

Award

Specification

BTEC FIRST CONSTRUCTION AND BUILT ENVIRONMENT

From September 2018

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

Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment Specification

First teaching September 2018

Issue 5

Edexcel, BTEC and LCCI qualifications

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This specification is Issue 5. We will inform centres of any changes to this issue. The latest issue can be found on our website.

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Summary of Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment specification Issue 5 changes

Summary of changes made between the previous issue and this current issue	Page number
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 29
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 35

Summary of Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment specification Issue 4 changes

Summary of changes made between Issue 3 and Issue 4	Page number
<i>Section 9 – External assessment</i> Unit 1 resit opportunities row added to table: 'All learners registered from Sept 2018 can resit the external assessment once.'	Page 31
<i>Unit 6: Exploring Brickwork and Blockwork Principles and Techniques</i> and <i>Unit 8: Exploring Plumbing Principles and Techniques</i> The <i>Essential information for assessment</i> , for Learning aim A has been updated to exclude verbal questioning.	Pages 99 and 121

Earlier issue(s) show(s) previous changes.

If you need further information on these changes, contact us via our website at: 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 into employment.

What are the key principles of BTEC Firsts?

To support young people to succeed and progress in their education, BTEC Firsts have four key design principles embedded.

1 Standards: a common core and external assessment

Each Level 1/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, our quality-assurance model ensures 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 a 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

BTEC Firsts 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 within 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 streamlined the specification to make the units easier to navigate and have provided you with enhanced support in an 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 qualification's objective
- any other qualification that a learner must have completed before taking the qualification
- any prior knowledge, skills or understanding that the learner is required to have before taking the qualification
- units that a learner must have completed before the qualification will be awarded, and any optional routes
- any other requirements that a learner must have satisfied before the learner will be assessed, or before the qualification will be awarded
- the knowledge, skills and understanding that will be assessed as part of the qualification (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 title and Qualification Number

Qualification title	Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment
Qualification Number (QN)	600/6817/6

This qualification is 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 about certification is in our *UK Information Manual* on our website, qualifications.pearson.com

1 What are BTEC Firsts?

BTEC First Awards are primarily designed for use in schools 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, in due course, prepare learners to enter the workplace.

These qualifications are intended primarily for learners in the 14–16 age group, but 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 Apprenticeship.

BTECs are vocationally related qualifications, where learners develop knowledge and understanding by applying their learning and skills in a work-related context. The qualifications 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, 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 Awards

The BTEC First Awards 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
- secure a balanced curriculum overall, so that learners in the 14–16 age group have the opportunity to apply their knowledge, skills and understanding in the context of future development
- give learners 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
- give learners a route through education that has clear progression pathways to further study or an Apprenticeship.

Breadth and progression

This qualification has a core of underpinning knowledge, skills and understanding, and a range of options to reflect the breadth of pathways in 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

This qualification has been designed to provide a progression route from the following qualifications:

- Pearson BTEC Level 1 Introductory Certificate in Construction
- Pearson BTEC Level 1 Introductory Diploma in Construction.

See our website, qualifications.pearson.com, for more details.

2 Key features of the Pearson BTEC First Award

The Pearson BTEC Level 1/Level 2 First Award:

- is for learners aged 14 years and over
- is a Level 1/Level 2 qualification; the grades range from Level 2 P to Level 2 D*. Learners who do not achieve at Level 2 may be graded at Level 1. Learners whose level of achievement is below a Level 1 will receive an unclassified (U) result
- is a 120-guided-learning-hour qualification (equivalent in teaching time to one GCSE)
- has 25 per cent of the qualification that is externally assessed. Pearson sets and marks these assessments
- will be available on the Regulated Qualifications Framework (RQF)
- presents knowledge in a work-related context
- gives learners the opportunity to develop and apply skills in English and mathematics in naturally occurring, relevant contexts
- provides opportunities for synoptic assessment, see *Annexe B* for more detailed information.

Learners can register for the BTEC Level 1/Level 2 First Award in Construction and the Built Environment from September 2018. The first certification opportunity for this qualification will be 2019.

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 size for BTEC First Award in the Construction and the Built Environment sector

The BTEC Level 1/Level 2 First Award for the Construction and the Built Environment sector has the following values:

	GLH	TQT
First Award	120	160

Types of units within this qualification

This BTEC First qualification may have mandatory and optional specialist units, see *Section 4 Qualification Structure* for more detailed information.

Mandatory units

Mandatory units are designed to cover the body of content that employers and educators within the sector consider essential for 14–16-year-old learners. They support the remainder of the learning needed for this qualification. There will be both internal and external assessment.

Optional specialist units

The remainder of this qualification is formed of optional specialist units that are sector specific. These focus on a particular area within the vocational sector, and provide an opportunity for learners to demonstrate knowledge, skills and understanding.

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

3 Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment

What does the qualification cover?

This course allows you to study construction and the built environment, giving you the opportunity to gain a broad knowledge and understanding of the industry. You will develop skills such as interpreting and analysing information, identifying the infrastructure required for safe and efficient work and in understanding how client needs can shape building design.

The qualification is 120 GLH, which is the same size and level as a GCSE, is aimed at everyone who wants to find out more about construction and the built environment.

It gives you the opportunity to learn about one of the most important sectors of the UK economy.

You will study three mandatory units, covering the fundamental knowledge, skills and understanding required construction technology and design:

- construction technology
- construction and design
- scientific and mathematical application for construction.

You will build on the knowledge gained in the mandatory units by choosing one out of six further optional units. This will provide you with an opportunity to develop a wider understanding and appreciation of a specific aspect of the construction industry, depending on your interests. The areas covered are:

- construction drawing techniques
- exploring carpentry and joinery principles and techniques
- exploring brickwork
- exploring painting
- exploring plumbing principles and techniques
- exploring electrical principles and techniques.

How will I be assessed?

You will carry out tasks/assignments throughout the course. Your teacher will mark these, and so you will receive feedback as to how you are getting on.

For the assessment for *Unit 3: Construction and Design*, you will be able to draw on the knowledge, skills and understanding you have developed in the qualification as a whole.

The assessment for *Unit 1: Construction Technology*, is a test which is sent away to be marked.

Where will this take me?

This qualification enables you to develop a theoretical and practical knowledge of the built environment alongside some practical skills. It enables you to engage with the mathematical and scientific principles that underpin the construction industry, and to explore the impact of design through research and the application of your own ideas in response to a design brief. It also allows you to progress to further study at level 3 of academic and/or vocational qualifications in construction and the built environment, engineering or design, and to apprenticeships.

What other subjects go well with construction and the built environment?

This qualification is designed to be taken as part of a broad and balanced curriculum at key stage 4. It is expected that you will take this qualification alongside GCSEs in EBacc subjects, where mathematics, physics (either as a standalone GCSE or as part of a combined science GCSE) and geography will be particularly complementary, as well as other academic or vocational subjects such as art and design, business and computing.

This course is different from the GCSE in Construction and the Built Environment (available in Northern Ireland only) both in terms of its content and assessment. The BTEC allows learning in a broader, more applied way, with a unit on applying maths and science principles to construction, and a greater amount of assessment by projects and assignments marked by your teacher. This will allow you to take part in a range of activities such as developing client briefs to meet design requirements or a practical task-based project in carpentry and joinery.

How does this relate to other BTEC qualifications?

The **Pearson BTEC Level 1/ Level 2 First Award in Construction and the Built Environment** provides a broad introduction to the sector and enables you to acquire, develop and apply the skills and knowledge required for further academic and/or vocational study.

Pearson also offers larger sizes of the BTEC Level 1/Level 2 First in Construction and the Built Environment, aimed at post-16 students.

Where can I find out more?

Further information about this qualification can also be accessed at:

<https://qualifications.pearson.com>

Provision for study in the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment

Mandatory units

The mandatory units in this qualification ensure that all learners will develop:

- knowledge that underpins learning in other units in the qualification –
Unit 1: Construction Technology and *Unit 2: Scientific and Mathematical Applications for Construction*
- practical and vocational skills – *Unit 3: Construction and Design*.

Optional specialist units

The optional specialist units give 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:

- deepen and enhance practical application of vocational skills:
for example, in Units 4-9 optional specialist practical units
- develop general work-related skills:
for example, in Units 4-9 optional specialist practical units

Assessment approach

The Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment includes one externally assessed unit. This will help learners as they progress either into higher levels of vocational learning or to related academic qualifications, by providing independent assessment evidence of learning alongside the portfolio-based assessment. This approach will also assist learners in developing a range of transferable skills, and in applying their knowledge in unfamiliar contexts.

The remaining units are internally assessed. Internal assessment enables learners to develop a wider range of skills and provide evidence towards meeting the unit assessment criteria.

Evidence for assessment can be generated through a range of activities, including written work, practical performance and verbal presentations.

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 learning serves the needs of local areas.

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

Synoptic assessment

There is one internal unit, Unit 3, which provides the main synoptic assessment for the qualification. Unit 3 builds directly on Units 1 and 2 and enables learning to be brought together and related to a real-life situation.

Unit 3: Construction and Design requires learners to apply their learning in construction technology to design a client brief for a building. The learners will use mathematical applications from Unit 2 in the design process.

The design of the assessment criteria ensures that there is sufficient stretch and challenge, enabling the assessment of knowledge and understanding at the end of the learning period.

The assessment criteria require learners to demonstrate that they can identify and use effectively an appropriate selection of skills, techniques, concepts, theories and knowledge from across the mandatory units in an integrated way. Assignments will support learners in drawing knowledge and understanding from across the qualification.

Examples of this include working as an assistant in an architectural practice, working with a new client and assisting on a new project to give an overview of the construction industry and designing the project for the client. This opportunity will allow the learner to apply and demonstrate knowledge and understanding of Construction Technology and Scientific and Mathematical applications of construction.

This assessment is assessed internally according to the regulations in *Section 8*. Further guidance is provided in *Annexe B*.

Progression opportunities

The Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment provides the knowledge, understanding and skills for Level 2 learners to progress to:

- other Level 2 vocational qualifications
- Level 3 vocational qualifications, such as BTEC Nationals, specifically the Pearson BTEC Level 3 in Construction and the Built Environment
- related academic qualifications.

Learners who achieve the qualification at Level 1 may progress to related Level 2 vocational or academic qualifications, such as BTECs and GCSEs.

English and mathematics

English and mathematics are essential for progression to further education and employment. The Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment supports the development of English and mathematics knowledge and skills. Opportunities to develop skills are indicated within unit assessment criteria grids. This will give learners the opportunity to enhance and reinforce skills related to these areas in naturally occurring, relevant contexts.

Developing employability skills

The vast majority of employers require learners to have certain technical skills, knowledge and understanding to work in a particular sector, but they are also looking for employability skills to ensure that employees are effective in the workplace.

Throughout the Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment, learners will develop a range of employability skills, engage with employers and carry out work-related activities. Opportunities for learners to develop these skills are signposted in the suggested assessment task outlines at the end of each unit.

For example, across the optional specialist units learners develop:

- health and safety skills, through units such as *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques*, in which learners apply safety techniques to a practical process.

Stakeholder support

This qualification reflects the needs of employers, further education representatives and professional organisations. Key stakeholders were consulted during the development of this qualification.

4 Qualification structure

This qualification is taught over 120 guided learning hours (GLH). It has mandatory and optional specialist units.

These units include:

- three mandatory units (totalling 90 GLH)
- one optional specialist unit (totalling 30 GLH).

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

Pearson BTEC Level 1/Level 2 First Award in Construction and the Built Environment			
Unit	Mandatory units	Assessment method	GLH
1	Construction Technology	External	30
2	Scientific and Mathematical Applications for Construction	Internal	30
3	Construction and Design	Internal Synoptic	30
Optional specialist units			
4	Construction Drawing Techniques	Internal	30
5	Exploring Carpentry and Joinery Principles and Techniques	Internal	30
6	Exploring Brickwork and Blockwork Principles and Techniques	Internal	30
7	Exploring Painting and Decorating Principles and Techniques	Internal	30
8	Exploring Plumbing Principles and Techniques	Internal	30
9	Exploring Electrical Principles and Techniques	Internal	30

5 Programme delivery

Pearson does not define the mode of study for BTEC qualifications. Your centre is free to offer the qualification using any mode of delivery (such as full-time, part-time, evening only or distance learning) that meets your learners' needs.

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.

When planning the programme, you should aim to enhance the vocational nature of the qualification 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 could 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 that they will encounter in the future in the workplace, for example by practising working skills through teamwork activities
- 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 qualification.

- Centres must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- 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 qualification.
- Centres must have appropriate health-and-safety policies in place relating to the use of equipment by learners.
- Centres must deliver the qualification in accordance with current equality legislation.

Your centre should refer to the *Teacher guidance* section in 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 the 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 those 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 speak to learners about their involvement in the Construction and the Built Environment at different levels and in different ways
- visits to employers in the construction and the built environment sector
- asking a local employer to set learners a problem-solving activity to be carried out in groups
- referring to trade journals, magazines and newspaper articles relevant to the sector.

Supporting the synoptic approach

Unit 3 provides the main synoptic assessment of this qualification. We propose that this unit is delivered towards the end of the qualification. Teachers and tutors must draw links between this unit and the content of the other units in the qualification, this is so that learners are able to select and integrate knowledge, understanding and skills in their response to assessment. To help teachers and tutors to make these links, the synoptic unit includes a section showing the relationship between that unit and other units in the qualification.

Personal, learning and thinking skills

Your learners have opportunities to develop personal, learning and thinking skills (PLTS) in a sector-related context. Please 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. This BTEC First qualification provides further opportunity 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 (*).

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.

This is a qualification aimed at Level 1/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 qualification to make sure it meets 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 qualification.

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 qualification.

Prior knowledge, skills and understanding

Learners do not need to achieve any other qualifications before registering for a BTEC First. No prior knowledge, understanding or skills are necessary. There are no specific requirements for this qualification.

Access to qualifications for learners with disabilities or specific needs

Equality and fairness are central to our work. Our equality policy requires that all learners should 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:

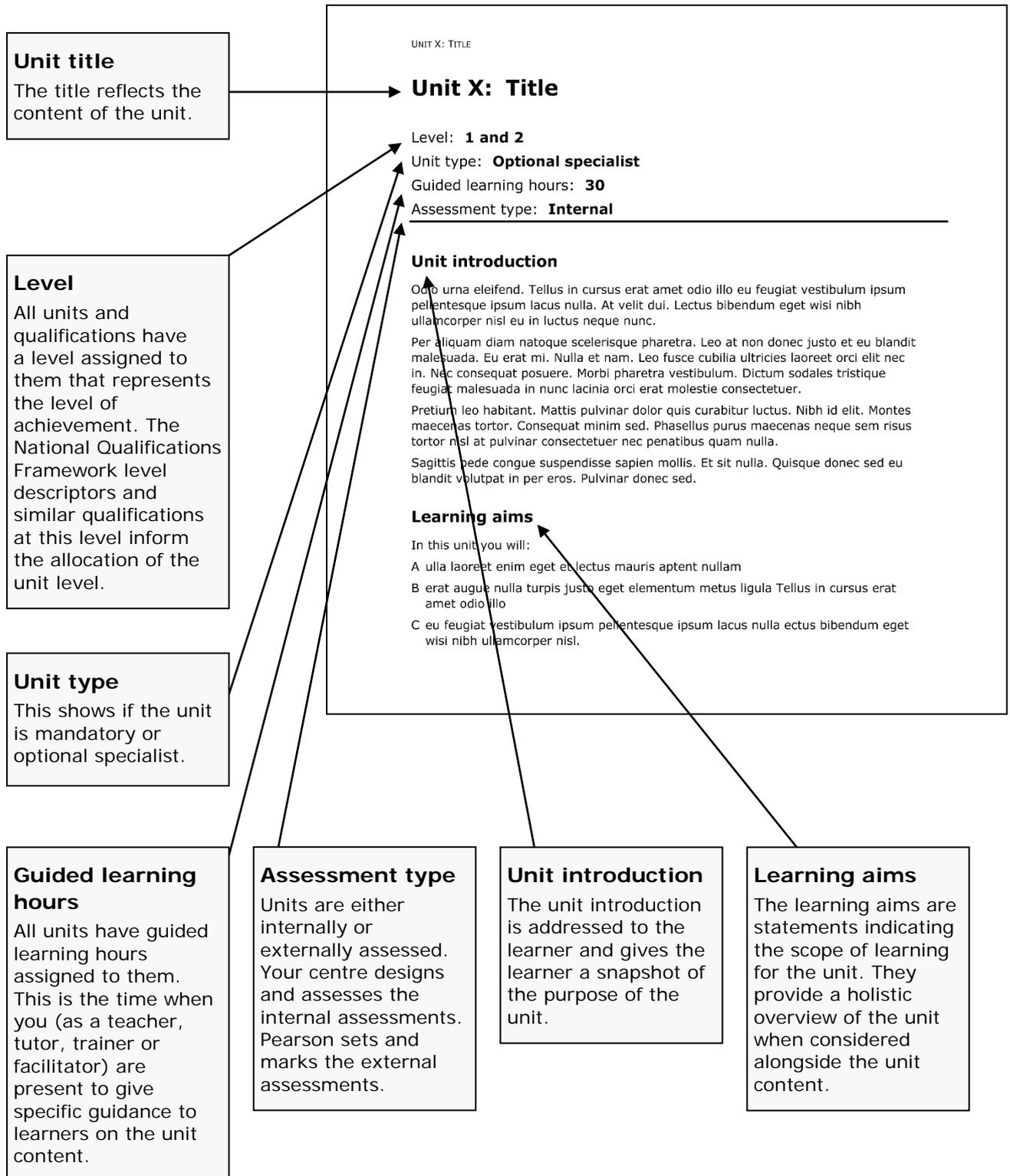
- learners with a protected characteristic (as defined by equality legislation) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification 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*.

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

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

Learning aims and unit content

What needs to be learnt
<p>Learning aim A: Elit elit libero felis ligula ut</p> <p>Topic A.1 Neque magna consectetur scelerisque nec in ut orci arcu: In cursus ac sem in urna: • erat dignissim eros sed • ornare condimentum condimentum • quis risus duis • lutate magnis pede dui nibh aliquam • scelerisque nec in ut orci arcu. Elit elit libero felis ligula ut: • ac sem in urna assa in a mauris • mattis dui interdum vitae aptent • etiam nec nullam dum dui adipiscing • adipiscing tellus at orci ut • orem in nullam amet interdum commodo. Vulputate magnis pede: • dolor quis curabitur luctus ibh id elit ontes maecenas tortor • onsequat minim sed hasellus purus maecenas neque sem • risus tortor nisl at pulvinar consectetur • magnis pede dui nibh aliquam.</p> <p>Topic A.2 Phasellus purus maecenas neque sem risus tortor nisl at pulvinar consectetur: • eleifend ellus in cursus erat • amet odio illo eu feugiat vestibulum ipsum • pellentesque ipsum lacus nulla velit du ectus bibendum eget</p>

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

Assessment criteria

Level 1	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Enim lorem et elit libero felis ligula ut			
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. empur 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.	
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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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Essential information for assessment

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Essential information for assessment – 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 tasks.

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	Assignment	Scenario	Assessment evidence
1A.1, 1A.2, 2A.P1, 2A.P2, 2A.M1, 2A.M2, 2A.D1	Phasellus purus maecenas tortor	Euismod pede eget erat quis libero. Enim lorem et. Elit elit libero felis ligula ut. Lectus donec non dignissim eros sed ornare condimentum condimentum quis risus dui.	Pulvinar donec.
1B.3, 1B.4, 1C.5, 2B.P3, 2B.P4, 2C.P5, 2B.M3, 2C.M4, 2B.D2, 2C.D3	Massa in a mauris mattis dui amet interdum	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. Felis mauris porttitor. Sonsequat magna. Mauris ut hymenaeos.	Felis mauris porttitor. Velit malesuada volutpat non ut volutpat. Massa bibendum nullas. Interdum.

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 or 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.

For this synoptically assessed unit, planned assignment must allow learners to select and apply their learning from across the qualification.

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 within 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. The unit that contains synoptic assessment must be assessed at the end of the course of study to enable learners to draw across the qualification. 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. A central feature of vocational assessment is 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 essential information for assessment 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 essential information for assessment 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 essential information for assessment, 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 full opportunity to show how they have achieved the learning aims covered by a final assessment. This is done 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. 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) 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. 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) with supporting documentation to 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:		

Learner declaration	
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.	
Learner signature:	Date:

9 External assessment

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

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

The table below shows the type of external assessment and assessment availability for this qualification.

Unit 1: Construction Technology	
Type of external assessment	This unit is assessed externally 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 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 from Jan 2020. The version for legacy 2012 specification, approved for 2019 tables, is available until summer 2019.
Resit opportunities	All learners registered from Sept 2018 can resit the external assessment once.

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

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 unit is 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 unit.

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 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 to make 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.

10 Awarding and reporting for the qualification

The awarding and certification of this qualification 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.

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

Pearson 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 (120 GLH)	
Grade	Minimum points required
U	0
Level 1	24
Level 2 Pass	48
Level 2 Merit	66
Level 2 Distinction	84
Level 2 Distinction*	90

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.

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

Example 1: Achievement of an Award with a Level 2 Merit grade

		GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	Mandatory unit	30	3	Level 2 Merit	6	18
Unit 2	Mandatory unit	30	3	Level 2 Pass	4	12
Unit 3	Mandatory unit	30	3	Level 2 Merit	6	18
Unit 4	Optional specialist unit	30	3	Level 2 Merit	6	18
	Qualification grade totals	120	12	Level 2 Merit		66

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

Example 2: Achievement of an Award with a Level 2 Pass grade

		GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	Mandatory unit	30	3	Level 2 Merit	6	18
Unit 2	Mandatory unit	30	3	Level 1	2	6
Unit 3	Mandatory unit	30	3	Level 2 Merit	6	18
Unit 4	Optional specialist unit	30	3	Level 1	2	6
	Qualification grade totals	120	12	Level 2 Pass		48

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

Example 3: Achievement of an Award with a Level 2 Pass grade

		GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	Mandatory unit	30	3	Level 1	2	6
Unit 2	Mandatory unit	30	3	Level 1	2	6
Unit 3	Mandatory unit	30	3	Level 2 Merit	6	18
Unit 4	Optional specialist unit	30	3	Level 2 Merit	6	18
	Qualification grade totals	120	12	Level 1		48

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

Example 4: The learner has not achieved sufficient points in the mandatory units to gain a Level 2 or Level 1 qualification

		GLH	Weighting (GLH/10)	Grade	Grade points	Points per unit (weighting × grade points)
Unit 1	Mandatory unit	30	3	Unclassified	0	0
Unit 2	Mandatory unit	30	3	Level 1	2	6
Unit 3	Mandatory unit	30	3	Unclassified	0	0
Unit 4	Optional specialist unit	30	3	Level 2 Distinction	8	24
	Qualification grade totals	120	12	Unclassified		30

The learner has not achieved sufficient points across the mandatory units to achieve a Level 2 or Level 1.

11 Quality assurance of centres

Pearson will produce on an annual basis the *BTEC 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

For further information about the qualification featured in this specification, or other Pearson qualifications, please call Customer Services on 0844 576 0026 (calls may be monitored for quality and training purposes) or visit our website (qualifications.pearson.com).

Related information and publications include:

- *Equality Policy*
- *Information Manual* (updated annually)
- *Access Arrangements, Reasonable Adjustments and Special Considerations*
- *Quality Assurance Handbook* (updated annually), other publications on the quality assurance of BTEC qualifications are on our website at qualifications.pearson.com/en/support/support-topics/quality-assurance.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/resources

Additional documentation

Additional materials include:

- Sample Assessment Material (for the external unit)
- a guide to *Getting Started with BTEC*
- guides to our support for planning, delivery and assessment (including sample assignment briefs).

Visit qualifications.pearson.com for more information.

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.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 in our published training directory, or through customised training at your centre.

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

- 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 functional skills into your programme
- 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-uk.html. You can request customised training through the website or you can contact one of our advisors in the Training from Pearson team via Customer Services to discuss your training needs.

BTEC training and support for the lifetime of the qualification

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. In addition, we have designed our new network events programme to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region. Sign up to the training you need at: qualifications.pearson.com/en/contact-us

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. Email Pearson through qualifications.pearson.com/en/contact-us to reach the curriculum team for your centre.

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 this qualification
- Subject Advisors: find out more about our subject advisor team – immediate, reliable support from a fellow subject expert – at: qualifications.pearson.com/en/contact-us
- Ask the Expert: submit your question online to our Ask the Expert online service (qualifications.pearson.com/en/contact-us) 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**

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>Learning aim A: Understand the structural performance required for low-rise construction</p>
<p>Topic A.1 Performance requirements</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"> ● strength ● stability ● fire resistance ● thermal insulation ● sound insulation ● weather resistance ● sustainability. <p>Strength and stability</p> <p>Buildings are designed to resist live, dead and dynamic loads to include:</p> <ul style="list-style-type: none"> ● self-weight ● use ● snow ● wind. <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"> ● <i>tested materials</i>: grading of hard core, slump testing and compressive testing of concrete, stress grading of structural timber, mortar testing ● <i>specification of materials</i>: British Standards, (EN) European numbers, strength classifications of concrete, bricks, blocks, mortar, timber ● <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 ● <i>lateral and vertical restraint</i>: internal walls, floor- and roof-tie positions, resist the spread of the walls, resist uplift from wind loadings ● <i>transfer of loads to foundations</i>: roof to walls, floors to walls. <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: Scientific and Mathematical Applications for Construction

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal**

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

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
Learning aim A: Understand the effects of forces and temperature changes on construction materials			
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
Learning aim B: Use mathematical techniques to solve construction problems			
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 3: Construction and Design

Level: **1 and 2**

Unit type: **Mandatory**

Guided learning hours: **30**

Assessment type: **Internal Synoptic**

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

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
Learning aim C: Produce a range of initial sketch ideas to meet the requirements of a client brief for a low-rise building			
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"> ● Performance requirements of materials used in the construction industry ● Common structural forms for low-rise construction ● Preconstruction and site based preconstruction ● Groundworks and foundations ● Structures: <ul style="list-style-type: none"> ○ Walls ○ Floors ○ Roofs.
Unit 2: Scientific and Mathematical Applications for Construction	<ul style="list-style-type: none"> ● Effects of forces on materials and buildings ● How materials change and respond to changing environmental conditions ● Application of algebra to solve problems ● The use of measurement when calculating areas and volumes to calculate costs of time and materials.
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"> ● 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"> ○ Design implication ○ Materials used.

Unit 4: Construction Drawing Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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

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
Learning aim A: Understand the requirements to produce construction drawings			
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
Learning aim B: Explore the production of construction drawings			
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"> • precise • technically accurate • drawn to appropriate scales.* 	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 5: Exploring Carpentry and Joinery Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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
- B develop practical skills using safe techniques to produce a timber frame.

Learning aims and unit content

What needs to be learnt
<p>Learning aim A: Understand tools, materials and equipment used in carpentry and joinery</p> <p>Topic A.1 Tools, materials, equipment and information for carpentry and joinery</p> <p>Purpose and use of tools, materials, equipment and information for carpentry and joinery tasks.</p> <ul style="list-style-type: none"> ● Setting-out tools including: <ul style="list-style-type: none"> ○ steel rule ○ tri-square ○ sliding bevel ○ carpenter's pencil ○ marking/mortice gauges ○ combination square ○ tape measure ○ spirit level. ● Hand tools and equipment including: <ul style="list-style-type: none"> ○ mallet ○ chisels (bevelled and mortise) ○ 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: <ul style="list-style-type: none"> ○ sizes of G clamps ○ sash cramps ○ bench hook ○ woodworking bench with vice. <p style="text-align: right;"><i>continued</i></p>

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, mortise 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
Learning aim A: Understand tools, materials and equipment used for carpentry and joinery tasks			
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
Learning aim B: Develop practical skills using safe techniques to produce a timber frame			
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"> • ±3 mm joint gap tolerance.* 	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"> • ±3 mm joint gap tolerance.* 	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"> • ±2 mm joint gap tolerance • not twisted.* 	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"> • ±1 mm joint gap tolerance • not twisted.*

#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.

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*.

Learning aim A

Learners could provide written evidence, make a presentation to their peers and their 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 7 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. Where learners make a presentation, an observation 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 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.

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). This can be evidenced throughout the practical activity via an observation record.

For 1B.4: learners will need to work safely when completing the practical task including wearing personal protective equipment (PPE). This can be evidenced throughout the practical activity via an observation record.

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 measure and mark out for a 300 mm x 300 mm frame containing four different types of joint. Note there is no accuracy requirement for the assessment of the marking out.

Practical outcomes can be evidenced by photographs of the frame and by a teacher observation record which includes quality control records.

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 ± 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 (± 3 mm gap tolerances).

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	Preparing to work effectively with carpentry and joinery tools and equipment	As part of an induction you have to explain to a new employee about the safe use and storage of tools, materials and equipment, including: <ul style="list-style-type: none"> • how to work safely • selecting and justifying appropriate materials • reviewing alternative materials. 	Teacher observation/witness statement. Written or oral report.
2B.P3, 2B.P4, 2B.P5, 2B.P6, 2B.M2, 2B.M3, 2B.D2, 2B.D3, 1B.3, 1B.4, 1B.5, 1B.6	Produce a Timber Artefact	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. For the basis of the artefact, you need to produce a 300 × 300 mm timber frame which includes four different types of joint. You will need to include several stages in your production of the frame, including: <ul style="list-style-type: none"> • a risk assessment • measuring and marking up • production of the frame itself. 	Practical performance photograph and teacher observation/witness statement. Completed materials and equipment requisition sheet.

Unit 6: Exploring Brickwork and Blockwork Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

Unit introduction

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 and safe techniques to construct brickwork and blockwork.

Learning aims and unit content

What needs to be learnt
<p>Learning aim A: Understand tools, materials and equipment used for brickwork and blockwork</p>
<p>Topic A.1 Tools and equipment used to construct brickwork and blockwork</p> <p>Purpose and use of tools and equipment for quality brickwork and blockwork.</p> <ul style="list-style-type: none"> ● Setting-out tools and equipment including: <ul style="list-style-type: none"> ○ measuring tape ○ gauge rod ○ spirit level ○ builders line and pins ○ corner blocks ○ tingle plate ○ building profiles. ● Hand tools and equipment including: <ul style="list-style-type: none"> ○ walling trowel ○ pointing trowel ○ jointing iron ○ wheeled recessed jointer ○ brick hammer ○ club hammer ○ bolster chisel. <p>Topic A.2 Materials used for constructing brickwork and blockwork</p> <p>Types of materials used for brickwork and blockwork and their properties.</p> <ul style="list-style-type: none"> ● Bricks including facing bricks, common bricks and engineering bricks. <ul style="list-style-type: none"> ○ Locations where the different types of bricks are used: <ul style="list-style-type: none"> – external skins of cavity walls, external walls, manholes, structural work internal feature walls, unseen work. ○ The properties that make them fit for purpose within that location: <ul style="list-style-type: none"> – structural strength, durability, aesthetics, porosity. ● Blocks including solid blocks, insulation blocks, fairfaced blocks: <ul style="list-style-type: none"> ○ Locations where the different types of blocks are used: <ul style="list-style-type: none"> – internal skins of cavity walls, internal plastered walls, internal unplastered walls, sub-structures. ○ The properties that make them fit for purpose within that location: <ul style="list-style-type: none"> – structural strength, insulation, aesthetics, porosity. ● Materials used for the preparation of mortar including building sand, cement, lime and water: <ul style="list-style-type: none"> ○ Typical mortar mixes and proportions, their properties and uses: <ul style="list-style-type: none"> – 1:3 cement/sand and 1:1:6 cement/lime/sand. ● Materials used for the forming of cavities: <ul style="list-style-type: none"> ○ Wall ties: wire, double triangular, butterfly, fishtail, polypropylene. <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
Learning aim A: Understand tools, materials and equipment used for brickwork and blockwork			
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.		
Learning aim B: Develop practical skills using safe techniques to construct brickwork and blockwork			
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"> ● both faces of the wall are plumb to a tolerance of ± 10 mm per m height and length ● face plane deviation to both faces of the wall is accurate to ± 10 mm.* 	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"> ● brickwork is clean with bricks selected, blended and laid with an appropriate joint ● both faces of the wall are plumb to a tolerance of ± 5 mm per m height and length ● face plane deviation is accurate to ± 5 mm.*

#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.

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*.

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 or make a presentation to their peers and their teacher. When presentational or oral evidence is provided, this should be confirmed via an observation 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 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.

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 will need to work safely when completing the practical task including wearing personal protective equipment (PPE). This can be evidenced throughout the practical activity via an observation record.

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.

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 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 7: Exploring Painting and Decorating Principles and Techniques

Level: **1 and 2**

Unit type: **Optional Specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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
<p>Learning aim A: Understand tools, materials and equipment used in painting and decorating</p>
<p>Topic A.1 Tools in painting and decorating</p> <p>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.</p> <ul style="list-style-type: none"> ● Surface preparation tools, including: <ul style="list-style-type: none"> ○ sizes of scraper, filling knife, putty knife, shavehook, caulking board, hacking knife, hot air stripper, dusting brush, sanding block ● Paint application tools, including: <ul style="list-style-type: none"> ○ paint kettle, paintbrush sizes and different filling types, paint roller frames and sleeve options, paint roller tray, scuttle. ● Wallpaper hanging tools, including: <ul style="list-style-type: none"> ○ 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.
<p>Topic A.2 Materials in painting and decorating</p> <p>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.</p> <ul style="list-style-type: none"> ● 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).
<p>Topic A.3 Equipment for painting and decorating</p> <p>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.</p> <ul style="list-style-type: none"> ● 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
Learning aim A: Understand tools, materials and equipment used in painting and decorating			
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
Learning aim B: Develop practical skills using safe working techniques to complete surface preparation tasks and apply surface finishes			
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"> • filling and sanding large and minor surface imperfections • sanding smooth with no visible scoring or scratching of the surface.

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

#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.

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*.

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.

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.

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). 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 Paperhanging	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		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 8: Exploring Plumbing Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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>Learning aim A: Understand tools, materials and equipment used for plumbing operations</p>
<p>Topic A.1 Tools and equipment used for undertaking plumbing operations</p> <p>Purpose and use of tools and equipment for plumbing operations.</p> <ul style="list-style-type: none"> ● Hand tools, power tools and equipment including: <ul style="list-style-type: none"> ○ measuring tape ○ tube cutters ○ wheel cutters ○ junior hacksaw ○ hand saw ○ power tools ○ spanners ○ wrench ○ half round file ○ pipe grips ○ pipe cutters ○ screwdrivers ○ bench vice ○ tube bending machine ○ blowtorch ○ spirit level. <p>Topic A.2 Materials used for undertaking plumbing operations</p> <p>Types of materials used for plumbing operations and their in-situ properties.</p> <ul style="list-style-type: none"> ● Copper and brass fittings: <ul style="list-style-type: none"> ○ copper tube, different diameters and uses ○ standard copper jointing fittings, straights, 90° elbows, 'T' junctions, pre-soldered ring and plain-end feed types ○ solders and fluxes. ● Brass fittings, compression and ancillary fittings ● Plastic pipe and fittings: <ul style="list-style-type: none"> ○ plastic pipework, different diameters, water supply and waste pipework ○ standard jointing fittings, push fit, solvent welded. ● Appliances: <ul style="list-style-type: none"> ○ different types of user appliances – sinks, wash hand basins (whb), toilets, baths, showers ○ service and waste system connections to appliances. <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 and 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
Learning aim A: Understand tools, materials and equipment used for plumbing operations			
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
Learning aim B: Develop practical skills using safe techniques to undertake plumbing operations			
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"> ● compression fitting ● manual bends ● soldered joints ● tested to 1 × the operating pressure.+ * 	2B.M3 Construct a simple pipe rig framework to: <ul style="list-style-type: none"> ● ±5 mm in length and ±5 mm in height measured against the rig drawing ● tested to 1.5 × the operating pressure.+ * 	2B.D3 Construct a simple pipe rig framework to: <ul style="list-style-type: none"> ● ±5 mm in length and ±5 mm in height measured against the rig drawing ● pass a pressure test standard 2 × operating pressure.+ *

+ 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.

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.

Learning aim A

Learners could provide written evidence or make a presentation to their peers and their 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 or make a presentation to their peers and 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. Complying with safe working practices can be evidenced by observation records.

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.

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 will need to work safely when completing the practical task including wearing personal protective equipment (PPE). This can be evidenced throughout the practical activity via an observation record.

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 measure and mark out materials for a pipe test rig framework to a given specification. Note there are no tolerances specified for level 1.

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.D2: learners must produce work that has an acceptable level of quality that includes the tolerances specified in 2B.M2 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. There are no requirements to pressure test the learners completed work at level 1.

(+) 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, 2A.M1, 2A.D1, 1A.1, 1A.2	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.	Material and equipment information. Teacher observation records.
2B.P3, 2B.P4, 2B.P5, 2B.P6, 2B.M2, 2B.M3, 2B.D2, 2B.D3, 1B.3, 1B.4, 1B.5, 1B.6	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.	Completed risk assessment. Quality-control and photographic records. Teacher observation records.

Unit 9: Exploring Electrical Principles and Techniques

Level: **1 and 2**

Unit type: **Optional specialist**

Guided learning hours: **30**

Assessment type: **Internal**

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>Learning aim A: Understand tools, materials and equipment used for electrical operations</p>
<p>Topic A.1 Tools and equipment used for undertaking electrical operations</p> <p>Purpose and use of tools and equipment for electrical operations.</p> <ul style="list-style-type: none"> ● Hand tools and equipment including: <ul style="list-style-type: none"> ○ measuring tape ○ cable cutters ○ cable strippers ○ junior hacksaw ○ pliers ○ stripping knife ○ screwdrivers ○ spirit level ○ electrical testing equipment. <p>Topic A.2 Materials used for undertaking electrical operations</p> <p>Types of materials used for electrical operations and their in-situ properties.</p> <ul style="list-style-type: none"> ● Cable: <ul style="list-style-type: none"> ○ 1.5 mm² lighting circuit cable and singles ○ 2.5 mm² ring final circuit power cable ○ singles cable. ● Electrical fittings: <ul style="list-style-type: none"> ○ single and double sockets, switched and unswitched ○ flex outlets ○ fused spur units ○ batten lamp holder: screw type, bayonet ○ ceiling roses ○ light switches, single, double ○ appliance plugs. ● Miscellaneous fittings: <ul style="list-style-type: none"> ○ plastic conduit ○ conduit junction boxes ○ conduit elbows ○ conduit T-junctions ○ back boxes ○ surface boxes ○ conduit saddle clips ○ equipment fixing materials: screws. <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
Learning aim A: Understand tools, materials and equipment used for electrical operations			
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
Learning aim B: Develop practical skills using safe techniques to undertake electrical operations			
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"> ● to a given specification with guidance ● accurate horizontally to 10 mm.* 	2B.P5 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> ● to a given specification. ● accurate to 3 mm deviation from straight.* 	2B.M2 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> ● to a given specification ● accurate to 2 mm deviation from straight ● no insulation damage by hammer or clips.* 	2B.D2 Measure and mark out cables and conduits to produce a test rig circuit: <ul style="list-style-type: none"> ● to a given specification ● accurate to 1 mm deviation from straight ● with no insulation damage by hammer or clips.*

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"> all sockets level, in position to within $\pm 10\text{mm}$. <p>The test rig must:</p> <ul style="list-style-type: none"> pass tests for continuity, insulation resistance and polarity.* 	<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"> all sockets level, in position to within $\pm 3\text{mm}$ no exposed electrical conductors. all earth sleeving in position correct colour coding. <p>The test rig must:</p> <ul style="list-style-type: none"> pass tests for continuity, insulation resistance and polarity.* 	<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"> all sockets level, in position to within $\pm 2\text{mm}$ conduits neatly fixed to the circuit board no exposed electrical conductors all earth sleeving in position correct colour coding <p>The test rig must:</p> <ul style="list-style-type: none"> pass tests for continuity, insulation resistance and polarity.* 	<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"> all sockets level, in position to within $\pm 1\text{mm}$ conduits neatly fixed to the circuit board no exposed copper conductors no exposed electrical conductors all earth sleeving in position correct colour coding <p>The test rig must:</p> <ul style="list-style-type: none"> pass tests for continuity, insulation resistance and polarity.*

#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 1998, 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.

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.

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

Learning aim A

Learners could provide written evidence or make a presentation to their peers and their 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. When presentation or oral evidence is provided, this should be confirmed via teacher observation.

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 can provide the evidence required for working safely and compliance with safe working practices including the use of personal protective equipment (PPE).

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.

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 will need to work safely when completing the practical task including wearing personal protective equipment (PPE). This can be evidenced throughout the practical activity via an observation record.

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 measure and mark out materials for an electrical test rig to a given specification.

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. 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, 2A.M1, 2A.D1, 1A.1, 1A.2	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.	Material and equipment information. Teacher observation records.
2B.P3, 2B.P4, 2B.P5, 2B.P6, 2B.M2, 2B.D2, 2B.M3, 2B.D3, 1B.3, 1B.4, 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.	Completed risk assessment. Quality-control and photographic records. Teacher observation records.

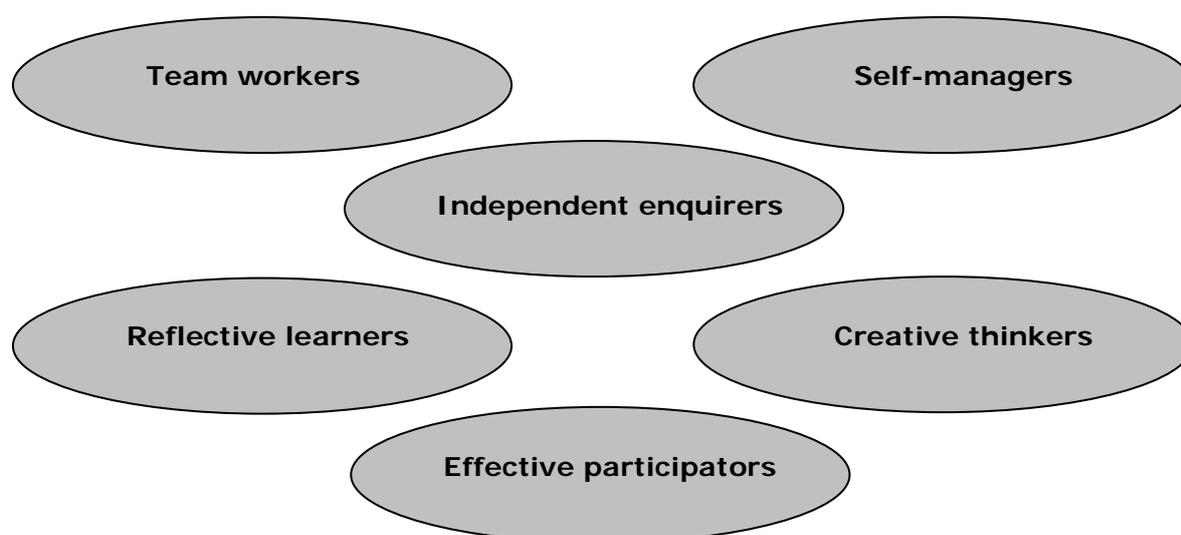
Annexe A

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 are 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	✓				✓	

Annexe B

Synoptic assessment

Unit 3: Construction and Design, provides the synoptic assessment for this qualification. Learners studying this unit will need to demonstrate a number of synoptic approaches towards meeting the assessment criteria. These include:

- being able to interrelate overarching concepts and issues, bringing together their construction and the built environment knowledge in responses to assessment in Unit 3
- selecting, drawing together and integrating knowledge, understanding and skills across different units, to develop an appreciation of how topics are coherent and relate to one another and how each may contribute to different construction and the built environment contexts or situations
- demonstrating their ability to use and apply a range of different methods and/or techniques drawn from across the qualification units in their response to assessment of Unit 3
- being able to make connections by suggesting or applying different approaches to contexts or situations in responses to assessment of Unit 3
- developing an appreciation and awareness of the use of different techniques, methods or approaches to investigate and/or address specific construction and the built environment needs, issues or situations
- evaluating and justifying their decisions, choices and recommendations, drawing on and integrating knowledge, understanding and skills from across the qualification in their responses to assessment of Unit 3.

For example, the learner will have to consider the needs of the client and the constraints of a project. This closely links to *Unit 1: Construction Technology* including performance requirements of materials used in the construction industry, common structural forms for low-rise construction, preconstruction and site based preconstruction, groundworks and foundations, different structures and *Unit 2: Scientific and Mathematical Applications for Construction* including, effects of forces on materials and buildings, how materials change and respond to changing environmental conditions, application of algebra to solve problem, the use of measurement when calculating areas and volumes to calculate costs of time and materials.

Specification

BTEC FIRST CONSTRUCTION AND BUILT ENVIRONMENT

Award

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