that some or all of the evidence is not authentic, they need to take appropriate action, including invoking malpractice policies as required.

It is important that all evidence can be validated through verification. This means that it must be capable of being reassessed in full by another person. When you are using practical and performance evidence, you need to think about how supporting evidence can be captured through using, for example, videos, recordings, photographs, handouts, task sheets, etc. This should be submitted as part of the learner's evidence.

The authentication of learner evidence is the responsibility of your centre. If during external sampling a Pearson Standards Verifier raises concerns about the authenticity of evidence, your centre will be required to investigate further. Depending on the outcomes, penalties may be applied. At the end of this section, you can find an example of a template that can be used to record the declaration of learners in relation to the authenticity of the evidence presented for assessment.

## Applying criteria to internal assessments

Each unit and learning aim has specified assessment criteria. Your centre should use these criteria for assessing the quality of the evidence provided. This determines the grade awarded.

Unless specifically indicated by the assessment guidance, assessment criteria are not a set of sequential activities but a way of making a judgement. For example, if a Level 2 Pass specifies a 'description' and a Merit an 'analysis', these do not require two different activities but rather one activity through which some learners will provide only description evidence and others will also provide analysis evidence. The assessment criteria are hierarchical. A learner can achieve a Merit only if they provide sufficient evidence for the Level 2 Pass and Merit criteria. Similarly, a learner can achieve a Distinction only if they give sufficient evidence for the Level 2 Pass, Merit and Distinction criteria.



A final unit grade is awarded after all opportunities for achievement are given.

A learner must achieve all the assessment criteria for that grade. Therefore:

- to achieve a Level 2 Distinction, a learner must have satisfied all the Distinction criteria in a way that encompasses all the Level 2 Pass, Merit and Distinction criteria, providing evidence of performance of outstanding depth, quality or application
- to achieve a Level 2 Merit, a learner must have satisfied all the Merit criteria in a way that encompasses all the Level 2 Pass and Merit criteria, providing performance of enhanced depth or quality
- to achieve a Level 2 Pass, a learner must have satisfied all the Level 2 Pass criteria, showing breadth of coverage of the required unit content and having relevant knowledge, understanding and skills
- a learner can be awarded a Level 1 if the Level 1 criteria are fully met. A Level 1 criterion is not achieved through failure to meet the Level 2 Pass criteria.

A learner who does not achieve all the assessment criteria at Level 1 has not passed the unit and should be given a grade of U (Unclassified).

A learner must achieve all the defined learning aims to pass the internally assessed units. There is no compensation within the unit.

## Assessment decisions

Final assessment is the culmination of the learning and assessment process. Learners should be given a full opportunity to show how they have achieved the learning aims covered by a final assessment. This is achieved by ensuring that learners have received all necessary learning, preparation and feedback on their performance and then confirming that they understand the requirements of an assessment, before any assessed activities begin.

There will then be a clear assessment outcome based on the defined assessment criteria. Your assessment plan will set a clear timeline for assessment decisions to be reached. Once an assessment has begun, learners must not be given feedback on progress towards criteria. After the final assignment is submitted, an assessment decision must be given.

An assessment decision:

- must be made with reference to the assessment criteria
- should record how it has been reached, indicating how or where criteria have been achieved
- may indicate why attainment against criteria has not been demonstrated
- must not provide feedback on how to improve evidence to meet higher criteria.

Your Internal Verifiers and assessors must work together to ensure that assessment decisions are reached promptly and validated before they are given to the learner.

## Late submission

You should encourage learners to understand the importance of deadlines and of handing work in on time. For assessment purposes it is important that learners are assessed fairly and consistently according to the assessment plan that the Lead Internal Verifier has authorised and that some learners are not advantaged by having additional time to complete assignments. You are not required to accept for assessment work that was not completed by the date in the assessment plan.

Learners may be given authorised extensions for legitimate reasons, such as illness at the time of submission. If you accept a late completion by a learner, the evidence should be assessed normally, unless it is judged to not meet the requirements for authenticity. It is not appropriate, however, to give automatic downgrades on assessment decisions as 'punishment' for late submission.

## Resubmission of improved evidence

Once an assessment decision is given to a learner, it is final in all cases except where the Lead Internal Verifier approves **one** opportunity to resubmit improved evidence.

The criteria used to authorise a resubmission opportunity are always:

- initial deadlines or agreed extensions have been met
- the tutor considers that the learner will be able to provide improved evidence without further guidance
- the evidence submitted for assessment has been authenticated by the learner and the assessor
- the original assessment can remain valid
- the original evidence can be extended and re-authenticated.

Your centre will need to provide a specific resubmission opportunity that is authorised by the Lead Internal Verifier. Any resubmission opportunity must have a deadline that is within 15 working days of the assessment decision being given to the learner, and within the same academic year. You should make arrangements for resubmitting the evidence for assessment in such a way that it does not adversely affect other assessments and does not give the learner an unfair advantage over other learners.

You need to consider how the further assessment opportunity ensures that assessment remains fit for purpose and in line with the original requirements; for example, you may opt for learners to improve their evidence under supervised conditions, even if this was not necessary for the original assessment, to ensure that plagiarism cannot take place. How you provide opportunities to improve and resubmit evidence for assessment needs to be fair to all learners. Care must be taken when setting assignments and at the point of final assessment to ensure that the original evidence for assessment can remain valid and can be extended. The learner must not have further guidance and support in producing further evidence. The Standards Verifier will want to include evidence that has been resubmitted as part of the sample they will review.

## Appeals

Your centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy would be a consideration of the evidence by a Lead Internal Verifier or other member of the programme team who, wherever possible, was not involved in the original assessment decision. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners.

If there is an appeal by a learner you must document the appeal and its resolution.

## Dealing with malpractice

### Learner Malpractice

Heads of Centres are required to report incidents of any suspected learner malpractice that occur during Pearson external assessments. We ask that centres do so by completing a JCQ Form M1 (available at [www.jcq.org.uk/exams-office/malpractice](http://www.jcq.org.uk/exams-office/malpractice)) and emailing it and any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc.) to the Investigations Team at [pqsmalpractice@pearson.com](mailto:pqsmalpractice@pearson.com). The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

### Teacher/centre Malpractice

Heads of Centres are required to inform Pearson's Investigations Team of any incident of suspected malpractice by centre staff, before any investigation is undertaken. Heads of Centres are requested to inform the Investigations Team by submitting a JCQ Form M2(a) (available at [www.jcq.org.uk/exams-office/malpractice](http://www.jcq.org.uk/exams-office/malpractice)) with supporting documentation to [pqsmalpractice@pearson.com](mailto:pqsmalpractice@pearson.com). Where Pearson receives allegations of malpractice from other sources (for example Pearson staff or anonymous informants), the Investigations Team will conduct the investigation directly or may ask the head of centre to assist. Incidents of maladministration (accidental errors in the delivery of Pearson qualifications that may affect the assessment of learners) should also be reported to the Investigations Team using the same method.

## Reasonable adjustments to assessment

You are able to make adjustments to assessments to take account of the needs of individual learners in line with Pearson's Reasonable Adjustments and Special Considerations policy. In most instances this can be achieved simply by application of the policy, for example to extend time or adjust the format of evidence. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable.

## Special consideration

You must operate special consideration in line with Pearson's Reasonable Adjustments and Special Considerations policy. You can provide special consideration only in the time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy.

## Exemplar for centres

### Learner Assessment Submission and Declaration

This sheet or a sheet fulfilling the same function must be completed by the learner and be provided for work submitted for assessment.

Learner name:		Assessor name:	
Issue date:	Submission date:	Submitted on:	
Programme:			
Unit:			
Assignment reference and title:			

Please list the evidence submitted for each task. Indicate the page numbers where the evidence can be found or describe the nature of the evidence (e.g. video, illustration).

Assignment task reference	Evidence submitted	Page numbers or description
Additional comments to the Assessor:		

<p>Learner declaration</p> <p>I certify that the work submitted for this assignment is my own. I have clearly referenced any sources used in the work. I understand that false declaration is a form of malpractice.</p> <p>Learner signature: _____ Date: _____</p>	
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## 9 External assessment

Externally-assessed units have the same grades as internally-assessed units:

- Level 2 – Pass, Merit, Distinction
- Level 1
- Unclassified.

The tables below show the type of external assessment and assessment availability for these qualifications.

<b>Unit 1: Construction Technology</b>	
Type of external assessment	This unit is externally assessed using a paper-based exam marked by Pearson. The assessment must be taken by the learner under examination conditions.
Length of assessment	The external assessment will be 1 hour and 15 minutes.
No. of marks	60
Assessment availability	January and June
First assessment availability	The updated assessment for Unit 1 (for the 2018 specification) is available Jan 2020.
Resit opportunities	All learners registered from Sept 2018 can resit the external assessment once.

<b>Unit 11: Sustainability in Construction</b>	
Type of external assessment	This unit is externally assessed using a paper-based exam marked by Pearson. The assessment must be taken by the learner under examination conditions.
Length of assessment	The external assessment will be one hour and fifteen minutes.
No. of marks	50
Assessment availability	January and June
First assessment availability	June 2014

Your centre needs to make sure that learners are:

- fully prepared to sit the external assessment
- entered for assessments at appropriate times, with due regard for resit opportunities as necessary.

Sample assessment materials will be available to help centres prepare learners for assessment. Specific arrangements for external assessment are available before the start of each academic year on our website [qualifications.pearson.com](http://qualifications.pearson.com).

## Grade descriptors for the internal and external units

### Internal units

Each internally-assessed unit has specific assessment criteria that your centre must use to judge learner work in order to arrive at a grading decision for the unit as a whole. For internally-assessed units, the assessor judges the evidence that the learner has presented to determine whether it meets all the relevant criteria, and then awards a grade at the appropriate level.

The criteria are arrived at with reference to the following grading characteristics:

- applying knowledge and understanding in vocational and realistic contexts, with reference to relevant concepts and processes, to achieve tasks, produce outcomes and review the success of outcomes
- developing and applying practical and technical skills, acting with increasing independence to select and apply skills through processes and with effective use of resources to achieve, explain and review the success of intended outcomes
- developing generic skills for work through management of self, working in a team, the use of a variety of relevant communication and presentation skills, and the development of critical thinking skills relevant to vocational contexts.

### External units

The externally-assessed units are assessed using both marks-based and levels-based schemes. For each external assessment, grade boundaries, based on learner performance, will be set by the awarding organisation.

The following criteria are used in the setting and awarding of the external units.

## Unit 1: Construction Technology

### Level 2 Pass

Learners will be able to recall and apply knowledge of construction technology in the low-rise building context (buildings up to 5.2 metres in height). They will have a sound understanding of the in-situ requirements for the elements of a low-rise building making up the sub-structure and superstructure, including the characteristics, properties, applications and interaction between these elements. They will be able to relate knowledge of structural performance requirements and common construction methods to realistic low-rise construction situations. They will be able to interpret building element features from construction diagrams using common construction drawing conventions, and produce their own construction sketches. Learners will have a sound understanding of the desk- and site-based pre-construction activities required for sub-structures to be constructed safely, as well as the functions and details of the sub-structures and superstructures themselves. They will be able to apply knowledge of the various types of walls, floors and roofs that comprise the superstructure to realistic low-rise construction situations.

### Level 2 Distinction

Learners will be able to synthesise knowledge of low-rise building construction structural performance requirements for sub-structures and superstructures, and the means of achieving this in the building's detailing. They will be able to demonstrate this by the use of extended written responses and by producing their own construction sketches utilising common construction drawing conventions. They will apply knowledge in sometimes complex contexts, involving realistic scenarios, for the construction of buildings, showing their understanding of key concepts by making

suggestions for appropriate solutions. Learners will be able to evaluate and recommend the performance requirements and the suitability of design detail application to meet location and client demands.

## **Unit 11: Sustainability in Construction**

### **Level 2 Pass**

Learners will be able to recall and apply knowledge of sustainability in the construction industry. They will have a sound understanding of key issues and concepts in sustainability, including technologies, methods and techniques used in modern construction. They will be able to interpret given information in order to consider the sustainability of different buildings, materials and technologies, and consider sustainability in terms of financial, social, environmental and construction issues.

### **Level 2 Distinction**

Learners will be able to synthesise knowledge of construction methods and techniques with an understanding of sustainability issues, bringing together an understanding of how these interrelate and applying it to specific scenarios. They will be able to assess how construction projects are impacted by sustainability, applying knowledge to sometimes complex contexts. Learners will balance the advantages and disadvantages within scenarios against financial, social, environmental and construction issues, and consider the outcomes of sustainable construction across a wide range of contexts.

## 10 Awarding and reporting for the qualifications

The awarding and certification of these qualifications will comply with the requirements of the Office of Qualifications and Examinations Regulation (Ofqual).

### Calculation of the qualification grade

This qualification is a Level 1/Level 2 qualification and the certification may show a grade ranging from Level 2 P to Level 2 D\*. Please refer to the Calculation of qualification grade table for the full list of grades. If these grades are not achieved, a Level 1 grade may be awarded. Learners whose level of achievement is below a Level 1 will receive an unclassified (U) result. Each individual unit will be awarded a grade of Level 2 Pass, Merit, Distinction or Level 1. Distinction\* is not available at unit level. Learners whose level of achievement is below a Level 1 will receive an unclassified (U) for that unit. Award of Distinction\* (D\*) D\* is an aggregated grade for the qualification, based on the learner's overall performance. In order to achieve this grade, learners will have to demonstrate a strong performance across the qualification as a whole. To achieve a Level 2 qualification, learners must:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome)
- have sufficient points across the mandatory units, i.e. 24 points
- achieve the minimum number of points at a grade threshold from the permitted combination, see the Calculation of qualification grade table.

Learners who do not achieve a Level 2 may be entitled to achieve a Level 1 where they:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome)
- have sufficient points across the mandatory units, i.e. 12 points
- achieve the minimum number of points for a Level 1, see the *Calculation of qualification grade* table.

### For the Certificate

To achieve a Level 2 qualification, learners must:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points at a grade threshold from the permitted combination, see the *Calculation of qualification grade* table.

Learners who do not achieve a grade at Level 2 may be entitled to achieve a grade of Level 1 Pass where they:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points for a Level 1, see the *Calculation of qualification grade* table.



## For the Extended Certificate

To achieve a Level 2 qualification, learners must:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points at a grade threshold from the permitted combination, see the *Calculation of qualification grade* table.

Learners who do not achieve a grade at Level 2 may be entitled to achieve a grade of Level 1 Pass where they:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points for a Level 1, see the *Calculation of qualification grade* table.

## For the Diploma

To achieve a Level 2 qualification, learners must:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points at a grade threshold from the permitted combination, see the *Calculation of qualification grade* table.

Learners who do not achieve a grade at Level 2 may be entitled to achieve a grade of Level 1 Pass where they:

- complete and report an outcome for all units within the permitted combination (NB Unclassified is a permitted unit outcome) and
- achieve the minimum number of points for a Level 1, see the *Calculation of qualification grade* table.

Learners who do not achieve sufficient points for the Certificate, Extended Certificate or Diploma qualification may be eligible to achieve the Award provided they have completed the correct combination of units and meet the appropriate qualification grade points threshold.

### Points available for unit size and grades

The table below shows the **number of points scored per 10 guided learning hours** at each grade.

Points per grade per 10 guided learning hours				
Unclassified	Level 1	Level 2 Pass (P)	Level 2 Merit (M)	Level 2 Distinction (D)
0	2	4	6	8

We will automatically calculate the qualification grade for your learners when your learner unit grades are submitted. Learners will be awarded qualification grades for achieving the sufficient number of points within the ranges shown in the *Calculation of qualification grade* table.

#### Example

A learner achieves a Level 2 Pass grade for a unit. The unit size is 30 guided learning hours (GLH). Therefore, they gain 12 points for that unit, i.e. 4 points for each 10 GLH, so 12 points for 30 GLH.

### Calculation of qualification grade

Award		Certificate		Extended Certificate		Diploma	
(120 GLH)		(240 GLH)		(360 GLH)		(480 GLH)	
Grade	Points threshold	Grade	Points threshold	Grade	Points threshold	Grade	Points threshold
U	0	U	0	U	0	U	0
Level 1	24	Level 1	48	Level 1	72	Level 1	96
Level 2 Pass	48	Level 2 PP	96	Level 2 PP	144	Level 2 PP	192
		Level 2 MP	114	Level 2 MP	174	Level 2 MP	234
Level 2 Merit	66	Level 2 MM	132	Level 2 MM	204	Level 2 MM	276
		Level 2 DM	150	Level 2 DM	234	Level 2 DM	318
Level 2 Distinction	84	Level 2 DD	168	Level 2 DD	264	Level 2 DD	360
		Level 2 D*D	174	Level 2 D*D	270	Level 2 D*D	366
Level 2 Distinction*	90	Level 2 D*D*	180	Level 2 D*D*	276	Level 2 D*D*	372

This table shows the minimum thresholds for calculating grades. The table will be kept under review over the lifetime of the qualification. The most up to date table will be issued on our website.

Pearson will monitor the qualification standard and reserves the right to make appropriate adjustments.

The tables below give examples of how the overall grade is determined.

**Examples used are for illustrative purposes only. Other unit combinations are possible, see *Section 4 Qualification structures*.**

### Example 1

#### Achievement of a Certificate with a Level 2 MM grade

	GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	30	3	Level 2 Merit	6	18
Unit 2	30	3	Level 2 Pass	4	12
Unit 3	30	3	Level 2 Merit	6	18
Unit 4	30	3	Level 2 Merit	6	18
Unit 5	30	3	Level 2 Merit	6	18
Unit 6	30	3	Level 2 Pass	4	12
Unit 7	60	6	Level 2 Distinction	8	48
<b>Qualification grade totals</b>	<b>240</b>	<b>24</b>	<b>Level 2 MM</b>		<b>144</b>

The learner has sufficient points for a Level 2 MM grade.

### Example 2

#### Achievement of a Certificate with a Level 2 D\*D grade

	GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	30	3	Level 2 Merit	6	18
Unit 2	30	3	Level 2 Distinction	8	24
Unit 3	30	3	Level 2 Merit	6	18
Unit 4	30	3	Level 2 Distinction	8	24
Unit 5	30	3	Level 2 Merit	6	18
Unit 6	30	3	Level 2 Distinction	8	24
Unit 7	60	6	Level 2 Distinction	8	48
<b>Qualification grade totals</b>	<b>240</b>	<b>24</b>	<b>Level 2 D*D</b>		<b>174</b>

The learner has sufficient points for a Level 2 D\*D grade.

### Example 3

#### Achievement of an Extended Certificate with a Level 2 MP grade

	GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	30	3	Level 2 Pass	4	12
Unit 2	30	3	Level 2 Pass	4	12
Unit 3	30	3	Level 2 Merit	6	18
Unit 11	30	3	Level 2 Pass	4	12
Unit 5	30	3	Level 2 Merit	6	18
Unit 6	30	3	Level 2 Distinction	8	24
Unit 16	60	6	Level 2 Pass	4	24
Unit 8	30	3	Level 2 Merit	6	18
Unit 7	30	3	Level 2 Merit	6	18
Unit 17	60	6	Level 2 Pass	4	24
<b>Qualification grade totals</b>	<b>360</b>	<b>36</b>	<b>Level 2 MP</b>		<b>180</b>

The learner has sufficient points for a Level 2 MP grade.

### Example 4

#### Achievement of a Diploma with a Level 2 DD grade

	GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	30	3	Level 2 Merit	6	18
Unit 2	30	3	Level 2 Distinction	8	24
Unit 21	60	6	Level 2 Merit	6	36
Unit 3	30	3	Level 2 Distinction	8	24
Unit 4	30	3	Level 2 Merit	6	18
Unit 22	60	6	Level 2 Distinction	8	48
Unit 23	60	6	Level 2 Distinction	8	48
Unit 25	60	6	Level 2 Distinction	8	48
Unit 11	30	3	Level 2 Distinction	8	24
Unit 12	30	3	Level 2 Distinction	8	24
Unit 26	60	6	Level 2 Distinction	8	48
<b>Qualification grade totals</b>	<b>480</b>	<b>48</b>	<b>Level 2 DD</b>		<b>360</b>

The learner has sufficient points for a Level 2 DD grade.

### Example 5

#### Achievement of a Diploma at Level 2 PP grade

	GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	30	3	Level 2 Pass	4	12
Unit 2	30	3	Level 1	2	6
Unit 21	60	6	Level 2 Merit	6	36
Unit 3	30	3	Level 2 Merit	6	18
Unit 4	30	3	Level 2 Pass	4	12
Unit 22	60	6	Level 2 Pass	4	24
Unit 23	60	6	Level 2 Pass	4	24
Unit 25	60	6	Level 1	2	12
Unit 11	30	3	Level 2 Merit	6	18
Unit 12	30	3	Level 2 Pass	4	12
Unit 26	60	6	Level 2 Pass	4	24
<b>Qualification grade totals</b>	<b>480</b>	<b>48</b>	<b>Level 1</b>		<b>198</b>

The learner has gained enough points overall for a Level 2 PP grade.

# 11 Quality assurance of centres

Pearson will produce on an annual basis the *UK Vocational Quality Assurance Handbook*, which will contain detailed guidance on the quality processes required to underpin robust assessment and internal verification.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering
- the centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities, through online standardisation, intended to exemplify the processes required for effective assessment, and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes, where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres.

We monitor and support centres in the effective operation of assessment and quality assurance. The methods we use to do this for BTEC First programmes include:

- making sure that all centres complete appropriate declarations at the time of approval
- undertaking approval visits to centres
- making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- an overarching review and assessment of a centre's strategy for assessing and quality assuring its BTEC programmes.

An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting.

Centres that do not fully address and maintain rigorous approaches to quality assurance cannot seek certification for individual programmes or for all BTEC First programmes. Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

## 12 Further information and useful publications

To get in touch with us visit our 'Contact us' pages:

- Edexcel: [qualifications.pearson.com/contactus](https://qualifications.pearson.com/contactus)
- BTEC Firsts: [qualifications.pearson.com/en/qualifications/btec-firsts.html](https://qualifications.pearson.com/en/qualifications/btec-firsts.html)
- Pearson Work Based Learning and Colleges: [qualifications.pearson.com/en/support/support-for-you/work-based-learning.html](https://qualifications.pearson.com/en/support/support-for-you/work-based-learning.html)
- books, software and online resources for UK schools and colleges: [www.pearsonschoolsandfecolleges.co.uk](http://www.pearsonschoolsandfecolleges.co.uk)

Key publications:

- Adjustments for candidates with disabilities and learning difficulties – Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications (Joint Council for Qualifications (JCQ))
- Equality Policy (Pearson)
- Recognition of Prior Learning Policy and Process (Pearson)
- UK Information Manual (Pearson)
- UK Quality Vocational Assurance Handbook (Pearson).

All of these publications are available on our website.

Publications on the quality assurance of BTEC qualifications are on our website at [qualifications.pearson.com/en/support/support-topics/quality-assurance/quality-assurance-overview.html](https://qualifications.pearson.com/en/support/support-topics/quality-assurance/quality-assurance-overview.html)

Our publications catalogue lists all the material available to support our qualifications. To access the catalogue and order publications, please go to [qualifications.pearson.com/en/support/published-resources.html#step1](https://qualifications.pearson.com/en/support/published-resources.html#step1)

### Additional documentation

Additional materials include:

- Sample Assessment Material (for the external units)
- a guide to getting started with BTEC
- guides to our support for planning, delivery and assessment (including sample assignment briefs).

### Additional resources

If you need to source further learning and teaching material to support planning and delivery for your learners, there is a wide range of BTEC resources available to you.

Any publisher can seek endorsement for their resources, and, if they are successful, we will list their BTEC resources on our website:

[qualifications.pearson.com/en/support/published-resources/about-endorsed-resources.html](https://qualifications.pearson.com/en/support/published-resources/about-endorsed-resources.html)



## 13 Professional development and support

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered on our website: [qualifications.pearson.com/en/support/training-from-pearson](https://qualifications.pearson.com/en/support/training-from-pearson).

The support we offer focuses on a range of issues, such as:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing learner-centred learning and teaching approaches
- building in effective and efficient quality assurance systems.

The national programme of training we offer is on our website at: [qualifications.pearson.com/en/support/training-from-pearson](https://qualifications.pearson.com/en/support/training-from-pearson). You can request centre-based training through the website or you can contact one of our advisers in the Training from Pearson UK team via Customer Services to discuss your training needs.

### BTEC training and support for the lifetime of the qualifications

**Training and networks:** our training programme ranges from free introductory events through sector-specific opportunities to detailed training on all aspects of delivery, assignments and assessment. We also host some regional network events to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region.

**Regional support:** our team of Curriculum Development Managers and Curriculum Support Consultants, based around the country, are responsible for providing advice and support in centres. They can help you with planning and curriculum developments.

To get in touch with our dedicated support teams please visit: [qualifications.pearson.com/en/contact-us.html](https://qualifications.pearson.com/en/contact-us.html)

### Your BTEC Support team

Whether you want to talk to a sector specialist, browse online or submit your query for an individual response, there is someone in our BTEC Support team to help you whenever – and however – you need, with:

- **Welcome Packs for new BTEC centres:** if you are delivering BTEC for the first time, we will send you a sector-specific Welcome Pack designed to help you get started with these qualifications
- **Subject Advisers:** find out more about our subject adviser team – immediate, reliable support from a fellow subject expert – at: [qualifications.pearson.com/en/contact-us.html](https://qualifications.pearson.com/en/contact-us.html)
- **Ask the Expert:** submit your question online to our Ask the Expert online service ([qualifications.pearson.com/en/contact-us/teachers.html](https://qualifications.pearson.com/en/contact-us/teachers.html)) and we will make sure your query is handled by a subject specialist.



# Units



# Unit 1: Construction Technology

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **External**

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## Unit introduction

Have you thought about how a building is constructed?

There are many different types of buildings we can construct and occupy across the UK. This unit will initially examine the different forms of construction that can be used for low-rise (up to 5.2 metres in height) offices, retail units and homes. The use of prefabrication to construct buildings is now a sustainable method used to build quickly and reduce damage to the environment. You will examine the modern methods of construction that rely heavily on offsite prefabrication, which benefits the environment sustainably.

In understanding how to set up a site you will examine the information that must be completed before starting work, along with the infrastructure that you will need to put in place to run the job efficiently and safely.

Sub-structure works are the most important part of a project as they have to safely support the superstructure that rests upon them. You will understand the methods that are used in constructing several different types of foundation and the safety aspects of supporting excavations while employees work within them. The removal of water from excavations must also be carefully considered.

Moving above the sub-structure, you will understand the need for provisions to stop damp rising, and the construction associated with the superstructure of a building. This is the part that has to be aesthetically pleasing, keep out the weather elements and ensure that the occupants are at a comfortable temperature.

You will develop a detailed understanding of how walls, floors and roofs are constructed, and you will be able to name each component part, along with its functions. This will change with each different type of construction method that can be employed in a building.

## Learning aims

In this unit you will:

- A understand the structural performance required for low-rise construction
- B explore how sub-structures are constructed
- C explore how superstructures are constructed.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand the structural performance required for low-rise construction</b></p> <p><b>Topic A.1 Performance requirements</b></p> <p>The in-situ requirements for elements of a building, the characteristics, properties, location, features and applications, and the interaction of different elements making up the sub-structure and superstructure. Learners will need to be able to demonstrate the use of sketching techniques.</p> <p>How buildings are designed and constructed, considering:</p> <ul style="list-style-type: none"> <li>• strength</li> <li>• stability</li> <li>• fire resistance</li> <li>• thermal insulation</li> <li>• sound insulation</li> <li>• weather resistance</li> <li>• sustainability.</li> </ul> <p><b>Strength and stability</b></p> <p>Buildings are designed to resist live, dead and dynamic loads to include:</p> <ul style="list-style-type: none"> <li>• self-weight</li> <li>• use</li> <li>• snow</li> <li>• wind.</li> </ul> <p>How buildings achieve their required strength – for the following, understand what is required, where it is required, why it is done and how it is achieved:</p> <ul style="list-style-type: none"> <li>• <i>tested materials</i>: grading of hard core, slump testing and compressive testing of concrete, stress grading of structural timber, mortar testing</li> <li>• <i>specification of materials</i>: British Standards, (EN) European numbers, strength classifications of concrete, bricks, blocks, mortar, timber</li> <li>• <i>cavity walls</i>: construction to provide composite strength and stability, building regulation requirements for buildings not exceeding 12 m high, including wall-tie spacing, height restrictions</li> <li>• <i>lateral and vertical restraint</i>: internal walls, floor- and roof-tie positions, resist the spread of the walls, resist uplift from wind loadings</li> <li>• <i>transfer of loads to foundations</i>: roof to walls, floors to walls.</li> </ul> <p style="text-align: right;"><i>continued</i></p>

## What needs to be learnt

### Fire resistance

How buildings are protected against fire and maintain their structural integrity – for the following, understand what is required, why it is done and how it is achieved:

- fire-resistant materials which include plasterboard, concrete, blockwork, intumescent paint
- fire compartments and fire barriers (separating building design requirements – walls, separating floors, door closes, fire-resistant doors), fire escapes, refuge areas, cavity fire barriers, fire alarm systems, smoke detection, sprinkler system.

### Thermal insulation

How buildings are insulated against heat loss – for the following, understand why it is done, what types of thermal insulation and resistant materials are used, and where it is provided:

- *purpose of insulation*: reduction of heat loss from a building, energy costs, prevention of the loss of heated air through gaps within a building or structure, providing an acceptable U-value in accordance with regulations
- *types of insulation*: sheep's wool, mineral wool, glass fibre, cellulose, foam, advantages of one type over another
- *types of thermally resistant materials*: aerated lightweight concrete blocks, timber, lightweight screeds
- *location*: cavity insulation, wall insulation, roofing insulation, flooring insulation, double glazing, draught strips.

### Sound insulation

How buildings meet their required sound resistance – for the following, understand why it is used, what is required to be provided, where it is required, and how sound resistance is achieved:

- *purpose*: to resist the passage of sound through a structure, preventing nuisance and noise disturbance of adjacent neighbours, reduce external infrastructure noise, reduce aircraft noise, provide confidentiality
- *types of sound insulation*: triple glazing, heavy-density blockwork, sound insulation quilt, plasterboard layers, flooring mats, carpeting, acoustic ceilings
- *location*: floor, wall and ceiling construction between adjacent rooms and flats, party walls, internal partition walls, windows, doors
- *provision*: adding material density, utilisation of robust design details, sound isolation of structures, reduction of transference by using machinery silencers.

### Weather resistance

How buildings achieve their resistance to the weather elements – for the following, understand why it is done, what types of materials are used, and where they are provided:

- *purpose*: to keep occupants in an acceptable environment, thermal comfort of occupants, humidity levels, prevention of damage to finishes, prevention of water staining
- *materials*: selection of waterproof and impervious materials, double glazing, use of falls, weather seals and sealants, flashings, soffits
- *location*: guttering, window and door openings, external walls, ventilation ducts, roof finishes, overhanging eaves.

*continued*

## What needs to be learnt

### Sustainability

Sustainability is preserving resources for future generations and minimising the impact of construction activities on the natural environment.

For the following, understand why it is done, how it is achieved, what sustainable materials are used for construction and where they are used:

- *purpose*: reduction in building energy use, conserving finite resources, reduction in carbon emissions to the atmosphere, reduction in pollution and wastage
- *methods*: building orientation for light and heat in the UK, reduction in the use of greenfield sites, brownfield re-use of sites, recycling waste materials into new products, low embodied energy materials, green renewable natural materials, using local suppliers, prefabrication of elements, reduction in construction wastage
- *materials*:
  - hemp, lime, rendering finishes
  - sheep's wool insulation
  - straw construction of walls
  - timber: cedar cladding, softwoods in timber framing
  - aluminium: guttering, downpipes.

### Topic A.2 Common structural forms for low-rise construction

For the following construction methods, understand how they are designed and detailed, what the terminology of each component is called, how and why each method differs, and the advantages and disadvantages of each structural form. Learners will need to be able to demonstrate the use of sketching techniques.

- *traditional cavity wall construction*: load-bearing elements; brickwork and blockwork, blockwork outer and blockwork inner with external rendered finishes (hemp, brickwork)
- *cross-wall construction*: load-bearing cross-wall element, relationships of connecting floors, prefabricated concrete cross wall, use of cross-wall construction in accommodation units
- *structural*: insulated panels (SIPS), panel finishes (brickwork, blockwork and render, insulation and timber cladding, hemp rendering, tiling), panel function (panel design to support load), position of insulation
- *timber-framed construction*: timber framing use, position of insulation, vapour/moisture barriers including damp-proof membranes, position of plywood on panels, connection binder details, external brick cladding, methods of tying external finish to supporting panel, formation of openings, panel/secondary finishes (brickwork, blockwork and render, insulation and timber cladding, hemp rendering, tiling), panel function (panel design to support load).



**What needs to be learnt****Learning aim B: Explore how sub-structures are constructed****Topic B.1 Preconstruction work**

For the following activities that have to be completed before work can begin on site, understand why they are carried out, what has to be provided on a site, and how it is accomplished. Learners will need to be able to demonstrate the use of sketching techniques and associated calculations (areas, volumes, distances, perimeters, time durations).

Desk-based preconstruction:

- *legal requirements*: construction health and safety plan, method statements and risk assessments, informing the Health and Safety Executive (HSE)
- *planning*: scaled site layout plan indicating site accommodation, welfare facilities, storage accommodation, compounds, temporary roads and hard standing, fixed plant, fire precaution measures
- producing a programme of work or scheduling of activities or resources, purchasing of resources, organising safety signs, statutory notices including footpath closures, road crossings, traffic management.

Site-based preconstruction:

- *demolition and clearance of existing structures*: sustainable demolition and recycling on brownfield sites, tree removal, general site clearance of vegetation
- *enabling work*: protection of existing services (water, gas, electricity), formation of access and egress routes, installation of temporary supports
- *site set-up*: fencing, gates and security of the site, temporary lighting, decontamination works, installation of site accommodation and associated services, signage, creation of storage compounds and hard standing, temporary works required to construct and support.

**Topic B.2 Sub-structure groundworks**

How sub-structures are constructed safely. For the following, understand what is used, why it is used (including potential hazards), where it is used and how it is achieved. Learners will need to be able to demonstrate the use of sketching techniques and associated calculations (areas, volumes, distances, perimeters).

- *hazards associated with groundworks*: gas, collapse of the sides of the excavation, protection of third parties, movement of ground water, confined space, safe access and egress, overburden, likelihood of collapse due to type of soil, avoiding services, proximity of excavation plant
- *control of water*: temporary control of sub-soil and surface water during excavation (simple sump pumping), permanent control of sub-soil water (land drainage)
- *earthwork support*: methods of support to the sides of the excavation (earthwork support), steel trench sheets, timbering, hydraulic trench supports, aluminium walling
- *function of a foundation*: to safely transmit the loads of the building to the sub-soil, to settle within acceptable limits for settlement, to support the loads of the building for its lifespan
- *understand how foundations are detailed*: the different types used to support a low-rise building, detailing and terminology, strip and deep strip, trench/mass fill, raft, short bored piles and ground beam, engineering brickwork to dpc and cavity fill, weepholes, selection of appropriate foundation for a variety of ground conditions, the advantages/disadvantages of each foundation type

*continued*

**What needs to be learnt**

- *understand how ground floors are detailed:* design and construction of ground floors, solid and suspended, beam and block, timber joists, solid concrete, including damp-proof course (dpc), damp-proof membrane (dpm), sand blinding, hardcore, thermal insulation (location of insulation), sub-floor ventilation and the advantages/disadvantages of each floor type.

**Learning aim C: Explore how superstructures are constructed****Topic C.1 Superstructures – walls**

For the following, understand what is used, where it is used, why it is used and how it is achieved. Learners will need to be able to demonstrate the use of sketching techniques and associated calculations (areas, volumes, distances, perimeters).

- *understand how walls are detailed:* types of construction (cavity masonry, timber frame, insulated panels (SIPs) and their advantages and disadvantages, wall-tie spacing, internal partitions (timber, metal stud, solid blockwork)
- *functions of a wall:* to resist heat transfer, to reduce sound transmission, to transfer loads to foundations, to provide shelter, to provide security
- *materials used:* thin joint masonry, lightweight thermal blockwork, quality of facing bricks, types of mortar and quality
- *types of wall finishes:* rendered blockwork, facing brickwork (including pointing – bucket handle/tooled, recessed, weathered, flush) and their advantages and disadvantages
- *wall openings and their functions:* provide ventilation, provide light, provide aesthetics
- *components of a wall opening:* lintel, sill, window, door, threshold, damp-proof course, cavity trays, cavity closers, weepholes, and the function of each
- *detailing around wall openings:* details of heads, thresholds, sills and jambs, including wall-tie spacing
- *functions of detailing:* prevention of damp transfer, continuity of insulation, maintaining structural integrity, load distribution.

**Topic C.2 Superstructures – floors**

For the following, understand what is used, where it is used, why it is used and how it is achieved. Learners will need to be able to demonstrate the use of sketching techniques and associated calculations (areas, volumes, distances, perimeters).

- *understand how floors are detailed:* types of construction (intermediate); solid, timber, engineered timber and their advantages and disadvantages
- *functions of a floor:* to provide a level surface, to reduce sound transmission, to transfer loads to walls, to provide accommodation of services
- *materials used:* stress-graded timber joists, beam and block, eco-joists, engineered timber joists, precast concrete planks
- *types of floor finishes:* screeded, chipboard, moisture-resistant chipboard, tongue-and-grooved softwood floorboards, skirtings
- *components of a floor:* supporting joists, structure, floor covering, wall support, skirtings, and the function of each.

*continued*

## What needs to be learnt

### Topic C.3 Superstructures – roofs

For the following, understand what is used, where it is used, why it is used and how it is achieved. Learners will need to be able to demonstrate the use of sketching techniques and associated calculations (areas, volumes, distances, perimeters).

- *Understand how roofs are detailed:* types of construction – flat, lean-to, mono pitch, double pitch, gable end, hipped end, their specific maintenance and advantages and disadvantages, the terminology used to label a roof detail.
- *Functions of a roof:* to provide a method of discharging rainfall away from the building, to waterproof the structure, to provide a recreational area, aesthetics, provides additional accommodation/space.
- *Materials used:* trussed rafters, traditional timber roof with purlins, breather membrane, tile felt, tile battens, roof tiles, bitumen felt.
- *Types of roof finishes:* types of roof finish employed for each type of roof, fixing of finishes, felt and tile battens, three-layer felt construction, rain water goods and downpipes, stages involved in the application of the roof finishes.
- *Components of a roof:* common rafters, jack rafters, cripple jack rafters, wall plates, roof trusses, binders, diagonal wind bracing, ridgeboard, fascia, eaves, valley, soffit, gable, hip, dormer window, insulation and the function of each.

## Teacher guidance

### Resources

There are no special resources needed for this unit.

### Essential information for assessment

This unit is externally assessed using a paper-based exam. The exam is set and marked by Pearson. The exam lasts for 1 hour 15 minutes and contains 60 marks. The first assessment date for the revised unit 1 examination for the 2018 specification is Jan 2020. Candidates may access the legacy 2012 specification examination prior to this date.

The assessment must be taken by the learner under examination conditions.

All questions in the exam paper are compulsory. There will be different types of objective, short answer and extended writing questions. Learners will need to be able to demonstrate the use of sketching techniques.

# Unit 2: Construction and Design

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal Synoptic**

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## Unit introduction

Have you ever wondered why buildings are very different in their design and function?

On completing this unit you will understand what the construction industry undertakes in terms of the different types of buildings and structures it designs and builds. You will learn how client briefs can be developed by analysing the client's requirements for the building and considering the external constraints on development.

You will also gain an understanding of the different types of construction activities that take place within the industry, from new build through to the refurbishment of existing older buildings. The contribution that construction makes to the UK built environment and the economy cannot be overestimated in terms of health and safety, design, wealth and comfort.

You will start to look at how designs are influenced by client needs and external constraints. The architect is usually the first appointment that a client will make. They will analyse the client's needs, develop a design brief and generate a number of concept ideas that could meet with the client's approval. These ideas may have to fit in with the style of traditional buildings within a locality or could be a more modern contemporary design when there are no such constraints. The client will then select a concept for the architect to develop into a final design solution that can utilise a number of methods of graphical communication.

In this unit you will analyse needs and constraints in order to produce a typical client brief for a low-rise domestic building (up to 5.2 metres in height) and produce a range of sketch proposals or ideas from this.

This unit has synoptic assessment requiring you to select and integrate knowledge from across the qualification. therefore it should be taken at the end of the course of study.

## Learning aims

In this unit you will:

- A understand the work of the construction industry
- B understand a client's needs to develop a design brief for a low-rise building
- C produce a range of initial sketch ideas to meet the requirements of a client brief for a low-rise building.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand the work of the construction industry</b></p> <p><b>Topic A.1 The construction industry and the built environment</b></p> <p>Understand how the construction industry contributes to and impacts on wider society including:</p> <ul style="list-style-type: none"> <li>• The design of attractive, aesthetically pleasing structures and buildings that make our built environment pleasant to live in:             <ul style="list-style-type: none"> <li>◦ designing for appearance and aesthetics</li> <li>◦ designing for sustainability</li> <li>◦ designing for functionality</li> <li>◦ designing for occupant and public safety.</li> </ul> </li> <li>• The contribution to the infrastructure of the built environment in terms of:             <ul style="list-style-type: none"> <li>◦ roads</li> <li>◦ drainage</li> <li>◦ provision of services (gas, electricity, water and communication technology)</li> <li>◦ flood defences.</li> </ul> </li> <li>• The inclusion of the community in terms of:             <ul style="list-style-type: none"> <li>◦ housing</li> <li>◦ green spaces</li> <li>◦ transport hubs</li> <li>◦ employment opportunities</li> <li>◦ security.</li> </ul> </li> <li>• The economic benefits and employment opportunities that construction brings, develops and maintains in terms of:             <ul style="list-style-type: none"> <li>◦ jobs and careers</li> <li>◦ wealth generated by property and land development</li> <li>◦ regeneration of inner-city areas.</li> </ul> </li> <li>• Consideration of the benefits that the construction sector brings to:             <ul style="list-style-type: none"> <li>◦ the built environment</li> <li>◦ the local community</li> <li>◦ the UK as a whole.</li> </ul> </li> </ul> <p><b>Topic A.2 The type of activities undertaken in the construction industry</b></p> <p>Know the range of work that the construction industry undertakes including:</p> <ul style="list-style-type: none"> <li>• Civil engineering, infrastructure works including railways, motorways, roads, bridges, airports, service distribution, sewers, tunnels, sea defences, flood defences, river and harbour works, renewable energies</li> <li>• Industrial: factories, workshops, industrial estates, warehousing</li> <li>• Residential: private housing, apartments, sheltered housing, social housing</li> <li>• Commercial: banks, offices, business parks</li> </ul> <p style="text-align: right;"><i>continued</i></p>

### What needs to be learnt

- Retail: shops, retail shopping parks, shopping centres
- Health: hospitals, clinics, health centres, doctors' surgeries
- Education: schools, colleges, universities, training centres
- Leisure and recreation: leisure centres, cinemas, swimming pools, stadiums, sports facilities
- Activities: design and construction of buildings and structures, design and construction of infrastructure works, refurbishment of existing buildings, repairs and maintenance of building, estates management, facilities management.

### Learning aim B: Understand a client's needs to develop a design brief for a low-rise building

#### Topic B.1 Understanding a client's needs

Understanding the client's needs in terms of –

- Sustainability:
  - materials
  - thermal efficiency
  - alternative energies
  - orientation
  - carbon footprint.
- Building use:
  - residential
  - communal space
  - retail
  - industrial.
- Accommodation:
  - rooms
  - size
  - function
  - space
  - orientation
  - floors.
- Style and aesthetics:
  - external
  - street scene
  - internal
  - style
  - preferred materials
  - mood boards
  - colours.

*continued*

## What needs to be learnt

### Topic B.2 Understanding the constraints on design

The client and design team will need to consider other influences and constraints on design to include –

- Resources:
  - budget
    - initial costs and life cycle costs
    - market positioning
    - level of specification
    - specialist skills required
  - site
    - area
    - location
    - access
    - services
  - building
    - size
    - structural form
    - materials
    - sustainability.
- Local planning and building control requirements:
  - local plan
  - building regulations
  - local needs
  - style
  - height
  - materials
  - structural form
  - density
  - community consultations
  - planning objections.
- Timescales:
  - completion date
  - contract period.

### Topic B.3 Production of a client brief for a low-rise building

Using the analysis of needs and constraints, produce a client brief that will aid the development of appropriate design solutions:

- existing situation
- project requirements
- budget
- design factors and constraints
- specification for internal and external features
- mood board
- end users.



## What needs to be learnt

**Learning aim C: Produce a range of initial sketch ideas to meet the requirements of a client brief for a low-rise building**

### **Topic C.1 Generation of initial sketch ideas to facilitate development of the final design solution**

- Initial sketch ideas in response to the client brief:
  - freehand sketching floor plans to approximate scale
  - freehand sketching external views in one- or two-point perspective
  - concept ideas for external appearance
  - concept ideas for internal layout.
- Client approval and review of ideas against the client brief:
  - review of the ideas against the client brief
  - client feedback and concept selection.
- Responding to client feedback:
  - amend and refine ideas to produce sketches for the final concept or a 3D CAD model for the final concept
  - addition of annotations to communicate construction form and type.

## Assessment criteria

Level 1		Level 2 Pass		Level 2 Merit	Level 2 Distinction
Learning aim A: Understand the work of the construction industry					
1A.1	Outline a range of work activities undertaken by the construction industry.	2A.P1	Describe the range of activities undertaken by the construction industry.	2A.M1 Explain the local contribution made by the construction industry to society.	2A.D1 Evaluate the local and national contributions made by the construction industry to society.
1A.2	Outline a contribution that the construction industry makes to society.	2A.P2	Describe the contribution that the construction industry makes to society.		
Learning aim B: Understand a client's needs to develop a design brief for a low-rise building					
1B.3	Identify client's needs for a given project scenario. #	2B.P3	Describe client's needs to develop a client brief for a given project scenario. #	2B.M2 Analyse needs and constraints, considering resources, planning and timescales to develop a client brief for a given project scenario that prioritises the design requirements. #	2B.D2 Refine needs and constraints to develop a client brief for a given project scenario that examines ways of complying with design requirements and constraints. #
1B.4	Identify constraints on design for a given project scenario. #	2B.P4	Describe the constraints on design, considering resources, planning and timescales to develop a client brief for a given project scenario. #		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Produce a range of initial sketch ideas to meet the requirements of a client brief for a low-rise building</b>			
1C.5 Produce initial sketches for a minimum of two concept ideas that meet the requirements of a client brief, with support and guidance.	2C.P5 Produce initial sketches for a minimum of two concept ideas, including the application of maths, that meet the requirements of a client brief.*	2C.M3 Produce initial sketches for a minimum of three fully annotated concept ideas, including the application of maths, that meet the requirements of a client brief.*	2C.D3 Produce initial sketches for a minimum of four fully annotated concept ideas, including the application of maths, that fully comply with all the requirements of a client brief and are influenced by different design styles.*
1C.6 Review concept ideas against a client brief with support and guidance.	2C.P6 Review concept ideas against the requirements of a client brief.	2C.M4 Refine a concept idea following client feedback.	

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

There are no special resources required for this unit. However, some learners may prefer to use a computer-based graphics package, such as Google SketchUp, for the generation of concept designs.

### Essential information for assessment

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

The centre will need to provide an appropriate scenario, which will include a client profile and a proposed site and location. Additionally, the centre will need someone to play the role of the client to provide feedback on the initial concept ideas, and to select or approve an idea for development.

### Learning aim A

**For 2A.P1:** the description should include a range of three activity areas in which construction operates within the UK. The activity area needs to be the sector classification, for example housing, infrastructure, civil engineering, construction and design, and not the type of work within each.

**For 2A.P2:** learners need to provide a description of the contribution that the construction industry makes to society. This must cover one economic and one social contribution in depth.

**For 2A.M1:** learners need to explain the local contribution that the construction industry makes to society, giving reasons or evidence to support their view. This could be in the form of local employment, local facilities, impact on the local economy, regeneration, aesthetic impacts, feelings of wellbeing, etc.

**For 2A.D1:** learners' evaluation must include three economic and three social benefits that the construction industry brings to the local area and nationally. The evaluation should include the advantages/disadvantages that the construction industry has brought to the area. These could be an extension of those identified for 2A.M1. Nationally, this could include the contribution to the gross domestic product, tourist attractions, the Olympics 2012 and its legacy, increased taxation revenues, wealth for developers, investment opportunities, increased consumer spending, a pleasant environment in which to work and live, benefits to health brought about by good standards of accommodation, and increased levels of home ownership.

**For 1A.1:** learners are required to provide an overview of a range of work activities undertaken by the construction industry. This range must cover three different work activity areas in which the construction industry operates. It needs to be the sector type (civil engineering, construction, housing, infrastructure) and not a type of building or structure produced. Work activity must be accompanied by one example of the type of work that is carried out in the sector – for example, civil engineering, e.g. road construction; services (water, electric, gas, telephony); housing, e.g. social or affordable housing, house refurbishment; construction examples such as commercial offices, retail units.

**For 1A.2:** learners need to outline, i.e. provide an overview of, one contribution that the construction industry makes to society. This needs to be in some detail, with an explanation of how the contribution adds to the built environment.

## Learning aim B

**For 2B.P3:** learners should identify, interpret and describe the client's needs for a given project scenario. This could be in the form of a written report or incorporated into the client brief. Note that the unit content for topic B1 gives an indication of breadth of coverage that could be considered for this assessment criterion.

**For 2B.P4:** learners should describe the constraints on design for a given project scenario. This could be in the form of a written report or incorporated into the client brief. Note that the unit content for topic B2 gives an indication of breadth of coverage that could be considered for this assessment criterion such as building size, material, structural form, planning, timescales and sustainability. Learners should also consider constants as appropriate from the skills they have studied in the optional units in relation to their design

**For 2B.M2:** this could be an extension of the activity undertaken for P3 and P4. Learners should analyse the needs and constraints to produce a client brief that prioritises the design requirements and considers:

- the design factors and constraints, project requirements
- the budget
- the mood board
- the specification for internal and external features.

**For 2B.D2:** learners should prioritise needs and constraints in order to produce a client brief that addresses the design requirements and examines ways of complying with design requirements and external constraints.

**For 1B.3:** learners should identify a client's needs for a given project scenario. This could be by providing a list, or by a record of oral questioning supported by an observation record.

**For 1B.4:** learners should identify the constraints on the design for a given project scenario. This could be by providing a list, or by a record of oral questioning supported by an observation record.

## Learning aim C

**For 2C.P5:** learners should produce a minimum of two concept ideas. Each idea should include freehand sketches of floor plans to an approximate scale, and freehand sketches of external views in one- or two-point perspective.

**For 2C.M3:** learners should develop a minimum of three concept ideas with annotations, demonstrating the learner's understanding that there are a number of alternatives to meet the needs of a client. Each idea should include freehand sketches of floor plans to an approximate scale, and freehand sketches of external views in one- or two-point perspective. Annotations could include: room labelling, room sizes, details of key features, circulation space and the thinking behind the concept.

**For 2C.P6:** learners should review the concept ideas with the client against the requirements of the client brief. This could be completed in the form of a table comparing a client's requirements against the concept ideas by objective and subjective comments, as appropriate. This could include the use of peer or user group feedback (a record of this feedback will be required).

**For 2C.M4:** learners will receive feedback from the client (who will select one of the concept ideas) and will then develop, refine and annotate a concept idea following the client's feedback.

**For 2C.D3:** learners should develop a minimum of four concept ideas that fully comply with all the requirements of a client brief. The concept ideas must demonstrate learner understanding that there are a variety of design solutions that will meet a client's needs. The ideas should be influenced by different design styles. Each idea should include freehand sketches of floor plans to an approximate scale, and freehand sketches of external views in one- or two-point perspective. Annotations could include: room labelling, room sizes, details of key features, circulation space and the thinking behind the concept.

**For 1C.5:** learners should produce a minimum of two concept ideas with support and guidance. This could be simple plan layouts with sketched 2D elevation views. Details of teacher support and guidance must be documented.

**For 1C.6:** learners review concept ideas against a client brief with support and guidance. This could take the form of the completion of a table to confirm that the idea matches the client brief, or could be by a record of oral questioning supported by an observation record. Details of teacher support and guidance must be documented.

## Suggested assignment outlines

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence, provided that they meet the assessment requirements of the unit.

### Suggested scenario

This scenario requires access to a client (this could be an external person or simulated using the lecturer or other staff as the client).

You have been working as an assistant in an Architectural Practice. The practice has a new client who would like a low rise domestic house designed. You have been asked to assist in the project. The client is new to the construction industry, you have been asked to produce a presentation explaining the construction industry in general, how it works and an evaluation local and national contributions. You will need to meet with the client to draw up a list of their specific requirements for their house. You will need to investigate the constraints of the site in terms of the impact it will potentially have on the existing surrounding environment and community. You will need to consider the local infrastructure in relation to the provision of domestic services. You will need to produce a range of design sketches to present to the client for their consideration and feedback before developing the designs into a final design proposal. You will need to consider the use of materials and the form of construction which will need to be presented to the planning committee and for building control purposes. You will also need to provide an estimate of the costs for materials and labour for the client.

This opportunity will allow you to apply and demonstrate your knowledge and understanding of Construction Technology, Scientific and Mathematical applications of construction and your optional unit.

You need to:

- meet with the client to deliver presentation and establish a list of the design features and constraints
- analyse the site
- write a specification for the design of the new house
- look at the effects of the infrastructure on the local environment
- produce some design sketches to discuss with the client and consider their feedback
- consider a range of materials, their associated properties and how they will behave in the local environment and use
- consider specific design and materials required for the skills from your optional unit
- apply mathematical applications
- review the design ideas in light of the client feedback
- investigate the performance characteristics of potential materials
- analyse the sustainability issues associated with the project
- look at potential construction methods including foundations, walls, floors and roofs
- propose a potential schedule for the project including both desk-based and site-based requirements
- produce a final design proposal to show how the accommodation would be set out
- produce an estimate for the client in relation to build and material costs.

## Links to other units

The table below illustrates how knowledge, understanding and skills from units across this qualification provide links to *Unit 3: Construction and Design*.

Unit	Synoptic links to Unit 3: Construction and Design
Unit 1: Construction Technology	<ul style="list-style-type: none"> <li>• Performance requirements of materials used in the construction industry</li> <li>• Common structural forms for low-rise construction</li> <li>• Preconstruction and site based preconstruction</li> <li>• Groundworks and foundations</li> <li>• Structures:               <ul style="list-style-type: none"> <li>◦ Walls</li> <li>◦ Floors</li> <li>◦ Roofs.</li> </ul> </li> </ul>
Unit 2: Scientific and Mathematical Applications for Construction	<ul style="list-style-type: none"> <li>• Effects of forces on materials and buildings</li> <li>• How materials change and respond to changing environmental conditions</li> <li>• Application of algebra to solve problems</li> <li>• The use of measurement when calculating areas and volumes to calculate costs of time and materials.</li> </ul>
Unit 4: Construction Drawing Techniques Unit 5: Exploring Carpentry and Joinery Principles and Techniques Unit 6: Exploring Brickwork and Blockwork Principles and Techniques Unit 7: Exploring Painting and Decorating Principles and Techniques Unit 8: Exploring Plumbing Principles and Techniques Unit 9: Exploring Electrical Principles and Techniques	<ul style="list-style-type: none"> <li>• When responding to the client brief draw in knowledge gained in the specialist unit for the following as relevant:               <ul style="list-style-type: none"> <li>◦ Design implication</li> <li>◦ Materials used.</li> </ul> </li> </ul>



# Unit 3: Scientific and Mathematical Applications for Construction

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

This unit aims to develop your understanding of the science and mathematics used in construction projects. It will help you to develop the mathematical and scientific skills needed to solve a variety of construction problems.

Did you know that the modern construction industry needs workers with more than just practical craft skills? It's essential to have sufficient knowledge of the science and mathematics principles that underpin both craft, technician and professional activities and to be able to apply those principles correctly when working on construction activities.

An understanding of the properties of construction materials is an essential requirement of almost every job in the construction industry. Whether working as a supervisor, manager, designer or planner, you will always need to know about the materials used to construct buildings and why they are used.

You will learn the scientific principles affecting the performance of construction materials. You will develop skills to perform a wide range of mathematical calculations relating to, for example, dimensions, areas, volumes, material quantities and costs.

You will have the opportunity to investigate the effect of forces acting on construction materials, and to explore how changes in temperature affect materials. This unit also introduces you to the mathematical techniques needed to perform simple calculations relating to commonplace tasks such as setting out, dimensional control, determining material quantities and calculating land areas.

The content of the unit has been designed to focus specifically on concepts that will be clearly and immediately useful to you when undertaking construction-related activities. You will be able to appreciate the importance of these concepts to the construction industry, and be much better placed to apply them in a wide vocational context.

## Learning aims

In this unit you will:

- A understand the effects of forces and temperature changes on materials used in construction
- B use mathematical techniques to solve construction problems.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand the effects of forces and temperature changes on materials used in construction</b></p> <p><b>Topic A.1 Effect of forces</b></p> <p>Understand the effect of forces on construction materials.</p> <ul style="list-style-type: none"> <li>• Typical construction materials (steel, concrete, brick, blocks, aluminium alloys, glass, plastics, wood):             <ul style="list-style-type: none"> <li>◦ key properties (strength, ductility, density)</li> <li>◦ stresses (compressive, tensile, shear, bending).</li> </ul> </li> <li>• Nature of forces:             <ul style="list-style-type: none"> <li>◦ Identifying forces –                 <ul style="list-style-type: none"> <li>– push and pull</li> <li>– active and passive</li> <li>– gravitational forces</li> <li>– forces as loads</li> </ul> </li> <li>◦ Effects on materials –                 <ul style="list-style-type: none"> <li>– change of shape</li> <li>– stresses (compressive, tensile, shear, bending)</li> </ul> </li> <li>◦ Hooke's law (<math>F = -Kx</math>).</li> </ul> </li> <li>• Determining effect of forces:             <ul style="list-style-type: none"> <li>◦ Simple calculations for the following –                 <ul style="list-style-type: none"> <li>– tensile and compressive stresses (Stress = Force/Area)</li> <li>– strain (Strain = Change in length/original length)</li> <li>– modulus of elasticity (Modulus of elasticity = Stress/Strain).</li> </ul> </li> </ul> </li> </ul> <p><b>Topic A.2 Changes in temperature</b></p> <p>Understand how changes in temperature affect construction materials.</p> <ul style="list-style-type: none"> <li>• Typical construction materials (steel, concrete, brick, blocks, aluminium alloys, glass, plastics, wood):             <ul style="list-style-type: none"> <li>◦ key properties (thermal resistance and conductivity, porosity, strength, rate of hydration).</li> </ul> </li> <li>• Scientific principles:             <ul style="list-style-type: none"> <li>◦ changes of state</li> <li>◦ sensible heat</li> <li>◦ evaporation</li> <li>◦ expansion and contraction.</li> </ul> </li> <li>• Effects on construction materials:             <ul style="list-style-type: none"> <li>◦ cooling effect of evaporation</li> <li>◦ expansion of water on freezing and contraction on thawing, its effect on porous construction materials and material cracks and fissures</li> <li>◦ coefficients of thermal expansion for construction materials</li> <li>◦ solving problems involving temperature changes.</li> </ul> </li> </ul>

**What needs to be learnt****Learning aim B: Use mathematical techniques to solve construction problems****Topic B.1 Algebraic and graphical methods**

- Applications:
  - stress–strain relationship for construction materials
  - change in rate of hydration with increase or decrease in temperature
  - relationship between thickness and thermal resistance of an insulating material
  - calculating cost of materials required for a construction activity.
- Rearranging formulae:
  - change subject of simple formulae containing three variables (e.g.  $F = ma$ ,  $V = IR$ ,  $s = vt$ ,  $W = mg$ )
  - complex formulae involving indices, square roots and trigonometric functions of the form: e.g.  $E_k = \frac{1}{2}mv^2$ ,  $T = 2\pi\sqrt{\frac{l}{g}}$ ,  $y = (2x^3)^4$ ,  $a^2 = b^2 + c^2 - 2bccosA$
- Substituting values into and evaluating formulae:
  - determination of numerical value of formulae (using a maximum of four variables, all four arithmetical operations and square and square root terms), of the form: e.g.  $E_k = \frac{1}{2}mv^2$ ,  $T = 2\pi\sqrt{\frac{m}{k}}$ .
- Solving equations:
  - equations of the form, e.g.  $x + 3 = 8$ ,  $6m + 11 = 25 - m$ ,  $2(x + 1) = 8$ ,  $7/x = 2$ ,  $4/t = 2/3$ ,  $3x = 7(8 - 2x)$ .
- Plotting a linear relationship from given data and interpreting information from graphs:
  - Cartesian coordinates
  - gradient and intercept
  - interpolation and extrapolation.
- Accuracy of calculations:
  - use of approximation to check a calculation
  - effects of rounding errors.

**Topic B.2 Mensuration**

Measurement of area of square, rectangle, triangle, circle and trapezium, and surface areas and volumes of cubes, prisms and cylinders.

- Areas:
  - cross-sectional areas of an I-section beam
  - cross-sectional area of a drainage pipe
  - plot of land laid out as a trapezium
  - surface area of a cone.

*continued*

**What needs to be learnt**

- Volumes:
  - cylinder
  - cube
  - prism
  - cone
  - I-section beam.
- Accuracy of calculations:
  - use of approximation to check a calculation
  - effects of rounding errors.

**Topic B.3 Trigonometry**

Using trigonometry.

- Applications:
  - staircase design
  - pitched roofs, setting out and dimensional control, checking for right angles, horizontal alignment, vertical alignment and squareness.
- Pythagoras' theorem:
  - finding lengths in right-angled triangles
  - 3-4-5 triangles.
- Relationships:
  - right-angled triangle functions (sine, cosine, tangent)
  - trigonometric relationship ( $\tan\theta = \sin\theta/\cos\theta$ ).
- Accuracy of calculations:
  - use of approximation to check a calculation
  - effects of rounding errors.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand the effects of forces and temperature changes on construction materials</b>			
1A.1 Identify the effects of forces on materials used in construction using scientific principles.	2A.P1 Explain the action and effects of forces on three different construction materials applying scientific and mathematical principles.	2A.M1 Discuss how two different construction materials behave under load in practical construction contexts.	2A.D1 Evaluate two different construction materials in terms of their behaviour under load and their response to changes in temperature in practical construction contexts.
1A.2 Identify the effects of temperature change on materials used in construction using scientific principles.	2A.P2 Explain the effects of temperature change on three different materials used in construction applying scientific principles.	2A.M2 Discuss the action and effect of extremes of temperature change upon two different construction materials in practical construction contexts.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Use mathematical techniques to solve construction problems</b>			
1B.3 Plot linear relationships and extract information in two construction contexts.*	2B.P3 Apply algebraic and graphical methods to solve two different practical construction problems.*	2B.M3 Solve a practical construction problem using trigonometric, mensuration and algebraic methods.*	2B.D2 Justify the application of algebraic and graphical methods, mensuration and trigonometry to solve a practical construction problem.*
1B.4 Find lengths, areas and volumes in three construction contexts.*	2B.P4 Apply mensuration and trigonometry to solve two different practical construction problems.*		

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

To ensure the vocational relevance of the unit, a range of appropriate, realistic and feasible project material should be available.

There are no special resources required for testing the materials, though centres are encouraged to use equipment for demonstration of the effects of forces and changes in temperature on construction materials.

### Essential information for assessment

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

By the very nature of this unit, it is acceptable for learners to rework their calculations after checking their own work, but it is recommended that reworking is monitored to avoid peer collaboration. Where appropriate, alternative problems could be set to avoid such collaboration.

### Learning aim A

**For 2A.P1:** learners must explain and determine the action and effects of forces on construction materials applying scientific principles. The scientific principles should include gravitational forces and a description of Hooke's law. To determine the effects of forces on construction materials learners should be given three situations involving materials under load, and they must determine, using calculations and diagrams, the stresses, strains and modulus of elasticity. The learner should conclude the effects of the forces on the materials in relation to their findings. Evidence for this criterion could be provided in the form of a presentation (with a teacher observation report) or a report supported with appropriate drawings or sketches together with notes and sketches, for example, with supportive graphs and calculations, based on construction-related investigative activities.

**For 2A.M1:** learners must discuss how two different building materials behave under load. Learners should consider one ductile and one brittle material and analyse their stress–strain relationship as well as the nature of stresses.

**For 2A.P2:** learners must explain the effects of temperature changes on three different construction materials. They should use the coefficients of thermal expansion to determine the effect on three materials from the list provided in topic A.2. Learners should be given three situations and determine sensible heat and latent heat changes, plus the magnitude of any expansion or contraction, for a range of temperature changes.

**For 2A.M2:** learners must discuss the action and effects of extremes of temperature change on two construction materials. This should also include how water, as ice, can damage two building materials when the temperature drops below the freezing point of water, i.e. the expansion of water on freezing, and the effect of repeated cycles of freezing and thawing on the two chosen materials.

**For 2A.D1:** learners must evaluate two building materials in terms of their behaviour under load and their response to changes in temperature in practical construction contexts, including where water is present. The evaluation should include how the response of each material to loads and temperature changes affects the way in which it is used in construction. The materials chosen could be steel and concrete, for example, or plastic and brick. In the former example, evidence might address the strength and ductility of steel, how it provides the tensile strength lacking in concrete, and how the

very similar coefficients of thermal expansion allow them to be used together in reinforced concrete. In the latter example, learners' evidence might explain that although some plastics are as strong as brick, their lack of strength and high coefficient of thermal expansion make them unsuitable for structural purposes. The actual materials selected should be negotiated and agreed between learners and teacher.

**For 1A.1:** learners must identify the effects of forces on construction materials using scientific principles. These should include gravitational forces and an outline of Hooke's law.

**For 1A.2:** learners must identify the effects of temperature changes on three different construction materials. The materials should be chosen from the list provided in Topic A.1.

### Learning aim B

**For 2B.P3:** learners must apply algebraic and graphical methods to solve two different practical construction problems. The algebraic problems should include opportunities to rearrange (transpose) formulae and to evaluate the formulae numerically. Evidence for this criterion could, for example, be derived from applied mathematical work related to other aspects of this unit or to other units within the specification. Alternatively, teachers may devise activities specifically for assessment purposes, but they must ensure that these have a clear and practical relevance to the construction industry. To apply graphical methods, learners can use data generated through other work in this unit or qualification, or use secondary information where it is not. The data may come from practical construction work, setting-out exercises or drawing classes. Learners must decide what they are going to do and apply their findings to reach a conclusion in terms of the construction contexts.

**For 2B.P4:** learners must apply mensuration and trigonometry to solve two different practical construction problems. The problems should include opportunities to calculate areas and volumes and to apply knowledge of Pythagoras' theorem and trigonometric relationships. Learners must decide what they are going to do and apply their findings to reach a conclusion in terms of the construction contexts.

**For 2B.M3:** learners must solve a practical construction problem using trigonometric, mensuration and algebraic methods. Learners must comment on the reliability and accuracy of their answers.

**For 2B.D2:** learners must use and justify their application of algebraic and graphical methods, mensuration and trigonometry to solve a practical construction problem. The problem can have various aspects, such as cost of materials, their stress-strain relationship, calculation of quantities required for a given shape, use in a pitched roof or a staircase, etc. This criterion could be evidenced through written notes and/or an oral presentation supported by an observation record/video evidence.

**For 1B.3:** learners must plot linear relationships and extract information in two construction contexts. Data could be generated through work in this or other construction units, or learners could use secondary data. The data may come from practical construction work, setting-out exercises or drawing classes. For level 1, the work need not be part of a larger problem, but should be related to a construction context. Learners are not required to relate their findings back to the original construction context.

**For 1B.4:** learners must find lengths, areas and volumes in three construction contexts. They must apply mensuration to arrive at correct answers. The assessment should provide opportunities to apply knowledge of Pythagoras' theorem. For level 1, the work need not be part of a larger problem, but should be related to a construction context. Learners are not required to relate their findings back to the original construction context.



## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 2A.P1, 2A.P2, 2A.M1, 2A.M2, 2A.D1	The Use of Science in Construction	A training manager supervising new apprentices to support their studies has been asked to prepare a comparison of construction materials in common use in terms of their behaviour when acted on by forces and temperature changes.	A presentation to include text, diagrams, tables, graphs, test results and calculations as appropriate, accompanied by a written report.
1B.3, 1B.4, 2B.P3, 2B.P4, 2B.M3, 2B.D2	The Use of Mathematics in Construction	A consultant has been contracted to oversee the refurbishment and adaptation of a large, old building into modern office accommodation. This requires calculating the materials, quantities and costs, involving application of algebraic and graphical methods as well as mensuration and trigonometry. The conversion includes renovating and refurbishing a large staircase.	A presentation to include calculations, diagrams, tables, graphs and text as appropriate, accompanied by notes and teacher observation records.



# Unit 4: Construction Processes and Operations

Level: **1 and 2**

Unit type: **Optional specialist (Extended Certificate),  
Mandatory (Diploma)**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

This unit aims to develop your knowledge of the processes and operations used in low-rise construction, the sequencing of construction work, and how the properties of construction materials affect their specification and use. For this unit, 'low-rise construction' applies to a building 5.2 metres in height or less.

Regardless of which role you would choose in the construction industry, understanding the key activities and elements typical of low-rise buildings is an essential requirement of almost every job in the industry. Whether working as a supervisor, manager, designer or planner, you will always need to know about the processes and operations used to construct buildings, and the part each plays in a construction project.

You will study processes and operations in the context of both traditional and modern construction techniques and will develop an awareness of the implications of each. This will help you understand how modern off-site manufacturing processes influence on-site processes and operations.

This unit also offers you an opportunity to explore the correct sequencing of construction activities and the simple planning techniques involved. This will help you understand how the various processes and operations of a project are integrated within the project timeframe.

You will study the practical activities associated with construction, enabling you to become familiar with the natural, processed and manufactured materials in general use in construction, together with the properties that make them suitable for their intended use in a particular element of a building.

## Learning aims

In this unit you will:

- A understand planning and sequencing of construction work
- B know about traditional and modern construction processes and operations used in low-rise construction
- C understand the properties and uses of construction materials.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand planning and sequencing of construction work</b></p> <p><b>Topic A.1 Construction operations</b></p> <p>Understand various stages of construction and construction operations.</p> <ul style="list-style-type: none"> <li>• Stages of construction:             <ul style="list-style-type: none"> <li>◦ setting up site</li> <li>◦ groundwork</li> <li>◦ sub-structure</li> <li>◦ superstructure, including finishes, internal services</li> <li>◦ external works including provision of utility services</li> <li>◦ finishes.</li> </ul> </li> <li>• Construction operations:             <ul style="list-style-type: none"> <li>◦ key activities including                 <ul style="list-style-type: none"> <li>– brickwork and blockwork</li> <li>– carpentry and joinery</li> <li>– roofing.</li> </ul> </li> <li>◦ other activities including                 <ul style="list-style-type: none"> <li>– painting and decorating</li> <li>– groundwork</li> <li>– concrete work</li> <li>– stonemasonry</li> <li>– floor, wall and ceiling finishes</li> <li>– plumbing and heating</li> <li>– electrical installation.</li> </ul> </li> </ul> </li> </ul> <p><b>Topic A.2 Sequencing and planning</b></p> <p>Understand how construction stages and operations are sequenced and the impact of sequencing on the construction process.</p> <ul style="list-style-type: none"> <li>• Appropriate and logical order of construction operations on site:             <ul style="list-style-type: none"> <li>◦ use of Gantt charts.</li> </ul> </li> <li>• Production problems caused by inappropriate planning or sequencing of work.</li> <li>• Effects of production problems and unforeseen events on productivity and cost, e.g. materials shortages, bad weather, accidents on site, industrial action, vandalism, flooding or a major trench collapse.</li> </ul>

**What needs to be learnt****Learning aim B: Know about traditional and modern construction processes and operations used in low-rise construction****Topic B.1 Key elements and their functions in low-rise buildings**

Know the key elements of low-rise buildings to fulfil their functional requirements.

- Functional requirements of key elements of low-rise domestic buildings:
  - key elements and their functions including
    - foundations – to support the building loads
    - floors – to provide a habitable and functional space
    - walls – to provide enclosure for human comfort, support the loads and protect from weathering elements
    - roofs – to make buildings weatherproof and provide human comfort
    - doors – to provide access
    - windows – to allow natural light and ventilation
    - stairs – to provide access
    - services – to provide water supply, drainage, electricity, gas and other services as required.

**Topic B.2 Traditional construction of low-rise buildings**

Understand the processes required for traditional construction of low-rise buildings.

- Processes and operations:
  - setting up a site
  - materials storage
  - setting out a building
  - groundworks
  - on-site craft operations:
    - in-situ concrete
    - brickwork and blockwork
    - roofing works
    - carpentry and joinery
    - finishes
    - service installations.
- Understand the impact of on-site traditional production:
  - use of off-site production of components, elements and materials and its effect:
    - productivity on site
    - costs on site
    - environmental impact.
- Performance in use.

*continued*

**What needs to be learnt****Topic B.3 Modern construction of low-rise buildings**

Understand the processes required for modern construction of low-rise buildings.

- Processes and operations including:
  - setting out the building with greater dimensional coordination
  - just-in-time delivery of components
  - off-site fabrication
    - modules
    - pods
    - frames
    - integrated services.
  - frame construction
  - on-site assembly
  - non-load-bearing curtain walling
  - cladding
  - lightweight demountable internal partitions
  - increasingly sophisticated services.
- Understand the impact of off-site production:
  - use of off-site production components, elements and materials and its effect:
    - productivity on site
    - costs on site
    - environmental impact
    - performance in use
    - safety improvement.

**What needs to be learnt****Learning aim C: Understand the properties and uses of construction materials****Topic C.1 Common construction materials**

Know the classification of materials.

- Natural materials including:
  - stone, timber.
- Processed materials including:
  - aggregates, concrete, bricks, metals, alloys, timber products, bituminous materials.
- Manufactured materials including:
  - cements, limes, plastics, paints.

**Topic C.2 Material uses and properties**

Understand the properties and uses of common construction materials.

- Common construction materials including:
  - bricks
  - concrete
  - timber
  - cements
  - metals
  - bituminous materials
  - plastics
  - aggregates
  - paints.
- Properties of construction materials including:
  - density
  - tensile and compressive strength
  - elasticity
  - ductility
  - porosity
  - thermal resistance
  - resistance to degradation or durability
  - workability
  - thermal conductivity and reflectivity.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand planning and sequencing of construction work</b>			
1A.1 Outline the construction stages for a low-rise building.	2A.P1 Describe the construction stages for a low-rise building.	2A.M1 Explain the construction stages and operations for a low-rise building.	
1A.2 Outline the construction operations for a low-rise building.	2A.P2 Describe the construction operations for a low-rise building.		
1A.3 List the sequence of construction operations for a low-rise building.	2A.P3 Explain the importance of sequencing construction operations for a low-rise building.	2A.M2 Analyse the sequence of construction operations in relation to the problems caused by inappropriate planning and sequencing of construction operations.	2A.D1 Evaluate the sequence of construction operations in relation to the effects of production problems and unforeseen events on productivity and cost for a low-rise building.



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim B: Know about traditional and modern construction processes and operations used in low-rise construction			
1B.4 Identify key elements of a low-rise building.	2B.P4 Describe functional requirements of key elements in low-rise buildings.		
1B.5 Outline the processes and operations used in traditional methods of construction.	2B.P5 Explain the processes and operations used in traditional methods of construction.	2B.M3 Compare traditional and modern construction operations and processes.	2B.D2 Evaluate traditional and modern construction operations and processes.
1B.6 Outline the processes and operations used in modern methods of construction.	2B.P6 Explain the processes and operations used in modern methods of construction.		
Learning aim C: Understand the properties and uses of construction materials			
1C.7 Classify construction materials as natural, processed or manufactured.	2C.P7 Describe the construction materials as natural, processed or manufactured.	2C.M4 Explain how the properties of a natural, a processed and a manufactured construction material determine their performance in use.	2C.D3 Justify the specification of two different construction materials and their performance for use in two different situations.
1C.8 Identify the properties of common construction materials.	2C.P8 Describe the properties of common construction materials.		

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Essential resources

The essential resources required for this unit include a variety of resource material relevant to the construction industry. Case studies of construction projects will help to illustrate both the nature of individual craft operations and the need for proper sequencing of construction processes and operations. A number of prepared Gantt charts, drawings, specifications and schedules for low-rise buildings are required.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

The structure of the unit content suggests that a minimum of three assignments could be used to give learners opportunities to produce the evidence required to achieve all the assessment criteria as detailed in *Suggested assignment outlines*. Use of one overarching construction project is suggested, which can be used to generate the evidence required for different aspects of this unit.

### Learning aim A

**For 2A.P1:** learners must describe the construction stages for a low-rise building. Evidence for this criterion could be given in the form of a presentation (a teacher record/recording of the presentation is required in addition to the presentation materials) or a report based on a real project or a teacher-provided case study. Appropriate drawings, sketches or tables could provide useful evidence.

**For 2A.P2:** learners must describe the construction operations for a low-rise building. Evidence for this criterion could be given in the form of a presentation or a report based on a real project or a teacher-provided case study. Appropriate drawings, sketches or tables could provide useful evidence.

**For 2A.M1:** learners must explain the construction stages and operations for a low-rise building. Evidence for this criterion could be provided in a report based on a real project or a teacher-provided case study. Appropriate drawings, sketches or tables could provide useful evidence.

**For 1A.1:** learners must outline the construction stages for a low-rise building. Evidence for this criterion could be given in the form of a presentation or a report based on a real project or a teacher-provided case study. Appropriate drawings, sketches or tables could provide useful evidence.

**For 1A.2:** learners must outline the construction operations for a low-rise building. Evidence for this criterion could be given in the form of a presentation (teacher record/recording required with supporting materials) or a report based on a real project or a teacher-provided case study. Appropriate drawings, sketches or tables could provide useful evidence.

**For 2A.P3:** Learners must explain the importance of sequencing construction operations for a low-rise building and in doing this they will interpret and extract information from a Gantt chart. The interpretation should also include how these charts are used to plan and sequence construction operations. There is no requirement here for learners to prepare such charts themselves. Evidence for this criterion could take the form of a presentation (teacher record/recording with presentation materials), or written or teacher recorded verbal responses to questions, based around teacher-provided Gantt charts.

**For 2A.M2:** learners must analyse the sequence of construction operations from a given Gantt chart and the production problems caused by inappropriate planning and sequencing of construction operations. Learners must use their knowledge and understanding of the logical sequencing of construction operations to predict the possible consequences of incorrect planning and sequencing of construction operations. Evidence for this criterion could take the form of a presentation (teacher record/recording and supporting materials required), or written or teacher record learner responses to verbal questions.

**For 2A.D1:** learners must evaluate the sequence of construction operations from a given Gantt chart and the effects of production problems and unforeseen events on productivity and costs for a low-rise building. They will need to use their knowledge and understanding of the logical sequencing of construction operations to predict the possible consequences of incorrect planning, sequencing or unforeseen events on production, costs and the satisfactory conclusion of the construction project. The range of unforeseen events could include, for example, materials shortages, bad weather, accidents on site, industrial action, vandalism, flooding or a major trench collapse. Evidence for this criterion could take the form of a presentation (teacher record/recording with supporting materials required), or written or teacher record of learner responses to verbal questions.

**For 1A.3:** learners must list the sequence of construction operations by interpreting a Gantt chart for a low-rise building. The interpretation should focus on how these charts are used to plan and sequence construction operations. There is no requirement here for learners to prepare such charts themselves. Evidence for this criterion could take the form of a presentation (teacher record/recording with supporting materials), or written or teacher record of learner responses to verbal questions, based around teacher-provided Gantt charts.

### Learning aim B

**For 2B.P4:** learners must describe functional requirements of key elements in low-rise buildings. These should include elements such as foundations, floors, walls, roofs, doors, windows, stairs and services. Learners must demonstrate an understanding of what building elements must achieve, rather than how they fulfil those functions. For example, they should be aware that foundations must bear combined imposed and wind loads without causing any settlement or movement that would impair the stability of, or cause damage to, any part of the building, and transmit the combined load to the ground. Learners are not required to know how this is done at this stage. Evidence for this criterion could be provided in the form of a report or presentation (teacher record/recording of presentation required with supporting materials), based, for example, on surveys of real buildings, visits to building sites, off-site fabrication centres, manufacturers' premises or building centres, or through examination of teacher-provided drawings or photographs.

**For 1B.4:** learners must identify the main features and purpose of the key elements of a low-rise building such as foundations, floors, walls, roofs, doors, windows, stairs and services. Learners must demonstrate an understanding of the function of building elements. Evidence for this criterion could be given in the form of a report or an individual learner presentation, based, for example, on surveys of real buildings, visits to building sites, off-site fabrication centres, manufacturers' premises or building centres, or through examination of teacher-provided drawings or photographs.

**For 2B.P5:** learners must explain, by providing clear details and the functions of, the processes and operations used in traditional methods of construction, and support their conclusion on the impact of using traditional methods of construction on overall productivity. These should include setting up a site, materials storage, setting out a building, groundworks and on-site craft operations. The evidence could take the form of checklists, supported with comments, compiled during site visits and completed after in-class discussions subsequent to the visits.

**For 2B.P6:** learners must explain, by providing clear details and the functions of, the processes and operations used in modern methods of construction, and support their conclusion on the impact of using modern methods of construction on productivity. These should include setting out the building, just-in-time delivery, off-site fabrication, on-site assembly, non-load-bearing curtain walling, cladding, lightweight demountable internal partitions, increasingly sophisticated services and frame construction. The evidence could take the form of checklists compiled by the learner during site visits, completed by the learner subsequent to the visit(s) and where necessary, supported with teacher comments.

**For 2B.M3:** learners must compare traditional and modern construction operations and processes in terms of overall productivity, environmental impact, performance in use and costs. The comparison should be based upon learners' research into traditional and modern methods of construction. Evidence for this criterion could be in the form of a written report or an individual learner presentation (teacher record/recording with supporting materials required), or teacher record of learner responses to verbal questions.

**For 2B.D2:** learners must evaluate the effects of traditional and modern construction operations and processes. They must also consider the effect of off-site production of components, elements and materials in terms of overall productivity, environmental impact, performance in use and costs. The evaluation should be based upon teacher-provided case studies of a traditional and a modern low-rise building. Case studies should have sufficient details regarding costs and programme of works. Evidence for this criterion could be in the form of a written report or an individual learner presentation (a teacher record/recording with supporting materials required indicating how the evidence presented meets this criterion), or teacher record of learner responses to verbal questions.

**For 1B.5:** learners must provide a summary of the processes and operations used in traditional methods of construction. These should include setting up a site, materials storage, setting out a building, groundworks and on-site craft operations. The evidence could take the form of learner compiled checklists compiled during site visits and completed by the learner subsequent to the visits and where necessary, supported with teacher comments.

**For 1B.6:** learners must provide a summary of the processes and operations used in modern methods of construction. These should include setting out the building, just-in-time delivery, off-site fabrication, on-site assembly, non-load-bearing curtain walling, cladding, lightweight demountable internal partitions, increasingly sophisticated services and frame construction. The evidence could take the form of learner compiled checklists compiled during site visits and completed by the learner subsequent to the visits and where necessary, supported with teacher comments.

## Learning aim C

**For 2C.P7:** learners must describe the construction materials in common use in the construction industry as either natural (three examples), processed (three examples) or manufactured (three examples). Within their descriptions learners should show they understand how the materials are processed or manufactured. The list of materials could be provided by the teacher. The evidence could be in the form of a written report or an individual learner presentation (a teacher record/recording with supporting materials required indicating how the evidence presented meets this criterion), or teacher record of learner responses to verbal questions.

**For 2C.P8:** learners must describe the properties of common construction materials. This could be done by describing clearly each of the following properties: density, tensile and compressive strength, elasticity, ductility, porosity, thermal resistance, resistance to degradation or durability, workability, creep, thermal conductivity and reflectivity. The learner could present their evidence to the teacher and other members of the group (a teacher record/recording of the presentation required, indicating how the evidence presented meets this criterion).

**For 2C.M4:** learners must explain how the properties for one natural, one processed and one manufactured construction material determine their performance in use. Learners should build upon their awareness of the important properties of natural, processed and manufactured construction materials to explain how this affects the use to which such materials are put, and how this leads to the selection and specification of materials. The evidence can be presented to the teacher and other members of the group (a teacher record/recording of the presentation required indicating how the evidence presented meets this criterion).

**For 2C.D3:** learners must be able to justify the specification of two construction materials for use in two different teacher-specified situations, chosen from those listed in the unit content. Evidence for this criterion could, for example, take the form of written specifications for building elements identified from a survey of a real building, from architectural drawings or from provided photographs.

**For 1C.7:** learners must classify natural, processed or manufactured materials. This can be achieved by providing at least three examples for each type. At this stage learners are not required to produce evidence to show they understand how the materials are processed or manufactured. The evidence can be presented by the individual learner to the teacher and other members of the group (a teacher record/recording of the presentation required indicating how the evidence presented meets this criterion).

**For 1C.8:** learners must identify the properties of common construction materials. Learners should also produce a table of common construction materials with their properties, with short comments such as 'high', 'low', 'good' and 'poor' (for example) in each cell. The important criteria vary from material to material but might include some or all of the following: density, tensile and compressive strength, elasticity, ductility, porosity, thermal resistance, resistance to degradation or durability and workability. The evidence can be presented by the individual learner to the teacher and other members of the group (a teacher record/recording of the presentation required indicating how the evidence presented meets this criterion).

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1A.3, 2A.P1, 2A.P2, 2A.P3, 2A.M1, 2A.M2, 2A.D1	Planning and Sequencing of Construction Work	You have been asked by your manager to consider the building operations sequence involved with a given low-rise building.	A report to include text, diagrams, tables and graphs as appropriate. Group presentation.
1B.4, 1B.5, 1B.6, 2B.P4, 2B.P5, 2B.P6, 2B.M3, 2B.D2	Traditional and Modern Methods of Construction	You have been asked by your line manager to investigate the differences between the construction methods used on two building sites, one modern and one traditional.	A report to include text, diagrams, tables and graphs as appropriate.
1C.7, 1C.8, 2C.P7, 2C.P8, 2C.M4, 2C.D3	Construction Materials	As part of your professional development, your manager has asked you to carry out research on common construction materials. You have also been asked to investigate how material properties determine the uses to which they are put.	Group presentations.

# Unit 5: Construction Drawing Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Regardless of which role you would choose in the construction industry, interpretation of drawings would be an essential part of it. Drawing is the main language of the construction industry as it is considered a clear, accurate and convenient way of communicating construction information. This unit offers you opportunities to interpret the information contained in various types of drawings. This skill is transferable and you can use it in a range of contexts within the industry.

In this unit you will initially investigate the different kinds of drawings used in the construction industry and explore the purpose of each. This will be followed by an introduction to the resources needed to produce these drawings. You will become familiar with the drawing equipment and materials in common use. You will also be introduced to a computer-aided drafting (CAD) environment.

You will then build upon this knowledge and understanding to explore drawing standards and conventions in common use. This will include scales, hatchings, lines, dimensions, annotations and projection methods used in construction drawings.

It is generally believed that the best way to learn construction drawing is to practise its techniques, and that is what you will do. You will have the opportunity to develop skills in producing construction sketches and drawings using relevant techniques, conventions and standards. The unit allows opportunities to apply manual techniques, CAD or a mix of the two.

## Learning aims

In this unit you will:

- A understand the requirements to produce construction drawings
- B explore the production of construction drawings.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand the requirements to produce construction drawings</b></p> <p><b>Topic A.1 Purpose of drawings</b></p> <p>Understand the information required at various stages of the construction process and the purpose of using different types of drawings.</p> <ul style="list-style-type: none"> <li>• Identification of the information required at various stages of the construction process.</li> <li>• Types of drawings:             <ul style="list-style-type: none"> <li>◦ location, assembly, component, presentation, working drawings.</li> </ul> </li> <li>• Purpose of each type:             <ul style="list-style-type: none"> <li>◦ <i>location drawings</i>: show position of buildings on site</li> <li>◦ <i>assembly drawings</i>: show how components and elements are put together</li> <li>◦ <i>component drawings</i>: show details of individual components such as windows, doors, staircases and fitted kitchen units</li> <li>◦ <i>presentation drawings</i>: convey information to the client</li> <li>◦ <i>working drawings</i>: show how to construct buildings and other structures.</li> </ul> </li> </ul> <p><b>Topic A.2 Manual materials and equipment</b></p> <p>Understand the materials and equipment required to produce drawings using manual techniques.</p> <ul style="list-style-type: none"> <li>• Manual techniques –             <ul style="list-style-type: none"> <li>◦ equipment:                 <ul style="list-style-type: none"> <li>– including pencil, pen, compasses, adjustable set square, eraser, drawing board, scale rule, dividers, protractors, french curves, stencils</li> </ul> </li> <li>◦ materials:                 <ul style="list-style-type: none"> <li>– paper – detail paper, cartridge paper, tracing paper, paper sizes (A0, A1, A2, A3, A4)</li> <li>– media – pencil (HB, H, 2H), pen (0.2–0.25 mm and 0.4–0.5 mm) and ink.</li> </ul> </li> </ul> </li> </ul> <p><b>Topic A.3 Computer-aided drafting (CAD)</b></p> <p>Understand the features of a CAD system.</p> <ul style="list-style-type: none"> <li>• Features of a CAD system to include:             <ul style="list-style-type: none"> <li>◦ basic drawing commands and editing commands to produce and erase lines, circles, text</li> <li>◦ manipulation of views, including zoom and pan options</li> <li>◦ saving the drawing data in an appropriate format</li> <li>◦ drawing template, to typically include a border, title block, projection, scale, drawing number, title of drawing, material, names of drawing creator and who checks/authorises the drawing</li> <li>◦ health and safety requirements.</li> </ul> </li> <li>• Evaluating drawings:             <ul style="list-style-type: none"> <li>◦ resources and techniques</li> <li>◦ costs and benefits.</li> </ul> </li> </ul>



**What needs to be learnt****Learning aim B: Explore the production of construction drawings****Topic B.1 Drawing conventions**

Know the conventions used and standards required for the production of construction drawings.

- Conventions –
  - *scales*: e.g. 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:1250, 1:2500
  - *hatchings*: brickwork, blockwork, concrete, stone, soil/earth, timber, plywood, hardcore, insulation
  - *lines*: centre lines, grid lines, break lines, section lines, outlines, dimension lines, hidden detail
  - *dimensions*: modular, running, for coordination, for sizing work
  - *annotation*: upper case, lower case
  - *projection methods*: orthographic.
- Standards –
  - patterns and conventions as indicated in the Code of Practice, BS1192: 2007 and subsequent updates.

**Topic B.2 Drawings**

Produce plans, elevations, sections and details typical of a domestic dwelling.

- Floor plans.
- Front and rear elevations
- One section
- One foundation and one roof detail.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand the requirements to produce construction drawings</b>			
1A.1 Identify different types of drawings used at various stages of the construction process.	2A.P1 Describe the purpose of different types of drawings required at various stages of the construction process.	2A.M1 Explain the production of drawings and the equipment/media used to produce them.	2A.D1 Evaluate the production of drawings using computer aided design and traditional drafting techniques.
1A.2 Interpret information communicated through different types of drawings, with guidance.	2A.P2 Interpret information communicated through different types of drawings.		
1A.3 Identify equipment and materials used to manually produce construction drawings.	2A.P3 Describe the appropriate selection and use of equipment and materials needed to produce construction drawings manually.		
1A.4 Identify the features of a computer-aided-design system.	2A.P4 Describe the features of a computer-aided-design system.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Explore the production of construction drawings</b>			
1B.5 Outline standard convention requirements for production of construction drawings.	2B.P5 Describe drawing conventions and standards used in the construction industry.	2B.M2 Produce construction drawings to meet a given brief that are: <ul style="list-style-type: none"> <li>• precise</li> <li>• technically accurate</li> <li>• drawn to appropriate scales.*</li> </ul>	2B.D2 Evaluate construction drawings produced to meet a given brief in terms of compliance with current British Standards.*
1B.6 Produce construction drawings to meet a given brief drawn to an appropriate scale.*	2B.P6 Apply drawing standards and conventions to produce construction drawings to meet a given brief, drawn to appropriate scales.*		

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit include a drawing studio containing drawing boards and equipment of a standard that will enable learners to achieve the assessment requirements. Access to computing facilities and introductory-level software will also be required.

As industry is increasingly moving towards use of computer-aided-design systems (CAD), the assessment criteria allow for production of drawings using CAD for which access to a suitably equipped computing room with printing/plotting facilities will be required. Software requirements for this unit may be considered at an introductory level, for which there are suitable free or inexpensive packages available.

### Essential information for assessment

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

The use of two assignments is suggested to allow full coverage of the outcomes as detailed in Suggested assignment outlines.

### Learning aim A

**For 2A.P1:** learners must give simple descriptions of the purpose of each of the drawings. Learners should have the opportunity to look at a variety of teacher-provided drawings, including at least one example of each of the types listed in the unit content. Evidence for this criterion could be provided by annotations to these, or by presentation evidenced by observation record/video recording.

**For 2A.P2:** learners must interpret the information communicated through different types of drawings. These teacher-provided drawings should include at least one example of each of the types listed in the unit content as in 2A.P1. Evidence requirements for this criterion are similar to 2A.P1.

**For 2A.P3:** learners must describe the appropriate equipment and materials required for construction drawings. They are not required to select or use any specific drawing conventions at this stage. Evidence for this criterion could be derived, for example, through assessment of learner work, or a presentation evidenced by observation record/video recording.

**For 2A.P4:** learners must describe the features of a CAD system as indicated in topic A3. This should include basic drawing and editing commands, manipulation of views and saving the drawing data in an appropriate format. It should conclude with learners developing a drawing template, typically to include a border, title block, projection, scale, drawing number, title of drawing, material, names of drawing creator and who checks/authorises the drawing. Evidence for this criterion could be provided by teacher records of direct observation or by oral presentation evidenced by observation record/video recording.

**For 2A.M1:** learners must explain which drawing equipment and materials are appropriate for producing a variety of teacher-provided drawings. This must include at least one example of each of the types listed in topic A.1. Evidence for this criterion could, for example, be derived through an extension of the assessment activities suggested for 2A.P1, 2A.P2 and 2A.P3.

**For 2A.D1:** learners must look at a number of construction drawings, including at least one example of each of the types listed in topic A1 the unit content, evaluate the fitness for purpose of the type of drawing employed, and relate this to the relative costs of the resources and techniques required to produce that drawing. Learners are required to express ideas and information clearly, precisely, accurately and appropriately in spoken and written communication. Evidence for this criterion could be in the form of a written report or by oral presentation evidenced by observation record/video recording.

**For 1A.1:** learners must identify the different types of drawings used at various stages of the construction process. They should have the opportunity to look at a variety of teacher-provided drawings, including at least one example of each of the types listed in the unit content. The type of drawing should not be explicitly clear. Learners must identify the type of drawing used at various stages of the construction process. Evidence for this criterion could be provided by annotations to the drawings, or by oral presentation evidenced by observation record/video recording.

**For 1A.2:** learners must interpret the information communicated through a construction drawing. These teacher-provided drawings should include at least one example of each of the types listed in the unit content as in 1A.1. Evidence requirements for this criterion are similar to those for 1A.1.

**For 1A.3:** learners must identify the main items of equipment and materials used to produce construction drawings, as set down in the unit content. Learners are not required to select specific equipment or materials for given tasks to achieve this assessment criterion. Evidence for this criterion could be provided by annotations to the teacher-provided drawings, , or by oral presentation evidenced by observation record/video recording.

**For 1A.4:** learners must identify the features of a CAD system as provided in topic A.3. This should include basic drawing and editing commands, manipulation of views and saving the drawing data in an appropriate format. It should conclude with learners developing a drawing template, typically to include a border, title block, projection, scale, drawing number, title of drawing, material, names of drawing creator and who checks/authorises the drawing. Learners will be expected to set up the system correctly and safely. Evidence for this criterion could be by oral presentation evidenced by observation record/video recording.

## Learning aim B

**For 2B.P5:** learners must describe the drawing standards and conventions used in the construction industry. They must be able to differentiate between standards and conventions and identify where each is used. They are not required to give evidence of their use in construction drawings. Evidence for this criterion could be in the form of a written report or by oral presentation evidenced by observation record/video recording.

**For 2B.P6:** learners must produce a range of drawings, to be specified by means of a centre brief, or agreed with the teacher and presented in a portfolio containing the work to be assessed. These drawings should include at least one floor plan, one front and one rear elevation, one section, one foundation detail and one roof detail. To give relevance to learners they could be linked to a single building such as the learner's home, or perhaps to a local building of interest. Learners' work must demonstrate use of the appropriate standards, conventions and scale. The work may be produced using manual techniques, CAD or a mix of the two.

**For 2B.M2:** learners must produce construction drawings. The range is to be specified by, or agreed with, the teacher and presented in a portfolio containing the work to be assessed. These drawings should include at least one floor plan, one front and one rear elevation, one section, one foundation detail and one roof detail. To give relevance to learners they could be linked to a single building such as the learner's home, or perhaps to a local building of interest. For the assessed work to achieve the standard required by the merit criterion it must provide evidence that learners' work is precise and technically accurate. The work must consistently be neat and tidy, the correct scales and projections must have been used, and learners must have made appropriate and consistent use of lines and hatching. Dimensioning and annotation must be clear and correct. The work may be produced using manual techniques, CAD or a mix of both.

**For 2B.D2:** The range of learner produced construction drawings to be evaluated is to be specified by, or agreed with, the teacher and presented in a portfolio containing the work to be assessed. These drawings should include at least one floor plan, one front and one rear elevation, one section, one foundation detail and one roof detail. To give relevance to learners they could be linked to a single building such as the learner's home, or perhaps to a local building of interest. The construction drawings to be evaluated may be produced using manual techniques, CAD or a mix of both.

**For 1B.5:** learners must outline the standard convention requirements for production of construction drawings. They are not required to differentiate between standards and conventions. They are not required to give evidence of their use in sketches or construction drawings. Evidence for this criterion could be in the form of a written report or by oral presentation evidenced by observation record/video recording.

**For 1B.6:** learners must produce construction drawings. The range is to be specified by, or agreed with, the teacher and presented in a portfolio containing the work to be assessed. These drawings should include at least one floor plan, one front and one rear elevation, one section, one foundation detail and one roof detail. To give relevance to learners they could be linked to a single building such as the learner's home, or perhaps to a local building of interest. The assessed work must demonstrate use of the appropriate scale. The work may be produced using manual techniques, CAD or a mix of both.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1A.3, 1A.4, 2A.P1, 2A.P2, 2A.P3, 2A.P4, 2A.M1, 2A.D1	Construction Drawings and Resources	You are working in a design practice. As part of the induction programme for trainee technicians, your manager has asked you to produce a report on types of drawings, their purpose, drawing equipment and materials, together with an introduction to CAD techniques.	Report comprising text, images, tables and charts as appropriate.  Observation record of learner presentation.
1B.5, 1B.6, 2B.P5, 2B.P6, 2B.M2, 2B.D2	Producing Construction Drawings	A client has asked you to produce construction drawings of a local building of interest. The work may be produced using manual techniques, CAD or a mix of both.	A portfolio containing two floor plans, one front and one rear elevation, one section showing staircase details, one foundation detail and one roof detail.





# Unit 6: Exploring Carpentry and Joinery Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Did you know that carpenters normally work on construction sites fitting staircases, doors and windows, while joiners work in joinery workshops manufacturing the staircases, doors and windows?

The knowledge and skills you will develop are used in today's construction industry. Both carpenters and joiners will at some time have to make a timber frame. For example, carpenters would assemble a door frame on site to fit into a brick wall, while a joiner would make a window frame in a workshop for an external wall.

This unit will introduce you to the tools, materials and personal protective equipment (PPE) used by carpenters and joiners. You will learn about the potential health and safety hazards in a carpentry and joinery work area, how to carry out a risk assessment, and what is safe working practice in the use of common tools and equipment. You will also develop the knowledge, skills and techniques to determine and select appropriate materials to produce a timber frame to a given specification.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used in carpentry and joinery tasks
- B develop practical skills using safe techniques to produce a timber frame.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand tools, materials and equipment used in carpentry and joinery tasks

##### Topic A.1 Tools, materials, equipment and information for carpentry and joinery

Purpose and use of tools, materials, equipment and information for carpentry and joinery tasks.

- Setting-out tools including:
  - steel rule
  - tri-square
  - sliding bevel
  - carpenter's pencil
  - marking/mortice gauges
  - combination square
  - tape measure
  - spirit level.
- Hand tools and equipment including:
  - mallet
  - chisels (bevelled and mortice)
  - tenon saw
  - universal saw
  - nail punch
  - claw hammer
  - nail pincers
  - marking knife
  - screwdrivers (slotted, pozi drive, Phillips)
  - bradawl
  - cordless drill
  - drill types (twist, auger) and sizes
  - smoothing plane, block plane.
- Equipment including:
  - sizes of G clamps
  - sash cramps
  - bench hook
  - woodworking bench with vice.

*continued*

### What needs to be learnt

- Information including:
  - purpose of drawings
  - how to read drawings
  - units of measurement
  - common abbreviations and symbols used
  - title box.
- Materials including those used in the construction of a timber frame, their properties and characteristics:
  - wood and wood composites
    - types of softwood, different sizes, characteristics, properties and use: softwood finishes (rough sawn, regularised, planed all round), effect of grain, knots, plywood construction (different thicknesses), medium density fibreboard (MDF) (different thicknesses)
    - renewable wood sources, how to identify, the Forest Stewardship Council (FSC)
  - types of glue, properties and use: natural adhesives, synthetic glues (polyvinyl acetate)
  - types of fixings – oval nails, panel pins, round wire nails, pozi drive woodscrews, wall plugs, sizes available, fixing use and selection
  - finishing materials – abrasive paper types, grades of paper, finishing material use.

### Topic A.2 Safe use and storage of the carpentry and joinery tools, materials and equipment

- Appropriate practices when working with carpentry and joinery equipment and materials.
- Selection and use of personal protective equipment (PPE): high-visibility visor, safety boots, eye protection, dust mask, ear plugs, ear defenders, knee pads.
- Appropriate storage of tools, materials and equipment: storage of glues (shelf life/pot life), dry, under cover, between batons for ventilation, timber bearers, pallets, height restrictions with respect to storage, security.
- Maintaining a clean and tidy storage area.
- Safe movement of items: safe manual handling techniques when lifting, moving, stacking materials.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Cleaning tools immediately after use to prevent build-up of deposits and maintain fitness for future use.
- Returning tools and equipment to appropriate storage upon completion of practical work.

## What needs to be learnt

### Learning aim B: Develop practical skills using safe techniques to produce a timber frame

#### Topic B.1 Health and safety

Risk assessment prior to starting the activity and approved procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - specified task – trips, slips, cuts and injuries caused by tools and equipment
  - awareness of other people in the area
  - safe movement of items and minimisation of musculoskeletal injuries (manual lifting techniques)
  - dust
  - flying particles
  - use of tools and equipment.
- Identification of people at risk.
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices, including the use of personal protective equipment (PPE):
  - ensuring a clean and tidy work area
  - the need for appropriate behaviour and a positive attitude towards health and safety
  - cleaning tools immediately after use to prevent build-up of deposits and maintain fitness for future use.

#### Topic B.2 Construction of a timber frame

Measuring, marking out, cutting and constructing timber joints.

- Preparing and setting up the work area:
  - marking out and cutting of practice joints (bridle joint, mitre joint, half lap joint, housing joint, tee halving joint, dovetail joint, mortice and tenon joint)
  - assembly of joint
  - measuring, marking out and constructing a timber frame using a setting-out rod.
- Cutting joints to make a timber frame:
  - gluing up a timber frame using sash cramps/G clamps on a level surface
  - checking frame is square (check diagonals).
- Safe use of chisels, saws, cordless drills.
- Using dust-minimisation techniques.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for carpentry and joinery tasks</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials in carpentry and joinery.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment for carpentry and joinery.	2A.M1 Justify the selection of tools, materials and equipment for a specified carpentry and joinery task.	2A.D1 Evaluate the use of alternative materials for a specified carpentry and joinery task.
1A.2 Outline the safe use and storage of carpentry and joinery tools, materials and equipment.	2A.P2 Explain the safe use and storage of carpentry and joinery tools, materials and equipment.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to produce a timber frame</b>			
1B.3 Identify hazards and control measures prior to commencing the construction of a timber frame.	2B.P3 Carry out a risk assessment prior to commencing the construction of a timber frame.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		
1B.5 Measure and mark out four different types of joints for a 300 × 300 mm timber frame to a given specification with guidance.*	2B.P5 Measure and mark out four different types of joints for a 300 × 300 mm timber frame to a given specification. Dimensionally square to 3 mm.*	2B.M2 Measure and mark out four different types of joints for a 300 × 300 mm timber frame to a given specification. Dimensionally square to 2 mm.*	2B.D2 Measure and mark out four different types of joints for a 300 × 300 mm timber frame to a given specification. Dimensionally square to 1 mm.*
1B.6 Produce a timber 300 × 300mm frame using four different types of joints to a given spec, with guidance: <ul style="list-style-type: none"> <li>• ±3 mm joint gap tolerance.*</li> </ul>	2B.P6 Produce a 300 × 300 mm timber frame using four different types of joints to a given spec: <ul style="list-style-type: none"> <li>• ±3 mm joint gap tolerance.*</li> </ul>	2B.M3 Produce a 300 × 300 mm timber frame using four different types of joints to a given spec: <ul style="list-style-type: none"> <li>• ±2 mm joint gap tolerance</li> <li>• not twisted.*</li> </ul>	2B.D3 Produce a 300 × 300 mm timber frame using four different types of joints to a given spec: <ul style="list-style-type: none"> <li>• ±1 mm joint gap tolerance</li> <li>• not twisted.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Essential Resources

This unit requires a fully equipped carpentry and joinery workshop, with tools and materials of a nature and standard typical of a real, industrial work environment, together with personal protective equipment (PPE) applicable to the production of the practical task. For the assessment of Learning aim B, learners will require a specification of a frame to work towards which includes four different types of joint.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

### Learning aim A

Learners could provide written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from the teacher. When oral evidence is given, this should be confirmed via an observation record.

**For 2A.P1:** learners should explain how tools, materials and equipment are used in carpentry and joinery and provide supported reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of twelve tools, five types of fixings, two types of glue, three types of wood/wood composites, and three different types of equipment.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific construction situation, and justify which tools, materials and equipment they would use for this task. Learners should explain, with reasons, why they selected items, e.g. 'Softwood because it is durable and fit for purpose and also sustainable'.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation for the merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for carpentry and joinery; a minimum of twelve tools, five types of fixings, two types of glue, three types of wood/wood composites, and three different types of equipment.

**For 2A.P2:** learners should explain how to safely use and store the tools, materials and equipment from 2A.P1, including in their explanations the reasons why these activities are undertaken. This should also include how to safely move items working as an individual or within a team-lifting situation. The learner could provide written evidence, make an individual presentation to their peers and their teacher, or respond to verbal questioning from their teacher. Where learners make a presentation or respond to teacher questioning, a teacher record is required.

**For 1A.2:** learners should outline how to safely use and store the tools, equipment and materials for 1A.1. Their outline does not need to include the reasons why tools, equipment and materials are used and stored in these ways.

## Learning aim B

For learning aim B, learners will work towards producing a 300 × 300 mm frame which includes four different types of joints. Observation records and the completion of quality control sheet can be used to evidence the production of the frame, as well as photographs of the learner undertaking the work. Learners are required to produce a suitable risk assessment for their activity before they begin, and should work safely throughout the Learning aim in order to produce their frame. Teacher observation records can be produced as evidence.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the practical activity. This should include identification of hazards, the risks associated with the practical activity, the people at risk and appropriate control measures to minimise the risk. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners need to identify, i.e. show that they recognise what and where hazards are present in the work area and the control measures required prior to beginning the construction of a timber frame. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 2B.P4:** learners need to work safely when undertaking the practical task. Learners would demonstrate safe working practices and use personal protective equipment (PPE).

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical task using personal protective equipment (PPE).

Having considered safe working practices, learners will measure and mark up and then produce their frame. These assessment criteria can be evidenced by the learner producing a timber frame from a given working drawing or setting-out rod provided by the teacher.

**For 2B.P5:** learners need to measure and mark up materials to produce their frame. The accuracy of their measurement and mark up could be evidenced by photographs or observation records. The measurement and marking out will be dimensionally square to within 3 mm.

**For 2B.M2:** learner measurement and marking out of materials to produce their frame needs to meet the criterion of dimensionally square to within 2 mm.

**For 2B.D2:** learner measurement and marking out of materials to produce their frame needs to meet the criterion of dimensionally square to within 1 mm.

**For 1B.5:** learners will need guidance in order to complete the measurement and mark up of their materials to produce their joint.

Following mark up and measurement, teachers should check that the learner is in an appropriate position to move onto cutting the timber for the frame, and provide guidance during the cutting to ensure learners can move onto producing the frame itself. These criteria can be evidenced by photographs of the frame, including shots which show the size of the tolerances, or by a teacher observation record.

**For 2B.P6:** learners will produce a 300 × 300 mm timber frame which includes four different types of joints to a given spec. The gap tolerance for the frame should be ± 3 mm.

**For 2B.M3:** learners will increase the accuracy of the tolerances in their frame to achieve the merit criteria. The frame should have improved tolerances (±2mm gap tolerance) and the joints should not be twisted.



**For 2B.D3:** The distinction criterion requires the timber frame to be produced using joints to tolerances of  $\pm 1$  mm gap tolerance and not twisted.

**For 1B.6:** learners should produce a timber frame using four different types of joints to a given spec ( $\pm 3$  mm gap tolerances). However, learners will need guidance in order to complete their frame.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P2, 1A.2	Safe Use and Storage of Tools	As part of an induction you have to explain to a new employee about the safe use and storage of tools, materials and equipment.	Teacher observation/witness statement. Written or oral report.
2A.P1, 2A.M1, 2B.D1, 1A.1  2B.P4, 2B.P5, 2B.P6, 2B.M2, 2B.M3, 1B.5, 1B.4, 1B.6, 2B.P3, 1B.3	Produce a Timber Artefact	<p>As an employee in a joinery business you are required to make a small, useful timber item to go in a shop display to advertise the high standard of craft skills and work in the joinery shop.</p> <p>For the basis of the artefact, you need to produce a 300 × 300 mm timber frame which includes four different types of joint.</p> <p>You will need to include several stages in your production of the frame, including:</p> <ul style="list-style-type: none"> <li>• a risk assessment</li> <li>• how to work safely</li> <li>• selecting and justifying appropriate materials</li> <li>• reviewing alternative materials</li> <li>• measuring and marking up</li> <li>• production of the frame itself.</li> </ul>	<p>Practical performance photograph and teacher observation/witness statement.</p> <p>Completed materials and equipment requisition sheet.</p>

# Unit 7: Exploring Brickwork and Blockwork Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Did you know that bricklaying is one of the oldest construction crafts, and structures exist in the Near East and India that are more than 5000 years old? This unit will introduce you to the safe selection and use of tools and equipment in order to develop the skills needed to construct basic brickwork and blockwork structures.

Brickwork forms a large proportion of the visual elements of buildings and structures in our towns and cities. Bricklayers are justified in feeling proud of their valuable contribution to the built environment. Unlike other elements of construction, which are renewed, replaced or repaired throughout the life cycle of a building, brickwork and blockwork are durable and long lasting. In fact, brickwork and blockwork often form 'the structure' of the building itself.

Bricklayers use bricks and mortar to build structures such as external and internal walls, bridges and chimneys, using a variety of specialist tools to carry out precise and accurate work from architectural drawings.

As bricklaying is such an old craft, specific terminology, varying techniques, patterns and processes have developed. Bricks themselves are made to standard sizes out of clay that has been either formed in a mould or extruded and wire cut, then fired in a kiln. The standard sizing of bricks allows them to be overlapped in a variety of regular patterns known as bonds, and it is this bonding that gives brickwork both its regular and attractive appearance and its strength and stability.

This unit will introduce you to commonly used hand tools, equipment and craft skills needed to construct basic brickwork and blockwork structures. Emphasis is placed on the correct selection and safe use of the appropriate tools and equipment, and on working safely.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used for brickwork and blockwork
- B develop practical skills using safe techniques to construct brickwork and blockwork.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand tools, materials and equipment used for brickwork and blockwork</b></p> <p><b>Topic A.1 Tools and equipment used to construct brickwork and blockwork</b></p> <p>Purpose and use of tools and equipment for quality brickwork and blockwork.</p> <ul style="list-style-type: none"> <li>• Setting-out tools and equipment including:             <ul style="list-style-type: none"> <li>◦ measuring tape</li> <li>◦ gauge rod</li> <li>◦ spirit level</li> <li>◦ builders line and pins</li> <li>◦ corner blocks</li> <li>◦ tingle plate</li> <li>◦ building profiles.</li> </ul> </li> <li>• Hand tools and equipment including:             <ul style="list-style-type: none"> <li>◦ walling trowel</li> <li>◦ pointing trowel</li> <li>◦ jointing iron</li> <li>◦ wheeled recessed jointer</li> <li>◦ brick hammer</li> <li>◦ club hammer</li> <li>◦ bolster chisel.</li> </ul> </li> </ul> <p><b>Topic A.2 Materials used for constructing brickwork and blockwork</b></p> <p>Types of materials used for brickwork and blockwork and their properties.</p> <ul style="list-style-type: none"> <li>• Bricks including facing bricks, common bricks and engineering bricks:             <ul style="list-style-type: none"> <li>◦ locations where the different types of bricks are used                 <ul style="list-style-type: none"> <li>– external skins of cavity walls, external walls, manholes, structural work internal feature walls, unseen work</li> </ul> </li> <li>◦ the properties that make them fit for purpose within that location                 <ul style="list-style-type: none"> <li>– structural strength, durability, aesthetics, porosity.</li> </ul> </li> </ul> </li> <li>• Blocks including solid blocks, insulation blocks, fairfaced blocks:             <ul style="list-style-type: none"> <li>◦ locations where the different types of blocks are used                 <ul style="list-style-type: none"> <li>– internal skins of cavity walls, internal plastered walls, internal unplastered walls, sub-structures</li> </ul> </li> <li>◦ the properties that make them fit for purpose within that location                 <ul style="list-style-type: none"> <li>– structural strength, insulation, aesthetics, porosity.</li> </ul> </li> </ul> </li> <li>• Materials used for the preparation of mortar including building sand, cement, lime and water:             <ul style="list-style-type: none"> <li>◦ typical mortar mixes and proportions, their properties and uses                 <ul style="list-style-type: none"> <li>– 1:3 cement/sand and 1:1:6 cement/lime/sand.</li> </ul> </li> </ul> </li> <li>• Materials used for the forming of cavities:             <ul style="list-style-type: none"> <li>◦ wall ties: wire, double triangular, butterfly, fishtail, polypropylene.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****Topic A.3 Safe use and storage of tools, materials and equipment for brickwork and blockwork**

Appropriate practices when working with brickwork and blockwork.

- Use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, high-visibility jacket.
- Use of task-specific PPE when cutting and laying bricks, e.g. barrier cream, gloves, eye protection.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Maintaining a clean and tidy work area.
- Safe manual handling when lifting, moving and stacking materials.
- Correct use of tools and equipment.
- Cleaning tools immediately after use to prevent the build-up of mortar deposits.
- Returning tools to appropriate storage upon completion of practical work.
- Appropriate storage methods for bricks, blocks, sand, cement.

**Learning aim B: Develop practical skills using safe techniques to construct brickwork and blockwork****Topic B.1 Health and safety**

Risk assessment prior to starting the activities and procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - slips, trips and falls
  - cuts and injuries caused by tools and equipment
  - abrasive materials
  - lime
  - cement
  - falling objects
  - untidy work area
  - musculoskeletal injuries resulting from lifting and moving heavy loads
  - flying particles from cutting operations.
- Identification of people at risk.
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices, including using personal protective equipment (PPE).

*continued*

**What needs to be learnt****Topic B.2 Cavity walls**

Setting out and constructing cavity walls using brickwork and blockwork.

- Preparing and setting up the work area.
- Setting out the work, including the use of a gauge rod or corner profiles for brickwork and blockwork.
- Trowel skills including:
  - rolling mortar
  - spreading and preparation of the bed joint
  - application of mortar to vertical joints
  - simple tooled 'bucket handle' jointing.
- Bonding method: stretcher bond.
- Laying and bedding bricks and blocks to line.
- Half brick wall to line in stretcher bond.
- Block walling to straight lengths in stretcher bond.
- Forming cavities and methods of maintaining a clean cavity.
- Correct placement and spacing of wall ties.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for brickwork and blockwork</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials for brickwork and blockwork.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment for brickwork and blockwork.	2A.M1 Justify the selection of tools, materials and equipment for a specified brickwork and blockwork task.	2A.D1 Evaluate the use of alternative materials for a specified brickwork and blockwork task.
1A.2 Outline the safe use and storage of brickwork and blockwork tools, materials and equipment.	2A.P2 Explain the safe use and storage of brickwork and blockwork tools, materials and equipment.		
<b>Learning aim B: Develop practical skills using safe techniques to construct brickwork and blockwork</b>			
1B.3 Identify hazards and control measures prior to commencing brickwork and blockwork activities.	2B.P3 Carry out a risk assessment prior to commencing brickwork and blockwork activities.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
1B.5 Construct a cavity wall to a given specification, with a minimum of six courses of bricks and two courses of blocks (450 mm high), with guidance.*	2B.P5 Construct a cavity wall to a given specification with a minimum of nine courses of bricks and three course of blocks (675 mm high).*	2B.M2 Construct cavity walls to a given specification, with a minimum of nine courses of bricks and three courses of blocks (675 mm high), with an appropriate joint, where: <ul style="list-style-type: none"> <li>• both faces of the wall are plumb to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• face plane deviation to both faces of the wall is accurate to <math>\pm 10</math> mm.*</li> </ul>	2B.D2 Construct a cavity wall to a given specification, with a central feature in the brick face using contrasting or recessed bricks, where: <ul style="list-style-type: none"> <li>• brickwork is clean with bricks selected, blended and laid with an appropriate joint</li> <li>• both faces of the wall are plumb to a tolerance of <math>\pm 5</math> mm per m height and length</li> <li>• face plane deviation is accurate to <math>\pm 5</math> mm.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills



## Teacher guidance

### Resources

Learners will require access to a bricklaying workshop, with hand tools and materials of a nature and standard typical of a real, industrial work environment. Learners will need:

- an appropriate means of mixing mortar, e.g. a mortar mill which will allow the easy recycling of sand-lime mortar used for learners' work
- personal protective equipment (PPE) , including safety boots, barrier cream, gloves and eye protection, along with other PPE that may be specific to the working environment.

The learning environment must be a safe place to work, with adequate space for safe construction of sample walls, washing facilities for the removal of mortar from exposed skin, and access to first-aid facilities.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Learners will complete one assignment task which will be the construction of a cavity wall.

### Learning aim A

**For 2A.P1:** learners should explain how tools, materials and equipment are used in brickwork and blockwork and provide supported reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of five setting-out tools, five types of hand tools and equipment, two types of mortar, two types of bricks and two types of blocks.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific construction situation, and justify which tools, materials and equipment they would use for this task. Learners should explain, with reasons, why they selected items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation explored in the merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for brickwork and blockwork. Learners should include a minimum of five setting-out tools, five types of hand tools and equipment, two types of mortar, two types of bricks and two types of blocks.

**For 2A.P2:** learners should explain how to safely use and store the tools, materials and equipment from 2A.P1, including in their explanations the reasons why these activities are undertaken. Learners could give written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When presentational or oral evidence is provided, this should be confirmed via a teacher record.

**For 1A.2:** learners should outline how to safely use and store the tools, equipment and materials for 1A.1. Their outline does not need to include the reasons why tools, equipment and materials are used and stored in these ways.

## Learning aim B

Learners are required to produce a suitable risk assessment for their activities before they begin, and should work safely throughout the Learning aim in order to produce their brickwork and blockwork. This can be evidenced by observation records, completion of quality control sheet and photographs. Learners will then construct brickwork and blockwork in accordance with a specification given to them in an assessment brief by the teacher.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the practical activity. This should include identification of hazards, the risks associated with the practical activity, the people at risk and appropriate control measures to minimise the risk. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners identify ie show that they recognise what and where hazards are present in the work area and the control measures required prior to commencing brickwork and blockwork. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. The learner can complete a risk assessment template (or document) to fulfil this criterion.

**For 2B.P4:** learners comply with safe working practices, wear appropriate PPE and behave appropriately, with a positive attitude towards health and safety. This can be evidenced throughout the practical activity via a teacher observation record.

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical task using personal protective equipment (PPE).

**For 2B.P5:** learners must construct a cavity wall to a minimum height of nine courses of bricks and three courses of blocks (675 mm), as specified in the brief provided by the teacher. The learner is not required to demonstrate achievement of the tolerances required for M2, but all work must be correctly bonded, with all joints properly formed and all bricks in their correct orientation with a correctly formed cavity.

**For 2B.M2:** learners must produce work to the height required for P5, completed to the tolerances stated. Work should be neatly jointed using an appropriate method such as a tooled (bucket handle) joint.

**For 2B.D1:** learners must produce work to the height required for P5, completed to the tolerances stated. The work will incorporate a central feature in contrasting or recessed bricks (in the external brick face only), as shown on the drawing provided by the teacher as part of the learner's brief. The brickwork is clean, with bricks selected, blended, laid and jointed using an appropriate method such as a tooled (bucket handle) joint.

**For 1B.5:** learners must construct a cavity wall to a minimum height of six courses of bricks and two courses of blocks (450 mm). Learners are not required to demonstrate achievement of the tolerances required for M2, but all work must be correctly bonded, with all joints properly formed and a correctly formed cavity. It is anticipated that learners will have received considerable support and guidance at level 1.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1B.3, 1B.4, 1B.5, 2A.P1, 2A.P2, 2B.P3, 2B.P4, 2B.P5, 2A.M1, 2B.M2, 2B.D1	Construction of a Cavity Wall	<p>You are a bricklayer working on a construction site and have been asked by the site manager to produce a sample panel of cavity walling for approval along with quality control comparisons throughout the contract period.</p> <p>Before you begin, you should explain the tools, equipment and materials you will be using and complete a risk assessment.</p>	<p>Material and equipment information.</p> <p>Completed risk assessment.</p> <p>Quality control and photographic records.</p> <p>Observation records.</p>



# Unit 8: Exploring Painting and Decorating Principles and Techniques

Level: **1 and 2**

Unit type: **Optional Specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Did you know that painting and decorating skills have been practised throughout history? Early man painted pictures on cave walls, telling the modern world the stories of how they lived. Since then, people from all cultures have used paint, wallpaper and other decorative finishes to enhance their environment – their homes, workplaces, social places or places of worship. The right combinations of colour and texture can transform a room to make it feel warmer or cooler, more lively or calmer, more comfortable and welcoming.

Decoration is not the only reason why surfaces are painted. In industrial settings, such as factories and warehouses, paint is often used to colour-code pipes and fire extinguishers or to identify hazardous areas. In hospitals and other sterile environments, paint is used to produce hygienic surfaces that are easy to keep clean. Sometimes paint is used outside to protect a surface from the weather so that doors, windows, bridges and external surfaces are kept in good condition for longer.

Decorating is about more than painting. Many people like to decorate their homes using wallpaper. It can be applied to walls and ceilings, it can be smooth or textured, and it can be plain or patterned. Being able to produce a good finish with paint, or hang wallpapers to a high standard, are valuable skills that could help you gain employment.

In this unit you will learn some of the basics about painting and decorating. You will familiarise yourself with some of the tools, materials and equipment that painters and decorators use in their work and develop some basic painting and wallpapering skills. You will learn how to use these skills safely by assessing the risks and planning to reduce them. Achieving a high-quality finish when painting and hanging wallpaper is dependent upon preparing the surface properly and thus you will learn how to prepare surfaces that have cracks, holes and other imperfections. All these skills will help to prepare you for further learning in painting and decorating.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used in painting and decorating
- B develop practical skills using safe working techniques to complete surface preparation tasks and apply surface finishes.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand tools, materials and equipment used in painting and decorating

##### Topic A.1 Tools in painting and decorating

Purpose and properties of each tool and the appropriate methods of use and storage required to ensure the safety of users, the security of tools and the prevention of injury to personnel, loss or damage through incorrect use or storage.

- Surface preparation tools, including:
  - sizes of scraper, filling knife, putty knife, shavehook, caulking board, hacking knife, hot air stripper, dusting brush, sanding block.
- Paint application tools, including:
  - paint kettle, paintbrush sizes and different filling types, paint roller frames and sleeve options, paint roller tray, scuttle.
- Wallpaper hanging tools, including:
  - paperhanging brush sizes, paperhanging shears knife, decorators straight edge, paste bucket, paste brush, paste table, spirit level, plumb line, decorators sponge, seam roller, tape rule, pencil.

##### Topic A.2 Materials in painting and decorating

Purpose and properties of each material and the appropriate methods of use and storage required to ensure the safety of users, security of materials and prevention of loss or damage through incorrect use or storage.

- Surface preparation materials: coated abrasives papers (aluminum oxide, sand, wet and dry), abrasive powders and compounds, liquid paint removers, detergents and washing materials (sugar soap, surface cleaners), fillers (powder-based, ready-mixed).
- Types of paint and use: water-based paints, solvent-based paints, acrylic, undercoat, paint finishes (soft sheen, satin, gloss, matt, silk), non-drip, solid emulsion.
- Wallpaper types and use: lining papers, relief coverings (Anaglypta, foamed vinyl, woodchip), standard wallpapers, washable wallpapers, paper-backed vinyl, flock.
- Wallpaper adhesives and use: pastes (cellulose, universal grade, fungicidal, grade).

##### Topic A.3 Equipment for painting and decorating

Know the purpose of each item of equipment and the appropriate methods of use and storage required to ensure the safety of users, the security of equipment and the prevention of injury to personnel, loss or damage through incorrect use or storage.

- Personal protective equipment (PPE): safety footwear, overalls, hand protection, barrier cream, eye protection, dust masks.
- Access equipment: stepladders, hop-ups, trestle working platforms.

**What needs to be learnt****Learning aim B: Develop practical skills using safe working techniques to complete surface preparation tasks and apply surface finishes****Topic B.1 Health and safety**

Risk assessment prior to starting and procedures to follow during the practical activity.

- Identification of hazards and risks associated with the practical activity including:
  - slips, trips and falls
  - cuts, injuries or ailments caused by tools and equipment
  - abrasive materials, solvents, fungicidal pastes, dust
  - falling objects
  - untidy work areas
  - musculoskeletal injuries caused by bending or stretching.
- Identification of people at risk.
- Identification of appropriate control measures to remove or minimise the risks.
- Adoption of safe working practices, including use of personal protective equipment (PPE).

**Topic B.2 Preparing surfaces**

Develop practical skills by preparing previously painted surfaces to receive paints and wallpapers using appropriate techniques, including:

- washing, cleaning and dusting surfaces
- filling large surface defects, including holes, cracks and dents
- filling minor surface imperfections, including nail holes, scratches, minor dents and score marks
- abrading filled and unfilled surfaces to ensure a smooth finish prior to the application of paints and wallpapers.

**Topic B.3 Applying paints**

Develop practical skills by selecting and applying appropriate water-based and solvent-based paints to previously painted wall areas and skirting boards by roller and brush using appropriate techniques, including:

- applying paint to a flat wall area by roller
- using paintbrushes to cut in around the edges of a roller-painted wall area
- applying paint to skirting boards by brush.

**Topic B.4 Hanging wallpaper**

Develop practical skills by hanging simple patterned wallpapers to previously prepared straight walls using appropriate techniques, including:

- measuring and cutting wallpaper to the required length prior to hanging
- applying paste to wallpaper prior to hanging
- hanging wallpaper to a straight wall with no internal or external angles and no switches, sockets or other obstacles
- ensuring that adjacent surfaces are left clean and free from paste.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used in painting and decorating</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials in painting and decorating.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment in painting and decorating.	2A.M1 Justify the selection of tools, materials and equipment for a specified painting and decorating task.	2A.D1 Evaluate the use of alternative materials for a specified painting and decorating task.
1A.2 Outline the safe use and storage of painting and decorating tools, materials and equipment.	2A.P2 Explain the safe use and storage of painting and decorating tools, materials and equipment.		



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe working techniques to complete surface preparation tasks and apply surface finishes</b>			
1B.3 Identify hazards and control measures prior to commencing painting and decorating tasks.	2B.P3 Carry out a risk assessment prior to commencing painting and decorating tasks.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		
1B.5 Prepare surfaces to receive undercoat, gloss and emulsion surface finishes by cleaning and removing dust.	2B.P5 Prepare surfaces to receive undercoat, gloss and emulsion surface finishes by filling and sanding large surface defects.	2B.M2 Prepare surfaces to receive undercoat, gloss and emulsion surface finishes by filling and sanding large and minor surface imperfections.	2B.D2 Prepare surfaces to receive undercoat, gloss and emulsion surface finishes by: <ul style="list-style-type: none"> <li>• filling and sanding large and minor surface imperfections</li> <li>• sanding smooth with no visible scoring or scratching of the surface.</li> </ul>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.6 Apply undercoat, gloss and emulsion surface finishes by brush and roller with:</p> <ul style="list-style-type: none"> <li>• minimal roller skid marks</li> <li>• no bristles visible on the finished surface.</li> </ul>	<p>2B.P6 Apply undercoat, gloss and emulsion surface finishes by brush and roller with:</p> <ul style="list-style-type: none"> <li>• no bristles or roller skid marks visible on the finished surface.</li> </ul>	<p>2B.M3 Apply undercoat, gloss and emulsion surface finishes by brush and roller with:</p> <ul style="list-style-type: none"> <li>• no brush marks or roller skid marks</li> <li>• minimal orange peel effect</li> <li>• neat cutting in</li> <li>• no more than one run, or sag visible on the finished surface.</li> </ul>	<p>2B.D3 Apply undercoat, gloss and emulsion surface finishes by brush and roller with no visible defects:</p> <ul style="list-style-type: none"> <li>• no brush or roller skid marks</li> <li>• no orange peel effect</li> <li>• neat cutting in</li> <li>• no runs or sags visible on the finished surface.</li> </ul>
<p>1B.7 Measure and cut wallpaper to required length, allowing 75 mm at each end for trimming, prior to hanging.*</p>	<p>2B.P7 Measure and cut wallpaper to required length, allowing 50 mm at each end for trimming, prior to hanging.*</p>		
<p>1B.8 Hang patterned wallpaper to straight walls with:</p> <ul style="list-style-type: none"> <li>• no gaps or overlaps &gt;5 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt;5 mm.*</li> </ul>	<p>2B.P8 Hang patterned wallpaper to straight walls with:</p> <ul style="list-style-type: none"> <li>• no gaps or overlaps &gt;3 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt;3 mm.*</li> </ul>	<p>2B.M4 Hang patterned wallpaper to straight walls with:</p> <ul style="list-style-type: none"> <li>• no gaps or overlaps &gt;2 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt;2 mm.*</li> </ul>	<p>2B.D4 Hang patterned wallpaper to straight walls with:</p> <ul style="list-style-type: none"> <li>• no gaps or overlaps</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt;1 mm.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit include a range of decorating tools, materials, personal protective equipment (PPE) and access equipment. A working area with a previously painted wall and previously painted skirting board will also be needed. The practical activities will proceed more effectively in a dedicated workshop, but portable frames can be used where this is not possible.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

### Learning aim A

**For 2A.P1:** learners should explain how tools, materials and equipment are used in painting and decorating and provide supported reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of three preparation tools, three wallpapering tools and three painting tools, three different surface preparation materials, three different types of paint, three different types of wallpaper and two different types of equipment.

**For 2A.M1:** learners must be able to justify why they have selected specific tools, materials and items of equipment for the specified task. Learners will be expected to state why each item has been selected and justify why it is the most appropriate tool, material or item of equipment.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation in the merit criteria, and expand their responses to explain which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for painting and decorating. Learners should consider a minimum of three preparation tools, three wallpapering tools and three painting tools, three different surface preparation materials, three different types of paint, three different types of wallpaper and two different types of equipment.

**For 2A.P2:** learners must describe the safe use of the selected tools, materials and equipment. Learners should include in their explanations the reasons why these activities are undertaken. This may include describing the correct handling of tools that have sharp blades in order to minimise the risk of injury, following appropriate regulations, such as the Control of Substances Hazardous to Health (COSHH) Regulations when using solvent-based paints or powder-based fillers, and compliance with the Working at Height (WAH) Regulations when using access equipment. Learners could evidence this through the production of a report, in tabular form, that identifies each tool, material and item of equipment and provides space for learners to enter text that describes the relevant practices to ensure each item is used safely. Alternatively, learners could give evidence through oral questioning.

**For 1A.2:** learners should outline the safe use of the selected tools, materials and equipment. This may include describing the correct handling of tools that have sharp blades in order to minimise the risk of injury, following appropriate regulations such as the Control of Substances Hazardous to Health (COSHH) Regulations when using solvent-based paints or powder-based fillers, and compliance with the Working at Height (WAH) Regulations when using access equipment. Their outlines do not need to include the reasons why tools, equipment and materials are used and stored in these ways.

### Learning aim B

Learners are required to produce a suitable risk assessment for their activity before they begin, and should work safely throughout the learning aim in order to complete their tasks. This can be evidenced by observation records and completion of a quality control sheet.

**For 2B.P3:** learners must complete a risk assessment that clearly identifies hazards, risks, persons at risk and control measures for a specified painting and decorating task. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners need to identify, i.e. show that they recognise what and where hazards are present in the work area and the control measures required for a specified painting and decorating task. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 2B.P4:** learners must demonstrate that they have followed safe working practices and that they have used appropriate personal protective equipment (PPE) when completing a practical task. The main source of evidence for this is likely to be an observation record completed by the teacher.

**For 1B.4:** learners must demonstrate that they can work safely using appropriate personal protective equipment (PPE). Learners at level 1 will need guidance in order to work safely when undertaking the practical task using personal protective equipment (PPE). The main source of evidence for this is likely to be an observation record completed by the teacher.

**For 2B.P5:** learners must make good any large surface defects in their work area by filling and sanding to produce a surface that is ready to receive surface finishes, including paint and wallpaper. The type of surface defect that learners will make good will include large cracks, holes and dents. Learners are expected to use powder-based fillers that they will mix prior to use. The main sources of evidence for this will be teacher observation records and photographs of the learner's work.

**For 2B.M2:** learners will build upon the requirements of 2B.P5 and also make good any minor surface imperfections in their work area by filling and sanding using ready-mixed fillers and fine-grade abrasives. The main sources of evidence for this will be teacher observation records and photographs of the learner's work.

**For 2B.D2:** learners will make good all surface defects and imperfections and sand smooth with no visible scoring or scratching of the surface. The main sources of evidence for this will be teacher observation records and photographs of the learner's work.

**For 1B.5:** learners at level 1 will prepare surfaces for painting by cleaning and removing surface dust. The main sources of evidence for this will be teacher observation records and photographs of the learner's work.

**For 2B.P6:** learners will apply emulsion paint to a flat wall surface using a roller, leaving no visible roller skid marks on the finished surface, and cut in around the edges using a brush, leaving no bristles. Learners will also apply undercoat and gloss finish to a length of skirting board using a brush and leaving no bristles on the finished surface. The main sources of evidence for this will be teacher observation records and photographs of the learner's work.

**For 2B.M3:** learners will apply emulsion paint to a flat wall surface using a roller and leaving only minor visible orange peel effect on the finished surface, with neat cutting in around the edges using a brush, leaving no bristles. Learners will also apply undercoat and gloss finish to a length of skirting board using a brush, with no visible brush marks on the finished surface. There should be a maximum of only one run or sag visible on any finished surface. Evidence can be provided by teacher observation records and photographs.

**For 2B.D3:** learners will apply emulsion paint to a flat wall surface using a roller and leaving no visible orange peel effect on the finished surface, with neat cutting in around the edges using a brush, leaving no bristles. Learners will also apply undercoat and gloss finish to a length of skirting board using a brush and leaving no visible brush marks on the finished surface. There should be no runs or sags visible on any finished surface. Evidence will be provided by teacher observation records and photographs.

**For 1B.6:** learners will apply emulsion paint to a flat wall surface using a roller and leaving only minor roller skid marks visible on the finished surface, and cutting in around the edges using a brush. Learners will also apply undercoat and gloss finish to a length of skirting board using a brush and leaving no bristles on the finished surface. It is expected that this will be evidenced through teacher observation records and photographs.

**For 2B.P7:** learners will measure and cut wallpaper to the required length prior to hanging, allowing 50 mm at each end for trimming.

**For 1B.7:** learners will measure and cut wallpaper to the required length prior to hanging, allowing 75 mm at each end for trimming.

**For 2B.P8:** learners will hang simple patterned wallpaper to a straight wall with no internal or external angles, switches, sockets or other obstacles. There should be no gaps or overlaps greater than 3 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 3 mm. It is expected that this will be evidenced through teacher observation records and photographs.

**For 2B.M4:** learners will hang simple patterned wallpaper to a straight wall with no internal or external angles, switches, sockets or other obstacles. There should be no gaps or overlaps greater than 2 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 2 mm. It is expected that this will be evidenced through teacher observation records and photographs.

**For 2B.D4:** learners will hang simple patterned wallpaper to a straight wall with no internal or external angles, switches, sockets or other obstacles. There should be no gaps or overlaps, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 1 mm. It is expected that this will be evidenced through teacher observation records and photographs.

**For 1B.8:** learners will hang simple patterned wallpaper to a straight wall with no internal or external angles, switches, sockets or other obstacles. There should be no gaps or overlaps greater than 5 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 5 mm. It is expected that this will be evidenced through teacher observation records and photographs.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.M1, 2A.D1, 1A.1, 2A.P2, 1A.2	Painting and Wallpapering	Your supervisor has asked you to prepare and paint a small area that has one wall and a length of skirting board. To do this you will need to describe the required tools, materials and equipment, justify your choices and evaluate alternatives, and describe how to use and store each item safely.	The description of tools, materials and equipment can be evidenced through the use of a stores requisition. Justification of choices and evaluation of alternatives can be provided verbally and recorded by the teacher.
2B.P3, 1B.3		Once you have selected your tools, materials and equipment, you will need to carry out a risk assessment for the task that identifies hazards, risks, people at risk and control measures.	Risk assessment document.
2B.P4, 2B.P5, 2B.M2, 2B.D2, 1B.4, 1B.5		Making sure that you work safely and use appropriate PPE, you will need to prepare the wall area and skirting board by cleaning, filling, sanding and dusting to leave the surface clean, smooth and dust free.	All the practical activities, including the preparation of the surfaces and the application of paint to the wall and skirting board, can be evidenced through teacher observation records supported by photographs.
2B.P6, 2B.M3, 2B.D3, 1B.6		The last part of your task is to apply emulsion paint to the wall area using a roller and brush for cutting in and to apply one coat of undercoat and one of gloss finish to the skirting board.	

Criteria covered	Assignment	Scenario	Assessment evidence
2B.P7, 1B.7, 2B.P8, 2B.M4, 2B.D4, 1B.8	Hanging Wallpaper	Your supervisor has said that you can have a go at hanging some wallpaper to a single straight wall. In order to do this you will need to measure and cut the wallpaper to length, allowing a surplus at each end for trimming once the wallpaper has been hung.	This practical task can be evidenced using teacher observation records supported by photographs.





# Unit 9: Exploring Plumbing Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

How does water arrive at the tap when you turn it on?

Plumbing is an important operation. It is used to distribute both hot and cold water for a variety of purposes. Piped water provides the supply for drinking, washing, heating, cleaning and appliances using water within a property. The safe distribution of water must be ensured so that it is suitable for human consumption, and so the cleanliness of an installation is essential.

This unit will give you the opportunity to explore the different tools and equipment used for plumbing operations and to learn how they are used to cut and bend pipework and fasten fittings together. The safe use of tools and equipment is essential as plumbing often takes place within tight and enclosed spaces.

Health and safety are important when working with plumbing materials as jobs can involve hot work – for instance, when using a gas torch to solder together plumbing joints. In this unit, you will understand the hazards associated with plumbing operations and the safe techniques that can be employed when installing pipework, appliances and fittings.

Within this unit you will learn about the different materials that are used in plumbing operations, from copper tubing to the new coiled plastic pipework, and the equipment that is used to install these. Most plumbing services are hidden from view within the service spaces of a building. Attention to detail and accurate jointing are therefore essential to prevent any leaks and maintenance issues in the future.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used for plumbing operations
- B develop practical skills using safe techniques to undertake plumbing operations.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand tools, materials and equipment used for plumbing operations</b></p> <p><b>Topic A.1 Tools and equipment used for undertaking plumbing operations</b></p> <p>Purpose and use of tools and equipment for plumbing operations.</p> <ul style="list-style-type: none"> <li>• Hand tools, power tools and equipment including:             <ul style="list-style-type: none"> <li>◦ measuring tape</li> <li>◦ tube cutters</li> <li>◦ wheel cutters</li> <li>◦ junior hacksaw</li> <li>◦ hand saw</li> <li>◦ power tools</li> <li>◦ spanners</li> <li>◦ wrench</li> <li>◦ half round file</li> <li>◦ pipe grips</li> <li>◦ pipe cutters</li> <li>◦ screwdrivers</li> <li>◦ bench vice</li> <li>◦ tube bending machine</li> <li>◦ blowtorch</li> <li>◦ spirit level.</li> </ul> </li> </ul> <p><b>Topic A.2 Materials used for undertaking plumbing operations</b></p> <p>Types of materials used for plumbing operations and their in-situ properties.</p> <ul style="list-style-type: none"> <li>• Copper and brass fittings:             <ul style="list-style-type: none"> <li>◦ copper tube, different diameters and uses</li> <li>◦ standard copper jointing fittings, straights, 90° elbows, 'T' junctions, pre-soldered ring and plain-end feed types</li> <li>◦ solders and fluxes.</li> </ul> </li> <li>• Brass fittings, compression and ancillary fittings.</li> <li>• Plastic pipe and fittings:             <ul style="list-style-type: none"> <li>◦ plastic pipework, different diameters, water supply and waste pipework</li> <li>◦ standard jointing fittings, push fit, solvent welded.</li> </ul> </li> <li>• Appliances:             <ul style="list-style-type: none"> <li>◦ different types of user appliances – sinks, wash hand basins (whb), toilets, baths, showers</li> <li>◦ service and waste system connections to appliances.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****Topic A.3 Safe use and storage of tools, materials and equipment**

Appropriate practices when working with plumbing tools, materials, equipment and water-using appliances.

- Use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, high-visibility jacket, safety gloves, safety glasses, barrier cream.
- Use of task-specific PPE when cutting and for hot work.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Maintaining a clean and tidy work area.
- Safe manual handling when lifting and moving.
- Correct use of tools and equipment.
- Cleaning tools and reporting any defects.
- Returning tools to appropriate storage upon completion of practical work.
- Appropriate storage methods for pipework, appliances and fittings.

**Learning aim B: Develop practical skills using safe techniques to undertake plumbing operations****Topic B.1 Health and safety**

Risk assessment prior to starting activities and procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - hot working
  - use of bottled gas
  - cuts, injuries and risk of infection caused by tools and equipment.
- Untidy work area causing slips, trips and falls, musculoskeletal injuries resulting from working in cramped environments, identification of people at risk.
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices.

**Topic B.2 Develop pipe bending and jointing skills**

- Marking out and manual bending of pipework:
  - reading and interpreting the drawn information for the practice piece to be constructed
  - mark out the lengths of pipework required
  - cutting to length
  - forming bends in pipework using pipe benders.
- Formation of a soldered joint:
  - preparation of pipework
  - flux application
  - soldering processes.

*continued*

### What needs to be learnt

- Formation of a compression joint:
  - preparation of pipework
  - connection using brass fittings
  - pressure testing of the completed pipe rig
  - preparation of test equipment
  - pressure test.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for plumbing operations</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials for plumbing operations.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment for plumbing operations.	2A.M1 Justify the selection of tools, materials and equipment for a specified plumbing operation task.	2A.D1 Evaluate the use of alternative materials for a specified plumbing operation task.
1A.2 Outline the safe use and storage of plumbing operations tools, materials and equipment.	2A.P2 Explain the safe use and storage of plumbing operations tools, materials and equipment.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to undertake plumbing operations</b>			
1B.3 Identify hazards and control measures prior to commencing plumbing operations.	2B.P3 Carry out a risk assessment prior to commencing plumbing operations.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		
1B.5 Measure and mark out materials for a pipe rig framework to a given spec with guidance.*	2B.P5 Measure and mark out materials for a pipe rig framework to a given spec, accurate to 5 mm.*	2B.M2 Measure and mark out materials for a pipe rig framework to a given spec, accurate to 3 mm.*	2B.D2 Measure and mark out materials for a pipe rig framework to a given spec, accurate to 2 mm.*
1B.6 Construct a simple pipe rig framework with compression and soldered joints, with guidance.*	2B.P6 Construct a simple pipe rig framework with: <ul style="list-style-type: none"> <li>• compression fitting</li> <li>• manual bends</li> <li>• soldered joints</li> <li>• tested to 1 × the operating pressure.+ *</li> </ul>	2B.M3 Construct a simple pipe rig framework to: <ul style="list-style-type: none"> <li>• ±5 mm in length and ±5 mm in height measured against the rig drawing</li> <li>• tested to 1.5 × the operating pressure.+ *</li> </ul>	2B.D3 Construct a simple pipe rig framework to: <ul style="list-style-type: none"> <li>• ±5 mm in length and ±5 mm in height measured against the rig drawing</li> <li>• pass a pressure test standard 2 × operating pressure.+ *</li> </ul>

+Operating pressure can be either heating system pressure or local mains water pressure. Whichever is the greater is taken as the operating pressure.

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

Learners will require access to a plumbing workshop with a hot working area, and with hand tools and materials of a nature and standard typical of a real, industrial work environment. A set of pipe benders must be made available for the manual bending of the copper pipework using a former. It is recommended that 15 mm diameter pipework is used for the construction of the test rig frame.

Personal protective equipment, (PPE) including safety boots, barrier cream, gloves and eye protection, will be required, along with other PPE that may be specific to the working environment.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

### Learning aim A

Learners could provide written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from the teacher. When oral evidence is given, this should be confirmed via an observation record.

**For 2A.P1:** learners should explain how tools, materials and equipment are used for plumbing operations and provide supported reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of seven, hand tools, power tools or items of equipment, three types of metal fittings, three types of plastic fittings and three types of appliances. This can form the basis of a requisition order that compiles all the items needed to complete the practical task.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific construction situation, and justify which tools, materials and equipment they would use for this task. Learners should explain, with reasons, why they selected items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation the merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify how tools and equipment are used for plumbing operations and the purpose of materials for different situations. Learners should include in their explanations a minimum of seven, hand tools, power tools or items of equipment, three types of metal fittings, three types of plastic fittings and three types of appliances. This can form the basis of a requisition order that compiles all the items needed to complete the practical task.

**For 2A.P2:** learners should describe how to safely use and store tools, materials and equipment, including in the reasons why these activities are undertaken. Learners could provide written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When oral evidence is provided, this should be confirmed via an observation record.

**For 1A.2:** learners are able to outline how to safely use and store tools, materials and equipment.

## Learning aim B

Learners are required to produce a suitable risk assessment for their activity before they begin, and should work safely throughout the LA in order to produce their pipe rig. This can be evidenced by observation records, and completion of a quality control sheet.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the simple pipe test rig test activity. This should include identifying hazards and the risks associated with the practical activity, the people at risk, and appropriate control measures to minimise the risk. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners need to identify, i.e. show that they recognise what and where hazards are present in the work area and the control measures required prior to beginning the practical activity. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 2B.P4:** learners comply with safe working practices, wear appropriate PPE and behave appropriately with a positive attitude towards health and safety during the pipe test rig framework activity.

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical task using personal protective equipment (PPE).

Learners will produce a practical plumbing rig. Evidence could be photographs, observation records and quality control records.

**For 2B.P5:** learners need to measure and mark up materials to produce their rig. The accuracy of their measurement and mark up could be evidenced by photographs or observation records. The measurement and mark up will be accurate to within 3 mm.

**For 2B.M2:** learners should improve the accuracy and precision within the measurement and mark up in order to demonstrate their ability at merit and distinction. For this criterion, their measurements and mark up will be accurate to within 2 mm.

**For 2B.D2:** learners should improve their accuracy and precision further and measure and mark up to within 1 mm.

**For 1B.5:** learners will need guidance in order to complete the measurement and mark up of their materials to produce their circuit.

For the production of the rig, evidence could include quality-control records, including dimensional tolerance, together with photographs of the completed work.

**For 2B.P6:** learners have to construct a practical plumbing rig to a drawn specification. This needs to include at least two made bends, one soldered bend, one soldered t-junction and one compression fitting. The completed assessment piece must be pressure tested to  $1 \times$  the operating pressure (+).

**For 2B.M3:** learners must construct the pipe rig to within 5 mm of the design drawing dimension provided. This dimensional tolerance must be applied to the overall height of the rig and the length. The completed assessment piece must be pressure tested to  $1.5 \times$  the operating pressure (+).

**For 2B.D3:** learners must produce work that has an acceptable level of quality that includes the tolerances specified in 2B.M3 and will hold a pressure of  $2 \times$  the operating pressure (+). For the pressure test, the highest operating pressure should be used, for example if the mains water pressure is 5 bar, then the pressure test standard should be 7 bar.

**For 1B.6:** learners will construct the simple pipework rig without the addition of a made bend, which requires the higher-level skills. Learners will need guidance in order to complete this activity.

(+) Operating pressure can be either heating system pressure or local mains water pressure. Whichever is the greater is taken as the operating pressure.



## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2B.P3, 2B.P4, 2B.P5, 2A.M1, 2A.D1  1A.1, 1A.2, 1B.3, 1B.4, 1B.5	Resources Required for Plumbing Operations	You have been asked to plumb in a sink unit within a busy commercial kitchen. As part of this task you have been asked to provide a safety pack containing information about materials, and risk assessments for the work.	Material and equipment information. Completed risk assessment. Quality-control and photographic records. Teacher observation records.
2B.P5, 2B.M2, 2B.D2, 2B.M3, 2B.D3, 1B.5	Construction of Plumbing Test Rig	You have been asked to provide a pipe test rig for a supervisor so they can check the quality of the work that you produce before commencing a contract.	Material and equipment requisitions. Completed risk assessment. Quality-control and photographic records. Teacher observation records.



# Unit 10: Exploring Electrical Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Electricity is vital for most commercial and industrial buildings, and is regarded as an essential service to our homes, where it is used to power a vast number of appliances, such as televisions, kitchen equipment and computers.

This unit will give you the opportunity to explore the different tools that are used for electrical operations, and how they are used to cut and connect electrical cabling and connect appliances to an electrical supply. You will find out about the materials that are used in electrical installation, such as the differently rated cables and the variety of fittings that can be used to terminate cables.

In this unit you will develop your knowledge and understanding of electrical principles and techniques and the skills necessary to safely perform simple tasks associated with electrical installation. You will recognise the hazards and risks associated with electrical work.

Electricity is safe as long as it is conveyed and enclosed within an insulating cable. However, it is extremely dangerous if it comes into direct contact with the body – for instance, if you touch an exposed live wire and receive an electrical shock – as it can stop the heart from functioning correctly. Thus safe working and use of electricity is essential. This unit will provide you with an understanding of the hazards associated with electrical operations and the safe techniques that can be employed when installing cabling circuits, sockets and lights.

This unit does **not** provide for the requirements of electrical occupational competence.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used for electrical operations
- B develop practical skills using safe techniques to undertake electrical operations.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand tools, materials and equipment used for electrical operations</b></p> <p><b>Topic A.1 Tools and equipment used for undertaking electrical operations</b></p> <p>Purpose and use of tools and equipment for electrical operations.</p> <ul style="list-style-type: none"> <li>● Hand tools and equipment including:             <ul style="list-style-type: none"> <li>○ measuring tape</li> <li>○ cable cutters</li> <li>○ cable strippers</li> <li>○ junior hacksaw</li> <li>○ pliers</li> <li>○ stripping knife</li> <li>○ screwdrivers</li> <li>○ spirit level</li> <li>○ electrical testing equipment.</li> </ul> </li> </ul> <p><b>Topic A.2 Materials used for undertaking electrical operations</b></p> <p>Types of materials used for electrical operations and their in-situ properties.</p> <ul style="list-style-type: none"> <li>● Cable:             <ul style="list-style-type: none"> <li>○ 1.5 mm<sup>2</sup> lighting circuit cable and singles</li> <li>○ 2.5 mm<sup>2</sup> ring final circuit power cable</li> <li>○ singles cable.</li> </ul> </li> <li>● Electrical fittings:             <ul style="list-style-type: none"> <li>○ single and double sockets, switched and unswitched</li> <li>○ flex outlets</li> <li>○ fused spur units</li> <li>○ batten lamp holder: screw type, bayonet</li> <li>○ ceiling roses</li> <li>○ light switches, single, double</li> <li>○ appliance plugs.</li> </ul> </li> <li>● Miscellaneous fittings:             <ul style="list-style-type: none"> <li>○ plastic conduit</li> <li>○ conduit junction boxes</li> <li>○ conduit elbows</li> <li>○ conduit T-junctions</li> <li>○ back boxes</li> <li>○ surface boxes</li> <li>○ conduit saddle clips</li> <li>○ equipment fixing materials: screws.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****Topic A.3 Safe use and storage of tools, materials and equipment for electrical operations**

Appropriate practices when working with electricity.

- Use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, high-visibility jacket, eye protection, barrier cream.
- Use of task-specific PPE when cutting cabling.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Maintaining a clean and tidy work area.
- Safe manual handling when lifting and moving.
- Correct use of tools and equipment.
- Cleaning tools and reporting any defects.
- Returning tools to appropriate storage upon completion of practical work.

**Learning aim B: Develop practical skills using safe techniques to undertake electrical operations****Topic B.1 Health and safety**

Risk assessment prior to starting activities and procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - electricity
  - use of cable strippers and knives
  - cuts and injuries caused by tools and equipment
  - untidy work area causing slips, trips and falls
  - musculoskeletal injuries resulting from working in cramped environments.
- Identification of people at risk.
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices.
- Importance of testing for continuity, insulation resistance and polarity.

**Topic B.2 Develop electrical operation skills**

Marking out electrical runs and sockets.

- Interpret requirements of the drawn information for the practice circuit.
- Mark out the lengths of cable required.
- Cut cable to required length.
- Mark out the conduit required, cut to length and install.

*continued*

**What needs to be learnt**

Installation of a ring final circuit to include two socket outlets and a fused spur using surface mounted conduit.

- Isolation of the supply.
- Laying out cable runs and cutting single cables.
- Installation of socket back boxes.
- Wiring of sockets.
- Wiring of fused spur.

Installation of a lighting circuit with batten holder using surface-mounted conduit.

- Isolation of the supply.
- Laying out cable runs and clipping cables.
- Installation of lighting back boxes.
- Wiring of lighting circuit.
- Fitting of switches.
- Fitting of lighting batten.

Testing of the completed power and lighting circuit.

- Isolation of circuit.
- Power connection.
- Visual inspection, tests for continuity, insulation resistance and polarity.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for electrical operations</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials in electrical operations.	2A.P1 Explain the purpose and use of appropriate tools, materials and equipment for electrical operations.	2A.M1 Justify the selection and use of tools, materials and equipment for a specified electrical operation task.	2A.D1 Evaluate the selection and use of tools, materials and equipment for a specified electrical operation task.
1A.2 Outline the safe use and storage of tools, materials and equipment for electrical operations.	2A.P2 Explain the safe use and storage of tools, materials and equipment for electrical operations.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to undertake electrical operations</b>			
1B.3 Identify hazards and control measures prior to commencing electrical operations.	2B.P3 Carry out a risk assessment prior to commencing electrical operations.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		
1B.5 Measure and mark out cables and conduits to produce a test rig circuit with guidance: <ul style="list-style-type: none"> <li>• to a given specification with guidance</li> <li>• accurate horizontally to 10 mm.*</li> </ul>	2B.P5 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> <li>• to a given specification.</li> <li>• accurate to 3 mm deviation from straight.*</li> </ul>	2B.M2 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> <li>• to a given specification</li> <li>• accurate to 2 mm deviation from straight</li> <li>• no insulation damage by hammer or clips.*</li> </ul>	2B.D2 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> <li>• to a given specification</li> <li>• accurate to 1 mm deviation from straight</li> <li>• with no insulation damage by hammer or clips.*</li> </ul>



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.6 Construct a test rig circuit consisting of a ring final circuit with two sockets and one fused spur, with guidance with:</p> <ul style="list-style-type: none"> <li>all sockets level, in position to within <math>\pm 10\text{mm}</math>.</li> </ul> <p>The test rig must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<p>2B.P6 Construct a test rig circuit consisting of a ring final circuit with two sockets, one fused spur and a single lighting switched circuit with lamp holder with:</p> <ul style="list-style-type: none"> <li>all sockets level, in position to within <math>\pm 3\text{mm}</math></li> <li>no exposed electrical conductors.</li> <li>all earth sleeving in position</li> <li>correct colour coding.</li> </ul> <p>The test rig must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<p>2B.M3 Construct a test rig circuit consisting of a ring final circuit with two sockets, one fused spur and a single lighting switched circuit with lamp holder with:</p> <ul style="list-style-type: none"> <li>all sockets level, in position to within <math>\pm 2\text{ mm}</math></li> <li>conduits neatly fixed to the circuit board</li> <li>no exposed electrical conductors</li> <li>all earth sleeving in position</li> <li>correct colour coding</li> </ul> <p>The test rig must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<p>2B.D3 Construct a test rig circuit consisting of a ring final circuit with two sockets, one fused spur and a single lighting switched circuit with lamp holder with:</p> <ul style="list-style-type: none"> <li>all sockets level, in position to within <math>\pm 1\text{ mm}</math></li> <li>conduits neatly fixed to the circuit board</li> <li>no exposed copper conductors</li> <li>no exposed electrical conductors</li> <li>all earth sleeving in position</li> <li>correct colour coding</li> </ul> <p>The test rig must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

Learners will require access to an electrical workshop, with hand tools and materials of a nature and standard typical of a real, industrial work environment.

It is not anticipated that learners will possess prior knowledge and understanding of electrical principles and techniques. It is therefore considered sensible that all electrical installations be connected to a power pack, so that the voltage can be stepped down to a safe level, rather than directly to the mains.

Training and proper supervision of young people is particularly important because of their youth and unfamiliarity with the working environment. Learners and centres must comply with Provision and Use of Work Equipment Regulations, Approved Code of Practice and guidance (L22), as they apply to young people in the workplace.

Teachers should supervise learners working with electrical equipment at all times.

Personal protective equipment (PPE), including safety boots, barrier cream, gloves and eye protection, will be required, along with other PPE that may be specific to the working environment.

The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

This unit does **not** provide for the requirements of electrical occupational competence.

### Learning aim A

Learners could provide written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from the teacher. When oral evidence is given, this should be confirmed via a teacher observation record.

**For 2A.P1:** learners should explain the purpose of tools, materials and equipment used for electrical operations and provide supported reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of five hand tools or items of equipment, two types of cable, three types of electrical fittings and three other types of fitting. This can form the basis of a requisition order that compiles all the items needed to complete the practical task.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific electrical operation task, and justify which tools, materials and equipment they would use for this task. Learners should provide reasons why they selected items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate their selection and use of tools, materials and equipment used for a specific electrical task.

**For 1A.1:** learners should identify tools and equipment used for electrical operations and the purpose of different materials. Learners should identify a minimum of five hand tools or items of equipment, two types of cable, three types of electrical fittings and three other types of fitting. An observation record and the production of requisitions can be evidence of the learner preparing for the practical activity. Tool and equipment identification sheets could be used as evidence for this criterion.

**For 2A.P2:** learners should describe how to safely use and store tools, materials and equipment, including the reasons why these activities are undertaken. Learners could provide written evidence, make a presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When presentation or oral evidence is provided, this should be confirmed via teacher observation or question records.

**For 1A.2:** learners are able to outline how to safely use and store tools, materials and equipment.

### Learning aim B

Learners are required to produce a suitable risk assessment for their activity before they begin, and should work safely throughout the Learning aim in order to produce their circuit. Teacher observation records and completion of a quality control sheet can provide evidence.

**For 2B.P3:** learners must produce a risk assessment prior to commencing the practical activity. This should include identification of hazards, the risks associated with the practical activity, the people at risk and appropriate control measures to minimise the risk. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners need to identify, i.e. show that they recognise what and where hazards are present in the work area and the control measures required prior to beginning the practical activity. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. The learner can complete a risk assessment template to provide evidence for this criterion.

**For 2B.P4:** learners must comply with safe working practices, wear appropriate PPE and behave appropriately, with a positive attitude towards health and safety, during the practical activity task.

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical task using personal protective equipment (PPE).

Learners will produce a test rig circuit. Evidence could be photographs, observation records and quality control records.

**For 2B.P5:** learners need to measure and mark up cable and conduits to produce their circuit. The accuracy of their measurement and mark up could be evidenced by photographs or observation records. The measurement and mark up will be accurate to within 3 mm from straight.

**For 2B.M2:** learners should improve the accuracy and precision within the measurement and mark up in order to demonstrate their ability at merit and distinction. For this criterion, their measurements and mark up will be accurate to within 2 mm from straight.

**For 2B.D2:** learners should improve their accuracy and precision further and measure and mark up to within 1 mm from straight.

**For 1B.5:** learners will need guidance in order to complete the measurement and mark up of their materials to produce their circuit.

The criterion for the production of the circuit can be evidenced in a number of ways. Quality-control records, including dimensional tolerance, together with photographs of the completed work, could provide evidence for these criteria.

**For 2B.P6:** learners have to construct a practical electrical rig to a drawn specification. This needs to include at least two power sockets, one fused spur and one single switched lighting circuit with lamp holder. The test rig must be constructed safely, with no exposed electrical conductors, with all earth sleeving in place, demonstrate the correct use of colour coding and must pass tests for continuity, insulation resistance and polarity. The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

**For 2B.M3:** learners must construct the circuits so that all sockets are level and the conduit is neatly installed onto the back board with no damage such that it has a neat visual appearance and matches the original setting-out drawing to within 2 mm for the socket positions. The test rig must be constructed safely, with no exposed electrical conductors, with all earth sleeving in place, demonstrate the correct use of colour coding and must pass tests for continuity, insulation resistance and polarity. The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

**For 2B.D3:** learners must construct the specified circuits with all earth sleeving in position, with no exposed copper conductors and with correct colour coding. No copper wires are to be exposed where they are terminated within sockets, and all earth sleeving must be in place. All colour coding for the single wires should be correct. The circuit must pass tests for continuity, insulation resistance and polarity. The work should be accurate to 1 mm deviation from straight, with no insulation damage by hammer or clips. The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

**For 1B.6:** learners need to construct the electrical power circuit without the addition of the lighting circuit. The circuit must pass tests for continuity, insulation resistance and polarity. Guidance may be needed in order for the learner to complete the activity. The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2B.P3, 2B.P4, 2A.M1, 2A.D1, 1A.1, 1A.2, 1B.3, 1B.4	Resources Required for Electrical Operations	You have been asked to wire a small electrical circuit for power and lighting. As part of this task you have been asked to provide a safety pack containing information about materials, and risk assessments for the work.	Material and equipment information. Quality-control and photographic records. Teacher observation records. Completed risk assessment.
2B.P5, 2B.P6, 2B.M2, 2B.D2, 2B.M3, 2B.D3, 1B.5, 1B.6	Construction of Electrical Test Rig	You have been asked to provide a test rig for a client so they can check the quality of the work that you produce before commencing the contract. This is an important job for you and could lead to working on a range of high-quality projects for this client.	Quality-control and photographic records. Teacher observation records.



# Unit 11: Sustainability in Construction

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **External**

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## Unit introduction

Is our planet slowly changing? What considerations will the construction industry have to make to limit and overcome the undesirable effects of climate change and the depletion of finite resources? What impact will this have on the places where we live, work and play and how can we ensure that the outcome is beneficial?

This unit covers the concept of sustainability. It also examines the techniques and methods that are commonly adopted in construction to work towards ensuring sustainability.

We should change the way in which we design and construct our residential, commercial, public and industrial buildings. We should adapt our resource usage during the manufacture of materials, how these materials are used during the construction process and over their lifetime, adopt sustainable approaches.

In this unit you will examine how construction activity has an impact on our physical, social and economic environments to gain an understanding of what approaches need to be taken in order to minimise the impacts. It will also focus on the associated short- and long-term benefits of this provision.

## Learning aims

In this unit you will:

- A understand the sustainability issues of construction for the physical, social and economic environment during the life cycle of a development
- B understand the techniques and methods used to reduce the impact of construction during the life cycle of a development.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand the sustainability issues of construction for the physical, social and economic environment during the life cycle of a development</b></p>
<p><b>Topic A.1 Sustainability concepts and benefits</b></p> <p>Understand the key concepts of sustainability and its benefits for the social, physical and economic environment.</p> <p><b>A1.1 Key concepts of sustainability:</b></p> <ul style="list-style-type: none"> <li>• meeting the needs of the present without compromising the needs and rights of future generations</li> <li>• protecting our natural environment</li> <li>• making efficient use of natural resources</li> <li>• improving quality of life</li> <li>• rights and responsibilities, participation and co-operation</li> <li>• minimisation of the impact of construction process during the phases of the development, i.e. planning, construction, completion, long term.</li> </ul> <p><b>A1.2 The benefits of sustainability</b></p> <p>Understand the potential social, physical and economic benefits of sustainable approaches and the sustainable benefits created:</p> <ul style="list-style-type: none"> <li>• regeneration of socially and economically deprived, rundown locations, areas or regions</li> <li>• reduction in crime figures leading to feeling of safety, lower cost of insurance premiums and increasing the area's ability to attract further commercial enterprise into a run-down location</li> <li>• inclusion of green spaces providing an attractive, aesthetically pleasing place to live, socialise and engage as a community</li> <li>• promoting community consultation and a sense of local involvement, so the community has an opportunity to contribute to decision making processes in what happens to their environment</li> <li>• improved environments attracting more people and business into an area, further promoting it as a sustainable environment</li> <li>• cleaner air through reductions in pollution and, in turn, improved health in the local population</li> <li>• reduction in flooding and its impact, enabling homes to obtain insurance and security against flood damage</li> <li>• improved education in sustainability and looking after our environment to producing future generation attitude change</li> <li>• conservation of resources for the future so their future availability is extended</li> <li>• economic well-being of all those involved in sustainability</li> <li>• environmental protection of local habitats and resources for the benefit of all to enjoy</li> <li>• development of eco-tourism and the benefits of associated commercial enterprises, and employment opportunities.</li> </ul> <p style="text-align: right;"><i>continued</i></p>



## What needs to be learnt

### Topic A.2 Physical issues of construction

Understand the physical issues of construction and development, the issues to consider when planning developments and during construction and how to limit the adverse effects of development locally.

#### A2.1 Physical environment issues:

- depletion of finite resources by the continued use of existing inefficient technology and supply chains
- pollution (carbon emissions, particulates, light, ground water)
- localised flooding and rising sea levels
- ground settlement through drying out during long periods of low rainfall
- disturbance/destruction of local natural habitats and biodiversity and relocation/conservation measures.

#### A2.2 Land use

Understand the physical and environmental damage caused through the use of land for construction purposes, and understand how to minimise damage:

- loss of natural woodlands and planting
- loss of land to vehicle parking
- destruction of local habitats and biodiversity
- use of land for waste disposal
- advantages and disadvantages of developing on greenfield and brownfield land.

#### A2.3 Wastage

Know the sources of waste during the life cycle of a building, understand how it can be minimised and know how to safely dispose of waste produced during materials extraction, processing and during the development's construction:

- production of waste –
  - waste raw materials from the supply chain network during a material's manufacturing process
  - from the demolition of existing structures
  - from the excavation of the building substructure
  - during the building process
  - from the packaging materials
  - during the operation and maintenance of the building (waste energy, waste heating and hot water, leakage of water) and the associated costs incurred
- safe disposal of waste –
  - safe transportation off site
  - the categorisation of waste materials for disposal to general and specialist disposal sites
  - using licensed disposal contractors to avoid fly tipping
  - by incineration
- environmental damage caused by the transportation of waste to landfill sites.

*continued*

## What needs to be learnt

### A2.4 Pollution

Understand how to minimise pollutants and understand the disposal of pollutants associated with construction related activity:

- how to reduce the noise from construction operations (use of silencers, maintenance of machinery)
- how to reduce emissions from construction traffic, plant and machinery (use of modern fuel-efficient vehicles and equipment, regular maintenance, servicing, use of locally sourced materials/buying in bulk/ordering a variety of materials from one supplier to cut travel distances and the number of journeys to site)
- how to reduce high carbon emissions created during the manufacture of high energy materials
- how to reduce dust from excavation and demolition work (damping down, road sweeping, use of dust suppression equipment, wheel cleaning)
- how to reduce construction site related light pollution (light shading, lower wattage lighting)
- how to reduce land contamination, waste treatment and correct waste disposal (general waste disposal, specialist waste disposal handling by trained and licensed contractors, site drainage damage minimisation by washing out cement plant and equipment, use of settlement tanks to filter debris, minimisation of fuel and oil spillages by use of bunded tanks, bund walls and absorbent mats)
- how to reduce pollutants at power stations that provide energy for constructing, operating and maintaining buildings (use of filters and scrubbers).

### A2.5 Energy and water resource use

Understand the energy and water used pre-construction, during construction and the operational life of developments, the environmental and economic impact of this and ways to minimise the undesirable impact of inefficient use upon our environment:

- energy use –
  - off-site, i.e. the 'embodied' and 'embedded' energy within construction materials
  - on-site
- water consumption and waste.

## Topic A.3 Social issues of construction

Understand the social issues of construction and development, the issues to consider when planning developments and during construction and how to limit the adverse effects of development locally.

### A3.1 Social environment issues:

- preventing over-development of an area to avoid vacant buildings and associated vandalism
- inner-city, urban, run-down areas and the use of regeneration strategies
- reducing local crime rates and vandalism to promote increased feelings of community safety through the improvement of buildings and their surrounds
- meeting the need for indoor and outdoor community areas and facilities (infrastructure, retail, education, health, recreation)
- advantages and disadvantages for a community of developing on greenfield and brownfield sites.

*continued*

### What needs to be learnt

#### A3.2 Reduction of impact on the community

Understand the site practices that can be used to minimise the effect of the project upon the local community, and know how and why they reduce the impact:

- community liaison to inform and guide neighbours and the surrounding local community –
  - community involvement during development design including consultation events
  - community liaison by the developer and community representatives
  - newsletters, leaflets
- site security
- acoustic hoardings, use of noise reduction equipment, site access arrangements, one-way systems, on-site parking facilities, wheel cleaning facilities, timing of deliveries, and agreed working hours
- maintaining a clean and tidy site
- membership and implementation of the Considerate Constructors Scheme.

#### Topic A.4 Economic issues of construction

Understand the economic issues of construction and development, the issues to consider when planning developments and during construction and how to limit the adverse effects of development locally.

Economic environment issues:

- employment and training opportunities
- need for a financial returns on most developments
- the costs of running a building over its full life (life cycle costing), from initial construction to refurbishment
- cost of flooding defence improvement as incidence of flash flooding increases
- associated infrastructure development costs
- the cost advantages/disadvantages of developing on greenfield and brownfield land.

**What needs to be learnt****Learning aim B: Understand the techniques and methods used to reduce the impact of construction during the life cycle of a development**

Understand the use of different techniques, methods and materials to reduce the impact of the construction of developments and structures on our environment. Understand the advantages and disadvantages of these techniques, methods and materials, their construction details, where and how they are used effectively and how they reduce undesirable social, physical and economic impact.

**Topic B.1 Designing for sustainability**

Understand the use of designing for sustainability, how it reduces the environmental impact, reduces operational costs and how it supports sustainable development for the community:

- using sustainable materials within the design of domestic, public and commercial buildings –
  - specifying low embodied energy materials (timber, straw bales, reeds for thatching, hemp for insulation, stone, slate) and techniques to reduce reliance on finite fuels
  - specifying a local source to reduce transportation costs and local pollution
  - specifying modular dimensions so that materials do not require cutting, therefore reducing wastage
- using design and technology solutions for –
  - heating and ventilation systems to reduce finite resource depletion and air pollutants (energy efficient and emission reducing equipment for space and water heating, natural ventilation and air conditioning)
  - water saving solutions (regular equipment maintenance, push type taps, low volume flush toilets, shower and tap flow restriction devices)
  - insulating buildings to reduce heat losses and noise transmission (double and triple glazing, recycled glass mineral wool, sheep's wool, hemp, flax)
  - lighting (maximising natural light, low energy lighting)
  - the reduction of air leakage from a building (weather-stripping materials and techniques for use on doors and windows, automatic external door closers)
  - cutting waste with the use of pre-fabrication techniques
- reducing air pollution from plant and equipment exhaust fumes (regular maintenance and servicing)
- reducing water use and waste through –
  - specifying reduction methods and water efficient installations
  - regular maintenance of equipment
  - reporting procedures
- use of building design and materials to mitigate the need for expensive flood defences
- use of thermal mass within buildings to absorb and emit heat
- use of a curved infrastructure road layout with south-facing houses to maximise the warmth and light the homes receive during the movement of the sun
- designing the density of homes so they are not too compact, provide open green spaces and incorporate social community areas so residents do not feel cramped and too close to other occupants

*continued*

### What needs to be learnt

- aspects related to sustainability of the building and construction process, covered in:
  - Government Regulations and voluntary codes setting out requirements for comfort, health and conservation of fuel and power, which include the use of insulation to reach a specified u-values, damp proofing and sound insulation (Building Regulations (Part L), BRE (Building Research Establishment) Technical guides, Sustainable Homes: British Research Establishment Environmental Assessment Method (BREEAM))
- designing the infrastructure to incorporate –
  - cycle tracks to encourage less use of vehicular transport
  - mass rapid transport links (trams, bus routes) to encourage use of mass transport
  - reduction of car use by measures such as designated ‘two people lanes’
  - vehicle parking.

### Topic B.2 Sustainable materials

Understand the range of sustainable materials available, their advantages and disadvantages, how they are used effectively and understand how they reduce the environmental impact of developments and buildings:

- low carbon materials incorporating low embodied energy
- timber-based products –
  - cedar boarding and shingles
  - recycled particleboard sheets
  - engineered eco-joists, engineered timber joists
  - timber framing
  - structural insulated panels
- roofing materials –
  - thatch used in roofing
  - re-constituted roofing slates
- insulation products –
  - recycled glass mineral wool
  - natural products such as sheep’s wool insulation, hemp, flax
- recycled and crushed hardcore from demolition of existing structures retained on site for use as a fill material
- ways to reduce plant and equipment exhaust fumes (regular maintenance and servicing)
- incorporating recycling technology into materials to enable easier recycling at the end of their life
- renewable sourced materials such as timber-based products, naturally occurring products, products that can be harvested and regrown.

*continued*

## What needs to be learnt

### Topic B.3 Alternative energy sources

Understand the characteristics, applications and advantages/disadvantages of using the following renewable sources of energy and water heating for domestic, public building and commercial applications:

- photovoltaic roof tiles and panels
- ground source heat recovery
- air source heat recovery
- combined heat and power units
- small-scale wind turbines
- solar hot water panels
- biomass fuelled heating systems.

### Topic B.4 Techniques and methods for sustainability

Understand the characteristics, design and construction details, applications and advantages/disadvantages of using the following techniques and methods for domestic, public building and commercial construction:

- straw bale construction techniques
- timber framed/panelled construction
- green roof technology using sedum planting
- rainwater harvesting
- grey water recycling systems
- sustainable urban drainage systems (SuDS)
- passive stack ventilation
- sun shading (timber and metal sun-screens).

### Topic B.5 Sustainable site practices

Know the construction site practices that minimise the effect upon the physical environment:

- protective fencing around trees
- correct storage of materials to prevent damage
- use of silt traps on temporary drains
- dust reduction (damping down, road sweeping, use of dust suppression equipment, wheel cleaning)
- segregation of waste
- recycling materials (crushed hardcore, timber, plastics, and metals)
- correct storage of fuels and chemicals (use of bund walls)
- providing efficient means of water and social area heating on site for workers
- relocation of animal habitats.

## Teacher guidance

### Resources

There are no special resources needed for this unit.

### Assessment guidance

This unit is externally assessed using a paper-based exam. The exam is set and marked by Pearson. The exam lasts for 1 hour and 15 minutes and contains 50 marks.

The assessment must be taken by the learner under examination conditions.

All questions in the exam paper are compulsory. There will be different types of objective, short answer and extended writing questions, and questions based on source material contained within the examination.





# Unit 12: The Construction Industry

Level: **1 and 2**

Unit type: **Optional specialist (Extended Certificate),  
Mandatory (Diploma)**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

What type of career do you want to follow in the future? Construction is a dynamic and exciting field of employment where ideas and dreams are turned into reality and both professionals and operatives feel justifiably proud of their contributions to the built environment and society.

There are many different personnel employed within the construction sector who have different roles that cover the design, safety management, construction, use and maintenance of the built environment. You will understand their roles, skills and interactions in managing, organising and completing a successful project.

The construction industry organises itself by classifying these personnel in order to design and construct a project, and you will examine the individual roles of the professionally qualified, management, craftsperson and general operative.

Effective health and safety is of vital importance in all industries and areas of modern life. In construction it is essential that all employees know about their health and safety role and the responsibilities of their employers. You will therefore gain an understanding of the key requirements that need to be observed when working on construction projects.

In this unit you will also explore approaches to help you seek employment in the construction industry and gain confidence in job-seeking situations. You will investigate the sources of construction vacancies and prepare a covering letter and curriculum vitae (CV) for a job description provided by your teacher. You will then learn how to prepare yourself for an interview.

## Learning aims

In this unit you will:

- A examine the job roles and responsibilities in the construction industry
- B explore approaches for gaining employment in the construction industry.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Examine the job roles and responsibilities in the construction industry</b></p> <p><b>Topic A.1 Construction career pathways</b></p> <p>Investigate the different types of careers, roles and responsibilities that are available within the construction industry:</p> <ul style="list-style-type: none"> <li>• the design of buildings by professionals, i.e. architects, architectural technologists, interior designers, architectural technicians, structural engineers, consulting engineers, building service engineers</li> <li>• the financial control and estimation by quantity surveyors, estimators, and commercial cost surveyors</li> <li>• the management and supervision of the construction of buildings by site engineers, planners, site managers, site agents, construction managers, general forepersons, and gangers</li> <li>• the construction of buildings by craftspeople and general operatives, i.e. brickwork, carpentry and joinery, painting and decorating, plastering, roofing, labourers, and ground workers</li> <li>• the safety of construction which includes employment with the Health and Safety Executive (HSE), as a health and safety officer, as a health and safety trainer, and as the Construction Design and Management Regulations (CDM) contractor for a project</li> <li>• the value, use and maintenance of buildings by estate agents, facilities managers, maintenance direct labour, contracted services and building surveyors.</li> </ul> <p><b>Topic A.2 The professional pathways</b></p> <p>Investigate the professional pathways, qualifications and professional status for careers in construction:</p> <ul style="list-style-type: none"> <li>• the route, qualifications, training and experience to gain professional status for a chosen career</li> <li>• the function of the professional institutes including the Chartered Institute of Building (CIOB), the Royal Institution of Chartered Surveyors (RICS), the Royal Institute of British Architects (RIBA), the Chartered Institute of Building Services Engineers (CIBSE), and the Institution of Civil Engineers (ICE).</li> </ul> <p style="text-align: right;"><i>continued</i></p>

## What needs to be learnt

### Topic A.3 Roles and responsibilities of personnel in the construction industry

Explore and understand the roles and responsibilities of the different personnel engaged in the construction industry, including:

- the designer – with regard to needs of the client and compliance with legislation
- the financial management team – from the initial cost estimates through to the final account for the completed project
- the construction manager responsible for the management of a building project, the organisation of resources (including sub contractors) and working to an agreed programme
- the facilities or maintenance manager in maintaining a building or structure for its intended life cycle and considering its life cycle costing, energy management and sustainable use.

### Topic A.4 Health and safety requirements

Understand health and safety application to the construction industry, including:

- the health and safety role and responsibilities of employees in different roles and employers in the construction industry
- the safe management of a construction project in order to minimise accidents by considering –
  - all personnel responsibilities for hazards and risks and their control
  - method statements
  - site inductions
  - policy statements
- roles and responsibilities relating to current legislation including the Health and Safety at Work Act (HASAWA), Construction Design and Management Regulations (CDM), Control of Substances Hazardous to Health Regulations (COSHH), and Manual Handling Operations Regulations.

**What needs to be learnt****Learning aim B: Explore approaches for gaining employment in the construction industry****Topic B.1 Investigating sources of construction recruitment**

Identify sources of construction recruitment vacancies and their relevance to the learner's chosen construction career destination, including:

- the Sector Skills Council, CITB – ConstructionSkills, in support of the apprenticeship route into construction
- college and school links, local careers guidance services and other direct links with employers
- university recruitment
- recruitment agencies, including their web-based job search services
- website searches and advertisements, e.g. 'vacancies' link on company websites
- professional journal advertising
- press advertising –
  - national
  - regional
  - local
- direct applications to companies.

**Topic B.2 Methods of application**

For a suitable vacancy, investigate the vacancy requirements, the skills and attributes the learner can offer the employer, and identify the requirements of and prepare a 'fit for purpose' covering letter and CV:

- the purpose of covering letters and CVs in recruitment
- identifying personal attributes, strengths and achievements relevant to the vacancy
- the layout and style of a covering letter
- the content of a letter of application
- the features and layout of a CV, e.g. –
  - personal details
  - qualifications, training courses, professional memberships
  - previous job roles or experience
  - personal profile
- proofreading covering letters and CVs, including how to use spellchecking software appropriately
- reviewing how suitable letters and CVs are to a specific job description.

**Topic B.3 Preparation for interview**

The preparation required to maximise success in a job interview:

- research into the company/organisation
- evaluating the strengths of the company/organisation
- evaluating own strengths and areas for development
- anticipating interview questions and preparing responses.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Examine the job roles and responsibilities in the construction industry</b>			
1A.1 Outline a craft and an operative job role in the construction industry.	2A.P1 Describe a managerial, craft, and operative job role in the construction industry and the skills and qualifications required. #	2A.M1 Compare the skills and qualifications requirements for an operative, craft, managerial and professional position in the construction industry, including professional membership where appropriate. #	2A.D1 Discuss how a combination of skills, qualifications and experience enable progression from craft roles through to managerial or professional job roles in the construction industry, considering two different progression routes. #
1A.2 Outline the function of a professional association in the construction industry. #	2A.P2 Describe the function of a professional association in construction and the progression opportunities provided by achieving professional status. #		
1A.3 Identify health and safety responsibilities for an employee in a craft role in the construction industry, relating to current regulation and legislation. #	2A.P3 Describe the health and safety responsibilities of an employee in a craft role and a supervisor for a construction project, relating to current regulation and legislation. #	2A.M2 Explain the main health and safety responsibilities of an employee in a craft role, a supervisor and a construction manager. #	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Explore approaches for gaining employment in the construction industry</b>			
1B.4 Identify sources of construction vacancies and opportunities with guidance.#	2B.P4 Describe sources of construction vacancies and opportunities.		
1B.5 Create a covering letter and a CV with guidance.#	2B.P5 Create a covering letter and a CV in response to a given job description: <ul style="list-style-type: none"> <li>• with appropriate formatting</li> <li>• with no grammatical or spelling errors</li> <li>• that follows document format conventions</li> <li>• with content relevant to the job description. #</li> </ul>	2B.M3 Create a covering letter and a CV in response to a given job description: <ul style="list-style-type: none"> <li>• with content that matches the applicant's relevant skills and attributes to the requirements of the job description.#</li> </ul>	2B.D2 Evaluate a CV and letter of application against that of another applicant, for a job description.#
1B.6 Identify potential questions in preparation for an interview with guidance.	2B.P6 Develop answers to potential questions in preparation for an interview.	2B.M4 Analyse given recruitment information and materials to prepare for potential questions at interview.#	

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit are access to a suitable job description (either real or simulated) and an exemplar CV and application letter for the position.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Learners should be encouraged for level 2 to work independently to complete the evidence required to meet the assessment criteria, except where the assessment criteria indicates the use of guidance.

### Learning aim A

**For 2A.P1:** the learner should describe one managerial, one craft, and one operative role in detail and describe the skills and qualifications required for each role. This description should include the qualifications, training and opportunities for progression within the industry.

**For 2A.P2:** learners must describe the function of a professional association in construction, the types of professional membership, how members' progression opportunities are enhanced or improved by professional status and the purpose the professional association serves for its members.

**For 2A.M1:** learners will extend their work in the pass criteria to compare different roles within the industry. The comparison must include the skills, and qualifications that would be required for an operative, a craft, a managerial and a professional position in the construction sector, including professional membership where appropriate. Appropriate professional membership would include: RIBA (Architect), RICS (Quantity Surveyor), CIBSE (Building Services Engineer), IStructE (Structural Engineer), ICE (Civil Engineer) etc.

**For 2A.D1:** learners need to discuss how a combination of skills, qualifications and experience enable progression from craft roles or junior technician roles through to managerial or professional job roles. The learner must link the relevant experience, skills and training to the progression route towards professional or managerial status. The learner must consider at least two alternative progression routes.

**For 1A.1:** learners need to outline a site-based career role for a craftsperson and a general operative in construction. For both craftsperson and general operative roles, the statement must contain some detail of the role, what it entails, and the work they would undertake.

**For 1A.2:** learners need to outline the function of one professional association in the construction industry. This can be drawn from the CIOB, RICS, RIBA, CIBSE or ICE. The outline should include information on what the association provides for its members and its purpose.

**For 2A.P3:** the description of an employee in a craft role and supervisor's responsibilities for a project must be detailed from at least two different pieces of health and safety legislation or regulations.

**For 2A.M2:** the explanation of the health and safety responsibilities of a manager must be detailed. These must be higher level responsibilities, i.e. in terms of the global management of several contracts. For example, the manager will be responsible for ensuring that all employees on site are adequately trained and evidence of training records are retained within the office. The manager's responsibilities must be clearly differentiated from those of a supervisor and considered in relation to current regulation and legislation.

**For 1A.3:** learners need to identify an employee's responsibilities in the construction industry for a craft role. These must be related to current legislation and regulation, e.g. those specified in the Health and Safety at Work Act, which is the primary piece of health and safety legislation applicable to the construction industry.

### Learning aim B

For learning aim B, learners should be provided with a job description to write an application letter and CV for. Centres should either provide a job description that is suitable for students at their current age and experience, or provide learners with case study information so they can write an application letter and CV as someone else. This can be linked into the progression and career work learners completed for learning aim A. Learners can devise the information for the CV and the application letter, but teachers must approve the scenario applicant before the assessment begins.

**For 2B.P4:** learners must describe the sources of construction vacancies and opportunities. This will include sources indicated in the unit content. Learners could conduct their own independent research into employment information sources in order to illustrate their findings.

**For 1B.4:** the learner must identify sources of construction vacancies and opportunities with support and guidance. This will include some of sources indicated in the unit content. Learners could conduct their own independent research into sources in order to illustrate their findings.

**For 2B.P5:** learners must create a covering letter and a CV in response to a given job description. This could be for a genuine advertised job description or an exemplar job description provided by the teacher but it should facilitate the analysis that is required for D2. The covering letter and CV must use appropriate formatting, be grammatically correct and with no spelling errors as these are essential characteristics of a good job application. Documents should be in a suitable format and include content that is relevant to the job description.

**For 2B.M3:** learners will build on their work for 2B.P5. Learners must create a covering letter and a CV for an advertised vacancy. The content must match the applicant's relevant skills and attributes to the requirements of the job description.

**For 2B.D2:** learners must evaluate the application documentation against that of another applicant for the job. The other applicant's documentation may have been created by the centre to enable the learner to fulfil this requirement. The evaluation should include an evaluation of personal qualities, experience, transferrable skills and achievements.

**For 1B.5:** the learner must create a covering letter and a CV with guidance. This could be for a genuine job description, or for an exemplar description provided by the teacher.

**For 2B.P6:** learners must develop potential answers to questions in preparation for an interview. Learners could write a range (three or more) of questions that they think are likely to be asked during the interview.



**For 2B.M4:** learners must anticipate potential questions through an analysis of a variety of information and materials to include details of the company, vacancy requirements and the details supplied in their letter of application and CV in preparation for an interview. This should be linked to the scenario and also consider personal qualities and skills that the learner is able to offer.

**For 1B.6:** learners must identify potential questions in preparation for an interview. Learners could write, with some guidance, some questions that they think are likely to be asked during the interview.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.M1, 2A.D1, 1A.1, 1A.2  2A.P3, 2A.M2, 1A.3	Careers and Health and Safety in Construction	<p>You have been asked to provide a marketing tool for your employer for learners who are interested in construction as a career. Produce a leaflet that gives potential learners an insight into the types of jobs available, the qualifications you would need, and the professional career options.</p> <p>You have also been asked to investigate health and safety in the construction industry to provide a briefing for a group of supervisors and managers. Prepare briefing materials describing the different responsibilities of an employee in a craft role, a construction manager and a supervisor.</p>	<p>A leaflet that covers a range of career opportunities, with routes to professional competence, roles and responsibilities explained, along with skills and qualifications required; separate evaluations for the distinction criterion.</p> <p>A video record of the briefing and notes/presentation where used.</p>
2B.P4, 2B.P5, 2B.P6, 2B.M3, 2B.M4, 2B.D2, 1B.4, 1B.5, 1B.6	My Job Search	You are looking for a job in construction and need to ensure that you can submit a high-quality application and be well prepared for interview. As an applicant for a construction vacancy, investigate sources of construction job vacancies, write your CV and covering letter and prepare for an interview. Evaluate all your application documentation against that of another applicant.	Analysis of construction job vacancy sources and opportunities; complete a CV and covering letter; evaluation of application against that of another applicant.

# Unit 13: Exploring Roofing Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

In this unit, you will learn about working techniques used to perform roofing tasks and familiarise yourself with the relevant tools and equipment. You will apply these techniques to develop practical skills in doing roofing tasks.

In this unit, you will learn about hand tools, access equipment, personal protective equipment (PPE) and safe working techniques used to perform roofing operations. You will learn about the potential health and safety hazards in roofing, how to carry out a risk assessment, and safe working practices in the use of common tools and equipment. You will also develop the knowledge, skills and techniques to determine and select appropriate materials to carry out roofing tasks.

In this unit you will also carry out a practical task involving preparing a sloping roof to receive plain tiles and the fixing of plain tiles to that surface. You will develop an understanding of the issues associated with working at height. You will know the requirements for the safe use of access equipment including extension ladders, mobile scaffold towers and mobile elevated working platforms.

## Learning aims

In this unit you will:

A understand tools, materials and equipment used for roofing tasks

B develop practical skills using safe techniques to carry out roofing tasks.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand tools, materials and equipment used for roofing tasks

##### Topic A.1 Structure of a roof

Structure of sloping roofs, including terminology for parts of roofs.

##### Topic A.2 Tools and equipment used to carry out roofing tasks

Purpose and use of tools and equipment for roofing tasks.

- Hand tools and equipment, including:
  - claw hammer
  - tile cutter
  - slate cutter
  - felt cutting knife
  - tape measure
  - level
  - trowel
  - lead dresser.
- Access equipment, including safe checking, erection, use, dismantling and storage:
  - extending ladders
  - mobile scaffold towers
  - mobile elevated working platforms.

##### Topic A.3 Materials used to carry out sloping roof tasks

Types of materials used to carry out roofing tasks and their purpose:

- underlay – a material which is used to make the roof windproof and watertight, including sarking and roofing felts
- wooden battens – counter battens run down the roof from the ridge to the eaves while tile battens are horizontal timbers fixed over the counter battens
- plain tile fixings and nails
- roof slates and tiles – often made of clay or concrete, slates and tiles are used to cover the roof surface to make the roof weatherproof
- ridge tiles – used at the top or ridge of the roof
- sand and cement mortar mixes – used on a tiled roof to bed and joint a tiled ridge and to fill the gaps at the edge of the verge.

*continued*

**What needs to be learnt****Topic A.4 Safe use and storage of tools, materials and equipment for roofing**

Appropriate practices when working on roofing tasks:

- use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, and high-visibility jacket
- use of task-specific PPE, e.g. safety belts, safety harnesses, gloves, and eye protection
- the need for appropriate behaviour and a positive attitude towards health and safety
- maintaining a clean and tidy work area
- safe manual handling when lifting, moving and stacking materials
- correct use of tools and equipment
- cleaning tools immediately after use to prevent the build-up of mortar deposits
- returning tools to appropriate storage upon completion of practical work.

**What needs to be learnt****Learning aim B: Develop practical skills using safe techniques to carry out roofing tasks****Topic B.1 Health and safety**

Risk assessment prior to starting the activities and procedures during the practical activity, including:

- hazard identification and risks associated with the practical activity –
  - working at height
    - hazards associated with working in icy, wet and windy conditions
    - falls from roofs, through gaps in roofs and through fragile roof materials
    - falls from roofs while ascending and descending
  - being struck by falling roofing elements
  - electric shock caused by contact with defective equipment
  - injuries caused by flying debris
  - slips, trips and falls
  - cuts and injuries caused by tools and equipment
  - abrasive materials
  - cement: burns and inhalation
  - falling objects
  - untidy work area
  - musculoskeletal injuries resulting from lifting and moving heavy loads
- identification of people at risk
- use of control measures to remove or minimise the risk –
  - use of edge protection when working on sloping roofs
  - use of enclosed rubbish chutes to protect persons working below
- adoption of safe working practices, including using PPE, e.g. safety belts, safety harnesses and non-slip shoes.

**Topic B.2 Fix plain roof tiles to a sloping roof surface**

Fixing plain roof tiles to a sloping roof surface using slates or tiles:

- preparing and setting up the work area
- calculating the pitch and gauge
- applying underlay, e.g. sarking felt, roofing felt
- fixing battens to roof – counter battens and tile softwood battens, spacing to suit tiles used
- fixing plain tiles to battens, including half bonds at verges
- considering lap and gauge.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for roofing tasks</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials in roofing.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment for roofing.	2A.M1 Justify the selection of tools, materials and equipment for a specified roofing task.	2A.D1 Evaluate the use of alternative materials for a specified roofing task.
1A.2 Outline the safe use and storage of roofing tools, materials and equipment.	2A.P2 Explain the safe use and storage of roofing tools, materials and equipment.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to carry out roofing tasks</b>			
1B.3 Identify hazards and control measures prior to commencing roofing tasks.	2B.P3 Carry out a risk assessment prior to commencing roofing tasks.#		
1B.4 Work safely using personal protective equipment with guidance.	2B.P4 Comply with safe working practices including using appropriate personal protective equipment.		
1B.5 Calculate gauge and number of courses from technical or manufacture's specification with guidance.*	2B.P5 Calculate gauge and number of courses from technical or manufacture's specification.*		
1B.6 Prepare and set up a sloping roof surface, with guidance: <ul style="list-style-type: none"> <li>• for a minimum area of 3 m<sup>2</sup></li> <li>• for a minimum pitch of 30°</li> <li>• underlay neatly fixed with no ridges</li> <li>• tile battens fixed to within 5mm of parallel of each other.*</li> </ul>	2B.P6 Prepare and set up a sloping roof surface: <ul style="list-style-type: none"> <li>• for a minimum area of 3 m<sup>2</sup></li> <li>• for a minimum pitch of 30°</li> <li>• underlay neatly fixed with no ridges</li> <li>• tile battens fixed within 5 mm of parallel to each other.*</li> </ul>		



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
1B.7 Fix plain roof tiles to a sloping roof surface, with guidance: <ul style="list-style-type: none"> <li>to produce a watertight roof finish.</li> </ul>	2B.P7 Fix plain roof tiles to a sloping roof surface: <ul style="list-style-type: none"> <li>to produce a watertight roof finish.</li> <li>all joints correctly bonded.</li> </ul>	2B.M2 Produce finished work to a sloping roof surface: <ul style="list-style-type: none"> <li>all tiles laid to correct lap and gauge.</li> <li>to produce a watertight roof finish</li> <li>all joints correctly bonded.*</li> </ul>	2B.D2 Produce finished work to a sloping roof surface: <ul style="list-style-type: none"> <li>all tiles laid to correct lap and gauge</li> <li>a half-bond bedded at both verges</li> <li>to produce a watertight roof finish.</li> <li>all joints correctly bonded.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit are access to hand tools, materials, Personal Protective Equipment and access equipment of a nature and standard typical of a roofing work environment. The learning environment must be a safe place of work with adequate space for construction of the roof tiling model, the safe use of access equipment, adequate washing facilities, and access to first aid facilities and a person trained in first aid. The practical activities will proceed effectively only in a dedicated workshop or training area. The roofing activity must only be attempted at ground level. Centre health and safety risk assessments should be available and implemented as a learning resource.

Given the nature of the practical activities in this unit, learners' work for assessment should be evidenced through witness statements and observation records, annotated photographs and video recordings.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

#### Learning aim A

**For 2A.P1:** learners should explain how tools, materials and equipment are used in roofing and provide supported reasons as to when they would be selected for different situations. The range of hand tools and materials should be wider than that to be used for the practical roofing task.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific centre devised roofing situation, and justify which tools, materials and equipment they would use for this task. Learners should explain, with reasons, why they selected items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation explored in the Merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for roofing. The range of hand tools and materials should be wider than that to be used for the practical roofing task.

**For 2A.P2:** learners should explain how to safely use and store the tools, materials and equipment from 2A.P1, including in their explanations the reasons why these activities are undertaken. Learners could give written evidence, make an individual presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When presentational or oral evidence is provided, this should be confirmed via a teacher record.

**For 1A.2:** learners should outline how to safely use and store the tools, equipment and materials for 1A.1. Their outline does not need to include the reasons why tools, equipment and materials are used and stored in these ways.

#### Learning aim B

Learners are required to produce a suitable risk assessment for their activities before they begin, and should work safely throughout the Learning aim in order to complete their roofing tasks. This can be evidenced by observation records and completion of a quality control sheet and photographs. The practical task must be carried out at ground level. Learners will fix plain tiles to a sloping roof surface in accordance with a specification given to them in an assessment brief by the teacher.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the practical tasks. This should include identification of hazards, the risks associated with the practical activity (especially working at height), the people at risk and appropriate control measures to minimise the risk. This criterion can be evidenced by a risk assessment template completed by the learner.

**For 1B.3:** learners identify, i.e. show that they recognise what and where hazards are present in the work area and the control measures required prior to commencing the practical task. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. The learner can complete a risk assessment template (or document) to fulfil this criterion.

**For 2B.P4:** learners comply with safe working practices, wear appropriate PPE and behave appropriately, with a positive attitude towards health and safety. This can be evidenced throughout the practical tasks via a teacher observation record.

**For 1B.4:** learners at level 1 will work safely, with guidance, when undertaking the practical tasks using personal protective equipment (PPE).

**For 2B.P5:** Learners must calculate the gauge and the number of courses required using the technical or manufacturer's specification information provided by the teacher.

**For 1B.5:** with guidance from the teacher, learners must calculate the gauge and the number of courses required using the technical or manufacturer's specification information provided.

**For 2B.P6:** learners must prepare and set out a sloping roof surface with a minimum area 3m<sup>2</sup> and minimum pitch of 30° as specified in the brief provided by the teacher. The brief should include a requirement to apply an underlay and fix tile battens to the roof. The underlay should be neat and laid without ridges. The battens should be of appropriate size and correctly spaced to take the tiles to be used, fixed firmly and within 5mm of parallel.

**For 1B.6:** learners must prepare and set out a sloping roof surface, with guidance, for with a minimum area 3m<sup>2</sup> and minimum pitch of 30° as specified in the brief provided by the teacher. The brief should include applying an underlay and fixing tile battens to the roof. The underlay should be neat and laid without ridges. The battens should be of appropriate size and correctly spaced to take the tiles to be used, fixed firmly and within 5mm of parallel.

**For 2B.P7:** learners must fix plain roof tiles to a sloping roof surface producing a watertight roof finish, with a minimum area 3m<sup>2</sup> and minimum pitch of 30° as specified in the brief provided by the teacher. The brief should include fixing tiles to the battens of a sloping roof structure. All work must be correctly bonded, with all joints properly formed.

**For 2B.M2:** learners must produce work that complies with the criteria stated in 2B.P5 with all tiles laid to correct lap and gauge. Lap and gauge will depend upon the type of covering (plain, concrete, slate) and the pitch, as recommended by the manufacturer. This should be specified in the brief.

**For 2B.D2:** learners must produce finished work of a standard as prescribed in 2B.P5 and all tiles laid to correct lap and gauge as for 2B.M3, but also with a half-bond properly bedded at both verges.

**For 1B.7:** learners must fix plain roof tiles to a sloping roof surface, with guidance, producing a watertight roof finish, with a minimum area 3 m<sup>2</sup> and minimum pitch of 30° as specified in the brief provided by the teacher. The brief should include fixing tiles to the battens of a sloping roof structure. All work must be correctly bonded, with all joints properly formed.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1B.3, 1B.4, 1B.5, 1B.6, 1B.7, 2A.P1, 2A.P2, 2B.P3, 2B.P4, 2B.P5, 2P.B6, 2P.B7, 2A.M1, 2B.M2, 2A.D1, 2B.D2	Fixing Plain Tiles to a Sloping Surface	<p>You are a roofer working on a construction site and have been asked by the site manager to tile a pitched roof at ground level. The roof will later be transported to a fixed structure for finishing for approval along with quality control comparisons throughout the contract period.</p> <p>Before you begin, you should explain the tools, equipment and materials you will be using and complete a risk assessment.</p>	<p>Material and equipment information; completed risk assessment.</p> <p>Calculations relating to gauge and quantities of materials.</p> <p>Quality control and photographic records.</p> <p>Observation records.</p>

# Unit 14: Exploring Wall and Floor Tiling Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Did you know that tiling requires specialist skills and is very important to produce visually pleasing spaces?

Wall and floor tiling is usually undertaken by specialist sub-contractors. These sub-contractors employ skilled tilers who can work in a wide range of contexts from domestic showers to public swimming baths. Skilled tilers can work with a variety of different types of tiles and can produce attractive designs to meet individual client requirements.

Tiling is a finishing process that involves working closely with other trades in the construction industry. It is usually undertaken towards the end of the construction process. The quality of the work done must therefore be high, because the finished product will be highly visible.

In this unit, you will learn about hand tools, Personal Protective Equipment (PPE) and the safe working techniques used to perform wall and floor tiling tasks. You will learn about the potential health and safety hazards involved in wall and floor tiling, how to carry out a risk assessment and safe working practices in the use of common tools and equipment.

You will also develop the knowledge, skills and techniques to determine and select appropriate materials to carry out an activity where wall and floor tiles are bonded to the background surface. Wall tiling involves working at height so you will develop an understanding of the issues associated with this together with the requirements for the safe use of access equipment.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used for wall and floor tiling tasks
- B develop practical skills using safe techniques to carry out wall and floor tiling tasks.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand tools, materials and equipment used for wall and floor tiling tasks</b></p> <p><b>Topic A.1 Tools and equipment used to carry out wall and floor tiling tasks</b></p> <p>Purpose and use of tools and equipment tiling tasks.</p> <ul style="list-style-type: none"> <li>● Hand tools and equipment:             <ul style="list-style-type: none"> <li>○ tile cutter</li> <li>○ paddle mixer</li> <li>○ power sander</li> <li>○ grout tool</li> <li>○ adhesive spreader</li> <li>○ tile drill</li> <li>○ scraper</li> <li>○ sponge</li> <li>○ tape measure</li> <li>○ level</li> <li>○ trowel</li> <li>○ plumb line</li> <li>○ chalk line</li> <li>○ pencil.</li> </ul> </li> </ul> <p><b>Topic A.2 Materials used to carry out wall and floor tiling tasks</b></p> <p>Types of materials used to carry out wall and floor tiling tasks and their purpose.</p> <ul style="list-style-type: none"> <li>● Surface preparation materials:             <ul style="list-style-type: none"> <li>○ abrasives paper</li> <li>○ filler</li> <li>○ battens</li> <li>○ surface primer</li> <li>○ sealer.</li> </ul> </li> <li>● Tiles for walls and floors, e.g. ceramic, porcelain, quarry, slate, stone, concrete, terrazzo, marble, glass, metal.</li> <li>● Trims, finishing edges, cover beads.</li> <li>● Adhesives:             <ul style="list-style-type: none"> <li>○ wall and floor adhesives</li> <li>○ flexible adhesives and their use for different backgrounds.</li> </ul> </li> <li>● Grout:             <ul style="list-style-type: none"> <li>○ pre-mixed</li> <li>○ dry powder</li> <li>○ coloured</li> <li>○ combined adhesive and grout</li> <li>○ tile spacers.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****Topic A.3 Safe use and storage of tools, materials and equipment for wall and floor tiling**

Appropriate practices when working on wall and floor tiling tasks.

- Use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, high-visibility jacket.
- Use of task-specific PPE, e.g. gloves, eye protection.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Maintaining a clean and tidy work area.
- Safe manual handling when lifting, moving and stacking materials.
- Correct use of tools and equipment.
- Cleaning tools immediately after use to prevent the build-up of mortar deposits.
- Returning tools to appropriate storage upon completion of practical work.

## What needs to be learnt

### Learning aim B: Develop practical skills using safe techniques to carry out wall and floor tiling tasks

#### Topic B.1 Health and safety

Risk assessment prior to starting the activities and procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - working at height
  - electric shock caused by contact with defective equipment
  - injuries caused by flying debris
  - slips, trips and falls
  - cuts and injuries caused by tools and equipment
  - hazardous materials (cement, adhesives)
  - falling objects
  - untidy work area
  - musculoskeletal injuries resulting from lifting and moving heavy loads.
- Identification of people at risk.
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices, including using personal protective equipment (PPE).

#### Topic B.2 Fix tiles to wall and floor areas

Fixing tiles to wall and floor areas:

- preparing and setting up the work area
- setting out using spirit level, plumb line, chalk line, pencil, and tape measure
- applying adhesive –
  - using pre-mixed adhesive or mixing adhesive
  - spreading adhesive
  - quality checks
- fixing tiles and finishing –
  - tile spacers
  - horizontal and vertical adjustment
  - grouting
  - polishing off.



## Assessment criteria

Level 1		Level 2 Pass		Level 2 Merit		Level 2 Distinction	
Learning aim A: Understand tools, materials and equipment used for wall and floor tiling tasks							
1A.1	Identify the purpose of tools and equipment, and the use of materials in wall and floor tiling.	2A.P1	Explain the selection and use of appropriate tools, materials and equipment for wall and floor tiling.	2A.M1	Justify the selection of tools, materials and equipment for a specific wall and floor tiling task.	2A.D1	Evaluate the use of alternative materials for a specific wall and floor tiling task.
1A.2	Outline the safe use and storage of wall and floor tiling tools, materials and equipment.	2A.P2	Explain the safe use and storage of wall and floor tiling tools, materials and equipment.				

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to carry out wall and floor tiling tasks</b>			
1B.3 Identify hazards and control measures prior to commencing wall and floor tiling tasks.	2B.P3 Carry out a risk assessment prior to commencing wall and floor tiling tasks.#		
1B.4 Work safely using personal protective equipment, with guidance.	2B.P4 Comply with safe working practices, including using appropriate personal protective equipment.		
1B.5 Prepare areas for tiling, with guidance: <ul style="list-style-type: none"> <li>• set out wall and floor areas</li> <li>• prepare background surface.*</li> </ul>	2B.P5 Prepare areas for tiling: <ul style="list-style-type: none"> <li>• set out wall and floor areas</li> <li>• prepare background surface.*</li> </ul>		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.6 Fix tiles and finish to wall and floor areas to a given specification, with guidance:</p> <ul style="list-style-type: none"> <li>fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area, including grout.*</li> </ul>	<p>2B.P6 Fix tiles and finish to wall and floor areas to a given specification:</p> <ul style="list-style-type: none"> <li>fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area, including grout and trim.*</li> </ul>	<p>2B.M2 Fix tiles and finish to wall and floor areas, to a given specification:</p> <ul style="list-style-type: none"> <li>fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area</li> <li>tiles fixed with full beds</li> <li>a joint tolerance of <math>\pm 5</math> mm</li> <li>cutting trim within 3 mm</li> <li>grout uniform for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area.*</li> </ul>	<p>2B.D2 Fix tiles and finish to wall and floor areas to a given specification:</p> <ul style="list-style-type: none"> <li>fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area</li> <li>tiles fixed with full beds</li> <li>a joint tolerance of <math>\pm 3</math> mm</li> <li>cutting trim within 2 mm</li> <li>grout uniform for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area.*</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit are suitable wall and floor areas in order to set out work in preparation for tiling operations. Appropriate hand tools and equipment will be required for learners to be able to identify the correct equipment to use. A mixing area is required for patching of walls for the repair of tiling backgrounds. Suitable tiled areas will be required for learners to be able to remove old wall tiles in preparation for new tiles.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Given the nature of the practical activities in this unit, witness statements and observation records, annotated photographs and video recordings should provide evidence of learners' work for assessment.

### Learning aim A

**For 2A.P1:** learners should explain how tools, materials and equipment are used in wall and floor tiling and when they would be selected for different situations. The range of hand tools and materials should be wider than that to be used for the practical tasks.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to a specific tiling situation, and justify which tools, materials and equipment they would use for this task. Learners should provide reasons for their selection of items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation explored in the Merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for wall and floor tiling. The range of hand tools and materials should be wider than that to be used for the practical tasks.

**For 2A.P2:** learners should explain how to safely use and store the tools, materials and equipment from 2A.P1, including in their explanations the reasons why these activities are undertaken. Learners could give written evidence, make an individual presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When presentational or oral evidence is provided, this should be confirmed via a teacher record.

**For 1A.2:** learners should outline how to safely use and store the tools, equipment and materials for 1A.1. Their outline does not need to include the reasons why tools, equipment and materials are used and stored in these ways.

## Learning aim B

Learners are required to produce a suitable risk assessment for their activities before they begin, and should work safely throughout the Learning aim in order to complete their wall and floor tiling tasks. This can be evidenced by the use of teacher observation records, completion of a quality control sheet and photographs. Learners will then fix tiles to wall and floor areas in accordance with a specification given to them in an assessment brief by the teacher.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the practical tasks. This should include identification of hazards, the risks associated with the practical activity, the people at risk and appropriate control measures to minimise the risk.

**For 1B.3:** learners identify, i.e. show that they recognise, what and where hazards are present and the control measures required prior to commencing the practical task. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. The learner can complete a risk assessment template (or document) to fulfil this criterion.

**For 2B.P4:** learners comply with safe working practices, wear appropriate PPE and behave appropriately, with a positive attitude towards health and safety. This can be evidenced throughout the practical tasks via a teacher observation record.

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical tasks using personal protective equipment (PPE).

**For 2B.P5:** learners must set out and prepare the wall and floor areas for tiling.

**For 1B.5:** learners should set out and prepare the areas for tiling, but will need guidance in order to do this.

**For 2B.P6:** learners must fix tiles to both wall and floor areas, to a given specification, fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area, including grout. The learners are not required to work to specific joint tolerances, though every tile joint must have been grouted. Learners should include a trim in their work.

**For 2B.M2:** learners must fix tiles to wall and floor areas, to a given specification, with tiles fixed with full beds, joint tolerance of  $\pm 5$  mm, cutting trim within 3 mm and grout uniform for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area.

**For 2B.D2:** learners must fix tiles to wall and floor areas, to a given specification, with tiles fixed with full beds, joint tolerance of  $\pm 3$  mm, cutting trim within 2 mm and grout uniform for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area.

**For 1B.6:** learners must fix tiles to wall and floor areas, to a given specification, fully bonded to the background for 1 m<sup>2</sup> of wall and 1 m<sup>2</sup> of floor area, including grout. The learners are not required to work to certain joint tolerances though every tile joint must have been grouted. It is anticipated that learners will have received considerable and guidance at this level.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1B.3, 1B.4, 1B.5, 1B.6, 2A.P1, 2A.P2, 2B.P3, 2B.P4, 2B.P5, 2B.P6, 2A.M1, 2B.M2, 2A.D1, 2B.D2	Fixing Tiles to Wall and Floor Areas	A client has awarded you a contract to perform wall and floor tiling. You will be working with your team. Before you begin, you are required to explain the tools, equipment and materials they will be using, safe working techniques to be used, producing and complying with health and safety risk assessments, general preparation for, and planning of, wall and floor tiling tasks.	Material and equipment information. Completed risk assessment. Photographic records as evidence of the quality of finished surfaces, supported by observation records and/or witness statements.

# Unit 15: Exploring Plastering and Dry Lining Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Did you know that plasterwork is one of the most ancient of handicrafts employed in connection with building operations? The earliest evidence shows that dwellings were erected in a simple fashion with sticks and plastered with mud. This construction method is still in evidence in parts of the developing world as it provides a very effective shelter against the elements. The pyramids in Egypt contain plasterwork executed at least four thousand years ago, probably much earlier, and yet remain hard and durable.

The collective term 'plastering and dry lining' covers a range of different skills that are employed by skilled workers in the construction industry to provide a finished surface for final decoration. Plastering requires the development of techniques involved to produce a finished surface. Plastering is a very technical skill, using a hand trowel that has to be mastered in order to achieve an acceptable finish.

Plasterwork refers to construction or ornamentation done with plaster. The process of creating plasterwork, called plastering, has been used in building construction for centuries. Dry lining is the process of using plasterboard linings secured to traditional brick or block backgrounds and is a dry trade, hence the name dry lining. With this technique the joints in the boards are taped and jointed.

This unit will enable you to explore the basic skills and materials involved in plastering and dry lining. You will learn how to use plastering hand tools safely and understand the different materials and techniques involved in applying basic craft skills needed to stud partitions and apply plaster coats. You will also learn about materials such as gypsum plaster, sand and cement and sand and lime mixes. You will be able to correctly select and safely use appropriate tools and equipment.

## Learning aims

In this unit you will:

- A understand tools, materials and equipment used for plastering and dry lining tasks
- B develop practical skills using safe techniques to carry out plastering and dry lining tasks.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand tools, materials and equipment used for plastering and dry lining tasks</b></p> <p><b>Topic A.1 Tools and equipment used for plastering and dry lining</b></p> <p>Purpose and use of tools and equipment in plastering and dry lining.</p> <ul style="list-style-type: none"> <li>● Hand tools and equipment:             <ul style="list-style-type: none"> <li>○ hawk</li> <li>○ plastering trowel (steel float)</li> <li>○ plastic float</li> <li>○ wood float</li> <li>○ gauging trowel</li> <li>○ square mouth trowel</li> <li>○ cutting knife</li> <li>○ hand mixer</li> <li>○ featheredge</li> <li>○ darby</li> <li>○ wet brush</li> <li>○ scratcher</li> <li>○ mixing tub</li> <li>○ tape measure</li> <li>○ club hammer</li> <li>○ mixing shovel</li> <li>○ tin snips</li> <li>○ claw hammer</li> <li>○ spirit level</li> <li>○ electric mixing tools.</li> </ul> </li> <li>● Access equipment (including safe checking, erection, use, dismantling and storage):             <ul style="list-style-type: none"> <li>○ low-level access platforms</li> <li>○ hop ups</li> <li>○ ladder</li> <li>○ tower scaffolds.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>



## What needs to be learnt

### Topic A.2 Materials used to carry out plastering and dry lining tasks

Types and purposes of materials used to carry out plastering and dry lining tasks, including reasons why specific materials are used for different tasks and alternatives available.

- Plasterboard: composition of plasterboard, different types of plasterboard, and advantages compared with traditional plastering.
- Browning plaster: a backing plaster or undercoat, where it is used, i.e. on absorbent surfaces, and thickness of layer applied.
- Bonding plaster: a backing plaster or undercoat, where it is used, i.e. on dense and less absorbent surfaces and those treated with Polyvinyl Acetate (PVA), and thickness of layer applied.
- PVA: the use of PVA, i.e. application to the walls to create a barrier, improve bonding and prevent the plaster from drying out too fast.
- Finishing plaster: application as a final coat over bonding/browning or over plasterboard, and thickness applied.
- Scrim tape: used to strengthen joints in plasterboards before applying skim finish.
- Angle beads and corner beads used to strengthen and define square edges.

### Topic A.3 Safe use and storage of tools, materials and equipment for plastering and dry lining

Appropriate practices when working on plastering and dry lining.

- Use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, and high-visibility jacket.
- Appropriate storage of tools and equipment.
- Appropriate storage methods for plasters and plasterboards.
- Use of task-specific PPE, e.g. gloves, eye protection, dust mask.
- The need for appropriate behaviour and a positive attitude towards health and safety.
- Maintaining a clean and tidy work area.
- Safe manual handling when lifting, moving and stacking materials.
- Correct use of tools and equipment.
- Cleaning tools immediately after use to prevent the build-up of deposits.
- Returning tools to appropriate storage upon completion of practical work.

**What needs to be learnt****Learning aim B: Develop practical skills using safe techniques to carry out plastering and dry lining tasks****Topic B.1 Health and safety**

Risk assessment prior to starting the activities and procedures during the practical activity.

- Hazard identification and risks associated with the practical activity:
  - working at height
  - electric, shock caused by contact with defective equipment
  - injuries caused by flying debris
  - slips, trips and falls
  - cuts and injuries caused by tools and equipment
  - abrasive materials
  - falling objects
  - untidy work area
  - musculoskeletal injuries resulting from lifting and moving heavy loads.
- Identification of people at risk
- Use of control measures to remove or minimise the risk.
- Adoption of safe working practices, including using PPE.

**Topic B.2 Undertake plastering and dry lining tasks**

Plastering and dry lining tasks.

- Methods used:
  - dry lining onto stud walls (timber studs, metal studs)
  - dot and dab on masonry walls
  - wet finishes
  - render and set.
- Preparing and setting up the work area.
- Mixing materials:
  - standard ratio mixes
  - sand and cement (lime can be used as a substitute), render
  - plaster skim coat finishes.
- Wet finishes:
  - apply rendering and plaster skim to block walls.
- Dry finishes:
  - measure, cut and fix plasterboard, scrim joints and apply finish coat.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand tools, materials and equipment used for plastering and dry lining tasks</b>			
1A.1 Identify the purpose of tools and equipment, and the use of materials for plastering and dry lining.	2A.P1 Explain the selection and use of appropriate tools, materials and equipment for plastering and dry lining.	2A.M1 Justify the selection of tools, materials and equipment for a specified plastering and dry lining task.	2A.D1 Evaluate the use of alternative materials for a specified plastering and dry lining task.
1A.2 Outline the safe use and storage of tools, materials and equipment for plastering and dry lining.	2A.P2 Explain the safe use and storage of tools, materials and equipment for plastering and dry lining.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Develop practical skills using safe techniques to carry out plastering and dry lining tasks</b>			
1B.3 Identify hazards and control measures prior to commencing plastering and dry lining tasks.	2B.P3 Carry out a risk assessment prior to commencing plastering and dry lining tasks.#		
1B.4 Work safely using personal protective equipment, with guidance.	2B.P4 Comply with safe working practices, including using appropriate personal protective equipment.		
1B.5 Prepare and set up working area, with guidance.	2B.P5 Prepare and set up working area.		
1B.6 Apply render and skim finishes to a wall area of 4 m <sup>2</sup> to a given specification, with guidance: <ul style="list-style-type: none"> <li>• fully bonded to the background.</li> </ul>	2B.P6 Apply render and skim finishes to a wall area of 4 m <sup>2</sup> to a given specification: <ul style="list-style-type: none"> <li>• fully bonded to the background</li> <li>• flat to within <math>\pm 4</math> mm.*</li> </ul>	2B.M2 Apply render and skim finishes to a wall area of 4 m <sup>2</sup> to a given specification: <ul style="list-style-type: none"> <li>• fully bonded to the background</li> <li>• flat to within <math>\pm 3</math> mm.*</li> </ul>	2B.D2 Apply render and skim finishes to a wall area of 4 m <sup>2</sup> to a given specification: <ul style="list-style-type: none"> <li>• fully bonded to the background</li> <li>• flat to within <math>\pm 2</math> mm</li> <li>• with no trowel marks.*</li> </ul>
1B.7 Measure and cut plasterboard, with guidance.*	2B.P7 Measure and cut plasterboard correct to within 5 mm.*	2B.M3 Measure and cut angle beads for a corner correct to within 4 mm.*	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
1B.8 Apply plasterboard dry lining finishes, fully bonded or fixed to wall areas, with guidance. *	2B.P8 Apply plasterboard dry lining finishes, fully bonded or fixed to wall areas. *	2B.M4 Produce finished work <ul style="list-style-type: none"> <li>• finishes fully bonded or fixed to wall areas</li> <li>• with angle beads fixed to an external plasterboard corner.*</li> </ul>	2B.D3 Produce finished work with: <ul style="list-style-type: none"> <li>• finishes fully bonded or fixed to wall areas</li> <li>• angle beads fixed to an external plasterboard corner</li> <li>• all angle beads plumb</li> <li>• the work ready for decoration. *</li> </ul>

#Opportunity to assess English skills

\*Opportunity to assess mathematical skills

## Teacher guidance

### Resources

The special resources required for this unit are suitable wall areas in order to perform plastering operations on blockwork and timber stud frames. Appropriate hand tools, power tools and equipment will be required for learners to be able to identify the correct equipment to use. Low-level access platforms will be required for learners to correctly set up in preparation for plastering. A mixing area is required when plastering.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Given the nature of the practical activities in this unit, learners' work for assessment should be evidenced through witness statements and observation records, annotated photographs and video recordings.

### Learning aim A

**For 2A.P1:** learners should explain how tools, materials and equipment are used in plastering and dry lining and provide reasons as to when they would be selected for different situations. Learners should include in their explanations a minimum of 16 tools, four types of plaster, one type each for tape and angle bead, and three different types of equipment.

**For 2A.M1:** learners should apply their understanding from 2A.P1 to dry lining and plastering situations, and justify which tools, materials and equipment they would use for the tasks. Learners should explain, with reasons, why they selected items.

**For 2A.D1:** learners should build on their work for 2A.P1 and 2A.M1 to evaluate alternative materials they could use for the situation explored in the Merit criteria, and expand their responses to which alternative materials would be suitable and appropriate to their selection and why.

**For 1A.1:** learners should identify the purpose of tools and equipment and the uses of materials for plastering and dry lining. Learners should include in their identification a minimum of 16 tools, four types of plaster, one type each for tape and angle bead, and three different types of equipment.

**For 2A.P2:** learners should explain how to safely use and store the tools, materials and equipment from 2A.P1, including in their explanations the reasons why these activities are undertaken. Learners could give written evidence, make an individual presentation to their peers and their teacher, or respond to verbal questioning from their teacher. When presentational or oral evidence is provided, this should be confirmed via a teacher record.

**For 1A.2:** learners should outline how to safely use and store the tools, equipment and materials for 1A.1. Their outline does not need to include the reasons why tools, equipment and materials are used and stored in these ways.

## Learning aim B

Learners are required to produce a suitable risk assessment for their activities before they begin, and should work safely throughout the learning aim in order to complete their plastering and dry lining tasks. This can be evidenced by teacher observation records, and completion of a quality control sheet and photographs.

**For 2B.P3:** learners should produce a risk assessment prior to commencing the practical tasks. This should include identification of hazards, the risks associated with the practical activity, the people at risk and appropriate control measures to minimise the risk. A risk assessment template completed by the learner can provide evidence.

**For 1B.3:** learners identify, i.e. show that they recognise, what and where hazards are present and the control measures required prior to commencing the practical tasks. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. Learners at level 1 are not expected to complete a full risk assessment but will identify the main hazards and control measures. A risk assessment template completed by the learner can provide evidence.

**For 2B.P4:** learners comply with safe working practices, wear appropriate PPE and behave appropriately, with a positive attitude towards health and safety. A teacher observation record can provide the evidence of this criterion.

**For 1B.4:** learners at level 1 will need guidance in order to work safely when undertaking the practical tasks using personal protective equipment (PPE).

**For 2B.P5:** learners should prepare and set out the working area for the plastering and dry lining task. Centres can decide whether their learners will use ready-mixed materials or whether to mix materials for the task. Centres where learners are mixing their own materials should check and approve the mix before the plastering assessment begins.

**For 1B.5:** learners must prepare and set out the working area for the plastering task with guidance. Learners will need support in order to be fully prepared for the plastering task. Learners at Level 1 are expected to use ready-mixed materials for their task.

**For 2B.P6:** learners must apply render and skim finishes to a wall area of 4 m<sup>2</sup> to a given specification. Learners will carry out the plastering tasks to produce work which is fully bonded to the background and is flat to within  $\pm 4$  mm, as specified in the brief provided by the teacher.

**For 2B.M2:** learners must apply render and skim finishes to a wall area of 4 m<sup>2</sup> to a given specification. Learners will carry out the plastering tasks to produce work that is fully bonded to the background and is flat to within  $\pm 3$  mm, as specified in the brief provided by the teacher.

**For 2B.D2:** learners must apply render and skim finishes to a wall area of 4 m<sup>2</sup> to a given specification. Learners will carry out the plastering tasks using trowel skills to produce work that is fully bonded to the background and is flat to within  $\pm 2$  mm, as specified in the brief provided by the teacher. The work at this level will have no trowel marks.

**For 1B.6:** learners must apply render and skim finishes to a prepared wall area of 4 m<sup>2</sup> to a given specification. Learners will carry out the plastering tasks using trowel skills to produce work which is fully bonded to the background as specified in the brief provided by the teacher. It is anticipated that learners will have received considerable support and guidance at level 1.

**For 2B.P7:** learners must measure and cut plasterboard to the given areas as specified in the brief. The measured and cut plasterboard should be accurate to within 5 mm.

**For 2B.M3:** learners must correctly measure an external corner, transfer this measurement and cut an angle bead correctly as specified in the brief provided by the teacher, to a tolerance of 4 mm.

**For 1B.7:** learners must measure and cut plasterboard for given areas. It is anticipated that learners will have received considerable support and guidance at level 1.

For the dry lining task, the teacher brief should indicate a partition of studwork using either metal or timber studs of 2.4 m high and 1.2 m wide.

**For 2B.P8:** learners must apply plasterboard dry lining finishes as specified in the brief provided by the teacher. The brief should include fixing plasterboard to given areas, scrimming joints and applying finish coat to solid or partition backgrounds, with all joints being completed.

**For 2B.M4:** learners must correctly fix an angle bead to a plasterboard corner, as specified in the brief provided by the teacher.

**For 2B.D3:** learners must produce finished work with angle beads fixed plumb vertically and/or horizontally to a plasterboard corner. Taping and jointing work should be of a standard that the surface is ready for decoration.

**For 1B.8:** learners must apply plasterboard dry lining finishes as specified in the brief provided by the teacher. The brief should include fixing plasterboard to given areas, scrimming joints and applying finish coat to solid or partition backgrounds with all joints being completed. It is anticipated that learners will have received considerable support and guidance at level 1.



## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2B.P3, 2B.P4, 2B.P5, 2B.P6, 2B.P7, 2B.P8, 2A.M1, 2B.M2, 2B.M3, 2B.M4, 2A.D1, 2B.D2, 2B.D3, 1A.1, 1A.2, 1B.3, 1B.4, 1B.5, 1B.6, 1B.7, 1B.8	Carrying Out Plastering and Dry Lining Work	A client has awarded you a contract to plaster a section of wall and dry-line another section. You will be working with your team. Before you begin, you are required to explain the tools, equipment and materials they will be using including alternatives that could be used, the safe working techniques to be used, producing health and safety risk assessments and the general preparation for, and planning of, plastering and dry lining tasks.  You will then carry out the plastering and dry lining task.	Material and equipment information.  Completed risk assessment.  Photographic records as evidence of the quality of finished surfaces, supported by observation records and/or witness statements.



# Unit 16: Carpentry and Joinery Operations

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Did you know that carpenters and joiners work with the greatest number and variety of tools in the construction trade? They work with a huge number of different tools, some of which can be used only for a specific purpose or task.

In this unit you will build upon the skills and knowledge gained from *Unit 6: Exploring Carpentry and Joinery Principles and Techniques*. You will learn about the various duties of employers and employees to ensure your safety when working in a carpentry and joinery environment. You will also undertake practical activities, making sure that you work safely at all times. Your practical activities will include calculating the amount of materials and equipment you need and scheduling them for use.

For the joinery task you will produce a setting-out rod/drawing of a timber door which you will use to help mark out your timber. Then you will cut timber joints to make and assemble a door. The carpentry task requires the cutting and fitting of a mortice deadlock and a pair of hinges, which may be attached to the door produced during your joinery task.

Note: *Unit 6: Exploring Carpentry and Joinery Principles and Techniques* is a prerequisite for this unit. Evidence from Unit 6 cannot be used for this unit. Unit 16 requires the learner to select personal protective equipment, the resources required (materials and equipment) and schedule these for more demanding practical tasks.

## Learning aims

In this unit you will:

- A explore health and safety regulations and legislation requirements in performing carpentry and joinery tasks
- B demonstrate practical skills and safe working techniques to carry out joinery tasks
- C demonstrate practical skills and safe working techniques to carry out carpentry tasks.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Explore health and safety regulations and legislation requirements in performing carpentry and joinery tasks</b></p> <p><b>Topic A.1 Health and safety regulations and legislation and their impact upon employers and employees</b></p> <p>A range of regulations and legislation that applies to construction activities on site, including changes and updates to key health and safety legislation as applies at the time of learner assessment that applies when undertaking carpentry and joinery.</p> <p><b>A1.1 Health and Safety at Work Act (HASAWA)</b></p> <p>Understand the main duties under the act.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ ensure the health and safety of all employees</li> <li>○ provide and maintain plant and system of work</li> <li>○ provide safe systems of work, including ensuring safety and the control of risk in connection with the use, handling, storage and transport of substances</li> <li>○ provide information, instruction, training and supervision</li> <li>○ produce a health and safety policy (when there are five or more employees)</li> <li>○ provide (and not charge for) equipment required for safety</li> <li>○ provide facilities for employees' welfare at work</li> <li>○ consult and cooperate with employees on health and safety.</li> </ul> </li> <li>• Employee duties to:             <ul style="list-style-type: none"> <li>○ take reasonable care for the health and safety of themselves and others</li> <li>○ cooperate with employers to enable the employer to perform or comply with their duties under the act</li> <li>○ correctly use anything provided for health and safety</li> <li>○ not misuse or damage anything provided for health and safety reasons.</li> </ul> </li> </ul> <p><b>A1.2 The Work at Height Regulations (as amended)</b></p> <p>Understand the main duties under the regulations.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ avoid work at height where possible</li> <li>○ properly plan and organise all work at height</li> <li>○ ensure all work at height takes account of weather conditions that could endanger health and safety of employees</li> <li>○ provide work equipment or other measures to prevent falls when working at height cannot be avoided</li> <li>○ provide work equipment or other measures to minimise the distance and consequences of a fall, if risk of fall cannot be eliminated</li> <li>○ ensure those involved in work at height are trained and competent</li> <li>○ ensure the place where work at height is done is safe</li> <li>○ inspect equipment for working at height at suitable intervals and when exceptional circumstances may jeopardise safety</li> <li>○ properly control the risks from fragile surfaces</li> <li>○ properly control the risks from falling objects.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

### What needs to be learnt

- Employee duties to:
  - report any safety hazard to the employer
  - not continue working if they think it is unsafe
  - follow any training or instruction
  - use the equipment supplied (including safety devices) properly, following any training and instruction.

#### A1.3 Construction (Design and Management) Regulations (CDM)

Understand the main duties under the regulations.

- Contractor (the employer) duties to:
  - plan, manage and monitor own work and that of others
  - check the competence of all employees
  - train employees and provide relevant information
  - ensure employees have adequate welfare facilities
  - cooperate and coordinate work with others to ensure the health and safety of all.
- Employee duties to:
  - cooperate with employers to enable the employer to perform or comply with their duties under the act.

#### A1.4 Manual Handling Operations Regulations

Understand main duties under the regulations.

- Employer responsibilities to:
  - avoid manual handling so far as reasonably practicable if there is a possibility of injury
  - assess manual handling operations that cannot be avoided and reduce the risk where practicable and possible
  - avoid the requirement for manual handling or limit loads
  - provide mechanical means of handling, where practicable and possible
  - reduce the risk of injury so far as reasonably practicable.
- Employee responsibilities to:
  - follow appropriate systems of work laid down for their safety
  - make proper use of equipment provided for their safety during manual handling
  - not misuse or damage anything provided for manual handling
  - cooperate with their employers on manual handling health and safety matters
  - inform the employer if they identify hazardous handling activities
  - take care to ensure that their activities do not put others at risk.

*continued*

### What needs to be learnt

#### A1.5 The Control of Substances Hazardous to Health Regulations (COSHH)

Understand the main duties under the regulations.

- Employer duties to:
  - conduct COSHH risk assessments
  - provide control measures to prevent harm to health and maintain these measures in good working order
  - ensure that the control measures are adopted and used
  - provide information, instruction and training for employees and others
  - provide health monitoring and surveillance in appropriate cases
  - plan for emergencies.
- Employee duties to:
  - attend relevant training provided by the employer
  - report hazards and risks
  - use control measures.

#### A1.6 The Control of Noise at Work Regulations

Understand the main duties under the regulations.

- Employer responsibilities to:
  - carry out a risk assessment to determine the level of noise and exposure
  - ensure that the risk from noise exposure to employees is eliminated at source or reduced to as low a level as is reasonably practicable
  - provide suitable and sufficient training for employees
  - provide personal protective equipment (PPE).
- Employee responsibilities to:
  - cooperate with their employers on health and safety and noise control
  - wear PPE.

#### A1.7 The Provision and Use of Work Equipment Regulations (PUWER)

Understand the main duties under the regulations.

- Employer responsibilities to:
  - ensure all work equipment is suitable for its intended purpose
  - maintain and regularly inspect all work equipment
  - train employees and provide information and instruction
  - ensure employees have written instructions and training on use of equipment.
- Employee responsibilities to:
  - comply with the employer's health monitoring and surveillance programme
  - wear PPE.

## What needs to be learnt

### Learning aim B: Demonstrate practical skills and safe working techniques to carry out joinery tasks

#### Topic B.1 Resources used for joinery

The *correct selection and use of* materials and equipment, *their properties and advantages and disadvantages*, including *calculating and scheduling* the quantities of materials and equipment required to produce a framed, ledged and braced door.

- Setting-out tools.
- Hand tools and equipment.
- Equipment and selection to hold and secure work.
- Materials.

#### Topic B.2 Safety equipment, its use and safety measures when undertaking joinery tasks

- Safe working and use of PPE.

#### Topic B.3 Knowledge and techniques

These include:

- preparing wood to receive screws – clearance hole, pilot hole, counter sinking
- how to make and use a joinery rod
- purpose and use of a joinery rod, taking-off techniques, scale 1:1
- purpose of a rebated timber section
- making a stepped mortice and tenon
- making a bare-faced tenon
- door assembly
- importance of position of a brace on a framed and braced door in relation to hinges
- finishing techniques – filling and sanding.

## What needs to be learnt

### Learning aim C: Demonstrate practical skills and safe working techniques to carry out carpentry tasks

#### Topic C.1 Resources and equipment used for carpentry

The *correct selection and use of* materials and equipment, *their properties and advantages and disadvantages*, including *calculating and scheduling* the quantities of materials and equipment required to hang a framed, ledged and braced timber door.

- Setting-out tools.
- Hand tools and equipment.
- Woodscrews.
- Hinges.
- Door furniture.
- Types of abrasive papers.

#### Topic C.2 Safety equipment, its use and safety measures when undertaking carpentry tasks

Safe working and use of PPE.

#### Topic C.3 Knowledge and techniques

The development of knowledge and techniques to carry out specified carpentry tasks.

- How to read and use:
  - door schedules
  - location drawings.
- How to fit steel butt hinges.
- How to fit a mortice deadlock.
- Industry practice on the positioning of hinges on a standard domestic door.
- Knowledge of cause of binding (hinge plates recessed too deep/screw sizes) and how to rectify.
- Finishing techniques – filling and sanding.
- How to use a cordless drill:
  - safety considerations
  - torque settings
  - different speeds.
- Selection of woodscrew size with respect to hinge holes/countersink size.



## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Explore health and safety regulations and legislation requirements in performing carpentry and joinery tasks</b>			
1A.1 Identify the requirements of a given health and safety regulation or legislation that applies to employees carrying out carpentry and joinery tasks.	2A.P1 Describe health and safety requirements for employees and employers when performing a practical task in carpentry and joinery.#	2A.M1 Explain health and safety requirements for employees and employers when performing a practical task in carpentry and joinery.#	2A.D1 Justify the health and safety requirements in use for a practical task in carpentry and joinery.#
<b>Learning aim B: Demonstrate practical skills and safe working techniques to carry out joinery tasks</b>			
1B.2 Select the resources required for a framed, ledged and braced door, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources.*</li> </ul>	2B.P2 Select the resources required for a framed, ledged and braced door, to include: <ul style="list-style-type: none"> <li>• calculating the resources required, including allowance for wastage</li> <li>• scheduling the resources.*</li> </ul>	2B.M2 Discuss the resources required for a framed, ledged and braced door, to include: <ul style="list-style-type: none"> <li>• their advantages and disadvantages</li> <li>• the appropriateness of the resources selected</li> <li>• the resource calculation, including allowance for wastage</li> <li>• scheduling the resources.*</li> </ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.3 Measure, mark out and produce a setting-out rod for a timber door to a given specification, with guidance:</p> <ul style="list-style-type: none"> <li>• <math>\pm 4</math> mm overall dimensions.*</li> </ul>	<p>2B.P3 Measure, mark out and produce a setting-out rod for a timber door to a given specification:</p> <ul style="list-style-type: none"> <li>• <math>\pm 3</math> mm overall dimensions.*</li> </ul>	<p>2B.M3 Measure, mark out and produce a setting-out rod for a timber door to a given specification:</p> <ul style="list-style-type: none"> <li>• <math>\pm 2</math> mm overall dimensions.*</li> </ul>	<p>2B.D2 Measure, mark out and produce a setting-out rod for a timber door to a given specification:</p> <ul style="list-style-type: none"> <li>• <math>\pm 1</math> mm overall dimensions.*</li> </ul>
<p>1B.4 Measure, mark out and produce a timber door with joints to a given specification, with guidance:</p> <ul style="list-style-type: none"> <li>• joint gaps not exceeding 3 mm</li> <li>• <math>\pm 4</math> mm overall dimensions</li> <li>• smooth finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2B.P4 Measure, mark out and produce a timber door with joints to a given specification:</p> <ul style="list-style-type: none"> <li>• joint gaps not exceeding 3 mm</li> <li>• <math>\pm 3</math> mm overall dimensions</li> <li>• smooth finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2B.M4 Measure, mark out and produce a timber door with joints to a given specification:</p> <ul style="list-style-type: none"> <li>• joint gaps not exceeding 2 mm</li> <li>• <math>\pm 2</math> mm overall dimensions</li> <li>• square</li> <li>• not twisted</li> <li>• smooth, true and neat finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2B.D3 Measure, mark out and produce a timber door with joints to a given specification:</p> <ul style="list-style-type: none"> <li>• joint gaps not exceeding 1 mm</li> <li>• <math>\pm 1</math> mm overall dimensions</li> <li>• square</li> <li>• not twisted</li> <li>• smooth, true and neat finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Demonstrate practical skills and safe working techniques to carry out carpentry tasks</b>			
1C.5 Select the resources required to hang a timber door and fit a mortice lock, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources required.*</li> </ul>	2C.P5 Select the resources required to hang a timber door and fit a mortice lock, to include: <ul style="list-style-type: none"> <li>• scheduling the resources required.*</li> </ul>	2C.M5 Discuss the resources required to hang a timber door and fit a mortice lock, to include: <ul style="list-style-type: none"> <li>• their advantages and disadvantages</li> <li>• scheduling the resources required.*</li> </ul>	
1C.6 Measure, mark out and fit a pair of steel butt hinges to a timber door and frame, with guidance: <ul style="list-style-type: none"> <li>• gaps around hinges not to exceed 3 mm</li> <li>• hinges do not bind</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	2C.P6 Measure, mark out and fit a pair of steel butt hinges to a timber door and frame: <ul style="list-style-type: none"> <li>• hinge positions as per specification</li> <li>• gaps around hinges not to exceed 3 mm</li> <li>• hinges do not bind</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	2C.M6 Measure, mark out and fit a pair of steel butt hinges to a timber door and frame: <ul style="list-style-type: none"> <li>• hinge positions as per specification</li> <li>• gaps around hinges not to exceed 2 mm</li> <li>• hinges do not bind</li> <li>• smooth, true and neat finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	2C.D4 Measure, mark out and fit a pair of steel butt hinges to a timber door and frame: <ul style="list-style-type: none"> <li>• hinge positions as per specification</li> <li>• gaps around hinges not to exceed 1 mm</li> <li>• hinges do not bind</li> <li>• closing tolerance is consistent</li> <li>• smooth, true and neat finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1C.7 Measure, mark out and fit a mortice deadlock to a timber door and its frame, with guidance:</p> <ul style="list-style-type: none"> <li>• which works the fore plate and keep</li> <li>• gaps not to exceed 3 mm</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2C.P7 Measure, mark out and fit a mortice deadlock to a timber door and its frame:</p> <ul style="list-style-type: none"> <li>• which works the fore plate and keep</li> <li>• gaps not to exceed 3 mm</li> <li>• correct position of lock keep</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2C.M7 Measure, mark out and fit a mortice deadlock to a timber door and its frame:</p> <ul style="list-style-type: none"> <li>• which works the fore plate and keep</li> <li>• gaps not to exceed 2 mm</li> <li>• correct position of lock keep</li> <li>• smooth and true finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2C.D5 Measure, mark out and fit a mortice deadlock to a timber door and its frame:</p> <ul style="list-style-type: none"> <li>• which works the fore plate and keep</li> <li>• gaps not to exceed 1 mm</li> <li>• correct position of lock keep</li> <li>• smooth and true finish</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

A fully equipped joinery workshop or training area with carpentry and joinery workbenches is required for this unit. A woodworking vice must be provided for each learner, as well as industrial standard tools as listed in the unit content.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*. It is advised that learners complete *Unit 6: Exploring Carpentry and Joinery Principles and Techniques* before taking this unit. Learners may not use evidence from Unit 6 for Unit 16.

Health and safety legislation and regulation references must be those current at the time of learner assessment.

### Learning aim A

**For 2A.P1:** learners must describe health and safety requirements that apply to employees and employers in carpentry and joinery. Learners should select two regulations or acts from the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.M1:** learners must explain health and safety requirements that apply for employees and employers in carpentry and joinery. Learners should select two regulations or acts from the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.D1:** Learners must justify the health and safety requirements in use for a practical task in carpentry and joinery, drawing from the regulations and legislation listed in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 1A.1:** learners must identify the requirements of a given health and safety regulation or legislation that applies to employees carrying out carpentry and joinery activities from the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

### Learning aim B

For the joinery practical task, the size of the framed, ledged and braced timber door must be at least 500 mm wide and 1000 mm high.

**For 2B.P2:** learners must select the resources required to complete a framed, ledged and braced door, including calculating the material quantities, and schedule the tools, materials and items of equipment required at various stages of the task. Learners could evidence this through the completion of a stores requisition and a cutting list, by a teacher observation record or by use of a teacher record of oral questioning.

**For 2B.M2:** learners must discuss the resources required to complete a framed, ledged and braced door, including their advantages and disadvantages, how they have calculated material quantities, including the allowance for wastage, and why they have scheduled tools, materials and items of equipment at various stages of the task. Learners will be able to evidence this through a word-processed document or via a record of discussion with their teacher.

**For 1B.2:** learners, with guidance, must select the resources required to complete a framed, ledged and braced door, including the scheduling of tools, materials and items of equipment required at various stages of the task. Learners could evidence this through the completion of a stores requisition and a cutting list, by a teacher observation record or by use of a teacher record of oral questioning.

**For 2B.P3:** learners must measure, mark out and produce a setting-out rod for a timber door, to a given specification ( $\pm 3$  mm overall dimensions). To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back and accompanied by a teacher observation report, including a quality control sheet.

**For 2B.M3:** learners must measure, mark out and produce a setting-out rod for a timber door, to a given specification ( $\pm 2$  mm overall dimensions). To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record, including a quality control sheet.

**For 2B.D2:** learners must measure, mark out and produce a setting-out rod for a timber door, to a given specification ( $\pm 1$  mm overall dimensions). To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report, including a quality control sheet.

**For 1B.3:** learners, with guidance, must measure, mark out and produce a setting-out rod for a timber door, to a given specification ( $\pm 4$  mm overall dimensions). To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record, including a quality control sheet.

**For 2B.P4:** learners must measure, mark out and produce a timber door using basic joints to a given specification ( $\pm 3$  mm overall dimensions), with joints gaps not to exceed 3 mm and having a smooth finish. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record, including a quality control sheet.

**For 2B.M4:** learners must measure, mark out and produce a timber door using basic joints to a given specification ( $\pm 2$  mm overall dimensions), with joint gaps not to exceed 2 mm, square, not twisted and having a smooth, true and neat finish. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record, including a quality control sheet.

**For 2B.D3:** learners must measure, mark out and produce a timber door using basic joints to a given specification ( $\pm 1$  mm overall dimensions), with joint gaps not to exceed 1 mm, square, not twisted and having a smooth, true and neat finish. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report.

**For 1B.4:** learners may utilise the rod they produced for 2B.P3, but it is acceptable for the teacher to provide an accurate rod for production of the practical task. Learners, with guidance, must measure, mark out and produce a timber door using basic joints to a given specification ( $\pm 4$  mm overall dimensions), with joint gaps not to exceed 3 mm. Learners must work safely, using PPE, although this may be with guidance. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report.

### Learning aim C

**For 2C.P5:** learners must select the resources required to hang a timber door and fit a mortice lock, including the scheduling of the tools, materials and items of equipment required at various stages of the task. Learners could evidence this through the completion of a stores requisition, by teacher observation or by use of a teacher record of oral questioning.

**For 2C.M5:** learners must discuss the resources required to hang a timber door and fit a mortice lock, including their advantages and disadvantages, and why they have scheduled tools, materials or items of equipment at various stages of the task. Learners will be able to evidence this through a word-processed document or via a record of discussion with their teacher.

**For 1C.5:** learners, with guidance, must select the resources required to hang a timber door and fit a mortice lock, including the scheduling of tools, materials and equipment required at various stages of the task. This could be via the completion of a materials requisition.

**For 2C.P6:** learners must measure, mark out and fit a pair of steel butt hinges to a timber door and its frame, with the gaps around the hinges not to exceed 3 mm. The hinges must not bind. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record including a quality control sheet.

**For 2C.M6:** learners must measure, mark out and fit a pair of steel butt hinges to a timber door and its frame, as per specification, with the gaps around the hinges not to exceed 2 mm. The hinges must not bind. The recesses created for the hinges must be smooth, true and neatly finished. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation record including a quality control sheet.

**For 2C.D4:** learners must measure, mark out and fit a pair of steel butt hinges to a timber door and its frame, as per specification, with the gaps around the hinges not to exceed 1 mm. The hinges must not bind and the closing tolerance for the door must be consistent. The recesses created for the hinges must be smooth, true and neatly finished. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.

**For 1C.6:** learners, with guidance, must measure, mark out and fit a pair of steel butt hinges to a timber door and its frame, with the gaps around the hinges not to exceed 3 mm. Learners must work safely, using PPE, although this may be with guidance. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.

**For 2C.P7:** learners must measure, mark out and fit a mortice deadlock to a timber door and its frame that is fully operational and works the fore plate and keep, with gaps not exceeding 3 mm. The position of the lock keep must be correct. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.

**For 2C.M7:** learners must measure, mark out and fit a mortice deadlock to a timber door and its frame that is fully operational and works the fore plate and keep, with gaps not exceeding 2 mm. The position of the lock keep must be correct. The recesses created for the lock and plate must be neatly finished. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.

**For 2C.D5:** learners must measure, mark out and fit a mortice deadlock to a timber door and its frame that is fully operational and works the fore plate and keep, with gaps not exceeding 1 mm. The position of the lock keep must be correct. The recesses created for the lock and plate must be neatly finished. Learners must comply with safe working practices and use appropriate PPE. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.

**For 1C.7:** learners, with guidance, must measure, mark out and fit a mortice deadlock to a timber door and its frame that is fully operational and works the fore plate and keep, with gaps not exceeding 3 mm. The position of the lock keep must be correct. Learners must work safely, using PPE, although this may be with guidance. To evidence the practical work for this criterion, the learner's work can be photographed, with the photograph endorsed with the learner's name on the back, accompanied by a teacher observation report including a quality control sheet.



## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.M1, 2A.D1, 1A.1	Health and Safety Site Induction	As part of a construction site induction talk to carpentry and joinery operatives, you are to prepare a presentation on employer and employee duties and responsibilities of two regulations or pieces of legislation.	Written report. PowerPoint presentation slides. Teacher observation report.
2B.P2, 2B.M2, 1B.2, 2B.P3, 2B.M3, 2B.D2, 1B.3  2B.P4, 2B.M4, 2B.D3, 1B.4	Manufacturing a Door	You are required to produce a small-framed, ledged and braced timber door for a main building contractor, working safely at all times. The door is an example of a door for the outside of a domestic house.  As part of this task you will need to select and schedule the materials and equipment you require and produce a setting-out rod for use in producing the door.	Practical performance. Teacher observation records. Witness statements. Photographs of products.
2C.P5, 2C.M5, 1C.5, 2C.P6, 2C.M6, 2C.D4, 1C.6  2C.P7, 2C.M7, 2C.D5, 1C.7	Hanging a Timber Door Including Fitting a Pair of Butt Hinges and a Mortice Deadlock	You have been requested by your supervisor to hang a timber door to a frame by fitting a pair of butt hinges, and also to fit a mortice deadlock. You are to work safely at all times.	Practical performance. Teacher observation records. Witness statements. Photographs of products.



# Unit 17: Brickwork and Blockwork Operations

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Did you know that bricklayers are an integral part of the construction industry and are responsible for much of the UK's built environment? Brickwork and blockwork continue to form the core element of the superstructure of most construction projects and often provide a major aesthetic contribution to the built environment.

The Romans introduced brickwork to the United Kingdom approximately 2000 years ago. However, it was not until the nineteenth century that it became widely adopted. While construction methods have continued to evolve, building with bricks remains a key activity within the construction industry. There are different types and grades of bricks, including facing bricks, common bricks and engineering bricks.

Blockwork has been an integral part of the construction industry since the introduction of concrete blocks in the early twentieth century. Blocks are now one of the most common materials used in construction, and are generally used in preference to bricks for unseen work when building and/or forming walls. Blocks are larger than bricks so fewer are required in any given structure, and this saves on labour, time and money. There are several different grades of concrete block, including dense concrete blocks used for their structural properties and considered to be weather resistant, and lightweight concrete blocks used primarily for their thermal insulation properties and which are not considered weather resistant, so are used where weather resistance is not a primary requirement.

In this unit you will build on the skills and knowledge gained from *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques* and learn more about building walls using bricks and blocks. This unit will offer you the opportunity to explore some of the health and safety regulations that apply to brickwork and blockwork activities, and to explore the common bonding arrangements for raising corners and junctions using bricks and concrete blocks, including the processes and techniques used in their construction. You will also have the opportunity to use simple calculations to establish the correct dimensions of walling when setting out masonry structures.

Note: *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques* is a prerequisite for this unit. Evidence from Unit 7 cannot be used for this unit. Unit 17 requires the learner to select personal protective equipment, the resources required (materials and equipment) and schedule these for more demanding practical tasks.

## Learning aims

In this unit you will:

- A explore health and safety regulations and legislation requirements in brickwork and blockwork operations
- B demonstrate practical skills and safe techniques to construct brickwork walls
- C demonstrate practical skills and safe techniques to construct blockwork walls.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Explore health and safety regulations and legislation requirements in brickwork and blockwork operations</b></p>
<p><b>Topic A.1 Health and safety regulations and legislation and their impact upon employers and employees</b></p> <p>A range of regulations and legislation that applies to construction activities on site including changes and updates to key health and safety legislation current at the time of the learner assessment when constructing brickwork and blockwork.</p> <p><b>A1.1 Health and Safety at Work Act (HASAWA)</b></p> <p>Understand the main duties under the act.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ ensure health and safety of all employees</li> <li>○ provide and maintain plant and system of work</li> <li>○ provide safe systems of work, including ensuring safety and the control of risk in connection with the use, handling, storage and transport of substances</li> <li>○ provide information, instruction, training and supervision</li> <li>○ produce a health and safety policy (when there are five or more employees)</li> <li>○ provide (and not charge for) equipment required for safety</li> <li>○ provide facilities for employees' welfare at work</li> <li>○ consult and cooperate with employees on health and safety.</li> </ul> </li> <li>• Employee duties to:             <ul style="list-style-type: none"> <li>○ take reasonable care for the health and safety of themselves and others</li> <li>○ cooperate with employers to enable the employer to perform or comply with their duties under the act</li> <li>○ correctly use anything provided for health and safety</li> <li>○ not misuse or damage anything provided for health and safety reasons.</li> </ul> </li> </ul> <p><b>A1.2 The Control of Substances Hazardous to Health Regulations (COSHH)</b></p> <p>Understand the main duties under the regulations.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ conduct COSHH risk assessments</li> <li>○ provide and maintain in good order control measures to prevent harm to health</li> <li>○ ensure that the control measures are adopted and used</li> <li>○ provide information, instruction and training for employees and others</li> <li>○ provide health monitoring and surveillance in appropriate cases</li> <li>○ plan for emergencies.</li> </ul> </li> <li>• Employee duties to:             <ul style="list-style-type: none"> <li>○ attend relevant training provided by the employer</li> <li>○ report hazards and risks</li> <li>○ use control measures.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****A1.3 Construction (Design and Management) Regulations (CDM)**

Understand the main duties under the regulations.

- Contractor (the employer) duties to:
  - plan, manage and monitor own work and that of others
  - check competence of all employees
  - train employees and provide relevant information
  - ensure employees have adequate welfare facilities
  - cooperate and coordinate work with others to ensure the health and safety of all.
- Employee duties to:
  - ensure they only carry out work that they are competent to do
  - report risks they are aware of
  - cooperate and coordinate work with others to ensure their own health and safety and that of others who may be affected by the work
  - follow site health and safety rules and procedures.

**A1.4 The Work at Height Regulations (as amended)**

Understand the main duties under the regulations.

- Employer duties to:
  - avoid work at height where possible and practicable
  - ensure all work at height is properly planned and organised
  - ensure all work at height takes account of weather conditions that could endanger health and safety
  - provide work equipment or other measures to prevent falls when working at height cannot be avoided
  - provide work equipment or other measures to minimise the distance and consequences of a fall if risk of a fall cannot be eliminated
  - ensure those involved in work at height are trained and competent
  - ensure the place where work at height is done is safe
  - ensure equipment for work at height is appropriately inspected
  - ensure the risks from fragile surfaces are properly controlled
  - ensure the risks from falling objects are properly controlled.
- Employee duties to:
  - report any safety hazards to their employer
  - not continue working if they think it is unsafe
  - follow any training or instruction
  - properly use any equipment following any safety instruction, including safety devices, provided by the employer.

*continued*

**What needs to be learnt****A1.5 Manual Handling Operations Regulations**

Understand the main duties under the regulations.

- Employer duties to:
  - assess the requirements for manual handling that cannot be avoided, in order to reduce the risk
  - avoid the requirement for manual handling or limit loads where manual handling is necessary
  - provide mechanical means of handling, where practicable
  - reduce the risk of injury so far as reasonably practicable.
- Employee duties to:
  - cooperate with their employers on manual handling health and safety matters
  - make proper use of equipment provided for their safety during manual handling
  - not misuse or damage anything provided for manual handling
  - inform the employer if they identify hazardous handling activities
  - take care to ensure that their activities do not put others at risk.

**Learning aim B: Demonstrate practical skills and safe techniques to construct brickwork walls****Topic B.1 Materials used to construct brickwork walls**

*Correct selection of materials used in brickwork, including calculating and scheduling the quantity of materials required, their properties and uses, together with their advantages and disadvantages.*

- Bricks:
  - machine-made facing bricks
  - hand-made facing bricks
  - engineering bricks
    - class A
    - class B
  - common bricks
    - concrete commons
    - reject facings used as commons
  - special bricks
    - copings and cappings
    - bullnose bricks
    - angle and cant bricks
    - plinth bricks
  - solid, frogged or perforated bricks
  - surface finish
    - smooth
    - dragwire
    - sand faced
    - rustic
    - tooled.

*continued*

### What needs to be learnt

- Mortars including mix proportions and required quantities of constituent parts:
  - cement mortars
  - sand-lime mortars
  - coloured mortars
  - ready-mixed retarded mortars.

### Topic B.2 Construction of solid walls in brickwork

Preparation, calculating material quantities, setting out and constructing walls in brickwork.

- Calculating wall sizes and materials required:
  - size of bricks, including modular sizes
  - standard wall lengths in half-brick multiples
  - wall heights based on number of courses
  - number of bricks, including a waste allowance for cutting and damage
  - quantity of mortar required to complete the wall.
- Setting out the work, including the use of a gauge rod or corner profiles:
  - types and methods of bonding:
    - stretcher bond
    - English bond – including English garden wall bond
    - Flemish bond – including Flemish garden wall bond
  - types and methods of jointing, including advantages and disadvantages:
    - flush
    - tooled (bucket handle)
    - recessed
    - weathered.
- Constructing brickwork wall:
  - half-brick walling to corners in stretcher bond
  - one-brick walling to corners and attached piers.
- Quality control checks:
  - main dimensions to appropriate tolerances
  - face plane deviation
  - level and plumb to appropriate tolerances
  - vertical joints (perps) in line
  - selection and blending of bricks
  - quality of jointing
  - general cleanliness of the completed brickwork.

### Topic B.3 Safety equipment, its use and safety measures when constructing brickwork

- Selection and use of personal protective equipment (PPE).

**What needs to be learnt****Learning aim C: Demonstrate practical skills and safe techniques to construct blockwork walls****Topic C.1 Materials used to construct blockwork walls**

*Correct selection of materials used in blockwork, including calculating and scheduling the materials required, their properties and uses, together with their advantages and disadvantages.*

- Blocks:
  - trench blocks
  - solid blocks
    - dense
    - lightweight
  - insulation blocks
    - aerated blocks
  - keyed blocks
  - fair-faced blocks.
- Mortars, including mix proportions, strength requirements and required quantities of constituent parts:
  - cement mortars
  - sand-lime mortars
  - ready-mixed retarded mortars.

**Topic C.2 Construction of solid walls in blockwork**

- Preparation, calculating material quantities, setting out and constructing walls in blockwork.
- Calculating materials required:
  - number of blocks, including a waste allowance for cutting and damage
  - quantity of mortar required to complete the wall.
- Setting out the work, including the use of a gauge rod or corner profiles:
  - types and methods of bonding
    - half bond
    - indents and toothings for junction walls
  - types and methods of jointing fair-faced blockwork, including advantages and disadvantages
    - flush
    - tooled (bucket handle)
    - weathered
- constructing blockwork walls:
  - quality control checks
    - main dimensions to appropriate tolerances
    - face plane deviation
    - level and plumb to appropriate tolerances
    - vertical joints (perps) in line
    - quality of jointing (for fair-faced work)
    - general cleanliness of the completed blockwork.

*continued*



**What needs to be learnt****Topic C.3 Safety equipment, its use and safety measures when constructing blockwork**

- Selection and use of personal protective equipment.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Explore health and safety regulations and legislation requirements in brickwork and blockwork operations</b>			
1A.1 Identify the requirements of a given health and safety regulation that applies to employees carrying out brickwork and blockwork tasks.	2A.P1 Describe the health and safety requirements for employees and employers when performing a practical task in brickwork and blockwork. #	2A.M1 Explain the health and safety requirements on employees and employers for a practical task in brickwork and blockwork. #	2A.D1 Justify the health and safety requirements in use for a practical task in brickwork and blockwork. #
<b>Learning aim B: Demonstrate practical skills and safe techniques to construct brickwork walls</b>			
1B.2 Select the resources and jointing techniques required for a specified task in brickwork, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources. *</li> </ul>	2B.P2 Select the resources and jointing techniques required for a specified task in brickwork, to include: <ul style="list-style-type: none"> <li>• calculating the resources required</li> <li>• scheduling the resources. *</li> </ul>	2B.M2 Discuss the resources and jointing techniques required for a specified task in brickwork, to include: <ul style="list-style-type: none"> <li>• their advantages and disadvantages</li> <li>• the resource calculation, including allowances for wastage</li> <li>• scheduling the resources. *</li> </ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.3 Set out and construct one brick wall to given specifications with a minimum height of six courses (450 mm) with guidance:</p> <ul style="list-style-type: none"> <li>• with the brickwork dimensionally accurate to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2B.P3 Set out and construct one brick wall to given specifications with a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm):</p> <ul style="list-style-type: none"> <li>• with the brickwork dimensionally accurate to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.M3 Set out and construct one brick wall to given specifications with a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm), with an appropriate joint to both faces:</p> <ul style="list-style-type: none"> <li>• with brickwork plumb to a tolerance of <math>\pm 10</math> mm per m height</li> <li>• with brickwork dimensionally accurate to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• with face plane deviation accurate to <math>\pm 10</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.D2 Set out and construct one brick wall to given specifications with a contrasting or recessed bricks central feature, a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm), with an appropriate joint to both faces:</p> <ul style="list-style-type: none"> <li>• with brickwork plumb to a tolerance of <math>\pm 5</math> mm per m height</li> <li>• with brickwork dimensionally accurate to a tolerance of <math>\pm 5</math> mm per m height and length</li> <li>• with face plane deviation accurate to <math>\pm 5</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
1B.4 Undertake a specified dimensional quality control check on the completed brickwork, with guidance.*	2B.P4 Undertake and record dimensional quality control checks on the completed brickwork, to include: <ul style="list-style-type: none"> <li>• length (including error)</li> <li>• height (including error)</li> <li>• level</li> <li>• plumb</li> <li>• face plane deviation.*</li> </ul>		
<b>Learning aim C: Demonstrate practical skills and safe techniques to construct blockwork walls</b>			
1C.5 Select the resources and jointing techniques required for a specified task in blockwork, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources.*</li> </ul>	2C.P5 Select the resources required for a specified task in blockwork to include: <ul style="list-style-type: none"> <li>• calculating the resources required</li> <li>• scheduling the resources.*</li> </ul>	2C.M4 Discuss the resources required for a specified task in blockwork to include: <ul style="list-style-type: none"> <li>• their advantages and disadvantages</li> <li>• the resource calculation, including allowances for wastage</li> <li>• scheduling the resources.*</li> </ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1C.6 Set out and construct blockwork walls to given specifications with guidance:</p> <ul style="list-style-type: none"> <li>• with a minimum height of three courses (675 mm)</li> <li>• complying with safe working practices, including the use of personal protective equipment.*</li> </ul>	<p>2C.P6 Set out and construct blockwork walls to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm):</p> <ul style="list-style-type: none"> <li>• with the blockwork dimensionally accurate to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2C.M5 Set out and construct blockwork walls to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm):</p> <ul style="list-style-type: none"> <li>• with blockwork plumb to a tolerance of <math>\pm 10</math> mm per m height</li> <li>• with blockwork dimensionally accurate to a tolerance of <math>\pm 10</math> mm per m height and length</li> <li>• with face plane deviation accurate to <math>\pm 10</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2C.D3 Set out and construct blockwork walls to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm):</p> <ul style="list-style-type: none"> <li>• with blockwork plumb to a tolerance of <math>\pm 5</math> mm per m height</li> <li>• with blockwork dimensionally accurate to a tolerance of <math>\pm 5</math> mm per m height and length</li> <li>• with face plane deviation accurate to <math>\pm 5</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

Learners will require access to a bricklaying workshop, with hand tools and materials of a nature and standard typical of a real, industrial work environment. Learners will need:

- an appropriate means of mixing mortar, e.g. a mortar mill which will allow the easy recycling of sand-lime mortar used for learners' work
- personal protective equipment, including safety boots, barrier cream, gloves and eye protection, along with other PPE that may be specific to the working environment.

The learning environment must be a safe place to work, with adequate space for safe construction of sample walls, washing facilities for the removal of mortar from exposed skin and access to first-aid facilities.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*. It is advised that learners complete *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques* before taking this unit. Learners may not use evidence from Unit 7 for Unit 17. Health and safety-related legislation and regulation references must be those current at the time of learner assessment.

### Learning aim A

**For 2A.P1:** learners should describe the health and safety requirements for employees and employers that apply when performing a specified practical task in brickwork and blockwork. This should include the requirements of any two of the five acts or regulations covered in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.M1:** learners must explain the health and safety requirements on employees and employers that apply for a specified practical task in brickwork and blockwork. This should include the requirements of any two acts or regulations from the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.D1:** learners must justify the health and safety requirements in use for a practical task in brickwork and blockwork, drawing from the regulations and legislation listed in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 1A.1:** learners must identify the requirements of a given health and safety regulation or legislation from those listed in the unit content that apply to employees carrying out brickwork and blockwork activities. It is not expected that the learner would be provided with a copy of the source regulation or act, due to the level of language used.

### Learning aim B

**For 2B.P2:** learners must select and schedule the resources required for a specified task in brickwork to include the calculation and scheduling of material quantities for bricks and mortar. This could be on the basis of 118 bricks per m<sup>2</sup> for a one-brick wall with an appropriate waste percentage (between 5 per cent and 10 per cent depending upon the susceptibility of the specific bricks to damage) and 1 kg of mortar per brick or 0.054 m<sup>3</sup> per m<sup>2</sup> of brickwork (or similar appropriate coverage rate dependent on whether the bricks are solid, frogged or perforated).

**For 2B.M2:** learners must discuss the resources and scheduling required for a specified task in brickwork to include, in addition to the requirements of 2B.P2, the advantages and disadvantages of the specified bricks and mortar. The discussion must include strength, including for mortar where a lower strength is more appropriate, workability, aesthetics, susceptibility to damage, colour variance, surface finish and textures, dimensional accuracy, porosity and whether the bricks are solid, perforated or frogged. Learners must also discuss how they have calculated the material quantities, including the allowance for wastage.

**For 1B.2:** learners must select, with guidance, the resources required for a specified task in brickwork, including the scheduling of what tools, materials and items of equipment will be needed at various stages of the task. The selection of resources may be evidenced via the completion of a materials requisition.

**For 2B.P3:** learners must set out and construct one brick wall to given specifications with a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm). The learner is required to complete work that is dimensionally accurate to  $\pm 10$  mm, and all work must be correctly bonded, with all joints properly formed and all bricks in their correct orientation. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.M3:** learners must set out and construct one brick wall to given specifications with a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm), with an appropriate joint to both faces. In order to achieve this grade, all work must be correctly bonded, with all joints properly formed and all bricks in their correct orientation. The specified tolerances of  $\pm 10$  mm per metre must be achieved for plumb, main dimensions and face plane deviation. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation record incorporating a fully detailed dimensional quality control record and a photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.D2:** learners must set out and construct one brick wall to given specifications with a central feature of contrasting or recessed bricks, a minimum area of 1 m<sup>2</sup> and a minimum height of nine courses (675 mm), with an appropriate joint to both faces. In order to achieve this grade, all work must be correctly bonded, clean and well blended, with all joints properly formed and all bricks in their correct orientation. The specified tolerances of  $\pm 5$  mm per m must be achieved for plumb, main dimensions and face plane deviation. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by the use of a teacher observation record incorporating a fully detailed dimensional quality control record and a photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 1B.3:** with support and guidance, learners must set out and construct one brick wall to given specifications with a minimum height of six courses (450 mm). Learners are required to demonstrate achievement of the tolerances required for 2B.P3, with all work must be correctly bonded, all joints properly formed and all bricks in their correct orientation. Learners must work safely, using PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.P4:** learners must undertake and record dimensional quality control checks on the completed brickwork. This should be recorded by the learner in the form of a drawing and a table detailing the actual dimensions for length and height, and errors found when the completed brickwork is checked against the specified tolerances, plumb, level and face plane deviation.

**For 1B.4:** learners must undertake a specified dimensional quality control check on the completed brickwork, with guidance. This could be any one of the following: the main dimensions, plumb, level or face plane deviation. This can be evidenced by the use of a teacher observation record or the learner's own records.

### Learning aim C

**For 2C.P5:** learners must select the resources required for a specified task in blockwork to include the calculation and scheduling of material quantities for blocks and mortar. This could be on the basis of 10 blocks per m<sup>2</sup> with an appropriate waste percentage (between 5 per cent and 10 per cent depending upon the susceptibility of the specific blocks to damage and whether or not the work is fair faced) and an appropriate coverage rate for the mortar to suit the thickness of the blocks being used for the assessment.

**For 2C.M4:** learners must discuss the resources required and scheduling for a specified task in blockwork to include, in addition to the requirements of 2B.P2, the advantages and disadvantages of the specified blocks and mortar. The discussion must cover strength, including for mortar where a lower strength is more appropriate, workability, insulation properties, fair faced or keyed, susceptibility to damage and dimensional accuracy. Learners must also discuss how they have calculated the material quantities, including the allowance for wastage.

**For 1C.5:** learners must identify and schedule the resources needed for a specified task in blockwork, with guidance. This could be via the completion of a materials requisition, although it is not expected that quantities of materials will have been accurately calculated.

**For 2C.P6:** learners must set out and construct a blockwork wall to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm) and a dimensional accuracy of  $\pm 10$ mm per metre height and length. All work must be correctly bonded, with all joints properly formed. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation record including a quality control sheet, and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2C.M5:** learners must set out and construct a blockwork wall to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm). In order to meet this criterion, all work must be correctly bonded, with all joints properly formed. The specified tolerances of  $\pm 10$  mm per metre must be achieved for plumb, main dimensions and face plane deviation. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by the use of a teacher observation record including a quality control sheet, incorporating a fully detailed dimensional quality control record and a photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).



**For 2C.D3:** learners must set out and construct a blockwork wall to given specifications, to include corners and junctions, with a minimum height of four courses (900 mm). In order to meet this criterion, all work must be correctly bonded with all joints properly formed. The specified tolerances of  $\pm 5$  mm per metre must be achieved for plumb, main dimensions and face plane deviation. Learners must comply with safe working practices, including the use of appropriate PPE. This can be evidenced by the use of a teacher observation record including a quality control sheet, incorporating a fully detailed dimensional quality control record and a photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 1C.6:** learners must set out and construct blockwork walls to given specifications with a minimum height of three courses (675 mm), with guidance. The learner is required to demonstrate achievement of the tolerances required for 2C.P6 with all work correctly bonded and all joints properly formed. Learners must work safely using PPE. This can be evidenced by the use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 2A.P1, 2A.M1, 2A.D1, 1B.2, 2B.P2, 2B.M2, 1B.3, 2B.P3, 2B.M3, 2B.D2, 1B.4, 2B.P4	Brickwork	<p>You have been asked to contribute to the production of health and safety information for the induction of new site personnel. Your contribution will need to provide them with an understanding of two health and safety acts/regulations that apply when carrying out a specified brickwork or blockwork task, indicating the requirements placed upon employers and employees by these acts/regulations.</p> <p>You are a bricklayer on a construction project and your supervisor has asked you to calculate and schedule the resources required for you to complete the brickwork tasks they have allocated to you.</p> <p>You will then safely complete your work and at the end of the task, undertake quality control checks on your completed practical task.</p>	<p>Report covering the health and safety responsibilities of the employer and employees on a construction project.</p> <p>Calculations and schedules of resources required to complete the brickwork task.</p> <p>For the practical tasks, a teacher observation record, incorporating confirmation of safe working, full dimensional quality control checks, including actual vs drawing dimensions checked against tolerance requirements, subjective and objective quality control comments and clear photographs of the completed work.</p> <p>Tabulated quality control records produced by the learner.</p>
1C.5, 2C.P5, 2C.M4, 2C.D3, 1C.6, 2C.P6, 2C.M5	Blockwork	<p>You are a bricklayer on a construction project and your supervisor has asked you to calculate and schedule the resources required for you to complete the blockwork tasks they have allocated you.</p> <p>You will then safely complete your work to a standard that ensures you have complied with the standards specified for the task.</p>	<p>Calculations and schedules of resources required to complete the blockwork task.</p> <p>A teacher observation record, incorporating confirmation of safe working, full dimensional quality control checks, including actual vs drawing dimensions checked against tolerance requirements, subjective and objective quality control comments and clear photographs of the completed work.</p>

# Unit 18: Painting and Paperhanging Operations

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Painters and decorators have valuable skills that are needed in the construction and maintenance of buildings. They apply decorative and appealing finishes to the surfaces of the construction fabric and help to create comfortable living, working and leisure environments. Good decoration, with the tasteful use of colour and texture, can contribute to making a room or space feel right for its intended purpose. For example, kitchens and hospitals need surfaces that can be easily cleaned to maintain high standards of hygiene; restaurants need colour schemes that make a customer feel welcome and comfortable; and industrial settings use colours to identify hazardous areas or substances.

In addition to paints and the use of colour, painters and decorators use texture to create a suitable ambience for the environment and this is often done with wallpaper. While some wallpapers are plain and smooth, others have patterns and texture to create an atmosphere. The use of patterned wallpaper can make a room appear larger or smaller, depending on the pattern size. A heavily textured wallpaper will help to mask imperfections in a wall, while others, such as flock, will add a touch of elegance and make a room feel lavish and expensive.

In this unit you will build on the skills and knowledge gained from *Unit 8: Exploring Painting and Decorating Principles and Techniques* and learn more about applying paints and hanging wallpapers. You will learn about the resources required, including the tools, materials and equipment needed to perform these tasks, how to estimate the required quantities of materials, and how to work safely. You will learn about some of the key areas of health and safety legislation that impact on painters and decorators and their employers. You will develop painting and wallpapering skills that will help you to produce good quality finishes.

Note: *Unit 8: Exploring Painting and Decorating Principles and Techniques* is a prerequisite for this unit. Evidence from Unit 8 cannot be used for this unit. Unit 18 requires the learner to select personal protective equipment, the resources required (materials and equipment) and schedule these for more demanding practical tasks.

## Learning aims

In this unit you will:

- A explore health and safety regulations and legislation requirements in painting and paperhanging
- B demonstrate practical skills and safe working techniques to complete painting operations
- C demonstrate practical skills and safe working techniques to complete paperhanging operations.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Explore health and safety regulations and legislation requirements in painting and paperhanging

##### Topic A.1 Health and safety regulations and legislation and their impact upon employers and employees

A range of regulations and legislation that applies to construction activities on site, including changes and updates to key health and safety legislation current at the time of learner assessment when painting and paperhanging.

##### A1.1 Health and Safety at Work Act (HASAWA)

Understand the main duties under the act.

- Employer duties to:
  - ensure the health and safety of all employees
  - provide and maintain plant and systems of safe working practice
  - provide safe systems of work, including ensuring safety and control of risks in connection with the use, handling, storage and transport of substances
  - provide information, instruction, training and supervision
  - produce a health and safety policy (when five or more employees)
  - provide (and not charge for) equipment required for safety
  - provide facilities for employees' welfare at work
  - consult and cooperate with employees on health and safety.
- Employee duties to:
  - take reasonable care for the health and safety of themselves and others
  - cooperate with employers to enable the employer to perform or comply with their duties under the act
  - correctly use equipment provided to maintain health and safety
  - not misuse or damage equipment provided to maintain health and safety.

##### A1.2 Control of Substances Hazardous to Health Regulations (COSHH)

Understand the main duties under the regulations.

- Employer duties to:
  - conduct COSHH risk assessments
  - provide and maintain in good order control measures to prevent harm to health
  - ensure that the control measures are adopted and used
  - provide information, instruction and training for employees and others
  - provide health monitoring and surveillance in appropriate cases
  - plan for emergencies.
- Employee responsibilities to:
  - attend relevant training provided by the employer
  - report hazards and risks
  - use control measures.

*continued*

### What needs to be learnt

#### A1.3 Work at Height Regulations (as amended)

Understand the main duties under the regulations.

- Employer duties to:
  - avoid work at height where possible and practicable
  - ensure all work at height is properly planned and organised
  - ensure all work at height takes account of weather conditions that could endanger health and safety of employees
  - provide work equipment or other measures to prevent falls when working at height cannot be avoided
  - provide work equipment or other measures to minimise the distance and consequences of a fall, if risk of a fall cannot be eliminated
  - ensure those involved in work at height are trained and competent
  - ensure the place where work at height is done is safe
  - inspect the equipment for work at height at suitable intervals and when exceptional circumstances may jeopardise safety
  - properly control the risks from fragile surfaces
  - ensure the risks from falling objects are properly controlled.
- Employee duties to:
  - report any safety hazard to the employer
  - not continue working if they think it is unsafe
  - follow any training or instruction
  - use the equipment supplied (including safety devices) properly, following any training and instruction.

#### A1.4 Manual Handling Operations Regulations

Understand main duties under the regulations.

- Employer duties to:
  - assess manual handling operations that cannot be avoided and reduce the risk
  - avoid the requirement for manual handling or limit loads where manual handling is necessary
  - provide mechanical means of handling, where possible or practicable
  - reduce the risk of injury so far as reasonably practicable.
- Employee duties to:
  - make proper use of equipment provided for their safety during manual handling
  - not misuse or damage anything provided for manual handling
  - cooperate with their employers on manual handling health and safety matters
  - inform the employer if they identify hazardous handling activities
  - take care to ensure that their activities do not put others at risk.

**What needs to be learnt****Learning aim B: Demonstrate practical skills and safe working techniques to complete painting operations****Topic B.1 Resources used for painting operations**

The *correct selection and use of* materials and equipment for painting operations, *their properties, uses, advantages and disadvantages*, including *calculating and scheduling* the quantities of materials and equipment required.

- Tools used for painting:
  - surface preparation tools
  - paint application tools.
- Materials used in painting:
  - surface preparation materials
  - types of paint and use.
- Safety equipment, its use and safety measures when painting:
  - personal protective equipment (PPE)
  - access equipment
  - ventilation requirements when working with solvents.

**Topic B.2 Applying paints**

Practical skills for room decoration to a given specification by using brushes and rollers to apply water-based and solvent-based paints.

- Specification:
  - applying emulsion paint to a ceiling area by roller, including cutting in around a ceiling rose
  - applying emulsion paint to walls by roller, including cutting in around electrical switches and sockets
  - applying undercoat and gloss paints to skirting boards and architraves by brush, including cutting in to adjacent surfaces
  - applying undercoat and gloss to a panelled door.

**What needs to be learnt****Learning aim C: Demonstrate practical skills and safe working techniques to complete paperhanging operations****Topic C.1 Resources needed for paperhanging operations**

The *correct selection and use of* materials and equipment for paperhanging operations, their *properties, uses, advantages and disadvantages*, including *calculating the quantities and scheduling* of materials and equipment required.

- Tools used for paperhanging:
  - paperhanging tools
- Materials used for paperhanging:
  - wallpaper types and uses
  - wallpaper adhesives and use.
- Safety equipment and its use when paperhanging:
  - personal protective equipment (PPE)
  - access equipment.

**Topic C.2 Hanging wallpaper**

Practical skills for the hanging of simple patterned wallpapers to previously prepared walls, where there is one internal and one external corner and an obstacle (switch, socket) using appropriate techniques.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Explore health and safety regulations and legislation requirements in painting and paperhanging</b>			
1A.1 Identify the requirements of a given health and safety regulation or legislation that applies to employees carrying out painting and paperhanging tasks.	2A.P1 Describe the health and safety requirements for employees and employers when performing a practical task in painting and paperhanging. #	2A.M1 Explain the health and safety requirements for employees and employers when performing a practical task in painting and paperhanging. #	2A.D1 Justify the health and safety requirements in use for a practical task in painting and paperhanging. #
<b>Learning aim B: Demonstrate practical skills and safe working techniques to complete painting operations</b>			
1B.2 Select the resources required for specified emulsion and gloss painting tasks, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources. *</li> </ul>	2B.P2 Select the resources required for specified emulsion and gloss painting tasks, to include: <ul style="list-style-type: none"> <li>• calculating the resources required, including allowance for wastage</li> <li>• scheduling the resources. *</li> </ul>	2B.M2 Discuss the resources required for specified emulsion and gloss painting tasks, to include: <ul style="list-style-type: none"> <li>• the appropriateness of the resources selected</li> <li>• their advantages and disadvantages</li> <li>• factors affecting the calculation of resources required, including allowance for wastage</li> <li>• scheduling the resources. *</li> </ul>	



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.3 Carry out emulsion painting to walls and ceilings, with guidance, by:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an emulsion surface finish by cleaning and removing dust</li> <li>• applying paint by brush and roller</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints</li> </ul> <p>On the visible finished surface:</p> <ul style="list-style-type: none"> <li>• minimal roller skid marks visible on the finished surface.</li> </ul>	<p>2B.P3 Carry out emulsion painting to walls and ceilings by:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an emulsion surface finish by filling and sanding large surface defects</li> <li>• applying paint by brush and roller</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the visible finished surface:</p> <ul style="list-style-type: none"> <li>• no bristles or roller skid marks visible on the finished surface.</li> </ul>	<p>2B.M3 Carry out emulsion painting to walls and ceilings by:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an emulsion surface finish by filling and sanding large and minor surface imperfections</li> <li>• applying paint by brush and roller</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the visible finished surface:</p> <ul style="list-style-type: none"> <li>• no bristles or roller skid marks</li> <li>• with minimal brush marks</li> <li>• with minimal orange peel effect</li> <li>• neat cutting in</li> <li>• no more than one run or sag.</li> </ul>	<p>2B.D2 Carry out emulsion painting to walls and ceilings by:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an emulsion surface finish by filling and sanding large and minor surface imperfections, with no visible scoring or scratching of the surface</li> <li>• applying paint by brush and roller</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the visible finished surface:</p> <ul style="list-style-type: none"> <li>• no bristles or roller skid marks</li> <li>• no brush marks</li> <li>• minimal orange peel effect</li> <li>• neat cutting in</li> <li>• no runs or sags.</li> </ul>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.4 Carry out undercoat and gloss paint finishes to skirtings, architraves and doors, with guidance, by brush:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an undercoat and gloss surface finish by cleaning and removing dust</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the finished surface:</p> <ul style="list-style-type: none"> <li>• minimal brush marks visible</li> <li>• minimal visible runs or sags.</li> </ul>	<p>2B.P4 Carry out undercoat and gloss paint finishes to skirtings, architraves and doors by brush:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an undercoat and gloss emulsion surface finish by filling and sanding large and minor surface defects</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the finished surface:</p> <ul style="list-style-type: none"> <li>• no visible bristles</li> <li>• no visible brush marks</li> <li>• no more than one run or sag visible.</li> </ul>	<p>2B.M4 Carry out undercoat and gloss paint finishes to skirtings, architraves and doors by brush:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive an undercoat and gloss emulsion surface finish by filling and sanding large and minor surface defects with no visible scoring of the surface</li> <li>• complying with safe working practices, including the use of personal protective equipment and ensuring adequate ventilation when using solvent-based paints.</li> </ul> <p>On the finished surface:</p> <ul style="list-style-type: none"> <li>• no visible bristles</li> <li>• no visible brush marks</li> <li>• no runs or sags visible.</li> </ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Demonstrate practical skills and safe working techniques to complete paperhanging operations</b>			
1C.5 Select the resources required for a specified paperhanging task, with guidance, to include: <ul style="list-style-type: none"> <li>• scheduling the resources.*</li> </ul>	2C.P5 Select the resources required for a specified paperhanging task, to include: <ul style="list-style-type: none"> <li>• calculating the resources required, including allowance for wastage</li> <li>• scheduling the resources.*</li> </ul>	2C.M5 Discuss the resources required for a specified paperhanging task, to include: <ul style="list-style-type: none"> <li>• their advantages and disadvantages</li> <li>• the resource calculation, including the allowances for wastage</li> <li>• scheduling the resources required.*</li> </ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1C.6 Prepare walls and materials for a paperhanging task, with guidance:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive wallpaper by cleaning and removing dust</li> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• measuring and cutting wallpaper to required length, allowing 75 mm at each end for trimming, prior to hanging.*</li> </ul>	<p>2C.P6 Prepare walls and materials for a paperhanging task:</p> <ul style="list-style-type: none"> <li>• preparing surfaces to receive wallpaper by filling and sanding large and minor surface imperfections</li> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• measuring and cutting wallpaper to required length, allowing 50 mm at each end for trimming, prior to hanging.*</li> </ul>		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1C.7 Hang patterned wallpaper to walls, including one internal and one external corner, and one obstacle, with guidance:</p> <ul style="list-style-type: none"> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• no gaps or overlaps &gt; 5 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt; 5 mm.*</li> </ul>	<p>2C.P7 Hang patterned wallpaper to walls, including one internal and one external corner and one obstacle:</p> <ul style="list-style-type: none"> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• no gaps or overlaps &gt; 3 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt; 3 mm.*</li> </ul>	<p>2C.M6 Hang patterned wallpaper to walls, including one internal and one external corner and one obstacle:</p> <ul style="list-style-type: none"> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• no gaps or overlaps &gt; 2 mm</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt; 2 mm.*</li> </ul>	<p>2C.D3 Hang patterned wallpaper to walls, including one internal and one external corner and one obstacle:</p> <ul style="list-style-type: none"> <li>• complying with safe working practices, including the use of personal protective equipment</li> <li>• no gaps or overlaps</li> <li>• no air bubbles, creases or wrinkles</li> <li>• no pattern mismatch &gt; 1 mm.*</li> </ul>

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

The special resources required for this unit include a range of decorating tools, materials, PPE and access equipment. A working area with a previously painted wall and previously painted skirting board will also be needed. The practical activities will proceed more effectively in a dedicated workshop, but portable frames can be used where this is not possible.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*. It is advised that learners complete *Unit 8: Exploring Painting and Decorating Principles and Techniques* before taking this unit. Learners may not use evidence from Unit 8 for Unit 18.

Health and safety legislation and regulation references must be those current at the time of learner assessment.

### Learning aim A

**For 2A.P1:** learners must describe the health and safety requirements for employees and employers that apply to painting and paperhanging. This should include the requirements of any two of the five acts or regulations covered in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.M1:** learners must explain the health and safety requirements for employees and employers that apply to painting and paperhanging. This should include the requirements of any two of the five acts or regulations covered in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.D1:** learners must justify the health and safety requirements in use for a practical task in painting and paperhanging, drawing from the regulations and legislation listed in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 1A.1:** learners must identify the requirements of a given health and safety regulation or legislation that applies to employees carrying out painting and paperhanging activities from those listed in the unit content. It is not expected that the learner would be provided with a copy of the source regulation or act, due to the level of language used. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

## Learning aim B

**For 2B.P2:** learners must select the resources required to complete the specified painting task, including calculating the material quantities and schedule of what tools, materials or items of equipment are required at various stages of the task. Learners could evidence this through the completion of a stores requisition, by teacher observation, or by use of a teacher record of oral questioning.

**For 2B.M2:** learners must discuss the resources required to complete the specified painting task, including the appropriateness of the resources selected, their advantages and disadvantages, how they have calculated material quantities, including the factors affecting the calculation of the resources required, the allowance for wastage and why they have scheduled tools, materials and items of equipment at various stages of the task. Learners will be able to evidence this through a word-processed document or via a record of discussion with their teacher.

**For 1B.2:** learners, with guidance, must select the resources required to complete the painting task, including the scheduling of what tools, materials and items of equipment are required at various stages of the task. Learners could evidence this through the completion of a stores requisition, by a teacher observation record or by use of a teacher record of oral questioning.

**For 2B.P3:** learners must prepare walls and a ceiling with a ceiling rose to receive emulsion finishes, including filling and sanding of surfaces to correct large surface defects. Learners must apply emulsion paint to walls and ceilings by roller, leaving no visible roller skid marks on the finished surface and cutting in around the edges using a brush, leaving no bristles on the finished surface. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 2B.M3:** learners must prepare walls and a ceiling with a ceiling rose to receive emulsion finishes, including the filling and sanding of surfaces to correct large and minor surface imperfections. Learners must apply emulsion paint to walls and ceilings by brush and roller with no bristle or roller skid marks, leaving only minimal brush marks, minimal orange peel effect, with neat cutting in and no more than one run or sag visible on the finished surface. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 2B.D2:** learners must prepare walls and a ceiling with a ceiling rose to receive emulsion finishes, including the correction of large and minor surface imperfections by filling and sanding, with no visible scoring or scratching of the surface. Learners must apply emulsion paint to walls and ceilings by brush and roller with no bristles or roller skid marks, leaving no brush marks, minimal orange peel effect, with neat cutting in and no runs or sags visible on the finished surface. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 1B.3:** learners, with guidance, must prepare surfaces to receive emulsion finishes by cleaning and dusting, then apply emulsion paint to walls and a ceiling with a ceiling rose by brush and roller, leaving only minimal roller skid marks visible on the finished surface. Learners must work safely, using PPE including protective overalls, safety footwear and barrier cream, and must ensure adequate ventilation

when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation records and photographs.

**For 2B.P4:** learners will prepare skirting, architraves and doors to receive undercoat and gloss surface finishes by correcting large and minor surface defects through filling and sanding. Learners will then apply undercoat and gloss finishes to the skirtings, architraves and doors by brush, leaving no visible bristles, brush marks or more than one run or sag on the finished surface. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation records and photographs.

**For 2B.M4:** learners will prepare skirting, architraves and doors to receive undercoat and gloss surface finishes by correcting large and minor surface defects through filling and sanding, with no visible scoring of the surface. Learners will then apply undercoat and gloss finishes to the skirtings, architraves and doors by brush, leaving no visible bristles, brush marks, runs or sags on the finished surface. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation records and photographs.

**For 1B.4:** learners, with guidance, will prepare skirting, architraves and doors to receive undercoat and gloss surface finishes by cleaning and removing dust. Learners will then, with guidance, apply undercoat and gloss finish to skirtings, architraves and doors by brush, leaving only minimal visible brush marks, runs or sags on the finished surface. Learners must work safely, using PPE including protective overalls, safety footwear and barrier cream as appropriate, and must ensure adequate ventilation when using solvent-based paints. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

### Learning aim C

**For 2C.P5:** learners must select the resources required to complete the specified paperhanging task, including calculating the material quantities and schedule of what tools, materials or items of equipment will be needed at various stages of the task. Learners could evidence this through the completion of a stores requisition, by teacher observation, or by a teacher record of oral questioning.

**For 2C.M5:** learners must discuss the resources required to complete the specified paperhanging task, including their advantages and disadvantages, how they have calculated material quantities, the allowances for wastage and why they have scheduled tools, materials or items of equipment at various stages of the task. Learners will be able to evidence this through a word-processed document or via a record of discussion with their teacher.

**For 1C.5:** learners, with guidance, must select and schedule the resources needed for a specified task in paperhanging. This could be via the completion of a materials requisition, although it is not expected that quantities of materials will have been calculated accurately.

**For 2C.P6:** learners will prepare walls to receive wallpaper, including filling and sanding to correct large and minor surface imperfections. Learners must measure and cut wallpaper to the required length prior to hanging, allowing 50 mm at each end for trimming. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.



**For 1C.6:** learners, with guidance, will prepare walls to receive wallpaper, including cleaning and removal of dust. Learners, with guidance, will measure and cut wallpaper to the required length prior to hanging, allowing 75 mm at each end for trimming. Learners must work safely, using PPE including protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 2C.P7:** learners will hang patterned wallpaper to previously prepared walls, including one internal and one external corner, with at least one switch, socket or other obstacle. There should be no gaps or overlaps greater than 3 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 3 mm. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 2C.M6:** learners will hang patterned wallpaper to previously prepared walls, including one internal and one external corner, with at least one switch, socket or other obstacle. There should be no gaps or overlaps greater than 2 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 2 mm. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 2C.D3:** learners will hang patterned wallpaper to previously prepared walls, including one internal and one external corner, with at least one switch, socket or other obstacle. There should be no gaps or overlaps, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 1 mm. Learners must comply with safe working practices, including the use of protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

**For 1C.7:** learners, with guidance, will hang patterned wallpaper to previously prepared walls, including one internal and one external corner, with at least one switch, socket or other obstacle. There should be no gaps or overlaps greater than 5 mm, no air bubbles, creases or wrinkles, and no pattern mismatch greater than 5 mm. Learners must work safely, using PPE including protective overalls, safety footwear and barrier cream as appropriate. It is expected that this will be evidenced through the use of teacher observation record including a quality control sheet and photographs.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 2A.P1, 2A.M1, 2A.D1	Health and Safety in Painting and Paperhanging	You have been asked to contribute to the training materials for this year's painting and decorating intake induction. Produce a PowerPoint presentation that includes details of two pieces of legislation and regulations.	<p>Presentation and notes covering the health and safety responsibilities of the employer/contractor/employees on a construction project.</p> <p>A completed teacher observation report.</p>
1B.2, 2B.P2, 2B.M2, 1B.3, 2B.P3, 2B.M3, 1B.4, 2B.P4, 2B.M4, 2B.D2	Applying Paints	<p>Your supervisor has asked you to decorate a room by preparing the surfaces to then apply emulsion paint to the walls, a ceiling with a ceiling rose and undercoat and gloss to the skirting boards, architrave and panelled door. To do this, you will need to identify and select the resources required, including a calculation of material quantities and a schedule of when various tools, materials and items of equipment will be required.</p> <p>Making sure that you follow recognised safe working practices and use appropriate PPE, you will complete the painting tasks to the best possible standard, including applying emulsion paint to the ceiling and walls by roller, cutting in arounds a ceiling rose and undercoat and gloss finish to the skirting board, architrave and panelled door by brush.</p> <p>Your supervisor has asked to discuss the resources you chose for the task, your calculation of how much you needed and your task scheduling.</p>	<p>Stores requisitions or oral questioning by the teacher to provide evidence of the identification and selection of resources.</p> <p>A word-processed document or teacher record to show the calculation of materials and scheduling.</p> <p>Teacher observation records and photographs evidencing the preparation for, and application of, paints to ceilings, walls and woodwork.</p> <p>A written or teacher-documented oral evaluation report evidencing the evaluation of resources, wastage and scheduling.</p>

Criteria covered	Assignment	Scenario	Assessment evidence
1C.5, 2C.P5, 2C.M5, 1C.6, 2C.P6, 1C.7, 2C.P7, 2C.M6, 2C.D3	Hanging Wallpaper	<p>You have been asked to prepare surfaces and then hang the wallpaper in a room, including papering around internal and external corners and around switches, sockets and other obstacles. To do this, you will need to identify and select the resources required, including a calculation of the quantities required together with wastage, and a schedule of when various tools, materials and items of equipment will be required.</p> <p>Making sure that you follow recognised safe working practices and use appropriate PPE, you will complete the paperhanging task to the best possible standard, including measuring and cutting wallpaper prior to hanging, and hanging wallpaper to walls, including one internal and one external corner and at least one switch, socket or other obstacle.</p> <p>Your supervisor has asked to discuss the resources you chose for the task, your calculation of how much you needed and your task scheduling.</p>	<p>Stores requisitions or oral questioning by the teacher can evidence the identification and selection of resources.</p> <p>A word-processed document or a teacher record of the calculation of materials and the schedule.</p> <p>Teacher observation records and photographs evidencing the preparation for and hanging of wallpaper against the tolerances set out in the assessment criteria.</p> <p>A written or teacher-documented oral evaluation report evidencing the evaluation of resources, wastage and scheduling.</p>



# Unit 19: Plumbing Operations

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Plumbing operations are essential for the distribution of our water supply and waste water services around low-rise domestic and commercial buildings. We rely on plumbing for the supply and discharge of water for safe washing, bathing and drinking. It is essential, therefore, that the plumbing that is installed into a building is accurate, pressure tested and clean for the consumption of the water it delivers.

Health and safety is important to safe working in construction, including when installing building services. Water contamination of the public supply must be avoided as there is the potential to affect large numbers of people with pathogens, water-borne viruses and contaminants that cause illness and disease. Legislation covers plumbing installation work within the UK to ensure that all systems that connect to the public supply will provide potable water for drinking and water for appliance use. Good quality, clean work is therefore essential when fitting plumbing installations.

In this unit you will build upon the skills and knowledge gained from *Unit 9: Exploring Plumbing Principles and Techniques*. This unit will offer you the opportunity to explore the health and safety requirements applicable when you are installing plumbing systems and the requirements of the Water Supply (Water Fittings) Regulations that operate within the UK, with which all installers of water pipework must comply.

For this unit, you will install pipework in a realistic environment to some of the services where water is used. You will carry out practical activities, with due regard to health and safety, to form accurate bends within pipework from the isolation valves to the specified services and install a wash-basin with pedestal and a toilet. Pipework and fittings may be exposed, so they need to appear neat and tidy.

Note: *Unit 9: Exploring Plumbing Principles and Techniques* is a prerequisite for this unit. Evidence from Unit 9 cannot be used for this unit. Unit 19 requires the learner to select personal protective equipment, the resources required (materials and equipment) and schedule these for more demanding practical tasks.

## Learning aims

In this unit you will:

- A explore the importance of health and safety regulations and legislation requirements in plumbing tasks
- B demonstrate practical skills and safe techniques to carry out plumbing tasks.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Explore the importance of health and safety regulations and legislation requirements in plumbing tasks</b></p>
<p><b>Topic A.1 Health and safety regulations and legislation and their impact upon employers and employees</b></p> <p>A range of regulations and legislation that applies to plumbing installation activities on site, including changes and updates to key health and safety legislation. These must be those current at the time of learner assessment applicable to plumbing.</p> <p><b>A1.1 Health and Safety at Work Act (HASAWA)</b></p> <p>Understand the main duties under the act.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ ensure the health and safety of all employees</li> <li>○ provide and maintain plant and system of work</li> <li>○ provide safe systems of work, including ensuring safety and the control of risk in connection with the use, handling, storage and transport of substances</li> <li>○ provide information, instruction, training and supervision</li> <li>○ produce a health and safety policy (when there are five or more employees)</li> <li>○ provide (and not charge for) equipment required for safety</li> <li>○ provide facilities for employees' welfare at work</li> <li>○ consult and cooperate with employees on health and safety.</li> </ul> </li> <li>• Responsibilities of the employee to:             <ul style="list-style-type: none"> <li>○ take reasonable care for the health and safety of themselves and others</li> <li>○ cooperate with employers on health and safety matters to help them perform or comply with their duties under the act</li> <li>○ correctly use anything provided for health and safety</li> <li>○ not misuse or damage anything provided for health and safety reasons.</li> </ul> </li> </ul> <p><b>A1.2 Control of Substances Hazardous to Health Regulations (COSHH)</b></p> <p>Understand the main duties under the regulations.</p> <ul style="list-style-type: none"> <li>• Employer duties to:             <ul style="list-style-type: none"> <li>○ conduct COSHH risk assessments</li> <li>○ provide control measures to prevent harm to health and maintain these measures in good working order</li> <li>○ ensure that the control measures are adopted and used</li> <li>○ provide information, instruction and training for employees and others</li> <li>○ provide health monitoring and surveillance in appropriate cases</li> <li>○ plan for emergencies.</li> </ul> </li> <li>• Responsibilities of the employee to:             <ul style="list-style-type: none"> <li>○ use control measures</li> <li>○ ensure safe storage of goods, materials or equipment</li> <li>○ report any defects in provided control measures</li> <li>○ make themselves available for any health monitoring and surveillance that may be required, e.g. Weil's disease, Legionella disease, exposure to water-borne viruses</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

### What needs to be learnt

- cooperate with employers to enable them to fulfil and discharge their own responsibilities
- attend relevant training provided by the employer.

#### A1.3 Work at Height Regulations (as amended)

Understand the main duties under the regulations.

- Employer duties to:
  - avoid work at height where possible and practicable
  - ensure all work at height is properly planned and organised
  - ensure all work at height takes account of weather conditions that could endanger health and safety of employees
  - provide work equipment or other measures to prevent falls when working at height cannot be avoided
  - provide work equipment or other measures to minimise the distance and consequences of a fall, if risk of a fall cannot be eliminated
  - ensure those involved in work at height are trained and competent
  - ensure the place where work at height is done is safe
  - inspect the equipment for work at height at suitable intervals and when exceptional circumstances may jeopardise safety
  - properly control the risks from fragile surfaces
  - ensure the risks from falling objects are properly controlled.
- Responsibilities of the employee to:
  - report any safety hazards to their employer
  - not continue work if they think it is unsafe
  - follow any training or instruction
  - use any equipment, including safety devices, provided by the employer, following any training and instruction where given.

#### A1.4 Construction (Design and Management) Regulations (CDM)

Understand the main duties under the regulations.

- Responsibilities of the contractor (the employer) to:
  - plan, manage and monitor own work and that of others
  - check competence of all employees
  - train employees and provide relevant information
  - ensure employees have adequate welfare facilities
  - cooperate and coordinate work with others to ensure the health and safety of all.
- Employee duties to:
  - cooperate with employers to enable the employer to perform or comply with their duties under the act.

*continued*

**What needs to be learnt****A1.5 Provision and Use of Work Equipment Regulations (PUWER)**

Understand the main duties under the regulations.

- Responsibilities of the employer to:
  - ensure that all work equipment is suitable for its intended purpose
  - maintain and regularly inspect all work equipment
  - train employees and provide information and instruction
  - ensure employees have written instructions and training on equipment.
- Employee responsibilities to:
  - comply with the employer's health monitoring and surveillance programme
  - wear PPE.

**Topic A.2 Water supply-specific health and safety regulations**

The content of the regulations covering the following aspects and the safety requirements that must be followed in their installation to ensure compliancy.

Water Supply (Water Fittings) Regulations:

- requirements for water fittings – leak-proof fittings, water-conservation measures, maintenance of fittings
- water system design and installation – safe design and installation of plumbing systems
- backflow prevention measures – to prevent contamination of the drinking water supply.

**Learning aim B: Demonstrate practical skills and safe techniques to carry out plumbing tasks****Topic B.1 Materials used for plumbing operations**

The *correct selection and use of* materials and equipment and *their in-situ properties* to install a wash hand basin with pedestal and toilet with cistern.

- Copper and brass fittings:
  - copper tube, 2 mm diameter, 15 mm diameter, chromed tubing for exposed installations
  - standard copper jointing fittings for 22/15 mm pipework, straights, 90° elbows, 'T' junctions 22 mm × 22 mm × 15 mm; pre-soldered ring and plain-end feed types
  - brass fittings, compression and tap connectors
  - isolation valves for maintenance and servicing.
- Plastic pipe and fittings:
  - pipework for water supply, connections to mains, hot and cold water supply
  - waste pipework, traps and soil stack connections
  - standard jointing fittings, push fit, solvent welded, compression fittings
  - specialist service and waste system fittings for connections to appliances.
- Appliances and fittings:
  - wash hand basin, waste kit and pedestal
  - wash hand basin taps, mixer
  - WC, WC seat, cistern, cover, flush mechanism and ball valve
  - overflow waste pipework and connections.

*continued*



## What needs to be learnt

### Topic B.2 Safety equipment, its use and safe work practices when undertaking plumbing operations

- Appropriate practices when installing a wash hand basin with pedestal and toilet with cistern.

### Topic B.3 Wash hand basin and toilet installation

Preparation, *calculating and scheduling* material quantities, setting out and installing a wash hand basin and toilet.

- Measurement, setting out and calculation of materials required:
  - length of pipework
  - number and type of fittings
  - position of wash hand basin and pedestal
  - position of toilet
  - position of waste and overflow
  - access to trap to sink
  - access to isolation valves.
- Installation of wash hand basin:
  - read and follow manufacturer's installation instructions
  - fixing of wash hand basin to wall and seating on pedestal
  - fixing of pedestal to floor
  - installation of taps
  - installation of cold water supply, including all bends, isolation valve and tap fitting
  - installation of hot water supply, including all bends, isolation valve and tap fitting
  - installation of sink waste system, including plug (plug and chain/pop-up waste/integrated stopper), bottle trap and connection to waste soil stack.
- Installation of close-coupled toilet:
  - read and follow manufacturer's installation instructions
  - fixing of toilet bowl to floor and waste outlet using pan connector
  - fixing of cistern to wall
  - installation of cistern valve and flush mechanism
  - installation of cold water supply, including all bends, isolation valve and connection to cistern flush
  - installation of toilet seat.
- Quality control checks:
  - sink positioned to wall and seating on pedestal
  - toilet securely fixed to floor and wall
  - pipe runs to be horizontal and/or vertical as appropriate
  - all joints to be watertight
  - waste pipework is free from defects
  - adequate water flow to both taps
  - taps securely fixed in position
  - quality of pipework installation, watertightness and cleanliness of pipe and fittings.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Explore the importance of health and safety regulations and legislation requirements in plumbing tasks			
1A.1 Identify the requirements of a given health and safety regulation that applies to employees carrying out plumbing operations.#	2A.P1 Describe the health and safety requirements for employees and employers when performing a practical task in plumbing operations.#	2A.M1 Explain the health and safety requirements for employees and employers when performing a practical task in plumbing operations.#	2A.D1 Justify the health and safety requirements in use for a practical task in plumbing operations.#
1A.2 Identify the requirements of the Water Supply (Water Fittings) Regulations for the safety of plumbing installations.	2A.P2 Describe the requirements of the Water Supply (Water Fittings) Regulations for the safety of plumbing installations.#	2A.M2 Explain the requirements of the Water Supply (Water Fittings) Regulations for the safety of plumbing installations.#	
Learning aim B: Demonstrate practical skills and safe techniques to carry out plumbing tasks			
1B.3 Select the resources required for a specified task in plumbing, with guidance, to include: <ul style="list-style-type: none"><li>• scheduling the resources required.*</li></ul>	2B.P3 Select the resources required for a specified task in plumbing to include: <ul style="list-style-type: none"><li>• scheduling the resources required</li><li>• checking conformity against a specification.*</li></ul>	2B.M3 Describe the resources required for a specified task in plumbing, to include: <ul style="list-style-type: none"><li>• scheduling the resources required</li><li>• checking conformity against a specification</li><li>• the advantages and disadvantages of alternative materials</li><li>• specifying the material requirements.*</li></ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.4 Mark out, measure and install a wash hand basin and pedestal to the wall and floor, including taps and waste, with guidance, to include:</p> <ul style="list-style-type: none"> <li>• basin horizontally level to <math>\pm 3</math> mm</li> <li>• pedestal vertical</li> <li>• hot and cold taps fixed and correctly fitted to supply</li> <li>• all connections watertight</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.P4 Mark out, measure and install a wash hand basin and pedestal to the wall and floor, including taps and waste, to a given specification, to include:</p> <ul style="list-style-type: none"> <li>• basin horizontally level to <math>\pm 3</math> mm</li> <li>• pedestal vertical</li> <li>• secure fixing</li> <li>• appropriate pipework installation</li> <li>• hot and cold taps or mixer securely fixed, correctly fitted to supply with adequate flow of both supplies</li> <li>• waste kit fitted to manufacturer's instructions</li> <li>• all connections watertight</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.5 Mark out, measure and fix a toilet and cistern to the wall and floor, with guidance, to include:</p> <ul style="list-style-type: none"> <li>• secure fix to floor and wall</li> <li>• all supply connections watertight</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.P5 Mark out, measure and install a toilet and cistern to the wall and floor, to include:</p> <ul style="list-style-type: none"> <li>• secure fix to floor and wall</li> <li>• all joints on supply pipework are watertight</li> <li>• cistern valve fitted correctly</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.M4 Mark out, measure and install a toilet and cistern to the wall and floor, to include:</p> <ul style="list-style-type: none"> <li>• secure fix to floor and wall</li> <li>• all joints on supply pipework and connections are watertight</li> <li>• cistern valve fitted correctly</li> <li>• WC seat fits correctly</li> <li>• pipework is horizontal and/or vertical as appropriate</li> <li>• cistern is horizontally level <math>\pm 3</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>	<p>2B.D2 Mark out, measure and install a toilet and cistern to a given specification, to include:</p> <ul style="list-style-type: none"> <li>• secure fix to floor and wall</li> <li>• all joints on supply pipework and connections are watertight</li> <li>• cistern valve fitted correctly</li> <li>• WC seat fits correctly</li> <li>• pipework is horizontal and/or vertical as appropriate</li> <li>• all close-coupled seals are watertight</li> <li>• all waste connections are watertight</li> <li>• cistern is horizontally level <math>\pm 1</math> mm</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.*</li> </ul>

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

Learners will require access to a workshop, with hand tools, materials and equipment of a nature and standard typical of a real, industrial work environment.

The learning environment must be a safe place to work, with adequate space for safe installation of plumbing fixtures.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*. It is advised that learners complete *Unit 9: Exploring Plumbing Principles and Techniques* before undertaking this unit. Learners may not use evidence from Unit 9 for Unit 19.

Health and safety legislation and regulation references must be those current at the time of learner assessment.

### Learning aim A

**For 2A.P1:** learners must describe the health and safety requirements with regard to the role of the employee and employer when undertaking specified plumbing operations. This must include the requirements of any two of the regulations covered in the unit content, excluding the water supply specific regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.M1:** learners must explain the health and safety requirements with regard to the role of the employee and employer when undertaking specified plumbing operations. This must include the requirements of any two of regulations or legislation listed in the unit content, excluding the water supply specific regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. This explanation must include an applied plumbing example against each of the employee's responsibilities for the three acts/regulations covered. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.D1:** learners must justify the health and safety requirements in use for a practical task in plumbing operations, drawing from the regulations and legislation listed in the unit content excluding the water supply specific regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 1A.1:** learners must identify the requirements of a given health and safety regulation or legislation (excludes the water supply specific regulations) that applies to employees carrying out plumbing operations from those listed in the unit content. It is not expected that learners would be provided with a copy of the source regulation or act due to the level of language used.

**For 2A.P2:** learners must describe the three regulation requirements of the Water Supply (Water Fittings) Regulations, i.e. water fitting requirements, safe design and installation, and the backflow prevention measures that apply to the safety of plumbing operations for water supply. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 2A.M2:** learners must explain the requirements with regard to the Water Supply (Water Fittings) Regulations. The explanation must cover the three aspects of the requirements for water fittings, safe design and installation, and backflow prevention measures. Learners must include an example for each applied to plumbing installations. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

**For 1A.2:** learners must identify the requirements of the Water Supply (Water Fittings) Regulations, i.e. water fitting requirements, safe design and installation, and the backflow prevention measures that apply to the safety of plumbing regulations. Evidence for this could be in the form of a word-processed document or through a record of oral questioning by the teacher.

### Learning aim B

**For 2B.P3:** learners must select and schedule the resources required for one of the specified tasks in plumbing, i.e. fitting of a wash hand basin and pedestal or toilet and cistern, to include the checking of conformity against a specification. This could be evidenced by a detailed worksheet containing a list of all resources required for the task, to include the specification of materials, quantities, tools and equipment.

**For 2B.M3:** learners must calculate and schedule the resources, i.e. tools, materials and equipment required, as for 2B.P3, and describe suitable alternative materials that could be used for water supply service. The description must outline the advantages and disadvantages of alternative materials that could be used for their proposed installations. For example, if they are using copper then the description would cover the use of plastic pipework and fittings, and vice versa. The learner must produce a detailed description of the specification of the materials that will be required for one of the plumbing tasks.

**For 1B.3:** learners must identify and schedule, with guidance, the resources, i.e. tools, materials and equipment, required for a specified task in plumbing, i.e. fitting of a wash hand basin and pedestal or toilet and cistern. This could be via the completion of a materials requisition.

**For 2B.P4:** learners must install a wash hand basin on a pedestal, including the taps (single or mixer) and the waste kit, and plumb both hot and cold water services. The sink must be level across the top to  $\pm 3$  mm, the pedestal must be vertical, the sink and pedestal must be securely fixed, the hot and cold taps or mixer correctly fitted to the supply and, together with the pipework installation and fitted waste kit, be watertight. Learners must also comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 1B.4:** learners, with guidance, must install a wash hand basin on its pedestal and secure it to the wall and floor correctly, including taps or mixer and waste kit, to meet the criterion's requirements. Learners must also work safely using PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.P5:** learners must install a close-coupled toilet pan and cistern and secure it to the wall and floor correctly. The cold water supply must be plumbed into the cistern and the cistern valve fitted correctly, with no leaks on the supply pipe. Learners must also comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.M4:** learners must install a close-coupled toilet pan and cistern and secure it to the wall and floor correctly. The cold water supply must be plumbed into the cistern and the cistern valve fitted correctly, with no leaks on the supply pipe. The WC seat must be fitted correctly. Pipework that supplies the cistern must be horizontal or vertical as appropriate. The cistern must be fixed so that it is level across the top to  $\pm 3$  mm deviation from horizontal. Learners must also comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation report including a quality control sheet and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.D2:** learners must install a close-coupled toilet pan and cistern and secure it to the wall and floor correctly. The cold water supply must be plumbed into the cistern and the cistern valve fitted correctly, with no leaks on the supply pipe, cistern valve, pan waste or close-coupled seals. The WC seat must be fitted correctly. Pipework that supplies the cistern must be horizontal or vertical as appropriate. The cistern must be fixed so that it is level across the top to  $\pm 1$  mm deviation from horizontal. Learners must also comply with safe working practices, including the use of appropriate PPE. This can be evidenced by use of a teacher observation report including a quality control sheet and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 1B.5:** learners, with guidance, must install a close-coupled toilet pan and cistern and secure it to the wall and floor to meet the requirements as stated in the criterion. Learners must also work safely using PPE. This can be evidenced by use of a teacher observation report including a quality control sheet and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 2A.P1, 2A.M1, 2A.D1, 1A.2, 2A.P2, 2A.M2	Plumbing Health and Safety Requirements	<p>You have been asked to carry out some plumbing work in a commercial kitchen. The work must be performed to the highest safety standards.</p> <p>Choose two pieces of health and safety legislation, plus the Water Supply (Water Fittings) Regulations, which will need to be applied while undertaking the work. Give practical examples of their application while working on a kitchen sink installation.</p>	A report covering the health and safety responsibilities of the employee on the project, with applied examples of each responsibility.
1B.3, 2B.P3, 2B.M3, 1B.4, 2B.P4, 2B.M4, 2B.D2, 1B.5, 2B.P5	Practical Installations and Resource Requirements	<p>A bathroom requires some refurbishment work. The old wash hand basin and toilet have been removed. Supply and fix a new wash hand basin and close-coupled WC.</p> <p>To organise the tools, equipment and materials that you need for the installation of the sink unit, write out a requisition list.</p>	<p>The schedule of resources (materials, tools and equipment) required to complete the plumbing task.</p> <p>A teacher observation record incorporating confirmation of working safely and correct use of PPE, quality control checks against tolerance requirements, quality control comments and clear photographs of the completed work.</p>



# Unit 20: Electrical Operations

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

The way in which we live, work and socialise relies heavily on electrical power, for example our home appliances, manufacturing processes and global communications all need power to work. It is therefore essential for our everyday lives that an adequate and consistent supply of electrical power is available.

Electrical installation in construction is usually undertaken by a specialist electrical sub-contractor.

Electric shock can injure or be fatal, so all wiring must be insulated and installed safely in accordance with current electrical regulations, and tested before it is made live. This unit will offer you the opportunity to explore health and safety legislation and regulations in relation to the practical tasks you will undertake in this unit.

All exposed wiring must be encased in an insulator or conduit to prevent damage or allow physical contact. The UK wiring system uses a series of colours for live, neutral and earth conductors. Being able to correctly recognise the colour-coded wires and controls is essential, so potential electricians must pass a colour blindness test before undertaking study and training.

In this unit, your practical activity will include working safely to mark out, measure and install a two-way switching circuit and light fitting, a ring final circuit and electrical power outlets.

This unit does *not* fulfil the requirements of occupational competence in electrical operations. You will need to undertake further study and gain experience to meet the current requirements for electrical installations for practising electricians.

Note: *Unit 10: Exploring Electrical Principles and Techniques* is a prerequisite for this unit. Evidence from Unit 10 cannot be used for this unit. Unit 20 requires the learner to select personal protective equipment, the resources required (materials and equipment) and schedule these for more demanding practical tasks.

## Learning aims

In this unit you will:

- A explore health and safety regulations and legislation requirements in electrical operations
- B demonstrate practical skills and safe techniques to carry out electrical operation tasks.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Explore health and safety regulations and legislation requirements in electrical operations

##### Topic A.1 Health and safety regulations and legislation and their impact on employers and employees

A range of regulations and legislation that applies to electrical installation, including changes and updates to key health and safety legislation. These must be those current at the time of learner assessment applicable to electrical operations. For sub-topics A1.1 and A1.2, this is in the context of employee responsibilities only. For sub-topics A1.3 and A1.4, this is in the context of employer responsibilities only.

##### A1.1 Health and Safety at Work Act (HASAWA)

- Employee duties to:
  - take due care of themselves and others
  - cooperate with employers on health and safety matters
  - correctly use anything provided for health and safety
  - not misuse or damage anything provided for health and safety.

##### A1.2 Work at Height Regulations (as amended)

- Employee duties to:
  - report any safety hazards to their employer
  - not continue if they think it is unsafe
  - follow any training or instruction
  - use any equipment, including safety devices, provided by the employer.

##### A1.3 Construction (Design and Management) Regulations (CDM)

- Contractor (the employer) duties to:
  - plan, manage and monitor own work and that of others
  - check competence of all employees
  - train employees and provide relevant information
  - ensure employees have adequate welfare facilities
  - cooperate and coordinate work with others to ensure the health and safety of all.

##### A1.4 Provision and Use of Work Equipment Regulations (PUWER)

- Employer duties to:
  - ensure that all work equipment is suitable for its intended purpose
  - maintain and regularly inspect all work equipment
  - train employees and provide information and instruction
  - ensure employees have written instructions and training on equipment.

##### Topic A.2 IET Wiring Regulations Current Edition

The content of the regulations that cover the following aspects and the safety requirements that must be followed in their installation to ensure compliance.

- Requirements for basic protection against electric shock, consisting of:
  - insulation
  - barriers and/or enclosures

*continued*

**What needs to be learnt**

- circuit protection conductor (earth)
- bonding
- automatic disconnection of the supply.
- Illustration of how the basic protection measures prevent electric shock.

**Learning aim B: Demonstrate practical skills and safe techniques to carry out electrical operation tasks****Topic B.1 Tools and equipment used for undertaking electrical operations**

*Purpose and use of tools and equipment for electrical operations and their scheduling for a given task.*

- Hand tools and equipment, including:
  - measuring tape
  - cable cutters
  - cable strippers
  - junior hacksaw
  - pliers
  - stripping knife
  - screwdrivers
  - spirit level
  - electrical testing equipment.

**Topic B.2 Materials used for undertaking electrical operations**

*Materials used for electrical operations, including calculating and scheduling the quantity of materials required and their in-situ properties.*

- Cable:
  - 1.5 mm<sup>2</sup> lighting circuit cable
  - 2.5 mm<sup>2</sup> final circuit power cable
  - radial circuit cable
  - cable clips.
- Electrical fittings:
  - single and double sockets, switched
  - fused spur units, switched
  - ceiling rose and lamp holder
  - light fitting
  - light switches, single
  - cooker connection unit and outlet plate
  - cooker switch
  - four-way consumer unit with RCD fitted.
- Miscellaneous fittings:
  - surface boxes
  - equipment fixing materials: screws.

*continued*

## What needs to be learnt

### Topic B.3 Safety equipment, its use and safe work practices when undertaking specified electrical operations

Appropriate practices when working with electricity:

- use of general personal protective equipment (PPE) needed in the workplace, e.g. safety boots, hard hat, high-visibility jacket, eye protection
- the need for appropriate behaviour and a positive attitude towards health and safety
- maintaining a clean and tidy work area
- use of safe manual handling techniques when lifting and moving
- correct use of tools and equipment
- maintaining tools and reporting any defects
- returning tools to appropriate storage upon completion of practical work.

### Topic B.4 Develop electrical operation skills

Marking out electrical runs and sockets:

- interpret the circuit requirements from a circuit diagram
- mark out the lengths of cable required
- cut cable to required length
- mark out the conduit required, cut to length and install.

Installation of a ring final circuit to include two double socket outlets with one switched fuse spur from one double socket, one single socket, one cooker supply connector with switch to the consumer unit connections using clipped cables:

- isolation of the supply
- laying out cable runs and cutting cables
- installation of socket back boxes
- wiring of socket faces
- wiring of switched fused spur.

Installation of a two-way switching lighting circuit with ceiling rose and domestic light fitting using clipped cables:

- isolation of the supply
- laying out cable runs and clipping cables
- installation of lighting back boxes
- wiring of lighting circuit
- fitting of switches
- fitting of light fitting.

Testing of the completed power ring final circuit and lighting circuit:

- isolation of circuit
- power connection
- visual inspection, tests for continuity, insulation resistance and polarity.
- legislative documentation required to record the testing of electrical circuits in accordance with National Inspection Council for Electrical Installation Contracting (NICEIC) procedures and building regulations in relation to installation requirements in force for electrical installation at the time of learner assessment.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Explore health and safety regulations and legislation requirements in electrical operations			
1A.1 Identify the requirements of a given health and safety regulation or legislation that applies to employees carrying out electrical operations.	2A.P1 Describe the health and safety requirements for employees and employers when performing a practical task in electrical operations.#	2A.M1 Explain the health and safety requirements for employees and employers when performing a practical task in electrical operations.#	2A.D1 Justify the health and safety requirements in use when performing a practical task in electrical operations.#
1A.2 State the three aspects of protection from electric shock.	2A.P2 Describe the three aspects of protection from electric shock applied to electrical operations tasks.	2A.M2 Explain the three aspects of protection from electric shock applied to electrical operational tasks.	
Learning aim B: Demonstrate practical skills and safe techniques to carry out electrical operation tasks			
1B.3 Select the resources required for a specified task in electrical installations, with guidance, to include: <ul style="list-style-type: none"><li>● scheduling the resources required.</li></ul>	2B.P3 Select the resources required for a specified task in electrical installations, to include: <ul style="list-style-type: none"><li>● scheduling the resources required</li><li>● checking conformity against a provided specification.*</li></ul>	2B.M3 Describe the resources required for a specified task in electrical installations, to include: <ul style="list-style-type: none"><li>● scheduling the resources required</li><li>● the advantages and disadvantages of alternative cable distribution</li><li>● specifying the material requirements.*</li></ul>	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>1B.4 Mark out, measure and install a two-way switching lighting circuit, including a ceiling rose, light fitting, bulb and clipped cables, to a given specification, with guidance:</p> <ul style="list-style-type: none"> <li>• switches level, in position to within <math>\pm 10</math> mm</li> <li>• ceiling rose flush with ceiling</li> <li>• no exposed electrical conductors</li> <li>• correct colour coding</li> <li>• all earth sleeving correctly fitted</li> <li>• complying with safe working practices, including the use of personal protective equipment.</li> </ul>	<p>2B.P4 Mark out, measure and install a two-way switching lighting circuit, including a ceiling rose, light fitting, bulb and clipped cables, to a given specification:</p> <ul style="list-style-type: none"> <li>• switches level, in position to within <math>\pm 5</math> mm</li> <li>• ceiling rose flush with ceiling</li> <li>• switch wire correctly identified</li> <li>• no exposed electrical conductors</li> <li>• correct colour coding</li> <li>• all earth sleeving correctly fitted</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul>	<p>2B.M4 Mark out, measure and install a two-way switching lighting circuit, including a ceiling rose, light fitting, bulb and clipped cables, to a given specification:</p> <ul style="list-style-type: none"> <li>• switches level, in position to within <math>\pm 2</math> mm</li> <li>• ceiling rose flush with ceiling</li> <li>• switch wire correctly identified</li> <li>• clipped cables are horizontal and/or vertical as appropriate</li> <li>• no exposed electrical conductors</li> <li>• correct colour coding</li> <li>• all earth sleeving correctly fitted</li> <li>• complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul>	<p>2B.D2 Mark out, measure and install a two-way switching lighting circuit, including a ceiling rose, light fitting, bulb and clipped cables, to a given specification:</p> <ul style="list-style-type: none"> <li>• switches level, in position to within <math>\pm 1</math> mm</li> <li>• ceiling rose flush with ceiling</li> <li>• switch wire correctly identified</li> <li>• batten holder cable correctly fitted</li> <li>• clipped cables horizontal and/or vertical as appropriate</li> <li>• no exposed electrical conductors</li> <li>• correct colour coding</li> <li>• all earth sleeving correctly fitted</li> </ul> <p style="text-align: right;"><i>continued</i></p>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<p>The circuit must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<p>The circuit must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<p>The circuit must:</p> <ul style="list-style-type: none"> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<ul style="list-style-type: none"> <li>complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul> <p>The circuit must:</p> <ul style="list-style-type: none"> <li>pass tests first time for continuity, insulation resistance and polarity.*</li> </ul>
<p>1B.5 Mark out, measure and install a ring final circuit using clipped cables with two double sockets and one single socket, to a given specification, with guidance, to include:</p> <ul style="list-style-type: none"> <li>all sockets level, in position to within <math>\pm 10</math> mm</li> <li>all earth sleeving in position</li> <li>no exposed electrical conductors</li> <li>correct colour coding</li> </ul>	<p>2B.P5 Mark out, measure and install a ring final circuit using clipped cables to a given specification, to include two double sockets, one single socket, one switched fuse spur and one cooker connector with isolation switch:</p> <ul style="list-style-type: none"> <li>all sockets and switches level, in position to within <math>\pm 5</math> mm</li> <li>all earth sleeving in position</li> <li>no exposed electrical conductors</li> <li>correct colour coding</li> </ul>	<p>2B.M5 Mark out, measure and install a ring final circuit using clipped cables, to a given specification, to include two double sockets, one single socket, one switched fuse spur and one cooker connector with isolation switch:</p> <ul style="list-style-type: none"> <li>all sockets and switches level, in position to within <math>\pm 2</math> mm</li> <li>clipped cables are horizontal and/or vertical as appropriate</li> <li>all earth sleeving in position</li> <li>have no exposed electrical conductors</li> <li>correct colour coding</li> </ul>	<p>2B.D3 Mark out, measure and install a ring final circuit using clipped cables, to a given specification, to include two double sockets, one single socket, one switched fuse spur and one cooker connector with isolation switch:</p> <ul style="list-style-type: none"> <li>all sockets and switches level, in position to within <math>\pm 1</math> mm</li> <li>clipped cables are horizontal and/or vertical as appropriate</li> <li>all earth sleeving in position</li> </ul> <p><i>continued</i></p>

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<ul style="list-style-type: none"> <li>complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul> <p>The circuit must:</p> <ul style="list-style-type: none"> <li>be installed in accordance with given cable design calculations</li> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<ul style="list-style-type: none"> <li>complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul> <p>The circuit must:</p> <ul style="list-style-type: none"> <li>be installed in accordance with given cable design calculations</li> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<ul style="list-style-type: none"> <li>complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul> <p>The circuit must:</p> <ul style="list-style-type: none"> <li>be installed in accordance with given cable design calculations</li> <li>pass tests for continuity, insulation resistance and polarity.*</li> </ul>	<ul style="list-style-type: none"> <li>no exposed electrical conductors</li> <li>no exposed copper conductors</li> <li>correct colour coding</li> <li>complying with safe working practices, including the use of appropriate personal protective equipment.</li> </ul> <p>The circuit must:</p> <ul style="list-style-type: none"> <li>be installed in accordance with given cable design calculations</li> <li>pass tests first time for continuity, insulation resistance and polarity.*</li> </ul>

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills



## Teacher guidance

### Resources

Learners will require access to a workshop, with hand tools and materials of a nature and standard typical of a real, industrial work environment.

The learning environment must be a safe place to work, with adequate space, washing facilities and access to first-aid facilities.

Learners are advised to have completed *Unit 10: Exploring Electrical Principles and Techniques* prior to undertaking this unit, so that they have some knowledge and understanding of electrical principles and techniques. Learners may not use evidence from Unit 10 for Unit 20. However, it is considered sensible for all electrical installations to be connected to a power pack, so that the voltage can be stepped down to a safe level, rather than directly to the mains.

A competent supervisor must carry out an induction for all learners on the safe use of the learning environment and equipment. The centre's health and safety risk assessments should be available and implemented as a learning resource.

Training and supervision of young people are particularly important because of their youth and unfamiliarity with the working environment. Learners and centres must comply with the Provision and Use of Work Equipment Regulations Approved Code of Practice and guidance Current Edition as they apply to young people in the workplace.

Teachers should at all times supervise learners working with electrical equipment.

The teacher will perform tests on the circuit for continuity, insulation resistance and polarity.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Health and safety legislation and regulation references must be those current at the time of learner assessment.

This unit does *not* fulfil the requirements of electrical occupational competence. It is important that learners are aware that further study and experience are required to work towards meeting the current requirements for electrical installations for practising electricians.

### Learning aim A

**For 2A.P1:** learners must describe the health and safety requirements with regard to the duties of the employee and employer when undertaking electrical operations. The duties provided in the unit's content have been selected to provide a specific focus for each safety regulation, and the learner is not expected to present evidence over and above this. The description must include the requirements of any two of the regulations covered in the unit content, excluding the IET Wiring regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.M1:** learners must explain the health and safety requirements with regard to the role of the employee and employer when undertaking electrical operations. The duties provided in the unit's content have been selected to provide a specific focus for each safety regulation, and the learner is not expected to present evidence over and above this. The explanation must include the requirements of any two of the regulations covered in the unit content, excluding the IET Wiring regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. This explanation must include an applied electrical installation example against each of the employee's responsibilities for the three regulations covered. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.D1:** learners must justify the health and safety requirements in use when undertaking electrical operations, drawing from the regulations and legislation listed in the unit content. The justification must include the requirements of any two of the regulations covered in the unit content, excluding the IET Wiring regulations. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 1A.1:** learners must identify the health and safety requirements in use for a practical task in electrical operations, excluding the IET Wiring regulations, drawing from the regulations and legislation listed in the unit content. Note that where regulations or legislation have been changed or amended, the choice should reflect those in force at the time of learner assessment. It is not expected that the learner would be provided with a copy of the source regulation or act, due to the level of language used. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.P2:** learners must describe the three aspects of protection from electric shock and include an example for each applied to electrical installations. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 2A.M2:** learners must explain the three aspects of protection from electric shock and include an example for each applied to electrical installations. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

**For 1A.2:** learners must state the three aspects of protection from electric shock. Evidence for this could be in the form of a word-processed document or through a teacher record of oral questioning.

### Learning aim B

**For 2B.P3:** learners must select and schedule the resources required for a specified task in electrical installations, i.e. for either the two-way switching lighting circuit or the ring final circuit. This could be evidenced by a detailed worksheet containing a list of all resources required, to include the specification of materials, quantities, tools, equipment and plant. The resources will need to be checked against a provided specification.

**For 2B.M3:** in addition to the requirements for 2B.P3 learners must describe suitable alternative methods of cable distribution, for example surface-mounted conduit or cable trays that could be used for electrical distribution. The description must outline the advantages and disadvantages of alternative methods that could be used for their proposed installations. Learners must produce a detailed description of the specification of the materials that will be required for one of the electrical tasks.

**For 1B.3:** learners, with guidance, must identify and schedule the resources needed for a specified task in electrical installation, i.e. for either the two-way switching lighting circuit or the ring final circuit. This could be via the completion of a materials requisition, although it is not expected that quantities of materials will have been accurately calculated at level 1.

**For 2B.P4:** learners must mark out, measure cable lengths and install a two-way switched lighting circuit, including a ceiling rose, a light fitting and a bulb, to meet the requirements in a given specification and all the assessment criterion requirements. Cables will need to be clipped to a suitable supporting structure. Learners must comply with safe working practices and use appropriate PPE. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. To evidence the practical work for this criterion, the learners work can be photographed, the photograph endorsed with the learner's name on the back and accompanied by a teacher observation record including a quality control sheet.

**For 2B.M4:** learners must mark out, measure cable lengths and install a two-way switched lighting circuit, including a ceiling rose, a light fitting and a bulb, to meet the requirements in a given specification and the assessment criterion requirements. Cables will need to be clipped to a suitable supporting structure. Learners must comply with safe working practices and use appropriate PPE. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. To evidence the practical work for this criterion, the learners work can be photographed, the photograph endorsed with the learner's name on the back and accompanied by a teacher observation record including a quality control sheet.

**For 2B.D2:** learners must mark out, measure cable lengths and install a two-way switched lighting circuit, including a ceiling rose, a light fitting and a bulb, to meet the requirements in a given specification and the assessment criterion requirements. Cables will need to be clipped to a suitable supporting structure. Learners must comply with safe working practices and use appropriate PPE. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. To evidence the practical work for this criterion, the learners work can be photographed, the photograph endorsed with the learner's name on the back and accompanied by a teacher observation record including a quality control sheet.

**For 1B.4:** learners, with teacher guidance, must mark out, measure cable lengths and install a two-way switched lighting circuit, including a ceiling rose, a light fitting and a bulb, to meet the requirements in a given specification and the assessment criterion requirements. Cables will need to be clipped to a suitable supporting structure. Learners must work safely, using PPE, although this may be with guidance. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. To evidence the practical work for this criterion, the learners work can be photographed, the photograph endorsed with the learner's name on the back and accompanied by a teacher observation record including a quality control sheet.

**For 2B.P5:** learners must install a ring final circuit using clipped cables that includes the details and requirements listed within the assessment criterion. A suitable dimensions drawing will need to be provided so that learners can take measurements and install the circuit. A cooker connection and switch need to be supplied and installed in accordance with the cable design size provided by the teacher. The teacher must inform learners that calculations are conducted to determine the load that a cable will take and the load that the equipment connected to it consumes. The outcome of these calculations determines the size of cabling required. A suitable consumer unit and outlet plate will need to be provided to terminate all connection within, that is isolated from any supply.

The consumer unit *must* contain an RCD device. The fused spur is required to be supplied from one of the double sockets. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. Learners must comply with safe working practices and use appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.M5:** in addition to the requirements for 2B.P5, learners must produce their work to meet the drawn information to within a tolerance of  $\pm 2$  mm, and clipped cables are to be horizontal and/or vertical as appropriate. The circuit must contain no exposed electrical conductors and must pass tests for continuity, insulation resistance and polarity. Teachers must provide learners with the cable design requirements and inform learners that load calculations are required to determine the design circuit requirements as indicated in 2B.P5. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. Learners must comply with safe working practices and use appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 2B.D3:** in addition to the requirements for 2B.M5 learners must produce their work to meet the drawn information to within a tolerance of 1 mm. The circuit must have all earth sleeving in position, with no exposed copper conductors or electrical conductors and all wiring correctly colour coded. The initial testing for continuity, insulation resistance and polarity must be passed first time without faults. Teachers must provide learners with the cable design requirements and inform learners that load calculations are required to determine the design circuit requirements as indicated in 2B.P5. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. Learners must comply with safe working practices and use appropriate PPE. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

**For 1B.5:** learners must mark out, measure cable lengths and install a ring final circuit main using clipped cables for the two double sockets and one single socket only to meet the requirements as specified in the assessment criterion requirements. Although the learner will not meet the requirements for the installation of the one switched fuse spur and one cooker connector, the teacher must inform learners that calculations are conducted to determine the load that a cable will take and the load that the equipment connected to it consumes. The outcome of these calculations determines the size of cabling required. To record the outcome of circuit testing, learners must complete a centre devised or modified document to show their awareness of the safety paperwork requirements for electrical installation. Learners must work safely, using PPE, although this may be with guidance. This can be evidenced by use of a teacher observation record and photographic record of the completed work (the work should be clearly labelled with the learner's name on the photograph).

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 2A.P1, 2A.M1, 2A.D1, 1A.2, 2A.P2, 2A.M2 1B.3, 2B.P3, 2B.M3	Electrical Health, Safety and Resource Requirements	You have been asked to contribute to the training materials for this year's electrician intake induction. Produce a PowerPoint presentation that includes two pieces of legislation applied to electrical installation plus the protection from electric shock from the current IET wiring regulations.	Presentation and notes covering the health and safety responsibilities of the employer/contractor/employees on a construction project. A completed teacher observation report.
1B.4, 2B.P4, 2B.M4, 2B.D2, 1B.5, 2B.P5, 2B.M5, 2B.D3	Lighting and Mains Installation	<p>Your supervisor has allocated you the task of installing a lighting circuit that operates at the top and bottom of a staircase, along with a ring final circuit mains and cooker supply.</p> <p>You need to gather and schedule the resources that you need to complete the job.</p> <p>Your supervisor wants to discuss with you the alternative cable distribution options available to you. Prepare for this discussion.</p> <p>Using appropriate PPE and working safely at all times, install the circuits in accordance with the drawn specification provided. The installation cabling will be clipped direct, therefore the maximum current rating applies to the cables. You will need to complete electrical installation safety paperwork following circuit testing.</p>	<p>Calculations and schedules of resources required to complete the electrical task.</p> <p>A teacher observation record incorporating full dimensional quality control checks, including actual vs drawing dimensions checked against tolerance requirements, subjective and objective quality control comments, and clear photographs of the completed work.</p>



# Unit 21: Maintenance and Adaptation of Buildings

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Is the property you live in constructed from bricks, stone, timber or even steel? Have you wondered how it stays in good condition, or what would happen if you needed more space?

In England and Wales alone there are over 25 million domestic properties which range in type, size and methods of construction. Regardless of the method of construction, there will always be a need to maintain the elements of the fabric for the use and enjoyment of future generations.

In addition to the need to maintain properties, there is an increasing need to adapt, alter and extend properties to provide more space for the ever-changing needs of modern society. The property repair and alteration market is worth almost 50 per cent of the total value of construction works in the UK.

By the end of this unit you will be able to inspect a property, and consider what repairs are needed and what future maintenance may be required. You will also be able design adaptations for properties that will meet the requirements of your client, users and the regulators who monitor and check this kind of work.

## Learning aims

In this unit you will:

- A understand the factors influencing the maintenance and adaptation of buildings
- B explore the maintenance of buildings
- C explore the requirements for the adaptation of buildings.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand the factors influencing the maintenance and adaptation of buildings

##### Topic A.1 Maintenance and adaptation

Reasons why buildings may require maintenance and adaptation:

- ageing housing stock
- building material deterioration including effect of age, weather, use and misuse
- preservation of the historic environment
- government requirements for increased use of brownfield sites
- building obsolescence due to –
  - social factors – changes in societal needs, desires, fashion, demographics
  - technological factors – changes in technology, construction methods
  - organisational factors – building closure due to business reorganisation, rationalisation
- improve sustainability performance
- changing building needs due to demographic and social changes –
  - an aging population
  - an increase in single-person households
  - children living with parents for a longer period of time
  - elderly relatives living with the family
- financial –
  - a lack of affordable property
  - preservation of property value through cost effective maintenance
- adaptation for specific use –
  - disability adaptations
  - elderly residents
  - property improvement.

The need to comply with building regulations during maintenance and adaptation works.

##### Topic A.2 Levels of intervention to a property

The levels of maintenance and adaptation interventions for a property, the relative increase in the amount of work required progressing through the levels, the stages when each would be undertaken, the advantages and disadvantages of each, and the benefits of regular maintenance.

- Planned maintenance to halt the general deterioration of the fabric.
- Upgrade of a specific space to include kitchen, bathroom, living spaces.
- Modernisation and renovation.
- Extension to add more useable space.
- Restoration to put the property back into its original condition.

*continued*



**What needs to be learnt****Topic A.3 Legislative requirements for maintenance and adaptation projects**

The implications of specific legislative requirements, including changes and updates applicable at the time of learner assessment.

- Town and Country Planning requirements:
  - permitted development
  - planning application process
  - listed buildings
  - conservation areas
  - areas of outstanding natural beauty
  - Sites of Specific Scientific Interest.
- Building regulations:
  - application process
    - full plans
    - building notice
  - role of local authority and private inspectors
  - applicable works
    - structural alterations
    - new windows
    - electrical alterations.
- Health and safety requirements:
  - legislative
  - risk assessments
  - welfare requirements.

**What needs to be learnt****Learning aim B: Explore the maintenance of buildings****Topic B.1 Building maintenance and preservation approaches**

Approaches to maintain the fabric of a structure.

- Planned maintenance: organised or managed.
- Preventative maintenance: at specified, to predetermined criteria.
- Scheduled maintenance after a set period of use: for plant, for machinery.
- Condition-based maintenance.
- Reactive and unplanned (emergency) maintenance.
- Consequences and implications of a lack of regular maintenance:
  - materials: failure, degradation, performance reduction
  - loss of structural integrity
  - occupant health issues due to
    - damp
    - cold
    - poor ventilation
    - potential for carbon monoxide poisoning
  - wider neighbourhood issues
    - building collapse
    - rodent infestation
    - blight
    - squatters
    - vandalism.

**Topic B.2 Building element maintenance interventions**

Identification of elements and possible problems that will require maintenance during the lifetime of a building.

- Building elements:
  - roof and chimney stacks
    - loose, slipped, missing ridge tiles and roof covering
    - loose, missing pointing and flashing
    - mortar flashings at abutments or roof penetrations
    - leaning stacks and pots
    - loose, badly fitted aials
  - rainwater goods
    - loose, missing, blocked or defective gutters and downpipes
    - loose, missing or defective fixings and brackets
    - blocked, damaged outlets and pipes
  - flashings
    - loose, missing flashing details
    - deteriorated flashings

*continued*

**What needs to be learnt**

- external masonry
  - loose, defective pointing
  - spalling masonry
  - loose masonry, damaged masonry
- external woodwork
  - rotten, damaged timber
  - loose, defective timber and fixings
  - unpainted, untreated timber
- windows
  - loose and poorly fixed frames and glazing
  - rotten, damaged frames
  - unpainted, untreated timber windows
  - unpainted, untreated metal windows
- doors
  - loose and poorly fixed frames and glazing
  - rotten, damaged frames
  - unpainted, untreated timber doors
  - unpainted, untreated metal doors
- internal walls
  - cracking and damage from movement, impact
  - loose, defective plaster and wall finish
- internal floors
  - uneven floor structure
  - loose boards, finish
  - excessive deflection
- inspection of services, including regular inspection by suitably qualified personnel in line with legislative requirements and manufacturers recommendations
  - electrical
  - gas
  - water
  - drainage
  - oil.

**Topic B.3 Property inspection and schedules of maintenance**

How to undertake a property inspection to identify and report maintenance requirements.

- Systematic inspection and recording.
- Schedule of maintenance to include:
  - immediate maintenance requirements
  - ongoing maintenance requirements
  - maintenance planning for future maintenance of the property.

**What needs to be learnt****Learning aim C: Explore the requirements for the adaptation of buildings**

Understand the practical requirements of adapting a property to meet the needs of the client, end users and regulators to produce sketch schemes.

**Topic C.1 Surveying properties for adaptation**

How to undertake a building survey of a property to assess its viability for adaptation.

- Inspection of the structure to ascertain general condition, materials used, methods of construction and suitability for adaptation/alteration.
- Inspection of the area surrounding the building to include:
  - space available for lateral extension
  - general ground conditions
  - location of services
  - location of trees
  - location of built components and natural physical features.
- Building survey reporting requirements to record inspection findings.
- Measured surveys to produce existing plans, elevations, sections and site plans.

**Topic C.2 Adaptation**

Different options for adapting and altering a property.

- Structural adaptation:
  - removing walls, doors to create larger rooms
  - removing chimney breast
  - structural alterations to floors.
- Lateral adaptation:
  - extensions
  - inserting walls to divide the space
  - garage extensions
  - conservatories.
- Vertical adaptation:
  - additional floors
  - loft conversions
  - building above existing single storey extension.

**Topic C.3 The client brief and feasibility**

- The client brief and interpreting the client's requirements.
- Assessing the feasibility of the client's requirements:
  - practicability – can it be done within budget, time, quality constraints?
  - functionality – will it satisfy the client's requirements?
  - viability – is it economically viable?

*continued*

## What needs to be learnt

### Topic C.4 Sustainable adaptations

Adapting properties to improve their environmental performance.

- Insulation:
  - roof, cavity wall, internal, external
  - windows and doors: use of thermally efficient materials, low-E Argon-filled double glazing, low-E Argon-filled triple glazing.
- Energy production: use of photovoltaic panels, wind turbine, combined heat and power systems.
- Energy conservation: use of air and ground heat pumps, solar thermal systems, biomass heating systems, energy-efficient lighting, building management systems.
- Water conservation: use of rainwater harvesting, grey water recycling, SuDS (sustainable drainage system), low-flush WCs, spray heads on taps, self-timing controls.
- Sustainable design use: passive solar, Trombe walls, brise soleil.

### Topic C.5 Adaptation proposals

Producing annotated sketch plans for alterations and adaptations to a property to meet client and legislative requirements, to include:

- floor plans
- sections
- elevations.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand the factors influencing the maintenance and adaptation of buildings</b>			
1A.1 Identify why properties require maintenance and adaptation.	2A.P1 Describe why properties require maintenance and adaptation.	2A.M1 Explain reasons why properties require maintenance and adaptation.	2A.D1 Justify the reasons why properties require maintenance and adaptation.
1A.2 Identify different levels of maintenance and adaptation interventions.	2A.P2 Describe different levels of maintenance and adaptation interventions.	2A.M2 Explain different levels of maintenance and adaptation interventions.	
1A.3 Identify legislative implications for maintenance and adaptation works on properties.#	2A.P3 Describe legislative implications for maintenance and adaptation works on properties.#	2A.M3 Explain legislative implications for maintenance and adaptation works on properties.#	
<b>Learning aim B: Explore the maintenance of buildings</b>			
1B.4 Identify the different approaches to maintaining the fabric of a specified property, and the consequences of not undertaking regular maintenance and preservation.	2B.P4 Describe the different approaches to maintaining the fabric of a specified property, and the consequences of not undertaking regular maintenance and preservation.		
1B.5 Identify the elements of a specified property that require regular maintenance.	2B.P5 Describe the elements of a specified property that require regular maintenance.	2B.M4 Explain the elements of a specified property that require regular maintenance.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
1B.6 Identify reactive and short-term maintenance requirements for a specified property following a property inspection.	2B.P6 Describe reactive and short-term maintenance requirements for a specified property following a property inspection.	2B.M5 Explain the maintenance requirements for a specified property following a property inspection.	2B.D2 Evaluate the maintenance requirements for a specified property following a property inspection.
<b>Learning aim C: Explore the requirements for the adaptation of buildings</b>			
1C.7 Identify the requirements of a client brief, including an assessment their feasibility, with guidance.	2C.P7 Describe the requirements of a client brief, including an assessment of their feasibility.		
1C.8 Identify methods of improving the environmental performance of a property.	2C.P8 Describe methods of improving the environmental performance of a specified property.	2C.M6 Explain methods of improving the environmental performance of a specified property.	2C.D3 Justify methods of improving the environmental performance of a specified property.
1C.9 Outline options available for adaptations and alterations from the property survey findings to meet client requirements.	2C.P9 Assess options available for adaptations and alterations from the property survey findings to meet client requirements.	2C.M7 Produce a detailed sketch scheme for the alteration and adaptation of a property, in line with the client brief and complying with legislative considerations.*	2C.D4 Produce a justified detailed sketch scheme for the alteration and adaptation of a property, in line with the client brief and complying with legislative considerations.*
1C.10 Produce an outline sketch scheme for alteration and adaptations to a property.*	2C.P10 Produce a sketch scheme for the alteration and adaptation of a property, in line with the client brief and legislative considerations.*		

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

There are no special resources needed for this unit, although learners will need access to a suitable property to enable them to fulfil the requirements of learning aims B and C. Some learners may prefer to use computer-based graphics packages to produce sketch schemes for learning aim C.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

The centre will need to provide a suitable scenario, which will include a suitable property or properties, and a client brief for an alteration and adaptation scheme. The centre may wish to provide someone to act as the client to provide initial feedback to learners as part of the design process.

### Learning aim A

**For 2A.P1:** the learner should provide a clear, coherent description that identifies and considers why a property will require regular maintenance and adaptation through its life cycle. The discussion should identify relevant reasons as identified in Topic A.1 and could be broken into two clear areas: maintenance to maintain the integrity of the fabric and adaptation to alter the space to suit changing needs. The evidence for this criterion could be delivered as part of an individual presentation.

**For 2A.M1:** the explanation will build on 2A.P1 and provide reasoned argument as to why it is important to maintain the fabric of a property and the possible consequences of failure to do so, giving examples where appropriate. The learner should also consider how a property can be adapted to suit the needs of the occupier. Examples of how a property has been adapted should be used to illustrate the explanation. The evidence for this criterion could be delivered as part of an individual presentation.

**For 2A.P2:** learners will describe different levels of intervention for maintenance and adaptation. The description should show how each level of intervention typically increases the amount of work required and will consider the stages when each will be undertaken. The evidence for this criterion could be delivered as part of an individual presentation.

**For 2A.M2:** the explanation will build on 2A.P2 and provide a reasoned and coherent explanation for each of the different levels of maintenance and adaptation intervention. The learner should consider each stage and provide examples of when each might be carried out as part of the life cycle of a property. The evidence for this criterion could be delivered as part of an individual presentation.

**For 2A.D1:** building on 2A.M1 and 2A.M2, the learner will justify why maintenance is required for a property and why it is so important. The justification will include consideration of the consequences of not undertaking regular maintenance and the impact this would have on the structure of the fabric. The learner will also consider various reasons for adapting, providing suitable and appropriate justification of when and how a property owner would adapt a property.

**For 1A.1:** learners need to identify why a property will require maintenance and adaptation. There does not need to be a detailed discussion of each aspect but it should be clear that the learner understands reasons why a property will require maintenance or adaptation.



**For 1A.2:** learners should be able to identify the different levels of intervention. They should be able to articulate the different levels and give an approximation of how much input there will be at each stage. For example, remodelling will involve less work than refurbishment.

**For 2A.P3:** the learner will describe legislative requirement implications on maintenance and adaptation schemes for a property. The description will consider the elements identified in Topic A.3, but does not need to consider these in detail. It is sufficient for the learner to show an understanding of the need for legislative compliance and the main areas of compliance. The evidence for this criterion could be delivered as part of an individual presentation.

**For 2A.M3:** the explanation will build on 2A.P3 and will provide a detailed explanation of legislative requirements for conversion and adaptation projects. The learner will be able to differentiate between the different aspects of the key areas of legislative compliance. The discussion will be illuminated with examples to show a thorough understanding. The legislative implications can be linked as part of the description for 2A.P2 and 2A.M2 where the learner can indicate what legislation would apply at the different levels of intervention. The evidence for this criterion could be delivered as part of an individual presentation.

**For 1A.3:** the learner will identify legislative requirements and consider the implications. It is not intended that the learner will be able to discuss in detail each aspect, but they must be able to articulate, for example, the different requirements of the building regulations, planning, and health and safety.

## Learning aim B

**For 2B.P4:** the description will consider each of the different approaches to the maintenance and preservation of a specified property. Each aspect will be considered, outlining the key features and when each could be used and any benefits from implementing this type of approach. The discussion will extend to consider the consequences of not undertaking regular maintenance and the impact this could have on the property, the property user and the wider neighbourhood. Evidence for this criterion could be in the form of a report.

**For 1B.4:** learners will identify the different methods of maintenance and preservation and indicate when each will be carried out for a specified property. They must be able to differentiate between the different methods and the possible consequences of not undertaking regular maintenance. Evidence for this criterion could be in the form of a verbal report recorded through the use of audio/visual means and/or a teacher record.

**For 2B.P5:** learners will describe the elements of the specified property that will require regular ongoing maintenance. The description will be limited to identification and a brief explanation of the reasons as to why the element will require regular maintenance. The evidence for this criterion could be in the form of a checklist, identifying the elements and a description of what to look for during an inspection.

**For 2B.M4:** learners will build on 2B.P5, explaining the elements of the specified property that will require regular maintenance, including the areas of the element which may fail and require subsequent maintenance. The evidence for this criterion could be as for 2B.P5 but with this additional information for each element. The learner should be able to identify how an element could fail during its life cycle as outlined in Topic B2. The checklist could then be used in 2B.P6, 2B.M5 and 2B.D2.

**For 1B.5:** learners will be able to identify the elements of the specified property that will require regular maintenance. The evidence for this criterion could be in the form of a checklist identifying the elements.

**For 2B.P6:** learners will produce a schedule of maintenance following an inspection of a specified property. The learner is not required to carry out the property inspection themselves. Their description should detail all aspects of the property that require maintenance interventions. The property chosen must be suitable to enable the learner to meet the criterion. Where a centre allows learners to carry out their own property inspection (this is not required for the achievement of criterion), the centre must ensure that health and safety requirements are explicitly explained to the learner and that there is no requirement for the inspection of any services or roofs (other than from ground level) and no requirement to enter roof or other inaccessible spaces. The evidence for this criterion will be a schedule of maintenance for the specified property which identifies and describes the reactive and short-term maintenance requirements. This should identify the element and what the defect/maintenance requirement is. Where appropriate, photographic evidence can be used to confirm the maintenance requirements. There is no requirement for the learner to suggest methods of repair or remediation other than the basic requirement, e.g. replace loose flashing to chimney.

**For 2B.M5:** building on 2B.P6, learners will produce a detailed schedule of maintenance for a specified property that also considers the medium- and long-term maintenance requirements for the property. Learners will identify the property element and any defects evident, and explain the maintenance requirement. Evidence for this criterion will be as for 2B.P6.

**For 2B.D2:** learners will have produced a schedule of maintenance for a specified property, as for 2B.M5. To achieve this criterion, learners will justify the contents of their maintenance schedule. For each element that requires maintenance, learners will justify their maintenance recommendations. This will consider the existing condition, the immediate, short-, medium- and long-term maintenance requirements, the consequences should the maintenance not be carried out and the longer-term implications for the property. The evidence for this criterion could be in the form of a report that draws on the maintenance schedule, summarising the requirements and then justifying the recommendations.

**For 1B.6:** learners will identify the reactive and short-term maintenance requirements for a specified property. From this they will produce a schedule of maintenance that will list the element and what maintenance is required. All health and safety issues, as outlined in the teacher guidance for 2B.P6, are relevant.

### Learning aim C

The property and brief should be carefully selected to allow learners sufficient opportunity to meet the various criteria requirements. The brief could include alterations to a place of residence or another suitable property available to the centre. Should a suitable property not be available, it is permissible for the centre to use an appropriate area for this assessment. This could include converting a classroom into a flat/apartment or similar.

**For 2C.P7:** learners will require a client's brief for this criterion. The brief will have specific requirements for the adaptation of a specified property. Learners will describe the client's requirements and their wishes, then apply this to a specific property to ascertain whether they are feasible. The evidence for this criterion can be in the form of a report to the client, which interprets the brief, identifies and describes what is required, states whether it is feasible and what the limitations of the scheme may be.

**For 1C.7:** learners will establish the requirements from a provided client brief, with teacher guidance. This will include a list of what the client wants. The evidence for this criterion will be in the form of a simple report which can be provided verbally to the teacher through the use of a suitable recording method.

**For 2C.P8:** learners will describe different methods of improving the environmental performance of a specified property. The methods considered will be suitable for the property but may include some methods that may not be the most appropriate or viable. Learners must identify the specific mechanism for sustainable improvement and state how it will improve the property's performance. This discussion is expected to be limited to the reduction in heat loss or energy consumption, or the specific benefit from the method suggested. Evidence for this criterion can be in the form of an illustrated report to the client.

**For 2C.M6:** learners will develop the description given in 2C.P8 to explain how the environmental performance of a property can be improved. The explanation will identify the most appropriate mechanisms and clearly state how and why they will be advantageous to the property owner. Learners will give examples to underpin their argument and some evidence of why alternative methods were rejected. The explanation must relate to the specified property rather than be a generic discussion on alternative methods, and the benefits must be evident. The evidence for this criterion may be included with the report provided for 2C.P7.

**For 2C.D3:** learners will demonstrate an understanding of different methods of improving the environmental performance of a specific property. They will justify their selected methods and demonstrate, with examples, how they are better than the alternatives for this property. Learners who suggest multiple methods of improving sustainability must demonstrate the combined benefits. It can be shown that using too many different methods will increase the carbon footprint of the property and there will not be an overall environmental benefit.

**For 1C.8:** learners will produce a list of suitable methods for improving the environmental performance of a property. The list is likely to be generic, with little application to the specified property. Learners must be able to differentiate between the key areas, such as energy production, reducing energy consumption etc. Evidence for this criterion can be in the form of a verbal report with a teacher record of how the learner's evidence meets the criterion.

**For 2C.P9:** using the information from a property survey report, learners will ascertain whether the client's requirements can be achieved. They will apply the client's requirements to the findings of the property survey report and consider whether the adaptations required can be undertaken. The evidence for this criterion will form part of the report produced for 2C.P7 and 2C.P8.

**For 2C.P10:** learners will produce an outline sketch scheme that satisfies the client's requirements and is possible within the specified property. This will include plans, sections and elevation drawings. The drawings do not have to be of professional standard or to the relevant British Standards, but they should be rule assisted, legible, utilise standard construction language and be clearly annotated to enable the reader to fully understand the scheme. The drawings should show how the client's brief has been met and how legislative compliance can be achieved. Evidence for this criterion will include drawings and supporting notes, either on the drawings or as a separate document.

**For 2C.M7:** developing 2C.P9 and 2C.P10, learners will produce a detailed sketch scheme proposal to satisfy the client's brief. The scheme will maximise the potential of the property, fully satisfy the client's brief and demonstrate all relevant legislative compliance. Learners will demonstrate good analytical and application skills to produce detailed, accurate and annotated drawings and supporting descriptive notes.

There is no requirement for a specification, but learners will show an understanding of how the adaptation would be undertaken, including structural considerations. This may include items such as inserting a lintel into a new opening or upgrading a floor structure to increase its strength and rigidity. The evidence for this criterion builds on that for 2C.P9 and 2C.P10.

**For 2C.D4:** learners will justify the design proposals they have produced for 2C.P9 and 2C.P10. The justification will be in line with the client's brief, legislative issues and the property used for the assessment. Learners will demonstrate that they have considered several alternatives and produced the best available option, stating why it is better than the alternatives. The justification will be based on several factors and not just on specific issues, such as design or structural limitations. The evidence for this criterion could be in the form of a supporting letter to the client that would accompany their sketch scheme produced in 2C.P10, and the client's requirements and subsequent analysis for 2C.P7.

**For 1C.9:** using the client's brief, learners will use a survey report for a specified property to assess its suitability for adaptation and alteration and outline the options available to the client. The evidence produced will be used to inform the sketch scheme for 1C.10.

**For 1C.10:** learners will produce a sketch scheme for an adaptation project based around a client's brief for a specific property. Learners will produce straight line sketch plans and elevations, with some explanatory supporting notes. The scheme should satisfy the client's brief albeit with some limitations, which may include failure to include all elements of the brief, poorly thought out design and spatial planning, failure to consider structural aspects of the scheme or obvious aspects which would not satisfy planning or building regulation requirements, and designs that would create health and safety implications both during and after construction. Evidence for this criterion will include straight line sketch plans and supporting notes.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.M1, 2A.P2, 2A.M2, 2A.D1, 2A.P3, 2A.M3, 1A.1, 1A.2, 1A.3	Maintenance and Adaptation Methods	A local estate agency has asked you provide information to their team of sales and letting agents on the different reasons for and types of maintenance and adaptation. They have asked you to prepare a presentation to show them why a specified property requires maintenance and adaptation, the different levels of intervention and the legislative considerations for a scheme, so that they can advise their clients.	A presentation, produced in a format suitable for the client group. This could include a series of posters, a computer-based presentation or a video presentation. It will include why a specified property requires maintenance and adaptation, the different levels of intervention and the legislative considerations for a scheme.
2B.P4, 1B.4, 2B.P5, 2B.M4, 1B.5, 2B.P6, 2B.M5, 2B.D2, 1B.6	Maintenance Requirements for Properties	Following an inspection of a specified property, the owner has asked you to advise what is required for the ongoing maintenance of the property. Detail what the reactive, short-, medium- and long-term maintenance requirements are, based on your findings.	Report for the client outlining the different types of property maintenance options and the specific maintenance requirements for the property.

Criteria covered	Assignment	Scenario	Assessment evidence
2C.P7, 1C.7, 2C.P8, 2C.M6, 2C.D3, 1C.8, 2C.P9, 2C.P10, 2C.M7, 2C.D4, 1C.9 1C.10	Adaptation of Property	Following the successful maintenance schedule that you produced for the property owner, they have now asked you to look at adapting their property to suit their changing needs. They require an additional room in the property to create a new office. They also want to improve their carbon footprint and have asked you to produce a sketch scheme.	Report ascertaining whether they can have a new office and how to improve their carbon footprint.  An annotated report with plans, elevations and section drawings.  Supporting notes showing how the client brief is satisfied.

# Unit 22: Tendering and Estimating

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Tendering and estimating is an important aspect of construction. Estimators have to accurately calculate the cost of construction projects; these could be new-build projects, maintenance projects, refurbishment work, extensions, or alterations and renovations. The calculated cost is presented in the form of a tender.

The estimate is converted into a tender by the addition of overheads and potential profit, taking into account market forces, supply and demand, the contractor's workload and the approach their competitors may take to the project. Estimators therefore have to skilfully apply mathematical techniques and exercise sound judgement in order to produce accurate estimates of project costs for the tender document. If the tender is too high, they may not win the work; if the estimate is too low, they may win the work but cause the company to lose money. Inaccurate estimates and poorly written tenders could lead to companies not winning any projects or losing money.

If in the future you would like to work for a company, understand what tendering and estimating is, run your own construction company, be a self-employed sole trader or develop a career in construction management, this unit will provide you with an introduction to the methods you would need to use in order to price work effectively and operate a profitable enterprise.

In this unit, you will learn about the different types of documentation and information that the estimator has to use to complete the estimate, and some of the techniques used to calculate the cost of construction work. You will also learn how the estimate is converted into a tender, taking into account market forces and other factors, and how this makes estimating an exciting and competitive area of construction.

## Learning aims

In this unit you will:

- A investigate types of tender documentation and how they are used
- B understand the information required to produce an estimate and submit a tender
- C develop skills to produce estimates.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Investigate types of tender documentation and how they are used

Investigate the use of tendering to procure construction work, including the standard form and tender envelope used to ensure consistency and fair and open competition.

##### Topic A.1 Tenders

A tender is an offer to complete the work detailed in the tender documents, in the specified contract period, for a fixed sum of money known as the tender sum.

- Information pre-printed on the form of tender:
  - project title and brief details
  - legal offer wording
  - form of contract
  - contract period
  - period for which the tender is to be open for acceptance.
- Information completed by the contractor tendering for the work:
  - the legal name of the contracting organisation
  - the tender sum in figures and words
  - signature by a senior member of the company (normally a director) who is authorised to sign tenders on behalf of the company
  - the date the form is completed
  - details of any surety or bond required by the client.
- Submission of the tender:
  - tender envelope
  - fixed date and time
  - non-acceptance of late tenders.

The benefits of using a standard tender form and envelope to ensure:

- the offer is for the work detailed in the tender documents
- the offer complies with the proposed contract terms and conditions
- the offer is to complete the project within the specified contract period
- that offers are consistent across the contractors tendering for the work
- a fair and open process

and to:

- prevent late tenders being accepted by the client
- reduce the risk of unfair practice.

##### Topic A.2 Bills of quantities

Investigate the contents and purpose of the two main types of tender documentation, i.e. bills of quantities, and drawings and specifications.

*continued*



## What needs to be learnt

Bill of quantities sections:

- preliminaries –
  - general conditions
  - contract particulars
  - contractor's accommodation
  - site management and supervision
  - insurances
  - temporary works, services and facilities
  - site security
  - items that are not covered in the measured work sections
- preambles containing specifications for –
  - materials
  - standards and quality control
- measured work –
  - produced using a standard method of measurement
    - the New Rules of Measurement (NRM)
    - the Civil Engineering Standard Method of Measurement (CESMM4)
  - typical sections within measured work sections
    - substructures
    - superstructures (trade or elemental)
    - external works
    - external services
    - drainage
- prime cost and provisional sums including dayworks –
  - prime cost (PC sums)
    - nominated subcontractors
    - nominated suppliers
    - additions for attendance and profit
  - provisional sums
    - contingency sums
    - works not yet fully detailed, designed or specified.

The form of tender that must be completed, including:

- the use of the official tender envelope
- adhering to the tender submission deadline.

The advantages and disadvantages of bills of quantities as methods of:

- tendering for construction work (contractor's viewpoint)
- procuring construction work (client's viewpoint).

*continued*

**What needs to be learnt****Topic A.3 Drawings and specifications**

Information provided to enable the contractor to produce a tender and how this is dependent upon the size and scale of the project:

- a full set of detailed drawings and schedules
- site investigation and bore hole reports
- a 'specification' containing:
  - preliminaries (as included in bills of quantities)
  - preambles (as included in bills of quantities)
  - a description of the works with individual items for pricing
  - the prime cost and provisional sums including dayworks
  - a general summary.

Why companies tendering for the works will need to produce their own version of bills of quantities (or approximate quantities) in order to tender for the work.

The advantages and disadvantages of drawings and specifications as a method of:

- tendering for construction work (contractor's viewpoint)
- procuring construction work (client's viewpoint).

**Learning aim B: Understand the information required to produce an estimate and submit a tender****Topic B.1 Preliminaries and general conditions**

Key information required to price preliminary items:

- hire costs of temporary site accommodation
  - offices
  - welfare facilities, e.g. canteens, drying rooms, toilets, first aid
  - stores and storage facilities
- site management and supervision, salary and cost to employ
  - a project/site manager
  - site supervisors (general, trade, gangers)
  - site engineers
  - the buyer, quantity surveyor and planner (when site based and not part of general overheads)
  - general operatives involved in storage
- insurances
  - contractor's all-risk insurance
  - public liability insurance
  - contract bonds
- scaffolding and access
  - general access scaffolding
  - access platforms and equipment

*continued*

### What needs to be learnt

- temporary works
  - fencing
  - temporary roads and access
  - site compound
  - signage
- materials distribution
  - tower crane
  - forklifts and telehandlers
  - dumpers
- temporary services
  - electricity
  - water
  - telephone
  - drainage
- transportation to site of operatives employed on the project
- site security.

### Topic B.2 Measured work

Unit rates that are applied in bills of quantities and the information that is needed in order to calculate them:

- cost of materials, materials enquiries
- offloading and distribution costs
- coverage rates (from manufacturers' data and historical cost information)
- waste percentages (appropriate to the material and project from historical cost data)
- plant and power tool costs (hire rates and analysis of hourly cost to own)
- labour constants (historical information, price books)
- 'all in' labour rates
- addition of overheads and profit (when not using net rates)
- use of subcontract rates, subcontract enquiries.

### Topic B.3 Market analysis, risk and workload considerations

- State of the local or regional market and recent tender levels.
- Size of the project and the type and scale of companies invited to tender.
- Commercial intelligence, including the workload of competitors.
- Locality and the likelihood of theft, vandalism and nuisance.
- Availability of a local skilled workforce.
- Local infrastructure.
- Rate of inflation and likely future pay settlements.
- Credit rating of the client.
- Current level of workload and the need to retain skills and expertise within the company.

*continued*

**What needs to be learnt**

- Need for the project to contribute to overhead costs.
- Potential profit.

How the final tender figure is decided, taking into account the net cost of construction, gross profit and an adjustment to take into account the above considerations.

**Learning aim C: Develop skills to produce estimates****Topic C.1 Pricing preliminary items**

Calculating items that are time related:

- site management and supervision
- general access equipment
- plant hire
- transportation to site
- site security.

Calculating items that have setting-up costs, time-related costs and dismantling and removal costs:

- site accommodation
- tower cranes
- temporary supplies and services
- fencing
- security alarms.

Calculating items that have setting-up costs and removal costs:

- temporary roadways and access
- site signage.

**Topic C.2 Calculating unit rates for measured work items**

Calculating unit rates for typical measured work items, i.e. concreting work, brickwork and blockwork, and carpentry and joinery by:

- calculating cost of materials using coverage rates
- application of appropriate waste percentages
- inclusion of charges relating to sundry power tools and small plant as appropriate
- use of labour constants and 'all in' labour rates to calculate the cost of labour
- addition of overheads and profit.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Investigate types of tender documentation and how they are used			
1A.1 Outline the information provided and inserted on a form of tender.	2A.P1 Describe the information provided and inserted on a form of tender.#	2A.M1 Explain the advantages of using a form of tender and tender envelope for both the client and contractor.	2A.D1 Evaluate the advantages and potential issues and problems if a form of tender is not used.
1A.2 Describe the contents of bills of quantities.	2A.P2 Describe the contents and purpose of bills of quantities.#	2A.M2 Explain the advantages and disadvantages of different types of tender documentation.#	2A.D2 Justify the use of different types of tender documentation for two different projects of differing size and complexity.#
1A.3 Outline the contents of drawings and specifications.	2A.P3 Describe the contents and purpose of tender documents based on drawings and specifications.#		
Learning aim B: Understand the information required to produce an estimate and submit a tender			
1B.4 Identify the types of information needed to calculate the cost of preliminary items for a given project.	2B.P4 Describe the information needed to calculate the cost of preliminary items for a given project.	2B.M3 Explain how the information needed to calculate unit rates and preliminary items for measured work is obtained and analysed.*	2B.D3 Analyse the factors and considerations taken into account when converting the estimated project cost into a tender sum.*
1B.5 Identify the information needed to calculate a unit rate for measured work for a trade area.	2B.P5 Describe the information needed to calculate a unit rate for measured work for a trade area.		
1B.6 Identify the factors that would contribute to a final tender.	2B.P6 Describe the factors that would contribute to a final tender.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Develop skills to produce estimates</b>			
1C.7 Calculate the hire costs related to a preliminary item, with support and guidance.*	2C.P7 Calculate the cost of <b>two</b> separate preliminary items.*	2C.M4 Calculate unit rates, including waste percentages, for measured items from different trade areas.*	2C.D4 Evaluate the use of different waste percentages for similar materials in different situations when calculating unit rates.*
1C.8 Calculate the cost of materials for a simple project utilising appropriate coverage rates, with support and guidance.*	2C.P8 Calculate the cost of materials for a simple project utilising appropriate coverage rates and waste percentages.*		

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

Centres will need to prepare details from which estimates and tenders can be produced.

### Assessment guidance

It would be helpful if the tendering and estimating work covered craft areas that the learner has previously experienced when studying other units.

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

### Learning aim A

**For 2A.P1:** learners must describe the information provided, the standard text for all tenders and information inserted by the contractor on a form of tender.

**For 2A.M1:** learners must explain the advantages of using a form of tender and tender envelope for both the client and contractor. This should focus on ensuring the contractor has offered to complete the work based on the tender documents and contract terms, including completion date, and fair and open competition for the contractors tendering for the work.

**For 2A.D1:** learners must evaluate the advantages, potential issues and problems that could arise if a form of tender is not used. This should cover both the client's and the contractor's viewpoints.

**For 1A.1:** learners must outline the information provided, the standard text for all tenders and information inserted on a form of tender.

**For 2A.P2:** learners must describe the contents and purpose of bills of quantities. The purpose should cover the benefits to both the client and the contractor from the provision of bills of quantities.

**For 2A.P3:** learners must describe the contents and purpose of tender documents based on drawings and specifications. The purpose should cover the benefits to both the client and the contractor from the provision of tender documents based on drawings and specifications.

**For 2A.M2:** learners must explain the advantages and disadvantages of different types of tender documentation. This should include the advantages and disadvantages for both the client and the contractor, and the likely impact upon the tender price and the overall cost to the client.

**For 2A.D2:** learners must justify the use of different types of tender documentation for projects of differing size and complexity. Here the learner could consider what is the most appropriate method for small, simple projects and large, complex projects, and compare the advantages and disadvantages of different methods.

**For 1A.2:** learners must describe the contents of bills of quantities. It is expected that considerable support and guidance will be provided at this level.

**For 1A.3:** learners must outline the contents of drawings and specifications.

## Learning aim B

**For 2B.P4:** learners must describe the information needed to calculate the cost of a minimum of two preliminary items, for example information relating to time, hire rates and set-up costs of site accommodation.

**For 2B.P5:** learners must describe the information that is needed in order to calculate a unit rate, including cost of materials, coverage rates, appropriate waste percentages, sundry plant costs, labour constants, 'all in' labour rates and percentage addition for overheads and profit.

**For 2B.P6:** learners must describe the factors that would contribute to a final tender. These should include estimated cost of the project, company overheads, desired profit margin, market analysis, commercial risk and workload considerations.

**For 2B.M3:** learners must explain how the information needed to calculate unit rates is obtained and analysed, including subcontract and materials enquiries, historical labour constants, historical waste data, coverage rates from manufacturers' data, historical estimating data, company overheads, management profit requirements.

**For 2B.D3:** learners must analyse the factors and considerations taken into account when converting the estimated project cost into a tender sum. This should include consideration of market analysis, risk and workload.

**For 1B.4:** learners should, with support and guidance, identify the information needed to calculate the cost of a typical preliminary item, for example information relating to time, hire rates and set-up costs of site accommodation.

**For 1B.5:** learners should, with support and guidance, identify the information that is needed in order to calculate a unit rate, including cost of materials, coverage rates, appropriate waste percentages, sundry plant costs, labour constants, 'all in' labour rates and percentage addition for overheads and profit.

**For 1B.6:** learners must identify the factors that would contribute to a final tender. These should include estimated cost of the project, company overheads and desired profit margin.

## Learning aim C

**For 2C.P7:** using data provided by the teacher, learners must calculate the cost of two separate preliminary items. This could typically be the calculation of site accommodation costs or site management costs for a teacher-provided scenario. Learners can use traditional methods or ICT methods, such as a spreadsheet, when calculating the cost of preliminary items.

**For 2C.P8:** using data provided by the teacher, learners must calculate the cost of materials for a simple project, utilising appropriate coverage rates and waste percentages, for example the number of bricks and quantity of mortar for a one-brick boundary wall. Learners can use traditional methods or ICT methods, such as a spreadsheet, when calculating the cost of materials.

**For 2C.M4:** using data provided by the teacher, learners must build up unit rates for a minimum of four measured items from two different trade areas. This could typically be brickwork items and carpentry and joinery items. This must include an enumerated item, a linear item, an area item and a volume item. Learners can use traditional methods or ICT methods, such as a spreadsheet, when calculating unit rates.



**For 2B.D4:** when building up unit rates in 2C.M4, learners will have selected an appropriate waste percentage. Learners must also analyse and evaluate the use of different waste percentages for similar materials (e.g. handmade bricks and engineering bricks) in different situations (e.g. with different bonding arrangements or on a tight site with constraints on storage where damage is more likely to occur). This should consider likelihood of breakage, waste from cutting, site storage issues and susceptibility to damage.

**For 1C.7:** using data provided by the teacher, learners should, with support and guidance, calculate the hire costs related to a preliminary item, such as site accommodation and storage.

**For 1C.8:** using data provided by the teacher, learners should, with support and guidance, calculate the cost of materials for a simple project utilising appropriate coverage rates, e.g. the number of bricks and quantity of mortar for a one-brick boundary wall.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.P3, 2A.M1, 2A.M2, 2A.D1, 2A.D2, 1A.1, 1A.2, 1A.3	Types of Tender Documentation	You are working as an assistant quantity surveyor or assistant construction cost consultant and are required to advise the client about the advantages and disadvantages of different types of tender documentation.	Report which could be supported by a PowerPoint presentation.
2B.P4, 2B.P5, 2B.P6, 2C.P7, 2C.P8, 2B.M3, 2C.M4, 2B.D3, 2C.D4, 1B.4, 1B.5, 1B.6, 1C.7, 1C.8	Producing Estimates	You are working for a contracting organisation. You have been requested to produce an estimate and advise the senior management of the factors that will influence the tender decision.	Calculations or spreadsheets showing estimate calculations for preliminary items and unit rates.  Word-processed technical report.

# Unit 23: Exploring Surveying

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Surveying is a profession that covers a number of different disciplines. In this unit you will be introduced to the work of the building surveyor, the land surveyor and the quantity surveyor. You will choose one of these disciplines to carry out an applied surveying task as part of this unit's assessment.

In this unit you will learn how the building surveyor produces measured and condition surveys of existing buildings, to develop skills such as collecting data, accurate measuring, taking photographs, using electronic surveying equipment, producing drawings and recording building defects.

You will learn how the land surveyor measures existing features on the natural and the built environment and presents the data for use by architects and engineers to design construction projects.

A quantity surveyor (QS) is an expert in construction costs and finance. You will learn how they work for either the contractor or the client and are involved both pre- and post-contract. In the pre-contract phase, quantity surveyors are involved in measuring in order to produce bills of quantities that are used by the contractor to tender for the project and by the QS to produce monthly valuations and the final account.

By completing this unit you will gain an understanding of the surveying professions and how they contribute to the development of the built environment.

## Learning aims

In this unit you will:

- A understand compliance with legislation, professional regulations, industry guidance and codes of practice for surveying
- B explore the principles that underpin surveying
- C explore knowledge, understanding and skills used in surveying.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand compliance with legislation, professional regulations, industry guidance and codes of practice for surveying

##### Topic A.1 Legislation

A range of legislation applied by surveyors:

- statutory control of building works, including –
  - building control
  - planning
- enforcement controls on unauthorised building works
- legislation relating to disability discrimination
- health and safety as it affects the construction industry
- the law and practice of dilapidations
- the law and practice of building contracts.

##### Topic A.2 Professional regulations

Chartered surveying professions' regulations and disciplinary codes and their purpose.

- Royal Institution of Chartered Surveyors (RICS) regulations:
  - professional indemnity insurance including 'run-off' insurance
  - RICS rules of conduct that apply to individuals
  - professional and ethical standards
  - continuous professional development (CPD)
  - RICS rules of conduct that apply to surveying firms.
- Chartered Institution of Civil Engineering Surveyors (CICES)
  - rules of professional conduct
  - professional competencies
  - CPD.

##### Topic A.3 Codes of practice and industry guidance

How surveyors use guidance to work to consistent standards of service across the profession.

- The need for a standardised method of measurement:
  - New Rules of Measurement (NRM1 and NRM2)
  - Civil Engineering Standard Method of Measurement 4th Edition (CESMM4).
- The need for codes of practice and guidance:
  - RICS guidance notes and codes of practice
  - Chartered Institute of Building (CIOB) codes of practice.

**What needs to be learnt****Learning aim B: Explore the principles that underpin surveying****Topic B.1 Mensuration**

Measuring land and buildings, taking measurements from drawings using drawing dimensions or scale rules, and using recorded information to calculate:

- enumerated (itemised) quantities
- linear quantities:
  - perimeters
  - circumferences
- area quantities:
  - regular shapes: rectangle including triangle, circle, trapezium
  - composite shapes
  - irregular shapes
- volume
  - regular solids including cuboid, prism, sphere.

**Topic B.2 Levelling**

Determining the height above sea level at any point on the Earth's surface:

- OS benchmarks
- use of optical and laser levels
- use of total station
- global positioning systems
- spot levels
- contouring.

**Learning aim C: Explore knowledge, understanding and skills used in surveying****Topic C.1 Building surveying**

Expert services provision for new buildings, existing buildings or specialist services such as building defects or on a specific market sector such as residential property.

- Building pathology:
  - analysing building failures and defects
  - developing solutions to building failures and defects.
- Building surveys:
  - preparing condition surveys of existing buildings
  - dilapidations
  - energy performance assessments
  - property valuations.
- Project management:
  - managing the design and delivery of construction projects
  - acting as the supervising officer, employer's agent
  - acting as the principle designer under the Construction (Design and Management) Regulations (CDM) (or legislation that supersedes)
  - contract administration.

*continued*

**What needs to be learnt**

- Property management:
  - preparing management plans for property portfolios
  - facilities management.

Conducting a condition survey of an existing building:

- property details
- photographs –
  - elevations
  - specific elements and components
  - defects
- summary of accommodation
- general description –
  - type/method of construction
  - services
  - heating and electrical installations
  - outside facilities
- recording of –
  - structural fabric condition and deterioration
  - building elements' and components' condition and deterioration
  - dampness
  - structural movement
    - evidence of
    - extent of
  - flood risk and precautions
- health and safety issues –
  - means of escape
  - fire control
  - structural instability
  - other issues to include radon gas, lead pipes, asbestos.

**Topic C.2 Land surveying**

Expert service provision including measurement, levelling, mapping and data collection covering the existing and proposed use of land, and specialist services.

- Geomatics:
  - measurement of land and property
  - engineering surveying, including
    - setting out and providing levels
    - checking the work of others
    - producing 'as built' drawings and information
  - mapping
  - ground engineering and subsidence, including
    - monitoring the effect of ground movement on a building/structure
    - investigating and reporting on the cause of ground movement
    - reporting on slope instability.

*continued*

### What needs to be learnt

- Environmental surveying:
  - environmental assessment
  - environmental audit and monitoring
  - environmental management.
- Minerals and waste management:
  - providing advice in respect of contaminated land
  - environmental impact assessments
  - ground engineering and subsidence
  - mapping
  - minerals management
  - waste management
  - sustainability.
- Planning and development:
  - cadastre and land management
  - compulsory purchase and compensation
  - development appraisals and project briefs
  - housing strategy and provision
  - management of the built environment
  - mapping and measurement of land and property
  - planning
  - purchase and sale including valuation.
- Rural surveying, providing advice to farmers and landowners on:
  - rural estate management
  - agriculture
  - planning
  - valuation
  - auctioneering
  - asset management
  - capital taxation
  - dispute resolution.

Setting out a building and establishing levels for construction work.

- Use of surveying equipment:
  - measuring tapes
  - site squares
  - optical and laser levels
  - theodolites
  - total stations
  - global positioning systems (GPS).

*continued*

### What needs to be learnt

- Setting out:
  - use of site datum
  - checking drawn information
  - use of lines, pegs and profile boards
  - measuring
  - use of instruments
  - methods of checking for accuracy.
- Establishing levels:
  - use of datum
  - transferring levels
  - use of 'rise and fall', 'collimation' methods
  - setting up a temporary site datum
  - setting levels for construction work
  - checking levels for construction work.

### Topic C.3 Quantity surveying

Expert service provision:

- design economics and cost planning –
  - producing estimates and cost plans
  - carrying out life cycle costing exercises
  - evaluating building design efficiency
  - assessing/evaluating market factors and trends in construction costs
  - analysing risk
- measurement –
  - production of bills of quantities
  - re-measurement of construction work
- contract administration and practice –
  - providing procurement advice
  - producing contract documentation
  - dealing with payment provisions
  - issuing valuation certificates
  - advising on contractual implications, including rights and obligations
  - assessing entitlement to extensions of time
  - assessing entitlement to loss and expense claims
- monthly valuation and final account procedures –
  - agreement of monthly valuations
    - preliminaries
    - measured work
    - dayworks
    - variations
    - retention
    - previous payments

*continued*



### What needs to be learnt

- commercial management of construction –
  - cash flow forecasting
  - cost/value comparisons and profit forecasting
  - cost to completion exercises
- dispute resolution –
  - contractual advice and evidence compilation
  - production and agreement of contractual claims
  - involvement and adjudication of dispute resolution procedure.

How to measure construction work:

- use of a standard method of measurement (SSM7 or NRM2)
- mensuration –
  - itemised
  - linear
  - square
  - volume
  - centre-line calculation
  - drawing dimensions
  - use of a scale rule
- recording and 'working up' dimensions using industry-standard methodology –
  - dimension paper
  - cut and shuffle
  - direct billing
- substructure measurement of a simple domestic strip foundation –
  - excavation
  - concrete
  - brickwork and blockwork
  - fill
  - damp proof course (DPC) and damp proof membrane (DPM)
  - insulation.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Understand compliance with legislation, professional regulations, industry guidance and codes of practice for surveying			
1A.1 Outline legislation, professional regulations and guidance used by surveyors.#	2A.P1 Describe legislation, professional regulations and guidance used by surveyors.#	2A.M1 Explain how professional surveying standards are promoted and maintained by professional guidance and regulations.#	2A.D1 Evaluate how professional surveying guidance and regulation promotion ensures a consistent methodology is used across the surveying profession.#
1A.2 Outline how professional surveying standards are promoted and maintained.	2A.P2 Describe how professional surveying standards are promoted and maintained.		
Learning aim B: Explore the principles that underpin surveying			
1B.3 Calculate perimeters and areas of regular shapes.*	2B.P3 Calculate perimeters, areas and volumes of regular shapes, and solids.*	2B.M2 Calculate areas of irregular shapes.*	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Explore knowledge, understanding and skills used in surveying</b>			
1C.4 Outline the surveying services provided by the building surveyor.	2C.P4 Describe the surveying services provided by the building surveyor.	2C.M3 Compare surveying services provided by the building surveyor, land surveyor and quantity surveyor.	2C.D2 Evaluate the range of surveying services provided by the surveying profession.
1C.5 Outline the surveying services provided by the land surveyor.	2C.P5 Describe the surveying services provided by the land surveyor.		
1C.6 Outline the surveying services provided by the quantity surveyor.	2C.P6 Describe the surveying services provided by the quantity surveyor.		
1C.7 Outline equipment and resources required to complete a specified surveying task.	2C.P7 Describe equipment and resources required to complete a specified surveying task.	2C.M4 Explain techniques used, including effective use of equipment, when carrying out a specified surveying task.*	2C.D3 Evaluate a completed surveying task.
1C.8 Provide the outcome of carrying out a specified surveying task in an appropriate format, with guidance.*	2C.P8 Provide the outcome of carrying out a specified surveying task in an appropriate format.*		

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

The special resources required for this unit are as follows.

- For the building surveying specialism: measuring tapes, rods, electronic distance-measuring instruments, damp meters, digital camera, binoculars, voice recorder and access to ICT facilities.
- For the land surveying specialism: measuring tapes, rods, site square, optical levels, electronic distance-measuring instruments, digital camera and access to ICT facilities. Laser levels, total stations and GPS technology may be used if they are available in the centre.
- For the quantity surveying specialism: standard method of measurement (SMM7 or NRM2), dimension, cut and shuffle or direct billing paper, scale rule and access to ICT facilities.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

#### Learning aim A

**For 2A.P1:** learners should describe legislation, professional surveying regulations and guidance used by building, land and quantity surveyors. Evidence for this criterion could be in the form of a word-processed document.

**For 2A.P2:** learners should explain, including evidence, how professional surveying standards are promoted and maintained. Reference should be made to practice notes, codes of practice, codes of conduct and standard methodologies.

**For 2A.M1:** learners should explain how professional surveying standards are promoted and maintained by guidance and regulations. They should give examples of guidance used by surveyors. They should also explain how the professional bodies use regulations and disciplinary procedures to maintain consistent, high standards in the profession. Evidence could take the form of an extension of the work carried out for 2A.P1 and 2A.P2.

**For 2A.D1:** learners should evaluate how professional surveying guidance ensures a consistent methodology is used across the surveying profession. They should use examples of professional guidance (e.g. RICS guidance notes) to evaluate how this ensures that surveyors provide consistent levels of service throughout the surveying profession. Evidence could take the form of an extension of the work carried out for 2A.P1, 2A.P2 and 2A.M1.

**For 1A.1:** learners should outline legislation, surveying professional regulations and guidance used by surveyors. Evidence for this criterion could be in the form of a word-processed document.

**For 1A.2:** learners should outline how professional surveying standards are promoted and maintained by applying rules of conduct and using guidance.

#### Learning aim B

**For 2B.P3:** learners should calculate perimeters, areas and volumes of regular shapes and solids. This should include calculations for rectangles, circles, triangles and trapeziums.

**For 2B.M2:** learners should calculate areas of irregular shapes. This could take the form of area calculations for a plot of land by sub-division into regular shapes utilising a line of balance or by using the offset method.

**For 1B.3:** learners should calculate perimeters and areas of regular shapes. At this level, learners may use graph paper to assist with area calculations.

### Learning aim C

Learners will need to complete a practical surveying task in either building, land or quantity surveying.

**For 2C.P4:** learners should describe the surveying services provided by the building surveyor and should include the provision of condition surveys and building pathology. Evidence for this criterion could be in the form of a word-processed document, poster or a presentation with accompanying notes and a teacher observation record.

**For 2C.P5:** learners should describe the surveying services provided by the land surveyor and should include the key areas of geomatics. Evidence for this criterion could be in the form of a word-processed document, poster or a presentation with accompanying notes and a teacher observation record.

**For 2C.P6:** learners should describe the surveying services provided by the quantity surveyor, including design economics and cost planning, measurement, monthly valuation and final account procedures. Evidence for this criterion could be in the form of a word-processed document, poster or a presentation with accompanying notes and a teacher observation record.

**For 2C.M3:** learners should compare the surveying services provided by the building surveyor, land surveyor and quantity surveyor. Evidence could take the form of an extension of the work carried out for 2C.P5, 2C.P6 and 2C.P7, and should look at key similarities as well as describing how the roles differ.

**For 2C.D2:** learners should evaluate the range of surveying services provided by the surveying profession. Evidence could take the form of an extension of the work carried out for 2C.M4.

**For 1C.4:** learners should outline the surveying services provided by the building surveyor. Evidence for this criterion could be in the form of a word-processed document, poster or verbal report/presentation accompanied by a teacher observation record.

**For 1C.5:** learners should outline the surveying services provided by the land surveyor. Evidence for this criterion could be in the form of a word-processed document, poster or verbal report/presentation accompanied by a teacher observation record.

**For 1C.6:** learners should outline the surveying services provided by the quantity surveyor. Evidence for this criterion could be in the form of a word-processed document, poster or verbal report/presentation accompanied by a teacher observation record.

**For 2C.P7:** learners should describe the equipment, resources and techniques required to complete a teacher specified surveying task for one of the surveying specialisms in the unit content (building surveying, land surveying, quantity surveying). Evidence for this criterion could be in the form of a word-processed document or verbal report/presentation accompanied by a teacher observation record.

**For 2C.P8:** learners should complete a teacher specified surveying task for one of the surveying specialisms in the unit content (building surveying, land surveying, quantity surveying). For a building surveying task, learners should produce a completed condition survey. For a land surveying task, learners should produce a map or plan of a parcel of land using linear survey methods. The completed map or plan must be to a suitable scale to represent the topography. For a quantity surveying task, learners should produce a completed 'take off'.

**For 2C.M4:** building on their evidence for 2C.P10, learners should explain the techniques used for the specified surveying task, including the effective use of equipment. This should include how the survey outcomes are recorded and presented. Evidence for this criterion could be in the form of a word-processed document or verbal report/presentation accompanied by a teacher observation record.

**For 2C.D3:** learners should evaluate their completed surveying task. This should include reflection on the development of new skills, the accuracy of the work, the use of vocationally correct methods and appropriate presentation. Evidence for this criterion could be in the form of a word-processed document or verbal report/ presentation accompanied by a teacher observation record.

**For 1C.7:** learners should outline the equipment, resources and techniques required to complete a teacher specified surveying task for one of the surveying specialisms in the unit content (building surveying, land surveying, quantity surveying). Evidence for this criterion could be in the form of a word-processed document or verbal report/presentation accompanied by a teacher observation record.

**For 1C.8:** learners, with guidance, should complete a teacher specified surveying task for one of the surveying specialisms in the unit content (building surveying, land surveying, quantity surveying). For a building surveying task, learners should produce a completed condition survey. For a land surveying task, learners should produce a map of a parcel of land using linear survey methods. The completed drawing or plan must be to a suitable scale to represent the topography. For a quantity surveying task, learners should produce a completed 'take off'.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.M1, 2A.D1, 1A.1, 1A.2	Use of Regulation and Guidance in Surveying	You are a trainee surveyor and have been asked to investigate the use of legislation, surveying regulations and surveying guidance. You are to produce information for use by your fellow trainees.	Word processed report/document, poster or presentation materials with notes and a teacher observation report.
2B.P3, 2B.M2, 1B.3	Measurement and ICT as Used in Surveying	In your role as trainee surveyor, you are developing knowledge and skills in the measurement of land and structures to calculate areas and volumes.  Your line manager has asked you to support them on a job. This involves calculating the area and volume of a piece of land and the building it contains.	Calculation sheets.  Word processed report/document.

Criteria covered	Assignment	Scenario	Assessment evidence
2C.P4, 2C.P5, 2C.P6, 2C.M3, 2C.D2, 2C.P7, 2C.P8, 2C.M4, 2C.D3, 1C.4, 1C.5, 1C.6, 1C.7, 1C.8	The Services Offered by Surveyors	<p>You are working in a surveying practice and have developed a detailed understanding of the role of the various surveying disciplines. You have been asked to investigate the services provided by building surveyors, land surveyors and quantity surveyors, to give a presentation to a group of learners who are considering a career in surveying. In order to give them a better understanding, you will also demonstrate a task in one of the surveying specialisms:</p> <ul style="list-style-type: none"> <li>• completion of a condition survey of an existing building <b>or</b></li> <li>• a topographical survey to produce a map or plan of a small piece of irregular shaped land <b>or</b></li> <li>• completion of a 'take-off' for the substructure a simple rectangular building with a solid floor and a strip foundation.</li> </ul>	<p>A video record of the presentation or teacher observation record, presentation materials and notes.</p> <p>Completed:</p> <ul style="list-style-type: none"> <li>• condition survey report <b>or</b></li> <li>• a completed map or plan to a suitable scale representing the topography of the parcel of land <b>or</b></li> <li>• completed 'take-off'.</li> </ul> <p>Word processed report/document.</p>



# Unit 24: Exploring Civil Engineering

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

The unit aims to develop your knowledge of the processes and operations used in the construction and design of civil engineering works. It will also develop your understanding of the context in which the civil engineering industry operates.

The aim of this unit is to develop an understanding of the roles and responsibilities of civil engineers, relevant legislative frameworks, and codes and practices. You will also explore how the job role of a civil engineer is changing due to a number of factors such as the sustainability agenda, legislative changes, construction process change, technological changes and economic factors. The civil engineering industry requires a workforce that is flexible, creative, highly skilled and technically competent.

Civil engineering construction underpins all civil engineering activities. You will learn about the techniques, processes and materials used in the construction of civil engineering works, and the factors that affect such works; earthwork activities and the methods and techniques used in substructures and superstructures, including foundations, drainage, external works, frames and bridges.

You will learn how civil engineering structures are designed. This includes how structural elements behave under load and the skills needed to analyse simple structural problems. You will develop an understanding that loads include, or are caused by, the self-weight of the materials used, the use to which the components or structures are put, and wind pressure. You will also consider below-ground drainage such as the types of drainage systems and the requirements to design these and the approaches to, and features of, a Sustainable Drainage System (SuDS).

## Learning aims

In this unit you will:

- A understand the context within which the civil engineering industry operates
- B understand the construction of substructure and superstructure civil engineering works
- C explore concepts and data required to analyse and design civil engineering works.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Understand the context within which the civil engineering industry operates

##### Topic A.1 Health and safety

The health and safety requirements associated with civil engineering works (this must be as in force at the time of learner assessment).

- Legislative framework:
  - Health and Safety at Work Act (HASWA)
    - duties of employers
    - duties of employees
  - Construction (Design and Management) Regulations (CDM)
    - duties of designer, main contractor, sub-contractor, health and safety officer
    - duties of CDM coordinator
    - compliance requirements
    - health and safety file requirements (welfare, site security, site access, training requirements, certification).
- Adoption of safe working practices:
  - risk assessments
  - method statements
  - use of control measures to remove or minimise the risk
  - use of personal protective equipment (PPE).
- Ensuring a clean and tidy work area.
- The need for appropriate behaviour and a positive attitude towards health and safety.

##### Topic A.2 Codes of practice (COPs), best practices and industry initiatives

Role of codes of practice, best practices and industry initiatives, and intended outcomes in civil engineering, including dissemination by guidance notes as in force at the time of learner assessment.

- Codes of practice determining the conduct of activities:
  - British Standards Institute BS 5930:2015 Code of practice for site investigations.
- Approved codes of practice (ACOPs) providing practical guidance on compliance with specific legislation:
  - Health and Safety Executive ACOPs
    - L153 Managing health and safety in construction for CDM.

*continued*

### What needs to be learnt

- Industry-produced guidance to comply with the CDM Regulations.
- Professional organisation 'best practices' documents and guidance notes:
  - Best Practices in Ground Engineering (Institution of Civil Engineers)
  - SuDS manual (CIRIA)
  - Good Practices in Site Investigation (Association of Geotechnical and Geoenvironmental Specialists)
  - other applicable Institution of Civil Engineers (ICE) manuals.
- Industry initiatives:
  - minimising waste production through Site Waste Management Plans (SWMP): sources of waste, minimisation, segregation
  - certification schemes
    - Construction Skills and Certification Scheme (CSCS) – ensuring personnel competency in health and safety, the various levels (from an operative to a manager)
    - Construction Plant Competence Scheme (CPCS) – ensuring the cardholder is competent to operate a specific plant item
  - Considerate Constructors Scheme (CCS) – improving the construction industry thorough environmental actions, managing good relations with the general public.

### Topic A.3 Dynamics of the industry

Factors driving change in civil engineering and the effect on job roles.

- Role and responsibilities of civil engineers:
  - design and construction of
    - tall buildings and large structures, industrial and commercial buildings
    - infrastructure including bridges, roads, tunnels, waterways, railways, utilities, power stations
  - development
    - provision of utilities on new developments
    - adoption of roads and drainage
  - maintenance and repair of infrastructure works.
- Job roles:
  - development engineers – provision and management of utilities on new developments, adoption of highways, sewers and public open space
  - ground workers – earthwork activities, external works
  - site managers – management of the construction work
  - project managers – management of the overall project
  - structural engineers – design of structural elements
  - highway engineers – design, construction and maintenance of highways
  - geotechnical engineers – site investigations, soil testing
  - drainage engineers – design, construction and maintenance of drainage systems
  - site engineers – setting out and alignment of buildings, roads and other infrastructure.

*continued*

**What needs to be learnt**

- Factors affecting job roles:
  - sustainability agenda including waste minimisation, energy use, pollution, Sustainable Drainage System (SuDS)
  - changes in legislation including CDM
  - construction process changes including offsite manufacture, modular construction
  - technology changes to include computer-aided drafting and design (CADD), virtual reality (VR), satellite navigation systems such as geographical positioning system (GPS) and global navigation satellite systems (GNSS), geographic information systems (GIS), software applications
  - plant and equipment to include surveying equipment, earthmoving plant including those using GPS and/or GNSS
  - economic factors to include global recession, emerging markets, movement of labour.

**Learning aim B: Understand the construction of substructure and superstructure civil engineering works****Topic B.1 Substructure works**

Processes, materials and construction plant required. Learners will need to be able to demonstrate the use of sketching techniques.

Earthwork activities:

- site clearance and general excavation –
  - clearing undergrowth and underground obstructions to include tree roots, old foundations
  - stripping topsoil
  - demolition of existing structures
- bulk excavation –
  - cuttings
  - shallow cut and fill
  - reducing levels
  - grading
- trench excavation –
  - purpose including construction of foundations, drainage works, laying of services
  - types including vertical and batter sides, cable trenching
  - supporting trenches
    - traditional methods including timbering, aluminium walling, steel sheets
    - trench boxes
    - proprietary systems
- groundwater exclusion – temporary, permanent
- plant required – graders, 180° and 360° excavators, bulldozers, dumpers, pumps
- disposal – on site, off site.

Substructure works:

- foundations – isolated pad foundations for reinforced concrete and steel
- external works – flexible and rigid pavement construction
- rainage – installation of sewers, methods of jointing, bedding, backfill, depth of cover, testing for alignment.

*continued*

## What needs to be learnt

### Topic B.2 Superstructure works

The processes, materials and construction plant required. Learners will need to be able to demonstrate the use of sketching techniques.

- Superstructures:
  - frames
    - steel, reinforced concrete
    - connections: beam to column connections including bolted, built-in and welded
    - erection of frames
  - bridges
    - beam
    - arch
    - suspension and cable-stayed
    - components
      - abutments
      - decking.
- Types of superstructure: precast and cast-in-situ.
- Plant and equipment required: mobile and static cranes, concrete pumps, access equipment.

### Topic B.3 Factors affecting civil engineering work

- Physical conditions:
  - ground conditions
  - climatic conditions including wind speed and direction, intensity of rainfall, extremes of temperatures.
- Financial considerations:
  - timescale
  - cost including labour, plant, materials
  - quality of materials and workmanship.
- Environmental factors:
  - noise
  - aesthetics
  - pollution.
- Life cycle issues:
  - future requirements
  - maintenance and repair
  - re-use, deconstruction and demolition.

**What needs to be learnt****Learning aim C: Explore concepts and data required to analyse and design civil engineering works****Topic C.1 Concepts and behaviour of structural elements**

- Types of loads to include self-weight, live, impact, wind, snow.
- Load configuration to include point loads, distributed loads, direct loads, eccentric load.
- Types of supports:
  - simply supported – pinned
  - fixed – welded, riveted, bolted, built-in
  - cantilever – fixed at one end only
  - continuous – over more than two supports.
- Behaviour under load of:
  - beams – bending, shear, deflection
  - columns – compression, buckling.
- Analysis of a structural element – simply supported beam:
  - beams in compression
  - beams in tension.

**Topic C.2 Drainage systems**

- Purpose: disposal of foul and surface water.
- Types:
  - combined systems
  - totally separate systems
  - partially separate systems.
- Design:
  - design flow (rainwater, foul water)
  - ventilation of drainage systems: use of open vents
  - access for maintenance: rodding points, manholes
  - minimum size of drain
  - maximum depth of flow
  - self-cleansing velocity
  - gradients or falls.
- Sustainable Drainage Systems (SuDS):
  - reasons for use
    - changes in the natural water flow patterns
    - reduced supply of rainfall due to hard standing areas
    - water quality issues
    - flooding

*continued*

**What needs to be learnt**

- approaches
  - manage pollution at source
  - protect water resources
- features
  - porous surfaces to include paving, filter trenches
  - soakaways, balancing and retention ponds
  - green roofs
  - rainwater harvesting
- estimation of surface water run-off from impermeable areas by use of HR Wallingford methods including  $Q_p = 2.78 \times A_p \times i$

**Topic C.3 Factors affecting analysis and design**

- Design brief: functional and life cycle requirements, time and budget.
- Sustainability goals.
- Materials selection.
- Type of soil.
- Ground-bearing capacity.
- Structural loading.
- Climatic conditions.
- Serviceability requirements.
- British Standards.
- European codes of practice.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand the context within which the civil engineering industry operates</b>			
1A.1 Identify the purpose of the health and safety legal framework applicable to civil engineering works.	2A.P1 Describe the purpose of the health and safety legal framework applicable to civil engineering works.#		
1A.2 Identify the role of codes of practice, best practices and industry initiatives in civil engineering.	2A.P2 Describe the role of codes of practice, best practices and industry initiatives in civil engineering.#	2A.M1 Analyse the role of codes of practice, best practices and industry initiatives in civil engineering.#	2A.D1 Evaluate the factors that drive change and affect the job roles in the civil engineering industry.
1A.3 Outline the factors that drive change in the context of three civil engineering job roles.	2A.P3 Describe the factors that drive change in the context of three civil engineering job roles.	2A.M2 Analyse the factors that drive change in the context of three civil engineering job roles.	



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim B: Understand the construction of substructure and superstructure civil engineering works			
1B.4 Outline the processes, plant and materials required in the construction of civil engineering substructure works for a given brief.	2B.P4 Describe the processes, plant and materials required in the construction of civil engineering substructure works for a given brief.	2B.M3 Explain the processes, plant and materials required in the construction of civil engineering substructure works for a given brief.	2B.D2 Evaluate factors that affect the construction of civil engineering works in terms of processes, materials and plant required for a given brief.
1B.5 Outline the processes, plant and materials required in the construction of civil engineering superstructure works for a given brief.	2B.P5 Describe the processes, plant and materials required in the construction of civil engineering superstructure works for a given brief.	2B.M4 Explain the processes, plant and materials required in the construction of civil engineering superstructure works for a given brief.	
1B.6 Outline factors that affect the construction of civil engineering works.	2B.P6 Describe factors that affect the construction of civil engineering works.	2B.M5 Analyse factors that affect the construction of civil engineering works.	
Learning aim C: Explore concepts and data required to analyse and design civil engineering works			
1C.7 Outline the behaviour of structural elements under given loading conditions.*	2C.P7 Describe the behaviour of structural elements under given loading conditions.*		
1C.8 Outline the requirements to design drainage systems.	2C.P8 Describe the requirements to design drainage systems.*	2C.M6 Explain the requirements to design drainage systems.*	
1C.9 Outline the factors to be considered in the design of civil engineering works.	2C.P9 Describe the factors to be considered when designing civil engineering works.	2C.M7 Analyse the factors to be considered when designing civil engineering works.	2C.D3 Evaluate the factors that affect the design of civil engineering works.

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

The essential resources required for this unit include the provision of civil engineering case studies to illustrate processes involved in the construction of substructures and superstructures.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

The structure of the unit content suggests that a minimum of three assignments could be used to provide learners with opportunities to produce the evidence required to achieve all the assessment criteria, as detailed in the *Suggested assignment outlines*. Use of one overarching construction project is suggested to generate the evidence requirements.

### Learning aim A

**For 2A.P1:** the learner's description should include the purpose of the duties of employers and employees under Health and Safety at Work Act. However, the focus should be on the Construction (Design and Management) Regulations (CDM), describing the duties of various parties and their purpose, including CDM coordinator. Learners must also include safe working practices and health and safety file requirements. Evidence for this criterion could be provided in the form of a presentation, a report and/or a record of oral questioning completed by the teacher.

**For 1A.1:** the learner's identification should include duties of employers and employees under Health and safety at Work Act. However, the focus should be on the Construction (Design and Management) Regulations (CDM), identifying the duties of various parties including the CDM coordinator. Learners must also include safe working practices and health and safety file requirements in the identification. Evidence for this criterion could be provided in the form of a presentation, a report and/or a record of oral questioning by the teacher.

**For 2A.P2:** learners need to describe the role of codes of practice (COPs) and approved codes of practice (ACOPs). They should include their legal status. Learners must also describe the role of best practices and industry initiatives, and their dissemination through a number of guidance notes. Evidence requirements are the same as for 2A.P1.

**For 2A.M1:** learners need to analyse the role of COPS, ACOPs, best practices and industry initiatives. This should be an in-depth analysis focusing specifically on industry initiatives and best practices, including the rationale and details of what is being proposed and the likely outcomes. Evidence for this criterion could take the form of a poster presentation, a written report or verbal responses to questions.

**For 2A.P3:** learners need to describe three job roles in civil engineering industry, the factors that drive role change and the role change that results. The roles could be drawn from three different industrial sectors, such as structural designing, highways engineering, bridge engineering and geotechnical, or from three different functions, such as project managers, site managers and ground workers. The description should include various tasks likely to be performed. Evidence for this criterion could be in the form of a written report or a job advertisement.

**For 2A.M2:** learners need to analyse factors that could change the job roles in civil engineering industry. The analysis should be in depth and must include factors relevant to the three job roles described in 2A.P3. Evidence for this criterion could be in the form of a written report or a presentation, with supporting materials.

**For 2A.D1:** learners must evaluate factors that drive change and how these affect job roles in the civil engineering industry. The evaluation should take into account a range of factors, such as industry initiatives, best practices, changes in legislation, technology, construction methods, plant and equipment, as well as financial considerations. Evidence for this criterion could be in the form of a written report or a presentation (a teacher record/recording with supporting materials required), or teacher record of learner responses to verbal questions.

**For 1A.2:** learners need to identify the role of codes of practice (COPs) and approved codes of practice (ACOPs). They should include their legal status. Learners must also identify the role of sharing industry best practices and industry initiatives through a number of guidance notes. Evidence for this criterion could be provided in the form of a presentation, a report and/or a record of oral questioning completed by the teacher.

**For 1A.3:** learners need to outline three job roles in civil engineering. These can be from three different industrial sectors, such as structural designing, highways engineering, bridge engineering and geotechnical engineering, or from three different functions, such as project managers, site managers and ground workers. The outline should include various tasks likely to be performed and changes in job roles as a result of change factors. Evidence for this criterion could be in the form of a written report or a job advertisement.

## Learning aim B

**For 2B.P4:** learners need to describe the processes involved, including plant and materials, to construct civil engineering substructure works for a given brief. These works should include earthwork activities, isolated pad foundations, external works and drainage works. Learners should also state how they are going to control groundwater and dispose of the surplus materials. Evidence for this criterion could be provided in the form of a report or presentation (teacher record/recording of presentation required with supporting materials) based, for example, on case studies, visits to sites etc. Appropriate drawings, sketches or illustrations could provide useful evidence.

**For 2B.M3:** learners need to build on 2B.P4, explaining the processes involved, including plant and materials, to construct civil engineering substructure works for a given brief. The explanation must be supported with construction details of substructure works. Learners could choose from the list provided in Topic B.1. This could be, for example, details of a vertical trench showing width, depth, size and spacing of supports. This could also be a section through a sewer line showing the thickness of bedding materials, size of trench and diameter of the drain pipe. Evidence could be in the form of a report and/or presentation with supporting materials, such as drawings to scale with appropriate annotations.

**For 2B.P5:** learners need to describe the processes involved, including plant and materials, to construct civil engineering superstructure works for a given brief. These works should include erection of steel and reinforced concrete frames and bridges. Learners should include both precast and cast-in-situ techniques. Evidence for this criterion could be provided in the form of a report or presentation (teacher record/recording of presentation required with supporting materials) based, for example, on case studies, visits to sites or a teacher-provided brief. Appropriate drawings, sketches or illustrations could provide useful evidence.

**For 2B.M4:** learners need to explain the processes required to construct civil engineering superstructure works for a given brief, by providing details of and reasons for the processes, including plant and materials. The explanation must be supported with construction details of superstructure works. Learners could choose from the list provided in Topic B.2. These could be, for example, a steel beam-to-column connection showing location, number, size and dimensioning of bolts. This could also be a section through a bridge deck, giving the dimensions and support details. Evidence could be in the form of a report and/or presentation, including drawings to scale with appropriate annotations.

**For 2B.P6:** learners need to describe the factors that could affect the construction of civil engineering works. They should consider both substructure and superstructure works and should include all the factors as indicated in Topic B.3. Evidence could be in the form of a written report or presentation, with teacher record/recording of presentation, with supporting materials.

**For 2B.M5:** learners need to analyse the factors that affect the construction of civil engineering works. The analysis is to be detailed and learners must use their knowledge and understanding of substructures and superstructures. Evidence could be in the form of a written report or presentation, with teacher record/recording of presentation required, and supporting materials.

**For 2B.D2:** learners need to evaluate the factors that affect the construction of civil engineering works for a given brief. They must relate the factors with the construction processes, plant and materials covered earlier. They should consider both substructure and superstructure works. Evidence could be in the form of a written report or presentation, with teacher record/recording of presentation required, and supporting materials.

**For 1B.4:** learners need to outline the processes involved, including plant and materials, to construct civil engineering substructure works for a given brief. These works should include earthwork activities, isolated pad foundations, external works and drainage works. Learners should also state how they are going to control groundwater and dispose of the surplus materials. Evidence for this criterion could be provided in the form of a report or presentation (with teacher record/recording of presentation required, with supporting materials) based, for example, on case studies, visits to sites etc. Appropriate drawings, sketches or illustrations could provide useful evidence.

**For 1B.5:** learners need to outline the processes involved, including plant and materials, to construct civil engineering superstructure works for a given brief. These works should include erection of steel and reinforced concrete frames and bridges. Evidence for this criterion could be provided in the form of a report or presentation (with teacher record/recording of presentation required with supporting materials) based, for example, on case studies, visits to sites, etc. Appropriate drawings, sketches or illustrations could provide useful evidence.

**For 1B.6:** learners need to outline the factors that could affect the construction of civil engineering works. They should consider both substructure and superstructure works and should include all the factors as indicated in Topic B.3 of the unit content. Evidence could be in the form of a written report or presentation with teacher record/recording of presentation required, and supporting materials.

## Learning aim C

**For 2C.P7:** learners need to describe the behaviour of structural elements under given loading conditions. Two structural elements – beams and columns – should be considered. Learners should include types of loads and load configurations, as well as types of supports provided for these elements. Learners should describe the behaviour of beams under point and distributed loads, as well as behaviour of columns under direct and eccentric loading. Evidence of this criterion could be in the form of a written report or a presentation, with teacher record/recording of presentation required, supported with appropriate illustrations and sketches.

**For 2C.P8:** learners need to describe the requirements to design drainage systems. They are not required to carry out any calculations for this criterion. Learners should include types of drainage systems and the requirements as laid out in the content of Topic C.2. Evidence of this criterion could be in the form of a written report or a presentation, with teacher record/recording of the presentation required, supported with appropriate illustrations and sketches.

**For 2C.M6:** learners need to explain the requirements to design drainage systems. The analysis should include reasons, approaches and features of a Sustainable Drainage System (SuDS) as detailed in Topic C.2. Learners must also be able to estimate surface water run-off from impermeable areas of a site using a given HR Wallingford method. This estimation could be based on the data provided by the teacher. Evidence for this criterion could be in the form of a report or presentation, with teacher record/recording of the presentation required, supported with calculations and appropriate sketches or illustrations.

**For 2C.P9:** learners need to describe the factors to be considered when designing civil engineering works. They should consider both civil engineering structures and drainage systems, and should include all the factors as indicated in Topic C.3 of the unit content. Evidence could be in the form of a written report or presentation, with teacher record/recording of the presentation required, and supporting materials.

**For 2C.M7:** learners need to analyse the factors to be considered when designing civil engineering works. They should consider both civil engineering structures and drainage systems, and should include all the factors as indicated in Topic C.3. Learners must use their knowledge and understanding regarding design requirements for civil engineering structures and drainage systems. Evidence could be in the form of a written report or presentation, with teacher record/recording of the presentation required, and supporting materials.

**For 2C.D3:** learners need to evaluate the factors that could affect the design of civil engineering works. Learners must use their knowledge and understanding regarding design requirements for civil engineering structures and drainage systems. They must relate the factors with the design requirements covered earlier. Evidence could be in the form of a written report or presentation, with teacher record/recording of the presentation required, and supporting materials.

**For 1C.7:** learners need to outline the behaviour of structural elements under given loading conditions. Two structural elements – beams and columns – are to be considered. Learners should include types of loads and load configurations, as well as types of supports provided for these elements. Learners should describe the behaviour of beams under point and distributed loads, as well as the behaviour of columns under direct and eccentric loading. Evidence of this criterion could be in the form of a written report or a presentation, with teacher record/recording of the presentation required, supported with appropriate illustrations and sketches.

**For 1C.8:** learners need to outline the requirements to design drainage systems. They are not required to carry out any calculations for this criterion. Learners should include types of drainage systems and the requirements as laid out in Topic C.2 of the unit content. Evidence of this criterion could be in the form of a written report or a presentation, with teacher record/recording of the presentation required, supported with appropriate illustrations and sketches.

**For 1C.9:** learners need to outline the factors to be considered when designing civil engineering works. They should consider both civil engineering structures and drainage systems, and should include all the factors as indicated in Topic C.3. Evidence could be in the form of a written report or presentation, with teacher record/recording of the presentation required, and supporting materials.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 1A.3, 2A.P1, 2A.P2, 2A.P3, 2A.M1, 2A.M2, 2A.D1	The Civil Engineering Industry	You have been approached by a company which provides career education and guidance. You have been asked to produce a detailed report regarding various potential job roles in civil engineering, and how health and safety, codes of practice and best practices apply to drive change and job roles.	A report to include text, diagrams, tables and graphs as appropriate.  Group presentation with supporting materials to include teacher observation confirming the learner's contribution against assessment criteria.
1B.4, 1B.5, 1B.6, 2B.P4, 2B.P5, 2B.P6, 2B.M3, 2B.M4, 2B.M5, 2B.D2	Construction of Civil Engineering Works	You are assisting a site manager and have been asked to produce guidance for civil engineers working in your company. You have been asked to include a range of substructure and superstructure works, highlighting the factors that might affect such works.	A presentation to include sketches, drawings, diagrams and text as appropriate, accompanied by notes and teacher observation records.
1C.7, 1C.8, 1C.9, 2C.P7, 2C.P8, 2C.P9, 2C.M6, 2C.M7, 2C.M8, 2C.D3	Design of Civil Engineering Works	You are working in a civil engineering design consultant's office. You have been asked by your line manager to produce an induction document for design engineers. This is to include design requirements for drainage systems and the behaviour of structural elements, together with factors that might affect the design of such works.	A presentation to include calculations, sketches, diagrams, graphs and text as appropriate, accompanied by notes and teacher observation records.





# Unit 25: Exploring Building Services Engineering

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

We tend to take building services for granted, as long as they are working properly, but the provision of high-quality building services is essential.

Today, domestic buildings have as a minimum a supply of cold water, single-phase electrical power, and drainage. Most also have a gas supply. These provide a comfortable, safe and hygienic environment for the building's occupants.

In this unit you will explore the building services generally provided to low-rise domestic buildings (of 5.2 m or less) and learn how these services are used to improve the occupants' quality of life.

You will be introduced to the legislation and guidance which ensure the safe distribution, installation and use of building services. You will investigate the principles that underpin the safe and effective provision and use of cold water, hot water, electricity, gas and drainage and their integration into domestic buildings. As part of this unit, you will discover how each of these services enters, and is used in, low-rise domestic buildings.

This unit does not provide competence in building services engineering.

## Learning aims

In this unit you will:

- A understand compliance with legislation and guidance applicable to building services engineering
- B understand the principles that underpin building services engineering for low-rise domestic buildings
- C explore how building services are integrated into low-rise domestic buildings.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand compliance with legislation and guidance applicable to building services engineering</b></p> <p><b>Topic A.1 Legislation and regulations</b></p> <ul style="list-style-type: none"> <li>• Health and Safety at Work Act (HASAWA).</li> <li>• IET Wiring Regulations 18th Edition.</li> <li>• Electricity at Work Regulations.</li> <li>• Gas Safety (Installation and Use) Regulations.</li> <li>• Water Supply (Water Fittings) Regulations.</li> <li>• Building Regulations with current amendments.</li> <li>• Flood and Water Management Act.</li> </ul> <p><b>Topic A.2 Codes of practice and guidance</b></p> <ul style="list-style-type: none"> <li>• Chartered Institute of Building Services Engineers (CIBSE) Guides A, B and C.</li> <li>• Water Regulations Advisory Scheme.</li> <li>• Code of Practice for Building Drainage BS8301 or subsequent updates.</li> <li>• HSE electrical standards and approved codes of practice.</li> </ul> <p><b>Topic A.3 Need for compliance with legislation and guidance</b></p> <ul style="list-style-type: none"> <li>• Legal requirement, possibility of prosecution, penalties for non-compliance.</li> <li>• Use of qualified staff, regular training and updating, use of external consultants (design engineers), specialist clerk of works.</li> <li>• Human, financial and corporate consequences of non-compliance.</li> <li>• Good practice in terms of energy efficiency, pollution control, sustainability, health and safety of users and installers.</li> </ul>
<p><b>Learning aim B: Understand the principles that underpin building services engineering for low-rise domestic buildings</b></p> <p>The standard building services and how to meet the needs of building users during their design.</p> <p><b>Topic B.1 Cold water</b></p> <ul style="list-style-type: none"> <li>• Uses: drinking, cooking, flushing toilets, watering plants and gardens.</li> <li>• Principles: including capacity, supply pressure, storage at height, flow under gravity.</li> <li>• Prevention of: waste, undue consumption, contamination, corrosion, freezing.</li> </ul> <p><b>Topic B.2 Hot water</b></p> <ul style="list-style-type: none"> <li>• Uses: cooking, bathing, laundry, cleaning, washing dishes, low-pressure hot water heating systems.</li> <li>• Principles: including water heated within building, fuels used to heat water, flow by gravity and convection, pumping only for central heating purposes.</li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt****Topic B.3 Drainage**

- Removal of:
  - foul water (to some form of treatment)
  - surface water
    - to watercourse, including danger of flooding due to watercourse
    - use of Sustainable Urban Drainage Systems (SuDS) to reduce flooding.
- Principles:
  - above-ground drainage single-stack system including grouping sanitary appliances, relevance of slopes, diameters and distances of discharge pipes from stack, need for water seals, ventilation, prevention of siphonage
  - below-ground drainage including capacity, correct fall for self-cleansing flow, junctions oblique and in direction of flow, need for ventilation and access points at all junctions.

**Topic B.4 Electricity**

- Uses: power for lighting, heating and appliances such as televisions, washing machines, dishwashers, tumble driers.
- Principles including supply voltage, capacity, isolation, earthing.
- Prevention of excess current, fire, shock.

**Topic B.5 Gas**

- Uses: heating air using gas fires, heating water using domestic hot water and gas-fired central heating, cooking.
- Principles: including need for air to support combustion, safe removal of flue gases, no pipes under foundations or in cavities, use of sleeves or ducts for pipes that pass through walls or floors.

**Learning aim C: Explore how building services are integrated into low-rise domestic buildings****Topic C.1 Cold water**

- Entry into buildings: 750 mm below ground for frost protection, above foundations or encased in mass concrete, last 600 mm of pipe insulated, rising main a minimum of 750 mm from external wall unless insulated against freezing.
- Distribution within buildings:
  - indirect systems: advantages of same, layout and components (no requirement for materials, dimensions or capacities)
  - direct systems: advantages of same, layout and components (no requirement for materials, dimensions or capacities)
  - direct supply of drinking water.

**Topic C.2 Hot water**

- Distribution within buildings, type of system advantages, layout and components (excluding materials, dimensions or capacities requirement):
  - indirect system
  - direct system
  - unvented system.

*continued*

## What needs to be learnt

### Topic C.3 Drainage

The layout and components for:

- foul water drainage –
  - above ground, exit from buildings by single-stack system
  - below ground
- surface water drainage –
  - from roofs, drives, patios
  - pitch of roof, gutters, downpipes, gullies.

### Topic C.4 Electricity

- Entry into buildings: 300 mm to 450 mm below ground to avoid disturbance or accidental cutting of cable, incoming service cable through wall and floor or via the cavity, plastic protective duct on cable, mastic seal at entry point.
- Distribution within buildings: layout and components only of single-phase supply, ring final circuit and radial circuits.
- Protection of electrical circuits to include:
  - miniature circuit breaker (MCB)
  - residual current device (RCD).

### Topic C.5 Gas

- Entry into buildings: service pipe 375 mm below ground to avoid disturbance, pipe bent to fix against external wall and connected to external meter box.
- Distribution within buildings: layout and components for gas fire, central heating boiler and cooker, arrangements to remove products of combustion.

### Topic C.6 Building services drawings

Production of drawings showing the systems and supply for a low-rise domestic building context.

- Symbols used on drawings to include fill patterns and line conventions.
- Cold water systems:
  - indirect
  - direct.
- Hot water systems:
  - indirect
  - direct
  - unvented.
- Drainage – single-stack drainage systems.
- Electricity – annotated drawings showing the positions of sockets, switches, light fittings, cooker outlet and consumer unit positions for a low-rise domestic building.
- Gas – gas supply to boiler/water heater, cooking appliances.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand compliance with legislation and guidance applicable to building services engineering</b>			
1A.1 Identify the purpose of three pieces of legislation used in building services engineering.#	2A.P1 Describe the purpose of three pieces of legislation used in building services engineering.#	2A.M1 Analyse the impact of specified legislation, codes of practice and guidance on the client, designer, installers and users of building services.#	2A.D1 Evaluate one piece of specified legislation, code of practice or guidance in terms of general requirements, target audience and commonly encountered forms of non-compliance.#
1A.2 Identify the purpose of two pieces of codes of practice and guidance used in building services engineering.#	2A.P2 Describe the purpose of two pieces of codes of practice or guidance used in building services engineering.#		
1A.3 Outline what is meant by monitoring compliance with legislation, codes of practice and guidance.#	2A.P3 Describe how organisations can monitor building services design and installation procedures to promote compliance.#	2A.M2 Explain how organisations can monitor building services design and installation procedures to promote compliance.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Understand the principles that underpin building services engineering for low-rise domestic buildings</b>			
1B.4 Identify two applications for each building service provided to low-rise domestic buildings.	2B.P4 Describe two applications for each building service provided to low-rise domestic buildings.	2B.M3 Explain how the principles that influence the provision of each building service are used to meet the needs of low-rise domestic building users.	2B.D2 Evaluate the provision and integration of cold water, hot water, drainage, electricity and gas services for the provision of low-rise domestic gas-fired, low-pressure heating and hot water systems.
1B.5 Identify three principles that influence the provision of each building service.	2B.P5 Describe three principles that influence the provision of each building service.		
1B.6 Identify four requirements of successful building services systems that comply with legislation.	2B.P6 Describe four requirements of successful building services systems that comply with legislation.	2B.M4 Explain the procedures used to ensure building services comply with legislation.	

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Explore how building services are integrated into low-rise domestic buildings</b>			
1C.7 State whether each of the standard building services provided to a low-rise domestic building enters or exits a building and, where relevant, at what depth.	2C.P7 Describe how each of the standard building services provided to a low-rise domestic building enters or exits a building.	2C.M5 Explain the factors that influence the methods by which standard building services enter or exit low-rise domestic buildings.	2C.D3 Justify the preferred methods of integrating building services into buildings in terms of efficiency, cost, health and safety, and sustainability.
1C.8 Identify the most common method used to distribute each of the standard building services within a low-rise domestic building.	2C.P8 Describe the most common method used to distribute each of the standard building services within a low-rise domestic building.	2C.M6 Explain the differences between the most common method used to distribute services within a low-rise building and one other method.	
1C.9 Produce 'not to scale' sketches of the building services provided to low-rise domestic buildings.	2C.P9 Produce scale drawings of the building services provided to low-rise domestic buildings.*	2C.M7 Produce scale drawings of the building services provided to low-rise domestic buildings and with all components in their correct position.*	2C.D4 Produce scale drawings of the building services provided to low-rise domestic buildings with all components in correct position with clear and accurate annotation.*

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

Details of relevant legislation, regulations, codes of practice and guidance will be required.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

#### Learning aim A

**For 2A.P1:** learners must describe the purpose of any three pieces of legislation (Acts of Parliament or regulations made under such Acts) that are relevant to the building services engineering sector. There is no requirement for learners to demonstrate an in-depth understanding of the various sections of legislation. The pieces of legislation should be drawn from those in the unit content.

**For 2A.P2:** learners must describe the purpose of two codes of practice or guidance from those listed in the unit content (this may be two codes of practice, two pieces of guidance or one of each) that are relevant to the building services engineering sector. There is no requirement for learners to demonstrate an in-depth understanding of the various sections of codes or guidance.

**For 2A.M1:** learners must analyse the impact of teacher-specified legislation, codes of practice and guidance in terms of the different impacts on each of the stakeholders in the assessment criterion for a teacher-specified scenario. Learners should show that the client, designer, installers and users all have different stake in the process, and need to satisfy different, but often overlapping, items of legislation and guidance.

**For 1A.1:** learners must identify the purpose of any three pieces of legislation (Acts of Parliament or regulations made under such Acts) that are relevant to the building services engineering sector. The pieces of legislation should be drawn from those listed in the unit content.

**For 1A.2:** learners must identify the purpose of any two codes of practice and/or guidance that are relevant to the building services engineering sector. These should be drawn from those listed in the unit.

**For 2A.P3:** learners must describe how organisations can monitor building services design and installation procedures to promote compliance. The choice lies with the learner. Learners should mention the use of internal staff, external experts and how to keep up to date with requirements.

**For 2A.M2:** learners must explain the methods used by organisations to ensure compliance. An in-depth answer is not required at this level, but learners should mention a minimum of three of the following: use of qualified and experienced staff, regular training, development and updating, internal monitoring, use of external experts where appropriate, and prompt response to identified issues of concern.

**For 2A.D1:** building on 2A.M1, learners must focus on one item of relevant legislation, code of practice or guidance, and evaluate its purpose, its use, the target audience and any potential areas of non-compliance for a teacher specified scenario.

The learner's evaluation must demonstrate an understanding of the legislation, code of practice or guidance, i.e. a broad view should be taken avoiding the inclusion of long sections of the legislation, code of practice or guidance.



**For 1A.3:** learners must define what is meant by monitoring compliance with legislation, codes of practice and guidance. There is no requirement for a dictionary definition, although this would be acceptable, but mention must be made of fulfilment of statutory criteria or standards, adherence to laws, rules and policies, or something similar. An attempt to answer this question using examples is acceptable if it supplements the definition, but not on its own.

### Learning aim B

**For 2B.P4:** learners must describe any two applications of each of hot and cold water, drainage, electricity and gas. Examples that mention more than one building service, such as the use of electricity to heat cold water to produce hot water, count as one answer. The answer for drainage could be 'to dispose of foul water and surface water' or 'to dispose of waste from WCs, baths, showers, sinks and/or wash hand basins'.

**For 2B.P5:** learners must describe three principles that underpin the provision of each of cold water, hot water, drainage, electricity and gas in a domestic building context. The answers do not need to be extensive. For example, 'air is needed to provide the oxygen required for the chemical combustion of gas' is an acceptable answer. There is no requirement for a description of how this air is provided, but 'an air supply is required' is not acceptable because there is no principle involved.

**For 2B.M3:** learners must explain how the principles described in 2B.P5 influence the uses described in 2B.P4. The principle must be clearly linked to the effect for an effective response. For example, 'cold water is supplied from the mains at a pressure equivalent to between 30 and 70 metre head, and stored in a cistern at a height sufficient to produce a reasonable flow by gravity alone' or 'below-ground drainage pipes must be laid to a fall sufficient to cause a self-cleansing velocity of flow that will prevent blockages' are acceptable answers, but 'all electrical supplies must be earthed' is not, because the principle is not clear and the benefit to the users is not explained.

**For 2B.D2:** learners must evaluate how the services provided can be integrated to a greater purpose. For example, learners must make reference to how a cold water supply is fed to a hot water cylinder to a boiler, which uses gas to heat the water, how the resultant hot water is either drawn off or stored in the hot water cylinder for future use, that an electrical supply powers the services controls used to regulate the heat output and the timing of heating periods, and drainage is taken care of by drain valves and feed and expansion tanks. There is no requirement for an in-depth answer at this level, and no requirement for supporting drawings, although these may be used to address the criterion. Each service must be mentioned to achieve the criterion.

**For 1B.4:** learners must identify two applications for each of the building services provided to domestic low-rise buildings. This means ten applications in total. There is no requirement for a description of the applications. Application duplication should be avoided, for example, 'heating' should not be given as a use of both 'gas' and 'electricity'.

**For 1B.5:** learners must identify three principles that influence the provision of each of the standard building services. This means 15 principles in total. There is no requirement for a description of the principles or how they affect the provision of building services.

**For 2B.P6:** learners must describe four requirements, or instances, where building services elements for low-rise domestic properties must comply with current legislation or codes of practice. These requirements could be the preventative measures to reduce or eliminate the contamination of water supplies, integrity of electric fires, risks from leaking gas supplies or corrosion of metals used in plumbing services. The choice lies with the learner, and examples not referred to in the specification are acceptable if relevant and correct.

**For 2B.M4:** learners must explain the procedures used to ensure successful design or installation of two building services to a low-rise domestic home. Whichever, procedures are selected, it is important to link them to unwanted outcomes, and the procedures used to address them are clearly linked. For example, learners could explain the implications for not installing non-return valves on cold water systems ie this could contaminate drinking water for wider areas of the population beyond the actual installation site.

**For 1B.6:** learners must identify four requirements or instances where building services elements for low-rise domestic properties must comply with current legislation or codes of practice. This requires four requirements in total, not four for each building service. There is no requirement for a description. As for 2B.P6, these outcomes could be anything from contamination of cold water supplies, electrical fires, leaking gas supplies or corrosion of metals. The choice lies with the learner. Examples not referred to in the specification are acceptable if relevant and correct.

### Learning aim C

**For 2C.P7:** learners must describe how each of the building services enters or exits a low-rise domestic building. There is no requirement for sketches or drawings but both are acceptable if of a quality sufficient to address the criterion. Reference must be made to the way in which the service breaches the envelope of the building, whether or not this is above or below the foundations, and the depth at which the service approaches the home, where appropriate.

**For 2C.M5:** learners must explain the factors that influence the methods of entry and exit described in 2C.P7 above. For example, responses should make reference to the protection of services from accidents such as cutting through electric cables while gardening, and the need to protect incoming cold water pipes from the possibility of the water freezing and interrupting the supply. This criterion is about why, not just how.

**For 2C.P8:** learners must describe the most common method used to distribute the building services as mentioned in the unit content or commonly used in their local area, within low-rise domestic buildings. As in 2C.P7, there is no requirement for sketches or drawings but both are acceptable if of a quality sufficient to address the criterion. All components must be shown in their appropriate position if drawings are to be used.

**For 2C.M6:** learners must explain the common method used to distribute building services listed in the unit content with one other of their choice (maybe a method which is in common local use) within the home. For example, responses could include reference to the advantages of indirect water systems, the importance of placing sanitary ware near the drainage stack, and the different purposes of ring final circuits and radial circuits.

**For 2C.D3:** learners must justify the methods and techniques described in 2C.P7, 2C.P8, 2C.M5 and 2C.M6 in terms of efficiency, cost, health and safety, and sustainability. The costs need only be relative; actual costs are not required. It is sufficient to say that one method is cheaper or works better than another. Health and safety issues should include installation and use, but there is no requirement for method statements or risk assessments to support the response.

**For 1C.7:** learners must state whether a service enters or leaves and at what depth. There is no requirement for supporting reasons or underpinning principles. For example, cold water enters a building at a depth of 750 mm below the ground, gas enters a building at 375 mm below the ground and so forth. It is important that learners mention that drainage exits the building rather than entering it.

**For 1C.8:** learners must identify which method is the most commonly used. If they choose to identify a different method from that given in the specification, possibly because that is not how things are done in their local area, they must point this out, and say why. One example could be the use of a direct cold water system rather than an indirect system. There is no requirement for a description of any of the methods used.

**For 2C.P9:** learners must produce simple scale drawings of all five of the standard services provided to low-rise domestic buildings, to a suitable scale.

**For 2C.M7:** learners must produce the drawings as for 2C.P9, with all of the component parts in their appropriate position.

**For 2C.D4:** learners must produce the drawings as for 2C.M7, with all component parts correctly positioned and accurately annotated, with no errors.

**For 1C.9:** learners must produce sketch drawings for all five of the standard services for low-rise domestic buildings. There is no requirement for adherence to a stated scale, although the sketches should be in reasonable proportion.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.P3, 2A.M1, 2A.M2, 2A.D1, 1A.1, 1A.2, 1A.3, 2B.P4, 2B.P5, 2B.P6, 2B.M3, 2B.M4, 2B.D2, 1B.4, 1B.5, 1B.6	The Legislation, Codes of Practice and Guidance, Uses and General Principles of Building Services to Low-rise Domestic Buildings	You are keen to extend your understanding of building services as it applies to low-rise domestic buildings. Your supervisor has asked you to research and produce a report on the legislation, guidance, uses and general principles of building services for both your own and other colleagues use.	A written report, supported by sketches and drawings as appropriate.
2C.P7, 2C.P8, 2C.M5, 2C.M6, 2C.D3, 1C.7, 1C.8, 2C.P9, 2C.M7, 2C.D4. 1C.9	How Building Services are Supplied to, and Distributed within, Low-rise Domestic Buildings	Your supervisor has asked you to research to produce a document to show how services enter or leave a building and at what depth, and how those services are distributed within low-rise domestic buildings for colleague use. You are keen to link the methods used to the general principles described in your first report. You intend to supplement the text with drawings of each of the building services.	A written report, supported by sketches or drawings as appropriate. The drawings may be presented in plan, elevation or sectional views.

# Unit 26: Exploring Facilities Management

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **60**

Assessment type: **Internal**

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## Unit introduction

Building functions have to be maintained by the estates or facilities management team, so they ensure the comfort and safety for any occupants or visitors to a building.

Facilities management covers the use and operation of a building or structure. This includes any aspect from the roles of security, cleaning and catering staff, reception and lettings, through to the maintenance and operation of air conditioning, fire alarms, lifts, telephone and IT services.

In this unit you will explore the legislation and regulations that have to be followed by the facilities management team when operating and running a building and industry guidance. You will understand the principles of facilities management, what it covers and how facilities management operates in a building. You will make a site visit to an organisation that uses facilities management principles, to undertake an audit of their provision. This audit will allow you to illustrate the different areas and functions that facilities management operates.

## Learning aims

In this unit you will:

- A understand compliance with legislation, regulations, guidance and codes of practice for facilities management
- B explore principles that underpin facilities management
- C explore organisational facilities management provision.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Understand compliance with legislation, regulations, guidance and codes of practice for facilities management</b></p> <p><b>Topic A.1 Legislation and regulations</b></p> <ul style="list-style-type: none"> <li>• Health and Safety at Work Act (HASAWA) covering:             <ul style="list-style-type: none"> <li>◦ provisions for employees and visitors to a public or private building                 <ul style="list-style-type: none"> <li>– what needs to be provided for its safe use</li> <li>– access and egress from a building</li> </ul> </li> <li>◦ general duty of care to all.</li> </ul> </li> <li>• Equality Act and its application to the design and access provision for all users:             <ul style="list-style-type: none"> <li>◦ protected characteristics as defined under the Act</li> <li>◦ adjustments that may need to be provided for disabled persons.</li> </ul> </li> </ul> <p><b>Topic A.2 Guidance and codes of practice</b></p> <ul style="list-style-type: none"> <li>• Contents of a general code of practice for the facilities management of a building of multiple occupation, student accommodation, housing associations, schools and colleges, commercial offices.</li> <li>• British Institute of Facilities Management (BIFM) good practice guides.</li> </ul>
<p><b>Learning aim B: Explore principles that underpin facilities management</b></p> <p><b>Topic B.1 How services are provided</b></p> <ul style="list-style-type: none"> <li>• The use of directly contracted labour and contracted-out services for:             <ul style="list-style-type: none"> <li>◦ general repairs, carpentry and joinery</li> <li>◦ electrical maintenance</li> <li>◦ mechanical maintenance</li> <li>◦ plumbing maintenance</li> <li>◦ cleaning and housekeeping</li> <li>◦ catering</li> <li>◦ waste disposal</li> <li>◦ security</li> <li>◦ fire-alarm systems maintenance</li> <li>◦ lettings</li> <li>◦ grounds maintenance.</li> </ul> </li> <li>• Maintenance management and organisation of:             <ul style="list-style-type: none"> <li>◦ in-house directly employed teams, how maintenance is managed, teamworking aspects, lone working, working at height, permits to work, safe systems of work</li> <li>◦ specialist contracted services, organisation and management.</li> </ul> </li> </ul> <p style="text-align: right;"><i>continued</i></p>

**What needs to be learnt**

- The different types of maintenance, typical maintained items that each would cover during maintenance:
  - planned maintenance functions
  - reactive maintenance and procedures involved
  - cyclical maintenance planning.
- The classifications for facilities management and what each would typically cover for an organisation:
  - soft facilities
  - hard facilities.

**Learning aim C: Explore organisational facilities management provision****Topic C.1 The benefits of facilities management**

Facilities management contribution to the maintenance, development and economic benefit of the built environment:

- extending the useful life cycle of a building due to maintenance
- enhancing building safety record during occupancy
- ensuring compliance with legislation and regulations
- maintaining an aesthetical facade
- adding security to the local built environment
- reducing vandalism damage
- employment opportunities
- enhancing sustainable and environmental benefits
- providing for feedback to the design teams for future feasibility of building materials and design
- improving the working environment for occupants.

**Topic C.2 Organisational facilities management**

Investigation of an organisation's facilities management functions:

- the facilities management functions and the processes or operations conducted
- function of the business and the facilities management it requires –
  - location
  - facilities or services provided
  - facilities or services are maintained in-house
  - facilities or services are contracted out
  - how the facilities are managed
  - documentation used to manage and organise maintenance
  - typical maintenance works undertaken
  - contribution of facilities management to the comfort, health and safety of building occupants
- planned maintenance requirements:
  - budgeting, planning and organisation of major maintenance expenditure
- typical reactive maintenance items for health and safety reasons

*continued*

**What needs to be learnt**

- services maintenance, methods used, personnel involved:
  - type of service, frequency of maintenance, what needs to be undertaken, who can undertake the work
- how services are managed and organised:
  - maintenance manager, facilities manager, estate manager
- services provision and management when in-house or contracted out:
  - lift maintenance
  - fire alarms
  - telephones
  - IT
  - air conditioning
  - refrigeration
  - soft services to include cleaning and catering
  - security
  - CCTV
  - general maintenance items and emergency repairs
  - hard services to include estate management, landscaping, service upgrading
- how life cycle costing is managed in the facilities management process:
  - use of better quality materials, use of low-maintenance materials
- sustainability incorporation during maintenance:
  - use of renewable maintenance materials when upgrading facilities
  - use of durable, long-lasting replacement materials to reduce need for future repair.



## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Understand compliance with legislation, regulations, guidance and codes of practice for facilities management</b>			
1A.1 Outline the purpose of health and safety legislation, regulation and guidance on building service provision requirements for employees and visitors.#	2A.P1 Describe the purpose of health and safety legislation, regulation and guidance on building service provision requirements for employees and visitors.#	2A.M1 Explain the impact of a piece of legislation and a code of practice or industry guidance on building service provision requirements for employees and visitors and facilities management.#	2A.D1 Evaluate a piece of health and safety legislation and a code of practice or industry guidance on building service provision requirements for employees and visitors and facilities management.#
1A.2 Outline the purpose of provisions contained within a given code of practice for facilities management.#	2A.P2 Describe the purpose of provisions contained within a given code of practice for facilities management.#		
<b>Learning aim B: Explore principles that underpin facilities management</b>			
1B.3 Identify the types of directly employed services for the maintenance of a building.	2B.P3 Describe the use of directly employed services for the maintenance of a building.	2B.M2 Compare the use of directly employed and contracted-out services.	2B.D2 Evaluate the use of directly employed and contracted-out services.
1B.4 Outline a contracted-out service within facilities management.	2B.P4 Describe the use of contracted-out services for the maintenance of a building.		
1B.5 Outline the three types of maintenance classifications.	2B.P5 Describe the three types of maintenance classifications.		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Explore organisational facilities management provision</b>			
1C.6 Identify an organisation's facilities management features.	2C.P6 Describe an organisation's facilities management provision.	2C.M3 Explain the organisational and wider built environment benefits provided by an organisation's facilities management provision.	2C.D3 Evaluate the organisational and wider built environment benefits provided by an organisation's facilities management provision.
1C.7 Describe the organisational benefits of an organisation's facilities management provision.	2C.P7 Describe the organisational and wider built environment benefits of an organisation's facilities management provision.		

\*Opportunity to assess mathematical skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

Access to an organisation with a range of in-house and contracted out facilities management provision will be required. The organisation will need to be willing to support the provision of a site visit, resources and time for learners to question provision. The learners' education institution facilities management may be suitable for this purpose.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

### Learning aim A

**For 2A.P1:** learners will need to describe the purpose of provisions contained within the Health and Safety at Work Act for employees (Section 1) and visitors to premises (Sections 3 and 4), regulations and guidance that cover what would need to be provided within a building for access, egress and safe use, and what typical adjustments would be needed in a refurbishment of a building under the Equality Act.

**For 2A.P2:** learners need to describe a code of practice on applying facilities management provisions to an organisation's premises or building. A description of the purpose of the code of practice or guidance for facilities management is required.

**For 2A.M1:** learners will need to build on the evidence for 2A.P1 and 2A.P2 and explain the impact of a piece of legislation and a code of practice or guidance on employees, visitors and the management of facilities in a premises.

**For 2A.D1:** learners will build upon their evidence for 2A.M1 and evaluate one piece of legislation and one code of practice or piece of guidance in terms of requirements for employees, visitors and the management of facilities in a premise.

**For 1A.1:** learners must outline the purpose of provisions under the HASAWA, the Equality Act, regulations and guidance with regard to employees and visitors to premises.

**For 1A.2:** learners must outline the purpose of a teacher-provided code of practice for the facilities management of an organisation's premise or building.

### Learning aim B

**For 2B.P3:** learners should include a description of the use of directly employed maintenance teams and their activities within a typical organisation or building.

**For 2B.P4:** learners should describe the use of services that are contracted out by an organisation to support its facilities management of a building.

**For 2B.M2:** learners need to directly compare the research obtained in 2B.P3 and 2B.P4 and describe the similarities and differences between the two and the benefits and disadvantages of each of these.

**For 2B.D2:** the learners need to evaluate the information gathered on the use of directly employed and contracted out facilities management services.

**For 1B.3:** learners need to identify by name the different types of maintenance items that would be undertaken by a directly employed workforce.

**For 1B.4:** learners need to outline a contracted-out service for the facilities management of a building.

**For 2B.P5:** learners must describe reactive, planned and cyclical maintenance and include one example of each within their description.

**For 1B.5:** learners need to provide short descriptions of the types of common maintenance classifications.

### **Learning aim C**

The host organisation will need to be briefed prior to the visit to ensure that learners have the opportunity to meet assessment criteria requirements.

**For 2C.P6:** learners should describe the organisation's facilities management provision, the range of provision they offer and the use of in-house and contracted-out provision.

**For 1C.6:** learners need to identify the key features of an organisation's facilities management in-house and contracted-out provision. This may be presented through a bulleted list.

**For 2C.P7:** learners should describe the organisation's facilities management provision benefits for the organisation, including the building occupants, and to the wider built environment.

**For 2C.M3:** learners should provide an explanation of the organisational and wider built environment benefits provided by the organisation's facilities management drawn from the content in C1 and C2.

**For 2C.D3:** building on 2C.M3, learners should evaluate an organisation's facilities management in terms of the benefits provided to the organisation, including the buildings occupants and the wider built environment.

**For 1C.7:** learners should describe the benefits of facilities management provision for the organisation.

## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.M1, 2A.D1, 1A.1, 1A.2	Facilities Management Compliance	As an assistant within an facilities management department, you have been tasked with investigating and producing a report to confirm they meet the HASAWA and the Equality Act with regard to providing access to the building, and other applicable codes of practice and guidance.	A report indicating the health and safety provisions to cover HASAWA, Equality Act, applicable codes of practice and guidance.
2B.P3, 2B.P4, 2B.P5, 2B.M2, 2B.D2, 1B.3, 1B.4, 1B.5	What is Facilities Management?	A senior manager is considering moving from directly employed maintenance teams to contracting out some or all of the maintenance services. You have been asked to assist with the preparation of a report to inform their considerations.	A report to include the use of directly employed staff versus contracted out, the benefits of each, and the types of maintenance each would undertake.
2C.P6, 2C.P7, 2C.P8, 2C.M3, 2C.D3, 1C.6, 1C.7, 1C.8	The Site Visit Report	You have been asked, as an assistant to the facilities manager, to investigate the facilities management provision in a building your organisation recently acquired through buying out a competitor. Your investigation is to be presented as a report.	A report for the facilities manager which includes details of the facilities management of the building and the benefits it currently offers.



# Unit 27: Construction Work Experience

Level: **1 and 2**

Unit type: **Optional**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

This unit will introduce you to the world of working in construction. Potential employers value work experience because it shows that you have initiative and are interested in the sector, and it gives them an opportunity to spot talented people. Also, it gives you first-hand experience of what is expected from potential employees and a taste of real job situations.

You will undertake a period of work experience with a construction employer that will give you a valuable insight into your future career and help you make informed decisions about important career prospects and professional development needs.

This unit builds on *Unit 12: The Construction Industry* in which you examined the employment opportunities in the industry, explored approaches to gain employment, producing a CV and letter of application and prepared for a job interview.

In this unit, you will prepare for and secure your construction work experience by finding and applying for a suitable work placement opportunity. You will be supported by your teacher, who will assist you in finding a suitable work placement that closely matches your skills and interests. This may include contacting one of the various organisations that support learners who are looking for suitable work experience.

Your work experience could take place over consecutive days or be spread over a period of time.

This unit provides an opportunity to build upon your knowledge of health and safety legislation, regulations and industry codes of practice gained in other units by observing their application within the work-placement environment. Through your work experience, you will investigate and use employability skills that are needed in the workplace, and you will gain first-hand experience of the construction industry.

This unit will also give you the opportunity to review and reflect upon your period of work experience so you can gain from the knowledge and understanding obtained and consider how this will help you achieve your personal career aims.

## Learning aims

In this unit you will:

- A prepare for construction work experience
- B use technical and employability skills during your construction work experience
- C review your construction work experience.

## Learning aims and unit content

What needs to be learnt
<p><b>Learning aim A: Prepare for construction work experience</b></p> <p><b>Topic A.1 Construction work experience job search</b></p> <p>Places to search for construction industry work experience to include:</p> <ul style="list-style-type: none"> <li>• internet sources, e.g. employment websites, company websites</li> <li>• published sources, e.g. publications, local phone directory, noticeboards</li> <li>• job centres</li> <li>• education and business organisations and networks, e.g. education work placement officer, college or institute contacts, local council's employment officer, local contractors' networks such as the Federation of Master Builders</li> <li>• use of local advertisements to indicate contractors who might be approached for work experience</li> <li>• personal networks, e.g. relatives or family who are working within the industry</li> <li>• direct approach in person to an office or construction site</li> <li>• speculative applications.</li> </ul> <p>Criteria to use when searching for construction work experience opportunities.</p> <p>Adapting curriculum vitae, letters of application, employer-devised application forms and documents to meet work experience and job opportunities requirements:</p> <ul style="list-style-type: none"> <li>• matching own skills and interests to specific opportunities.</li> </ul> <p><b>Topic A.2 Applying for and confirming the work experience placement</b></p> <p>Application process to include some or all of the following considerations that may be required by the potential employer offering work experience opportunities, and those required by the educational institute.</p> <ul style="list-style-type: none"> <li>• Learner completion of educational institution requirements, e.g. giving employer contact details, obtaining details of employer-learner supervision requirements, requesting third-party insurance details from employer, completion of a work experience risk assessment, forwarding of a covering letter confirming the work placement period, organisation of and attending a pre-work experience placement visit, confirming an itinerary for the work placement.</li> <li>• Learner completion of work experience employer requirements, e.g. application by employer's application form or CV and interview, learner's personal details, personal protective equipment requirements, employer induction requirements.</li> </ul> <p><b>Topic A.3 Health and safety considerations in the workplace</b></p> <ul style="list-style-type: none"> <li>• Measures to ensure personal health and safety in the workplace, e.g. Disclosure and Barring Service (DBS) check, frequent breaks, PPE, safe manual handling procedures.</li> <li>• Measures to ensure health and safety of others, e.g. working in a safe manner individually, Disclosure and Barring Service (DBS) check, keeping fire exits clear, safe operation of manual and/or electrical equipment.</li> <li>• Current and relevant legislation, e.g. Health and Safety at Work Act, Work at Height Regulations, Construction (Design and Management) Regulations.</li> </ul> <p style="text-align: right;"><i>continued</i></p>



**What needs to be learnt**

- Potential health and safety risks and working methods to reduce risks relevant to the work experience hosts activities or specialist field, e.g. falls from height from temporary platforms and structures during construction of a building project, injuries working with mechanical plant and machinery, slips, trips and falls due to housekeeping on a construction site and office-based work, poor management of construction work, fatigue and repetitive strain injury when using IT facilities in construction industry contexts.

**Learning aim B: Use technical and employability skills during your construction work experience****Topic B.1 Work-related technical construction skills**

Work-related skills could include:

- the use of computer-aided design software packages
- using database and spreadsheet software
- using site documentation control systems, e.g. drawing registers, delivery receipts, time sheets
- use of company intranet and email
- use of specific craft and technician construction industry skills.

**Topic B.2 Employability skills**

The employability skills that employers value in the workplace and why:

- communication and literacy, i.e. ability to produce clear, structured written work and oral literacy, including listening and questioning, and non-verbal communication (body language)
- self-management, i.e. being responsible, flexible and reliable, demonstrating time-management skills, integrity and a readiness to improve own performance, and the ability to maintain a positive attitude
- teamworking, i.e. respecting others, cooperating, negotiating, persuading and contributing to discussions
- problem solving, i.e. analysing facts and circumstances and applying creative thinking, including artistic appeal to develop appropriate solutions
- application of IT or digital literacy, i.e. the general ability/skills to use computers to support learning, work activities such as word processing, presentation software and file-management skills
- application of numeracy, i.e. the manipulation of numbers, general mathematical awareness and its application in practical contexts.

Employability skills include:

- communicating with others verbally and in writing, e.g. manager, colleagues, customers/clients
- building working relationships with others, including immediate colleagues
- completing given tasks within agreed timescales.
- working with autonomy and independence
- demonstrating leadership skills when working with others
- managing own time effectively
- problem solving by the use of critical analysis.

**What needs to be learnt****Learning aim C: Review your construction work experience****Topic C.1 Benefits of construction work experience**

Learner reflection on their knowledge and understanding gained from their work experience:

- completing technical tasks, e.g. use of CAD (computer aided design) to produce drawings
- communicating with colleagues, e.g. attending and participating in meetings, or using email systems
- promoting the organisation.

What has been learnt and how this can be of benefit to a future career in the construction sector:

- employability skills developed
- technical skills developed
- networking and relationship building
- employer reference for future employment
- confirming and reviewing learner preconceptions and interest in careers in the construction industry.

**Topic C.2 Review and reflection**

Collecting feedback during the construction work experience:

- from colleagues and supervisor(s)
- types of feedback, e.g. verbal, comment cards, questionnaires, video diaries
- the technical and employability skills and knowledge needed to be successful in a full-time role
- self-evaluation, including considering feedback from others, e.g. using a SWOT (strengths, weaknesses, opportunities and threats) analysis by contribution of technical and employability skills.

Areas for improvement, e.g. to meet planned goals on time, to communicate more effectively or to learn new techniques.

Recommendations for career development, e.g. further education, relevant part-time or voluntary work/work experience, research other sectors, including speaking to careers adviser and colleagues working in the sector, identify potential job roles of interest, including the required technical and employability skills, qualifications (e.g. maths, English, IT/computing).

Planning short-term and long-term career aspirations over time, e.g. within next six months, a year, three years.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Prepare for construction work experience</b>			
1A.1 Use job-search techniques and application methods, with guidance, to find construction work experience.#	2A.P1 Use job-search techniques and application methods to find a suitable opportunity for construction work experience.#	2A.M1 Refine applications for construction work experience, matching information provided to the employer's requirements.#	2A.D1 Evaluate your job search techniques, application methods and application, taking account feedback from others.#
1A.2 Produce documentation required for work experience placement with guidance.#	2A.P2 Produce the documentation required for work experience placement.#		
1A.3 Identify health and safety considerations to ensure personal safety in the construction work experience environment workplace.	2A.P3 Describe health and safety considerations and control measures that ensure the safety of self and others in the construction work experience environment.	2A.M2 Explain at least three potential health and safety risks that could occur during your construction work experience and the control measures that apply.	2A.D2 Discuss how control measures reduce potential health and safety risks during your construction work experience.

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Use technical and employability skills during your construction work experience</b>			
1B.4 Demonstrate a technical skill and an employability skill.	2B.P4 Demonstrate technical skills and employability skills.	2B.M3 Explain why technical and employability skills are valued by the employer.	
<b>Learning aim C: Review your construction work experience</b>			
1C.5 Identify your knowledge and skills gained during construction work experience.	2C.P5 Describe your knowledge and skills gained during construction work experience.	2C.M4 Explain your knowledge and skills gained during construction work experience how this has affected your career aspirations.	2C.D3 Evaluate your knowledge and skills gained during construction work experience and make recommendations for your career development over time.
1C.6 Identify the benefits of undertaking construction work experience in relation to your career aspirations.	2C.P6 Describe the benefits of undertaking construction work experience in relation to your career aspirations.		

\*Opportunity to assess mathematics skills

#Opportunity to assess English skills

## Teacher guidance

### Resources

This unit requires that learners undertake work experience in the construction and built environment sector that enables coverage of the unit assessment requirements. Centres are encouraged to develop links with a wide cross-section of organisations with diverse roles in the construction and built environment industry to support access to suitable work experience opportunities.

Visits by staff from companies offering potential work experience placements would add context and realism to the preparation process by, for example, allowing the staff to contribute towards learners' background knowledge.

Links could be established with the local careers service and/or job centres, which could give advice on the job market as well as the skills needed when applying for a job in this sector.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Learners will need to obtain work experience with an organisation by seeking out opportunities and applying to local organisations undertaking construction-sector activities with support from their centre. Care must be taken that the support does not prevent the learner from achieving the higher grades, although it is not necessary for the learner to secure their own work experience to meet all assessment criteria. Learners will undertake their work experience and demonstrate appropriate technical and employability skills throughout. Finally, learners will review their work experience by reflecting upon the development of their knowledge and skills during their period of work experience and making recommendations for their career development over time.

Learners should be clear about what is expected of them during their work experience. They should also be responsive to broader issues, such as timekeeping and health and safety issues, during their work experience.

The centre needs to take responsibility for ensuring that all centre policies and procedures have been met with regard to work experience. This includes Disclosure and Barring Service (DBS) checks (where applicable) and risk assessments. Learners are required to produce a risk assessment prior to the start of their work experience as part of their evidence but the centre must take responsibility to ensure all centre work experience requirements have been met.

The length of the learner's work experience must be sufficient to allow the achievement of the learning aims and all assessment criteria. Evidence from simulated work experience within the learners' centre is not acceptable.

Evidence generated and/or demonstrated during the work experience must be authenticated by a workplace supervisor or manager, or a visiting teacher or assessor. Centres are responsible for verifying evidence and should be confident that those who sign witness statements and observation records in a workplace are sufficiently competent to do so.

Observation records must clearly show learner achievement against the target criteria. Signed witness statements, observation records and supporting learner evidence should be retained by the centre for quality assurance purposes.

## Learning aim A

This learning aim will provide learners with an opportunity to search, locate and apply for a work placement position or opportunity with an organisation carrying out construction industry-related activities.

**For 2A.P1:** learners should use job-searching techniques and application methods to find a suitable construction work experience opportunity. Examples could include employment websites, company websites or local authority work placement officers within the education department. Application documents such as a CV, letter of application and employer application form produced for *Unit 12: The Construction Industry* may be used to support the learner's application, where these are relevant to the construction work experience opportunity. Evidence for this criterion could include a teacher observation report and a record of the search outcome, together with suitable work experience application documentation. The learner is not required to secure their own work experience opportunity to allow learners who have produced suitable documentation but have not secured their target work experience opportunities to achieve the criterion.

**For 2A.M1:** building on their evidence for 2A.P1, learners should refine their construction work placement application by matching the information provided to meet the requirements of the opportunity. Application documents may include letters of application, a CV and employer application forms. All documents must be accurately completed. The learner is not required to secure their own work experience opportunity to allow learners who have produced suitable documentation but have not secured their target work experience opportunities to achieve the criterion.

**For 2A.D1:** building on the evidence for 2A.M1, learners should evaluate their construction work placement search techniques, methods and application by evaluating their relevance to construction employers offering work experience opportunities. Learners should gather feedback from others, such as their teacher, head of department, peers or an employer, to make improvements which should be grammatically accurate, concise, tailored to the construction work placement and error free. Other refinements may include improving the presentation of the application. The learner is not required to secure their own work experience opportunity to allow learners who have produced suitable documentation but have not secured their target work experience opportunities to achieve the criterion.

**For 1A.1:** learners should use job-searching techniques to find a suitable construction work experience opportunity. At level 1, the teacher may give the learner sources of potential work experience to select from for their work experience search. Examples of given sources could include those found from employment websites, company websites or local authority work placement officers within the education department. Documents produced for *Unit 12: The Construction Industry* may be used to support the learner's application. Evidence for this criterion could include a teacher observation report and a record of the search outcome, together with suitable work experience application documentation. The learner is not required to secure their own work experience opportunity to allow learners who have produced suitable documentation but have not secured their target work experience opportunities to achieve the criterion.

**For 2A.P2:** learners should organise, manage and complete accurately, documentation to show the work experience employer and supervisor contact details, confirmation of the itinerary, a risk assessment and one other work experience-related document, in line with their educational institute's policy and procedures on work placements. These will need to be signed off by the teacher prior to starting any placement. It is the centre's responsibility to ensure that all centre work experience requirements are met prior to the commencement of the work experience, so that the learner will be safe.

**For 1A.2:** learners, with guidance from their teacher, should organise, manage and complete accurately, documentation to show the work experience employer and supervisor contact details, confirmation of the itinerary, a risk assessment and one other work experience-related document, in line with their educational institute's policy and procedures on work placements. This will then need to be signed off by the teacher prior to starting any placement. Note: although the learner is to complete these items to meet the evidence requirements, it is the centre's responsibility to ensure that all centre work experience requirements are met prior to the commencement of the work experience, so that the learner will be safe.

**For 2A.P3:** learners should describe the health and safety considerations for self and others that will need to be considered for their work placement. This could be undertaken by the use of a risk assessment for the work placement, identifying the hazards, associated risks and control measures that will need to be in place. The evidence from this criterion may be used to support the production of the risk assessment document requirement in 1A.2 and 2A.P2.

**For 2A.M2:** learners should explain at least three potential health and safety risks that could occur during their construction work experience and the control measures to employ, for example trip hazards with trailing cables, electric shock, use of cutting and shaping tools, lifting materials and equipment, if using computer equipment and printing facilities the toxic chemicals in the computer screen/keyboard, risk of chemical burns from products used in construction etc. The evidence from this criterion may be used to support the production of the risk assessment document requirement in 1A.2 and 2A.P2.

**For 2A.D2:** learners should expand upon their explanation for 2A.M2 by discussing the use of control measures to reduce the potential risks during their construction work experience. The evidence from this criterion may be used to support the production of the risk assessment document requirement in 1A.2 and 2A.P2.

**For 1A.3:** learners should identify the health and safety requirements of their potential work placement in terms of their personal safety requirements, in the form of a list. This must include the personal protective equipment applicable and behaviour required for the workplace where they will carry out their work experience. The evidence from this criterion may be used to support the production of the risk assessment document requirement in 1A.2 and 2A.P2.

## Learning aim B

**For 2B.P4:** learners should demonstrate the application of technical skills and employability skills during their construction work experience. These technical skills applied will vary depending on the host organisation's construction industry specialism. Examples of employability skills could responsibility for an aspect of a project, work effectively with others and demonstrating teamwork skills, using technology to complete tasks more efficiently, organising resources etc. to achieve specific objectives. The use of a witness/teacher observation report could be used to evidence this criterion.

**For 2B.M3:** learners should explain why technical and employability skills are valued by the employer. Learners may find it useful to seek the views of personnel they work with during their work experience to fulfil the requirement of this criterion. They should identify their technical and employability skills used during their construction work experience, giving examples of why they are valued by the employer, for example the use of technical skills when checking a quantity of construction materials delivered against an original order to establish any errors or organising their resources needed for a task. Evidence for this criterion could include the use of a witness/teacher observation report and learner report.

**For 1B.4:** learners should demonstrate a technical and an employability skill. The employability skill, for example, could include following instructions, asking for help and guidance when necessary, and the technical skill could include adhering to health and safety practices, providing internal or external customer service, adapting their communication methods and skills for different tasks and different people. The use of a witness/teacher observation report could be used to evidence this criterion.

### Learning aim C

Upon its completion, learners should review and reflect upon their construction work experience. Feedback to inform this may be obtained from the employer, peers or teacher.

**For 2C.P5:** learners should describe their work experience and what knowledge and skills they have gained. For example, they may have learnt and practiced how to complete construction site documentation, produced a drawing detail, etc. The description should include what they have gained from their work experience, including increased confidence or self-esteem.

**For 2C.P6:** learners should describe the benefits of undertaking construction work experience in relation to their career aspirations, e.g. learning valuable skills and knowledge of construction processes in a real workplace environment, which will help them choose a particular career path. Examples of their career aspirations could include to pursue a career as a construction manager or site agent etc., giving their reasons for their choice.

**For 2C.M4:** Learners should also describe how their construction work experience has affected their career aspirations or choices. For example, their experience of using computer-aided design has created an interest in following architecture as a career.

**For 2C.D3:** learners should expand upon their explanation for 2C.M4 to provide recommendations of how they could develop their career over time. For example, further study and/or experience to become a fully qualified electrician with 'competent person' status or the requirements to progress to membership of one of the professional institutes, etc.

**For 1C.5:** as a minimum, learners should identify the tasks they carried out and what they learnt without giving any further description.

**For 1C.6:** as a minimum, learners should identify the benefits of undertaking construction work experience in relation to their career aspirations, e.g. develop skills in a practical craft specialism, understand the range of activities a surveyor may undertake, etc. Examples of their career aspirations could include fully qualified electrician with 'competent person' status, or fully qualified architectural technician. They are not required to provide any further description.



## Suggested assignment outlines

The table below shows a programme of suggested assignment outlines that covers the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment evidence
2A.P1, 2A.M1, 2A.D1, 2A.P2, 2A.P3, 2A.M2, 2A.D2, 1A.1, 1A.2, 1A.3	Finding a Construction Work Experience Placement	You need to find a construction work placement position. Undertake a local search to establish a list of available opportunities and how you will approach these to obtain a placement.  Complete all the required documentation for the work placement, including an assessment of the health and safety requirements under current legislation, risks and their mitigation.	List of work placement opportunities. Completed application documents. Production of all documentation for the work placement. Report detailing health and safety requirements.
2B.P4, 2B.M3, 1B.4	Work Experience	Undertake a period of construction-related work experience, demonstrating the application of some of the employability, craft and technical skills learnt during studies.  Find out what employee employability and technical skills your work experience employer value and are looking for when recruiting an employee.	Signed witness statement(s) from work placement organisation. Observation record(s). Learner report.
2C.P5, 2C.P6, 2B.M4, 2C.D3, 1C.5, 1C.6	Reflect and Review	You have now to reflect and feedback on your experiences during the work placement. Include how the work experience has influenced your career aspirations.	Presentation reflecting on the work experience and supporting notes. Reflection log.



# Unit 28: Communications for Construction and the Built Environment

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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## Unit introduction

Effective communication is essential to the successful completion of construction projects and the continued profitability of the various organisations involved in the construction and built environment sector.

Effective communication can be achieved in a variety of ways, including speaking and listening and the use of written documents, either in hard copy or in electronic format.

The forms of communication used in the construction and built environment sector include contracts, reports, manuals, specifications, schedules, presentations, minutes of meetings and letters. Drawings and calculations can also be considered as important forms of communication, but these skills are dealt with in other units.

Construction organisations rely on employees who are able to listen to and understand instructions and communicate effectively with colleagues and supervisors. Effective communication between individuals requires good speaking, listening and writing skills.

In this unit, you will learn about the purpose and uses of effective communication. You will investigate the methods used to produce presentable and technically accurate written documents. You will consider the importance of using the most appropriate document for a specific purpose and for a specific audience, such as colleagues, external stakeholders and/or the general public. You will explore the different speaking and listening skills used in construction and the built environment workplaces.

You will develop your writing skills to produce hard copy and electronic documents to support a variety of communication techniques for a variety of purposes. You will then be able to use these skills to improve the work you do in other units, and to improve your performance in the workplace.

You will develop an understanding of the importance of good verbal and non-verbal communication skills in the workplace. You will have the opportunity to use your speaking and listening skills in one-to-one and group situations, and in different construction contexts.

## Learning aims

In this unit you will:

- A know the purpose and uses of effective communication in construction and the built environment
- B produce effective written documents for communication in construction
- C use effective speaking and listening skills in construction contexts.

## Learning aims and unit content

### What needs to be learnt

#### Learning aim A: Know the purpose and uses of effective communication in construction and the built environment

Communication purpose, written document types, formats and their selection for the context in which they are used, the requirements for effective verbal and non-verbal communication.

##### Topic A.1 Purposes and formats of different types of document

- Types of document, including contracts, reports, manuals, specifications, schedules, presentations, minutes of meetings, letters.
- Purpose of communication to inform, confirm, monitor, instruct, advise, request.
- Formats to include hard copy, electronic.

##### Topic A.2 Selection and use of document formats

- Formal and informal documents to include minutes of meetings, notices, reports, technical enquiries, complaints, presentation documents.
- Confidentiality requirements.
- Formal and informal communication contexts with supervisors, managers, colleagues, suppliers, customers.
- Selection of the most appropriate document format for a particular audience to include colleagues, external stakeholders, general public.
- Selection of the most appropriate documents and document formats for specific situations.
- Impact on outcomes of both effective and ineffective written communication.

##### Topic A.3 Purposes and methods of verbal and non-verbal communication

- Purposes to include sharing information, giving information, seeking clarification, asking questions, influencing and persuading others.
- Methods:
  - formal including interviews, meetings, presentations
  - informal including team discussions, with colleagues
  - verbal to include speaking to others, listening to responses, using listening skills
  - non-verbal to include body language, interpersonal skills.

##### Topic A.4 Verbal and non-verbal communication

Communicating effectively in different contexts.

- Using verbal and non-verbal communication skills effectively and professionally, including:
  - speaking clearly and concisely in an appropriate tone of voice
  - using appropriate language, terminology, when to avoid jargon use
  - conveying the required message in different situations
  - adapting communication to meet the needs of the audience to include those who have English as a second language, general public with no or little construction expertise.
- Using appropriate non-verbal communication skills effectively and professionally including eye contact, body language, gestures, facial expressions, posture.
- Demonstrating effective interpersonal skills to include attitude, behaviour, first impressions, courtesy, confidence.

**What needs to be learnt****Learning aim B: Produce effective written documents for communication in construction****Topic B.1 Planning and selecting appropriate documents**

- Factors to consider:
  - needs of the audience to include line manager, colleague, client, statutory body
  - cost and availability of resources to include appropriate software, dedicated stationery
  - time requirements to include deadlines such as return times, when the document is required
  - need for time to plan research and gather information
  - choice of suitable vocabulary, tone, clarity, presentation style and format
  - tools to check the level and clarity of language for the intended audience – fog index, crystal mark for clarity
  - confidentiality to include sensitivity to and understanding of material that may be confidential, data protection requirements
  - maintenance of records for audit requirements.

**Topic B.2 Steps involved in producing written documents**

- Use of standard and appropriate layouts to include following house style, using templates.
- Selection of documents appropriate to the task and for different audiences (internal and external) to ensure fitness for purpose.
- Entering, editing and formatting text.
- Use of different formats and styles to include choice of appropriate fonts, use of headings, images, pagination, document headers and footers.
- Drafting and redrafting to ensure accuracy, legibility and consistency.
- Editing and proofreading.
- Use of relevant technical language, information and conventions, avoiding jargon, situations where jargon use is acceptable.
- Recording and reporting to include minutes of meetings with agreed actions, accurate, detailed and concise reporting.
- Document production and treatment to meet confidentiality and data protection requirements.
- Copying documents, to include:
  - types of equipment to include photocopier, scanner, fax machine, printer
  - health and safety requirements when using equipment
  - copyright considerations
  - producing the correct number of copies
  - checking the quality of the copies
  - minimising paper wastage
  - sorting or fastening copies securely and in the correct order.
- Working within given timeframes to meet agreed deadlines.
- Ensuring documents reach intended audience to include post, email, tracking documents.

**What needs to be learnt****Learning aim C: Use effective speaking and listening skills in construction contexts****Topic C.1 Verbal communication skills in a one-to-one context**

- How to prepare for a formal one-to-one meeting, including:
  - carrying out research
  - preparing questions, responses to potential questions.
- How to demonstrate professional speaking and listening skills in a one-to-one context, including:
  - asking relevant questions
  - giving information
  - listening to, understanding and interpreting verbal instructions correctly.

**Topic C.2 Verbal communication skills in a group context**

- How to prepare for a formal group discussion including carrying out research, preparing questions, answers to potential audience questions.
- How to demonstrate good speaking and listening skills in group contexts, including:
  - listening and responding appropriately to others
  - making positive and relevant suggestions
  - seeking clarification and confirming understanding
  - being tactful and diplomatic.

**Topic C.3 Non-verbal communication skills in a one-to-one and group context**

- Preparing to use of non-verbal communication skills effectively in the following contexts:
  - a one-to-one meeting
  - a small-group discussion
  - a presentation.
- Demonstrating professional interpersonal skills, including:
  - use of appropriate eye contact and gestures
  - use of open body language and posture
  - use of facial expressions to support the intended message
  - showing empathy as a result of reading and responding appropriately to other people's body language.

**Topic C.4 Evaluating own verbal and non-verbal communication skills**

- Identifying strengths and weaknesses.
- Seeking feedback from others, e.g. clients, colleagues, external stakeholders.
- Using feedback to identify future communication skills development.

## Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim A: Know the purpose and uses of effective communication in construction and the built environment</b>			
1A.1 Identify the purpose of four different types of document used in construction and the built environment.	2A.P1 Describe the purpose of four different documents used in construction and the built environment.#	2A.M1 Compare the effectiveness of the chosen format and its impact for two documents used in construction and the built environment.#	2A.D1 Evaluate the impact of written communications for two different contexts in construction and the built environment.#
1A.2 Identify how context and purpose influences the format of four documents used in construction and the built environment.	2A.P2 Describe how the context and purpose influences the format of four documents used in construction and the built environment.#		
1A.3 Identify the purposes of verbal and non-verbal communication techniques in contrasting construction and the built environment contexts.	2A.P3 Describe the purposes of verbal and non-verbal communication in contrasting construction and the built environment contexts.#	2A.M2 Analyse the effectiveness of verbal and non-verbal communication skills used in two contrasting contexts in construction and the built environment.	2A.D2 Evaluate the importance of using effective verbal and non-verbal communication skills in construction and the built environment.
1A.4 Outline how verbal and non-verbal communication skills are used effectively in two contrasting contexts in construction and the built environment.	2A.P4 Explain how verbal and non-verbal communication skills are used effectively in two contrasting contexts in construction and the built environment.#		

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim B: Produce effective written documents for communication in construction</b>			
1B.5 List four factors to be considered when selecting appropriate written documents for use in construction and the built environment.	2B.P5 Describe four factors to be considered when selecting appropriate written documents for use in construction and the built environment.	2B.M3 Compare the effectiveness of written construction documents in meeting the needs of different audiences in two different construction contexts.	2B.D3 Evaluate the effectiveness of two written construction documents.
1B.6 Outline the suitability of written documents selected to meet the needs of an audience in two different construction contexts.	2B.P6 Explain the suitability of written documents selected to meet the needs of an audience in two different construction contexts.		
1B.7 Produce short written documents of different types to support internal communication in a construction context.#	2B.P7 Produce clear and accurate written documents of different types to support internal communication in a construction context.#		



Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
<b>Learning aim C: Use effective speaking and listening skills in construction contexts</b>			
1C.8 Use communication skills effectively in a one-to-one discussion in a construction context. #	2C.P8 Demonstrate effective communication skills, including the use of prior research and preparation, in a one-to-one construction context. #	2C.M4 Assess the effectiveness of own communication skills as used in a one-to-one and a group construction context. #	2C.D4 Evaluate own and others' communication skills as used in a one-to-one and a group construction context and recommend improvements based on feedback. #
1C.9 Use communication skills effectively in a group discussion in a construction context. #	2C.P9 Demonstrate effective communication skills, including the use of prior research and preparation, in a group context. #		

#Opportunity to assess English skills

## Teacher guidance

### Resources

Examples of construction specific documents and good/poor communication practice are useful to support the delivery of this unit. Some resource documents may be available from those used for/ produced for other units in this specification.

### Assessment guidance

This unit is assessed internally by the centre and externally verified by Pearson. Please read this guidance in conjunction with *Section 8 Internal assessment*.

Centres may choose to map the requirements of this unit and embed this into the learners programme of study for other units. However, centres must ensure that they track and record learner achievement against all the unit requirements.

For this unit, learners are required to show evidence that they understand the purpose and types of effective communications used in construction and the built environment, know how to produce documents that are fit for purpose using appropriate formats and language, and demonstrate the use of verbal and non-verbal communication skills in appropriate contexts.

Learners will also be expected to produce evidence of their ability to communicate in the construction and built environment sector. This may include:

- a presentation or report explaining their understanding of the importance and purpose of effective communication in the construction and built environment sector
- written documents typical of those used in the construction and built environment.

The learner's communication skills may also be supported by the use of witness testimonies indicating how effective learners have been when using both non-verbal interpersonal skills and verbal communication.

### Learning aim A

**For 2A.P1:** learners must describe the purpose of four different documents used in construction and the built environment. Evidence could be presented in tabular format or in a poster depicting the type of document, its purpose, the context in which it would be used and the most appropriate format for that context. This could be combined with 2A.P2 below.

**For 2A.P2:** learners must describe how the intended context and purpose of the four documents described in 2A.P1 influence their format. The contexts should show an acceptable level of contrast and should not be confined to internal communications between members of staff.

**For 2A.M1:** learners could develop the work done for 2A.P1 and 2A.P2 by selecting two documents used in different construction contexts and comparing their format and its impact on the effectiveness for the intended purpose.

**For 2A.D1:** learners should evaluate the impact of written communications in different construction contexts. They should look at the effectiveness of written communication in an organisation by contrasting it with other types of communication that could have been used, such as verbal or electronic. The evaluation should be clearly linked to the purpose of the communication and the appropriate construction context.

**For 1A.1:** learners must identify the purpose of four documents used in construction and the built environment. It is expected that the documents identified will be drawn from those given in the specification. Evidence could be presented in tabular format.

**For 1A.2:** learners must identify how context and purpose influence the format of four construction documents, for example a formal letter in response to a customer complaint or an email in reply to a question from a colleague. Learners could present this evidence in table format or as a leaflet. It would be of benefit to learners if the four documents used were those identified in 1A.1 above. The format should be different in each case.

**For 2A.P3:** learners must describe the purposes of verbal and non-verbal communication in a minimum of two contrasting contexts. This should demonstrate an acceptable level of contrast and should not be confined to internal communications within the office. For example, an external telephone call to a client or a supplier, in response to a complaint, has a different purpose and context from an internal telephone call to a colleague asking for help or advice. Learners must apply their knowledge and understanding to draw upon their research and experience. Evidence could be provided in the form of a report and, where this is provided verbally, a suitable recording method is required.

**For 2A.P4:** learners must explain how verbal and non-verbal communication skills are used effectively in two contrasting construction contexts. Examples should include situations where verbal and non-verbal communication has been effective in getting the correct message across to both colleagues and external stakeholders. Again, relevant personal experience and/or observation of others should be used to illustrate answers. Evidence could be provided in the form of a report and, where this is provided verbally, a suitable recording method is required.

**For 2A.M2:** learners must analyse the effectiveness of verbal and non-verbal communication skills by using practical examples to support their analysis in two contrasting construction contexts. These could be drawn from 2A.P3 and 2A.P4. Evidence could be provided in the form of a report and, where this is provided verbally, a suitable recording method is required.

**For 2A.D2:** learners need to evaluate the importance of using verbal and non-verbal communication skills effectively in the construction and the built environment sector. Examples should be drawn from the following: speaking clearly and concisely, friendly and authoritative tone of voice, appropriate language and terminology, avoidance of jargon, use of different messages for different situations, awareness of audience, maintenance of eye contact, awareness of body language, gestures, facial expressions and posture, confidence, and exhibiting a professional attitude and courteous behaviour. Evidence could be provided in the form of a report and, where this is provided verbally, a suitable recording method is required.

**For 1A.3:** learners must identify the purposes of verbal and non-verbal communications in a minimum of two contrasting contexts. Learners should use their knowledge and experience to recognise the context of each. For example, an external telephone call to a nominated sub-contractor, checking on the progress of work, has a different purpose and context to an internal telephone call to a colleague asking them if they could copy some drawings. Evidence could be provided in the form of a verbal report using a suitable recording method and teacher record.

**For 1A.4:** learners must outline how verbal and non-verbal communications are used effectively in two contrasting contexts. It would be of benefit to learners if these were the two examples used in 1A.3 above. Evidence could be provided in the form of a verbal report using a suitable recording method and teacher record.

### Learning aim B

The same documents identified as suitable evidence for 2A.P1, 2A.P2, 2A.M1 and 2A.D1 can also be used for learning aim B if the assessment is carefully planned.

**For 2B.P5:** learners need to describe a minimum of four factors to be considered when selecting the most appropriate written documents for use in two different construction contexts. Evidence could be provided in the form of a report and, where this is provided verbally, a suitable recording method is required.

**For 2B.P6:** learners should develop 2B.P5 further by explaining why the documents are suitable for the intended audience in two construction contexts. Learners need to demonstrate their understanding of how different methods of communication are suitable for different situations and audiences. They should focus on the suitability of the communication in terms of tone, clarity, vocabulary etc. It is recommended that two different audiences are considered, for example an external client or supplier and an internal member of staff, such as a supervisor or colleague. Evidence could be provided within the report for 2B.P5.

**For 2B.P7:** learners should produce three documents of different types to support communication in a construction context. The documents may be themed or based on different subject matter, but there must be sufficient contrast between the different types of document. For example, three letters would not be acceptable; however, a letter, a purchase order and a specification, all of which could well relate to the same item or construction task, would be acceptable. The documents should be 'well presented' and accurate, with correct spelling, punctuation and grammar, and must conform to accepted construction conventions.

**For 2B.M3:** the above could be developed to compare the effectiveness of the documents used to meet the needs of different audiences in two different construction contexts. The comparison should take into account the cost and availability of resources, for example the software needed to create certain documents and the cost of colour reproduction.

**For 2B.D3:** learners should examine whether the two documents have met the requirements they would normally be subject to in a real construction context, including confidentiality issues. Their evaluation should draw on relevant legislation and regulations such as the Data Protection Act, issues of commercial confidentiality, and how, when and where personal details are stored.

**For 1B.5:** learners must list a minimum of four factors that need to be considered when selecting the most appropriate written document for use in construction and the built environment. The context should be different in each case. Evidence could be provided in the form of a verbal report, using a suitable recording method and teacher record.

**For 1B.6:** learners must outline how and why the documents are suitable for the intended audience. For example, an email to a colleague confirming a meeting is appropriate but a tender requires a more formal structured approach. Learners could use the documents from 1A.1, 1A.2, 2A.P1 and/or 2A.P2.

**For 1B.7:** learners must produce three short written documents of different types. These should relate to internal communications only but the documents should serve different purposes.

### Learning aim C

**For 2C.P8:** learners need to prepare for and participate effectively in a one-to-one discussion session, using appropriate verbal and non-verbal communication skills. The evidence must reflect the nature of the discussion and provide a record of the learner's individual contribution. The research needed for the demonstration of verbal skills should include the preparation of questions and answers to potential questions, and could involve other activities such as planning a presentation. Preparation for demonstrating non-verbal skills should include consideration of appropriate interpersonal skills and dress. Suitable evidence might include audio, video, minutes, notes, slides or a transcript, but this will not cover the more ephemeral elements of the discussions and/or presentations. Evidence must therefore be supported by an observation record. This must be completed by the teacher, or a similarly qualified and experienced witness, confirming how the learner has met the assessment criterion.

**For 2C.P9:** the guidance is as for 2C.P8 but in the context of a group discussion, rather than a one-to-one discussion.

**For 2C.M4:** learners must assess the effectiveness of their verbal and non-verbal communication skills in the discussions in which they have taken part. Learners should refer to their particular strengths. There must be evidence that the learner is capable of using these observations in a reflective manner, to improve their own performance and learning.

**For 2C.D4:** learners need to reflect on their own and others' verbal and non-verbal communication skills, and assess the effectiveness of these in one-to-one and group construction contexts. Learners will need to produce honest and accurate reviews of their strengths and weaknesses. This should be completed after feedback from the teacher or a suitably qualified and experienced witness who observed the learner's and others' one-to-one and group communication skills and recorded the feedback in an observation sheet. There must be evidence that the learner is capable of using these observations in a reflective manner, to improve their performance and learning.

**For 1C.8 and 1C.9:** learners need to use verbal and non-verbal communication skills in one-to-one and group discussions, respectively, in a construction context. Evidence should be provided of at least one discussion for each criterion, recorded in a suitable format, along with learner notes and an observation record from the teacher or suitably qualified and experienced witness.

## Suggested assignment outlines

Centres may choose to embed the requirements of this unit across the learner's programme of study. Where this approach is used, centres must ensure that they track learner evidence against the requirements of this unit and demonstrate full coverage of the requirements

Where centres choose to offer this unit without embedding across the programme of study, the table below shows a programme of suggested assignment outlines that cover the assessment criteria. This is guidance and it is recommended that centres either write their own assignments or adapt any assignments we provide to meet local needs and resources.

Criteria covered	Assignment	Scenario	Assessment evidence
2A.P1, 2A.P2, 2A.P3, 2A.P4, 2A.M1, 2A.M2, 2A.D1, 2A.D2, 1A.1, 1A.2, 1A.3, 1A.4	The Purposes and Uses of Communication in Construction	<p>You are employed by an organisation that provides management services to construction companies. Your supervisor wants you to prepare information for guidance material on all aspects of communication. This covers written, verbal and non-verbal communication, their purpose, their relative effectiveness and the range of contexts in which they are used.</p> <p>As part of this task, your supervisor has asked you to examine the purpose of a range of documents used by a local firm. When scrutinising and selecting these documents, you are to consider the factors that affect the needs of various audiences and how the context influences the format of the document used.</p> <p>When preparing the information on effective communication skills, you will need to identify different construction contexts and explain the purposes and methods of both verbal and non-verbal communications used in each. You have also been asked to examine the overall impact of written, verbal and non-verbal communication, the negative impact of ineffective communication, and the issues of personal and commercial confidentiality in construction contexts.</p>	A presentation, accompanied by a leaflet, brochure or report.

Criteria covered	Assignment	Scenario	Assessment evidence
2B.P5, 2B.P6, 2B.P7, 2B.M3, 2B.D3, 1B.5, 1B.6, 1B.7	Communicating Using Written Documents	<p>Continuing your work in the management services company, you have been asked to produce exemplar documents that construction companies may use in their business.</p> <p>You will need to produce three clear and accurate documents of different types to be used in different contexts.</p> <p>You have also been asked to assess the factors that influence the production of the documents and their suitability in meeting the needs of the intended audience(s).</p>	<p>Fit-for-purpose construction documents with suitable format, layout and language.</p> <p>Details of the suitability of the documents for the intended context and audience.</p>
2C.P8, 2C.P9, 2C.M4, 2C.D4, 1C.8, 1C.9	Communicating Using Verbal and Non-verbal Skills	<p>Now that you have researched the purpose and methods of written communication in contrasting construction contexts, you have been asked to consider the use of both verbal and non-verbal communication skills. You can best do this through a demonstration of your own skills. This will involve you in using your verbal and non-verbal communication skills in both one-to-one and group contexts.</p> <p>You have also been asked to collect feedback on all such events and use this to show clients how to continuously improve their verbal and non-verbal skills.</p>	<p>Witness statements and/or teacher observation reports.</p> <p>Copies of all notes used in discussions and presentations.</p> <p>Hard copies or electronic copies of any presentational materials used.</p> <p>Reflective review of strengths and weaknesses, of self and others, together with identification of areas for improvement.</p>





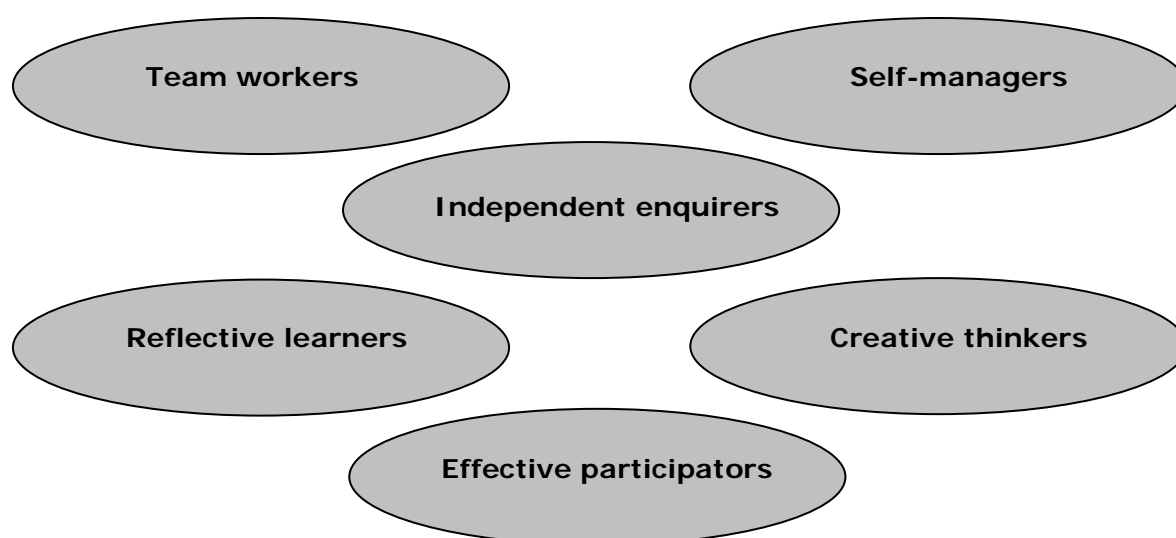
# Annexe A

## Personal, learning and thinking skills

### A FRAMEWORK OF PERSONAL, LEARNING AND THINKING SKILLS 11–19 IN ENGLAND

The framework comprises six groups of skills that are essential to success in learning, life and work. In essence, the framework captures the essential skills of: managing self; managing relationships with others; and managing own learning, performance and work. It is these skills that will enable young people to enter work and adult life confident and capable.

The titles of the six groups of skills are set out below.



For each group, there is a focus statement that sums up the range of skills. This is followed by a set of outcome statements that is indicative of the skills, behaviours and personal qualities associated with each group.

Each group is distinctive and coherent. The groups are also interconnected. Young people are likely to encounter skills from several groups in any one learning experience. For example, an independent enquirer would set goals for their research with clear success criteria (reflective learner) and organise and manage their time and resources effectively to achieve these (self-manager). In order to acquire and develop fundamental concepts such as organising oneself, managing change, taking responsibility and perseverance, learners will need to apply skills from all six groups in a wide range of learning contexts.

## The skills

### Independent enquirers

#### Focus:

Young people process and evaluate information in their investigations, planning what to do and how to go about it. They take informed and well-reasoned decisions, recognising that others have different beliefs and attitudes.

#### Young people:

- identify questions to answer and problems to resolve
- plan and carry out research, appreciating the consequences of decisions
- explore issues, events or problems from different perspectives
- analyse and evaluate information, judging its relevance and value
- consider the influence of circumstances, beliefs and feelings on decisions and events
- support conclusions, using reasoned arguments and evidence.

### Creative thinkers

#### Focus:

Young people think creatively by generating and exploring ideas, making original connections. They try different ways to tackle a problem, working with others to find imaginative solutions and outcomes that are of value.

#### Young people:

- generate ideas and explore possibilities
- ask questions to extend their thinking
- connect their own and others' ideas and experiences in inventive ways
- question their own and others' assumptions
- try out alternatives or new solutions and follow ideas through
- adapt ideas as circumstances change.

### Reflective learners

#### Focus:

Young people evaluate their strengths and limitations, setting themselves realistic goals with criteria for success. They monitor their own performance and progress, inviting feedback from others and making changes to further their learning.

#### Young people:

- assess themselves and others, identifying opportunities and achievements
- set goals with success criteria for their development and work
- review progress, acting on the outcomes
- invite feedback and deal positively with praise, setbacks and criticism
- evaluate experiences and learning to inform future progress
- communicate their learning in relevant ways for different audiences.

### Team workers

#### Focus:

Young people work confidently with others, adapting to different contexts and taking responsibility for their own part. They listen to and take account of different views. They form collaborative relationships, resolving issues to reach agreed outcomes.

#### Young people:

- collaborate with others to work towards common goals
- reach agreements, managing discussions to achieve results
- adapt behaviour to suit different roles and situations, including leadership roles
- show fairness and consideration to others
- take responsibility, showing confidence in themselves and their contribution
- provide constructive support and feedback to others.

### Self-managers

#### Focus:

Young people organise themselves, showing personal responsibility, initiative, creativity and enterprise with a commitment to learning and self-improvement. They actively embrace change, responding positively to new priorities, coping with challenges and looking for opportunities.

#### Young people:

- seek out challenges or new responsibilities and show flexibility when priorities change
- work towards goals, showing initiative, commitment and perseverance
- organise time and resources, prioritising actions
- anticipate, take and manage risks
- deal with competing pressures, including personal and work-related demands
- respond positively to change, seeking advice and support when needed.

### Effective participators

#### Focus:

Young people actively engage with issues that affect them and those around them. They play a full part in the life of their school, college, workplace or wider community by taking responsible action to bring improvements for others as well as themselves.

#### Young people:

- discuss issues of concern, seeking resolution where needed
- present a persuasive case for action
- propose practical ways forward, breaking these down into manageable steps
- identify improvements that would benefit others as well as themselves
- try to influence others, negotiating and balancing diverse views to reach workable solutions
- act as an advocate for views and beliefs that may differ from their own.

### Summary of the PLTS coverage throughout the programme

This table shows where units support the development of personal, learning and thinking skills.

#### Key:

- ✓ indicates opportunities for development
- a blank space indicates no opportunities for development

Unit	Personal, learning and thinking skills					
	Independent enquirers	Creative thinkers	Reflective learners	Team workers	Self-managers	Effective participants
1	✓					
2	✓	✓	✓			✓
3	✓	✓				
4	✓	✓				
5		✓				
6	✓				✓	
7	✓				✓	
8	✓				✓	
9	✓				✓	
10	✓				✓	
11	✓					
12	✓	✓	✓			✓
13	✓				✓	
14	✓				✓	
15	✓				✓	
16	✓		✓		✓	
17	✓		✓		✓	
18	✓		✓		✓	
19	✓		✓		✓	
20	✓		✓		✓	
21	✓	✓	✓		✓	
22	✓	✓			✓	
23	✓	✓	✓		✓	✓
24	✓	✓			✓	

Unit	Personal, learning and thinking skills					
	Independent enquirers	Creative thinkers	Reflective learners	Team workers	Self-managers	Effective participants
25	✓	✓	✓		✓	
26	✓	✓	✓			✓
27	✓	✓	✓	✓	✓	✓
28	✓	✓	✓	✓		✓



# Annexe B

## Level 2 Functional Skills

### Functional Skills standards for English Level 2

<b>Speaking, listening and communication</b>
Make a range of contributions to discussions in a range of contexts, including those that are unfamiliar, and make effective presentations
<b>Reading</b>
Select, read, understand and compare texts and use them to gather information, ideas, arguments and opinions
<b>Writing</b>
Write a range of texts, including extended written documents, communicating information, ideas and opinions, effectively and persuasively

### Functional Skills standards for mathematics Level 2

<b>Representing</b>
<ol style="list-style-type: none"> <li>1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations</li> <li>2. Identify the situation or problems and identify the mathematical methods needed to solve them</li> <li>3. Select a range of mathematics to find solutions</li> </ol>
<b>Analysing</b>
<ol style="list-style-type: none"> <li>4. Apply a range of mathematics to find solutions</li> </ol> <p>Use appropriate checking procedures and evaluate their effectiveness at each stage</p>
<b>Interpreting</b>
<p>Interpret and communicate solutions to multistage practical problems in familiar and unfamiliar contexts and situations</p> <p>Draw conclusions and provide mathematical justifications</p>

## Functional Skills standards for ICT Level 2

<b>Using ICT</b>
5. Plan solutions to complex tasks by analysing the necessary stages 6. Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts 7. Manage information storage to enable efficient retrieval
<b>Finding and selecting information</b>
8. Use appropriate search techniques to locate and select relevant information 9. Select information from a variety of sources to meet requirements of a complex task
<b>Developing, presenting and communicating information</b>
10. Enter, develop and refine information using appropriate software to meet requirements of a complex task 11. Use appropriate software to meet the requirements of a complex data-handling task 12. Use communications software to meet requirements of a complex task 13. Combine and present information in ways that are fit for purpose and audience 14. Evaluate the selection, use and effectiveness of ICT tools and facilities used to present information



## Mapping to Level 2 Functional Skills

This table shows where a **learning aim** in a unit is of particular relevance for learners being prepared for assessment in Functional Skills in English, mathematics and/or ICT at Level 2. Centres may identify further opportunities arising in their own programmes in addition to those identified below, for example group work, research, employment-related activities and work experience.

**Key:** a letter, e.g. A, indicates the learning aim where there are opportunities for development; a blank space indicates no opportunities for development

Unit	English			Mathematics			ICT		
	Speaking, listening and communication	Reading	Writing	Representing	Analysing	Interpreting	Using ICT	Finding and selecting information	Developing, presenting and communicating information
1			A, B, C						
2	B	B	B				C		C
3		A, B	A, B	B	B	B			
4									
5				B	B	B	A, B		B
6		A	A, B	B	B				
7		A	A, B	B	B				
8		A	A, B	B	B				
9		A	A, B	B	B				
10		A	A, B	B	B				
11			A, B						
12		A, B	A, B				B	B	B

Unit	English			Mathematics			ICT		
	Speaking, listening and communication	Reading	Writing	Representing	Analysing	Interpreting	Using ICT	Finding and selecting information	Developing, presenting and communicating information
13		A	A, B	B	B				
14		A	A, B	B	B				
15		A	A, B	B	B				
16		A	A	B, C	B, C				
17		A	A	B, C	B, C				
18		A	A	B, C	B, C				
19		A	A	B	B				
20		A	A	B	B				
21		A	A, B, C		C	C	C		C
22		A, C	A, C	C	C	C			
23		A, C	A, B, C	B, C	B, C	C			B
24		A	A, B, C	B	B	B			
25		A	A, B, C	C	C	C	C		C
26		A	A, B, C	C	C	C			C
27		A	A, B, C				A	A	A
28	A, C	A, B	A, B, C						

## Annexe C

### Synoptic assessment

Synoptic assessment in these qualifications is embedded throughout the assessment criteria across the units of study. The mandatory units *Unit 3: Scientific and Mathematical Applications for Construction* and *Unit 11: Sustainability in Construction*, plus for the Diploma qualification *Unit 4: Construction Processes and Operations* and *Unit 12: The Construction Industry*, provide the essential knowledge, understanding and skills required in construction and the built environment and underpin the content of the optional specialist units.

In addition, there is a further mandatory unit in the Diploma, *Unit 21: Maintenance and Adaption of Buildings*, that is specifically designed to allow learners to draw together all the themes and skills gained from other units of study and apply them to planning and carrying out a project.

Learners studying these qualifications are able to demonstrate a number of synoptic approaches towards meeting the assessment criteria. These include:

- showing links and holistic understanding/approaches to units of study from the specification
- being able to interrelate overarching concepts and issues, bringing together their knowledge of the construction and the built environment sector
- drawing together and integrating knowledge, understanding and skills across different units, in order to develop an appreciation of how topics relate to one another, and how each may contribute to different construction and the built environment context or situations
- making and applying connections to particular construction and the built environment contexts or situations
- demonstrating their ability to use and apply a range of different methods and/or techniques
- being able to put forward different perspectives and/or explanations to support decisions they have made or evidence they have presented
- being able to suggest or apply different approaches to construction and the built environment contexts or situations
- synthesising information gained from studying a number of different construction and the built environment activities
- applying knowledge, skills and understanding from across different units to a particular construction and the built environment situation, issue or case study
- using specialist construction and the built environment terminology where appropriate
- demonstrating analytical and interpretation skills (of evidence and/or results) and the ability to formulate valid well-argued responses
- evaluating and justifying their decisions, choices and recommendations.



## Annexe D

### Summary of units in the BTEC Level 1/Level 2 First in Construction and the Built Environment

The BTEC First suite in Construction and the Built Environment contains four qualifications:

**Award (120 GLH), Certificate (240 GLH), Extended Certificate (360 GLH) and Diploma (480 GLH).**

The smaller qualifications are 'nested' within the larger qualifications, which means that learners may take a smaller-sized qualification, then top up to a larger size without repeating the units already achieved in the smaller size.

This table lists each unit in the suite and how it is used within individual qualifications, i.e. is the unit mandatory (Mand), optional specialist (Opt) or not included (—).

**Key:** Mand – Mandatory; Opt – Optional specialist; — indicates where the unit does not appear in the qualification

Unit	Unit title	GLH	Qualifications		
			Certificate	Extended Certificate	Diploma
1	Construction Technology (externally assessed)	30	Mand	Mand	Mand
2	Construction and Design	30	Mand	Mand	Mand
3	Scientific and Mathematical Applications for Construction	30	Mand	Mand	Mand
4	Construction Processes and Operations	30	Opt	Opt	Mand
5	Construction Drawing Techniques	30	Opt	Opt	Opt
6	Exploring Carpentry and Joinery Principles and Techniques	30	Opt	Opt	Opt
7	Exploring Brickwork and Blockwork Principles and Techniques	30	Opt	Opt	Opt
8	Exploring Painting and Decorating Principles and Techniques	30	Opt	Opt	Opt

Unit	Unit title	GLH	Qualifications		
			Certificate	Extended Certificate	Diploma
9	Exploring Plumbing Principles and Techniques	30	Opt	Opt	Opt
10	Exploring Electrical Principles and Techniques	30	Opt	Opt	Opt
11	Sustainability in Construction <b>(externally assessed)</b>	30	Mand	Mand	Mand
12	The Construction Industry	30	Opt	Opt	Mand
13	Exploring Roofing Principles and Techniques	30	Opt	Opt	Opt
14	Exploring Wall and Floor Tiling Principles and Techniques	30	Opt	Opt	Opt
15	Exploring Plastering and Dry Lining Principles and Techniques	30	Opt	Opt	Opt
16	Carpentry and Joinery Operations	60	—	Opt	Opt
17	Brickwork and Blockwork Operations	60	—	Opt	Opt
18	Painting and Paperhanging Operations	60	—	Opt	Opt
19	Plumbing Operations	30	—	Opt	Opt
20	Electrical Operations	30	—	Opt	Opt
21	Maintenance and Adaptation of Buildings	60	—	—	Mand
22	Tendering and Estimating	60	Opt	Opt	Opt
23	Exploring Surveying	60	Opt	Opt	Opt
24	Exploring Civil Engineering	60	Opt	Opt	Opt
25	Exploring Building Services Engineering	60	Opt	Opt	Opt

Unit	Unit title	GLH	Qualifications		
			Certificate	Extended Certificate	Diploma
26	Exploring Facilities Management	60	Opt	Opt	Opt
27	Construction Work Experience	30	—	—	Opt
28	Communications for Construction and the Built Environment	30	—	—	Opt

# Specification

## BTEC FIRST CONSTRUCTION AND BUILT ENVIRONMENT

**Certificate**  
**Extended Certificate**  
**Diploma**

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VAT Reg No GB 278 537121



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ISBN 978-1-4469-3611-5

