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Award • Certificate

Delivery Guide

CONSTRUCTION AND THE BUILT ENVIRONMENT

From January 2013

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

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

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Welcome to your BTEC First delivery guide

This delivery guide is a companion to your BTEC First specification. It contains a wealth of ideas for practical activities, realistic scenarios and independent learning, helping to bring the content of the units to life. The aim of this guide is to show how the content of the specification might work in practice and to inspire you to start thinking about different ways to deliver your course. The guidance has been put together by teachers who understand the challenges of finding new and engaging ways to deliver a BTEC programme, which means you can be sure the guidance is relevant and achievable.

Unit-by-unit guidance is given and includes suggestions on how to approach the learning aims and unit content, as well as providing ideas for interesting and varied activities. You will also find a list of carefully selected resources for each unit, including suggestions for books, websites and videos that you can either direct your learners to use or that you can use as a way to complement your delivery.

Guidance about the new features of the BTEC Firsts is also included, providing an explanation of how these work and what you will need to consider as you plan the course. You will also find comprehensive coverage of assessment, including useful advice about external assessment, as well as extensive guidance about how to plan, design and deliver your assignments. Information about the Quality Assurance process will help you understand the different roles and responsibilities of individuals within your centre, and how you can work closely with Edexcel to enable the successful running of your programme.

This delivery guide is intended to be read in conjunction with the qualification specification.

- The specification tells you what must be taught and gives guidance about how it should be assessed.
- This delivery guide gives suggestions about how the content could be delivered.

The suggestions given in this delivery guide link with the suggested assignment outlines in the specification but they are not compulsory; they are designed to get you started and to spark your imagination.

Remember that all assignments must go through internal verification before being delivered to learners.

When combining units for a BTEC First qualification, it is the centre's responsibility to ensure that the qualification structure(s) in the specification are adhered to.

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1 Introducing the new BTEC Firsts in Construction and the Built Environment

The Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment have been developed to inspire and enthuse learners to become engaged with the world of construction. The new BTEC Firsts will help learners to develop their knowledge of the construction sector, while introducing them to the theory and allowing them to practise a range of skills.

The BTEC philosophy of learning through doing remains at the heart of this qualification, in which learners are given the opportunity to gain a broad understanding and knowledge of skills in the construction sector.

Developing the qualification in response to change

The new suite of BTEC Firsts is now available on the National Qualifications Framework (NQF). The NQF fully supports both academic and vocationally related progression pathways and, unlike the QCF, is not purely for competency-based qualifications.

Professor Alison Wolf's *Review of Vocational Education* was published in March 2011. The Government has since accepted her proposals in full and the Department for Education (DfE) has produced a list of seven characteristics that all high-value vocational qualifications for pre-16 learners should demonstrate. Specifically, they should:

1. be at least as big as a GCSE in terms of guided learning hours (GLH),
i.e. 120 GLH
2. contain an element of external assessment, e.g. an externally set and marked test taken under specific conditions
3. contain some synoptic assessment so that learners appreciate the breadth of their course and the links between its different elements, rather than just taking units in isolation from each other
4. be graded, e.g. Pass, Merit, Distinction and Distinction*
5. contain content appropriate for learners aged 14+
6. enable progression to further study in the same subject at the next level, and also support progression to broader study at the next level
7. have a proven track record, measured by an uptake of at least 100 learners in five centres.

As part of the development of the new BTEC Firsts in Construction and the Built Environment, we have taken into account many consultations with schools, further education and higher education institutions, and employers. You joined us in our biggest ever market research and consultation process to ensure that the new BTEC Firsts demonstrate best practice.

Core units

The Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment comprises two core units:

- *Unit 1: Construction Technology* – allows you to deliver the fundamentals of construction technology. Learners will develop an understanding of the different forms of construction that can be used for low-rise offices, retail units and homes. Learners will also study the structural performance required for both sub-structures and superstructures, including the methods that are used to construct different types of foundations and superstructure elements. They will also develop a detailed understanding of the functional requirement of building elements and how walls, floors and roofs are detailed, including how this will change from one construction project to another. Different construction projects use different techniques. For example, the further north in the UK you construct buildings, the greater the use of traditional cavity wall techniques as these will resist the cold and the rain better than the use of a timber-framed construction. This unit is **externally assessed** through a paper-based exam.
- *Unit 2: Construction and Design* – this unit enables you to deliver the fundamentals of construction and design in an engaging and flexible way. The first learning aim allows learners to develop a broad understanding of the construction industry and how it works. As the learner moves through the unit they will start to look at the influence of clients' needs on the building design, and develop their own design briefs. They will then be able to produce a series of sketch ideas or proposals to fit the brief. This unit will allow learners to develop knowledge of key design principles in an engaging way. This unit is **internally assessed**.

Mandatory units

The BTEC Firsts in Construction also contain **mandatory units**. Learners taking the BTEC First Award must take Unit 3 in addition to the core units, while those taking the BTEC First Certificate must also take both Unit 3 and Unit 11:

- *Unit 3: Scientific and Mathematical Applications for Construction* – this unit is mandatory as it contains a number of key principles that learners must study in order for them to be able to progress to further learning within the construction industry. Within the unit, learners will develop an understanding of the effects of forces and temperature changes on materials used in construction. They will also learn how to use mathematical techniques to solve practical construction problems. The content of this unit has been designed with a focus specifically on concepts that will be immediately useful to learners when they undertake construction activities. This unit is **internally assessed**.
- *Unit 11: Sustainability in Construction* – this unit is mandatory as employers have highlighted the high importance of sustainability in the industry. In this unit, learners will develop a broader understanding of the important topic of sustainability and how construction can have an impact on the environment. They will also examine techniques that can be used within construction projects to reduce the impact of construction on the environment and improve the long-term sustainability of a development. This unit is **externally assessed** through a paper-based exam.

Optional specialist units

The optional specialist units included in the new BTEC Firsts in Construction and the Built Environment allow both flexibility and variation in the programme you choose to deliver. There are units covering a number of different areas of construction, including construction processes and operations, and drawing techniques, as well as the various major craft areas in the construction world, i.e. carpentry and joinery, brickwork and blockwork, painting and decorating, plumbing and electrical.

The optional specialist units are:

- *Unit 4: Construction Processes and Operations*
- *Unit 5: Construction Drawing Techniques*
- *Unit 6: Exploring Carpentry and Joinery Principles and Techniques*
- *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques*
- *Unit 8: Exploring Painting and Decorating Principles and Techniques*
- *Unit 9: Exploring Plumbing Principles and Techniques*
- *Unit 10: Exploring Electrical Principles and Techniques*
- *Unit 12: The Construction Industry*
- *Unit 13: Exploring Roofing Principles and Techniques*
- *Unit 14: Exploring Wall and Floor Tiling Principles and Techniques*
- *Unit 15: Exploring Plastering and Dry Lining Principles and Techniques*

Progression opportunities

The BTEC Firsts in Construction and the Built Environment provide the skills, knowledge and understanding for level 2 learners to progress to:

- other level 2 vocational qualifications
- level 3 qualifications, such as the Edexcel BTEC Level 3 National in Construction and the Built Environment or a construction apprenticeship
- academic qualifications, such as GCE in Design and Technology
- employment within the construction sector.

Learners who achieve the qualification at level 1 can progress to a BTEC level 2 qualification or to academic or other vocational level 2 qualifications.

2 Key features of the BTEC Firsts explained

We are always working to ensure our qualifications are relevant, and that they support opportunities and progression for young people. We have updated the current BTECs to meet the needs of today's learners, teachers, educators, employers and universities, and also to reflect the policy decisions being introduced following *The Wolf Report* (March 2011) on vocational education. Our new BTECs contain a number of new features and it is important that you understand these and how they relate to your delivery of the course.

Core units

Each subject in the new suite of BTEC First qualifications contains core units totalling 60 guided learning hours (GLH). These units have been developed in consultation with employers and educators in order to cover the essential knowledge and applied skills that are a foundation of the sector, and the knowledge and skills that will underpin learning of the optional units.

There are usually two contrasting types of core unit. One type focuses on essential knowledge and the other focuses on applying essential vocational skills. In the BTEC First Award in Construction and the Built Environment, the core units are:

- *Unit 1: Construction Technology*
- *Unit 2: Construction and Design*

Unit 1 is externally assessed using a paper-based examination. The external assessment provides independent confirmation that the standards are being met. It represents a maximum of 25 per cent of the overall assessment but does not distort the general BTEC approach, which continues to focus on predominantly portfolio-based applied learning.

The core units are an important part of the qualification and learners must gain sufficient marks to pass the core overall. However, it is possible to gain an unclassified grade in the externally assessed unit and still pass the core if the learner achieves a high enough mark in the internal assessment.

Mandatory units

The BTEC First Level 1/Level 2 Certificate also contains two further mandatory units totalling 60 GLH:

- *Unit 3: Scientific and Mathematical Applications for Construction*
- *Unit 11: Sustainability in Construction*

Unit 11 is externally assessed using a paper-based examination. The external assessment provides independent confirmation that the standards are being met. Combined with Unit 1, external assessment represents a maximum of 25% of the overall assessment. This does not distort the general BTEC approach, which continues to focus on predominantly portfolio-based applied learning.

Employability skills within BTEC

Helping learners to progress into employment has always been a cornerstone of BTEC qualifications. Equipping learners with the skills they will use in the workplace is at the very heart of BTEC and remains an important driver in determining the content of each qualification. When developing our qualifications, we work closely with employers to understand the skills they are looking for in new entrants to their

industries. The vast majority of employers not only require learners to have certain technical skills, knowledge and understanding to work in a particular sector, but they are also looking for what are termed **employability skills**. These are the skills that underpin the different tasks and duties that a person can be expected to undertake in their role, and are applicable across sectors.

Unlike technical skills, which may become outdated over time, employability skills enable learners to adapt to the ever-changing roles needed to survive in the global economy.

The CBI definition of employability skills is based on a positive attitude (readiness to take part, openness to new ideas and activities, desire to achieve) that underpins the seven following characteristics.

1. **Self-management:** readiness to accept responsibility, flexibility, time management, readiness to improve own performance.
2. **Teamworking:** respecting others, co-operating, negotiating/persuading, contributing to discussions.
3. **Business and customer awareness:** basic understanding of the key drivers for business success and the need to provide customer satisfaction.
4. **Problem solving:** analysing facts and circumstances, and applying creative thinking (including aesthetic appeal) to develop appropriate solutions.
5. **Communication and literacy:** application of literacy, ability to produce clear, structured written work, and oral literacy (including listening and questioning).
6. **Application of numeracy:** manipulation of numbers, and general mathematical awareness and its application in practical contexts.
7. **Application of information technology:** basic IT skills, including familiarity with word processing, spreadsheets, file management and use of internet search engines.

In a recent CBI/Pearson education and skills survey, *Learning to Grow: What employers need from education and skills 2012*, it was noted that employers (71 per cent) believe schools and colleges should prioritise developing employability skills. They also want to see more being done to develop literacy (50 per cent), numeracy (45 per cent) and technology skills (30 per cent).

How employability skills are promoted and developed in BTEC courses

All internally assessed BTEC units are based on centre-devised assignments that require learners to produce evidence of learning applied to a work-related scenario. For example, in Unit 2 learners are placed within the vocational context of an architectural practice. Within this scenario, learners will act in a junior role to assist in producing a client brief, by analysing the client's needs and site constraints. This is further extended through the learner producing sketch designs for the client and reviewing these against the obtained brief.

Suggestions for high-quality assignments are provided in the specifications and in the authorised assignment briefs. For example, in *Unit 3: Scientific and Mathematical Applications for Construction*, the following scenario is provided.

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.

Assessment evidence: a presentation to include text, diagrams, tables, graphs, test results and calculations as appropriate, accompanied by a written report.

Problem solving is developed through the research and/or practical part of the assignment, where the learners should create their own solution to the problem

being outlined in the assignment. All assignments require **self-management** in that it is the responsibility of the learners to plan their work (within a framework provided by the teacher) and to ensure they report their progress back to the teacher as required, raising any issues/problems and submitting evidence to the set deadline.

Some of the assignments may require learners to work with others in small groups to investigate construction methods or processes, which will build **team working** skills. Care should be taken when this is undertaken within assessment to ensure that learners record their individual contribution, and how it fully meets the assessment criteria, within their assessment work.

BTECs are vocational qualifications. This means that learners are preparing to work in the construction sector and so must have a sound understanding of how the sector operates, and the different roles and responsibilities within it, covering design, construction and use of the built environment. The BTEC Firsts in Construction and the Built Environment introduce these concepts to the learner through units such as *Unit 2: Construction and Design*. For Unit 2, learners have to identify a client's needs for a given project and the constraints on their design, followed by some initial sketches on design concepts.

In the BTEC Firsts in Construction and the Built Environment, each unit introduces a different aspect of the construction industry. The initial unit examines the technology that enables buildings to be constructed, along with the different methods that can be employed. Subsequent units examine the processes and organisation from the design stages of the construction project through to the operations on site and the planning behind them. Later units give learners the choice to explore and cover aspects of construction drawing, construction processes and operations, carpentry and joinery, brickwork and blockwork, painting and decorating and plumbing and electrical techniques.

Mastery of the essential skills of **communication and literacy** and **application of numeracy** are at the heart of a young person's ability to progress, as identified in the Wolf Report. These skills are woven throughout BTECs and tackled in two specific ways.

1. **Embedded maths and English throughout the units, mapped to GCSE and functional skills.** Opportunities to practise these essential skills in naturally occurring and meaningful contexts are provided throughout the units, where appropriate to the sector. In the specifications, *Annexe B* and *Annexe C* show where an assessment criterion in a BTEC First unit can provide an opportunity to practise a subject content area from the GCSE English and Mathematics subject criteria.
2. **Sector-specific mathematics and English units, where appropriate.** *Unit 3: Scientific and Mathematical Applications for Construction* provides learners with an opportunity to understand how mathematics is used in construction projects, and to develop the mathematical skills needed to solve a variety of construction problems. The assessment criteria within this unit use the application of mathematics within a construction context.

Throughout the course, learners are encouraged to **apply information technology** by producing their assignment work to the highest standard with forward-looking use of IT at the heart of their work, whether this is using the internet to do research, producing word-processed documents as evidence, or using sophisticated packages to record results aurally or visually. The assessment guidance for each unit provides suggestions for how evidence can be presented, and use of electronic portfolios is highly recommended.

Personal, learning and thinking skills

In addition to those qualities outlined by the CBI/Pearson, the qualifications were also developed with **personal, learning and thinking skills (PLTS)** in mind. The PLTS closely map to the CBI definition of employability skills in that they develop:

- independent enquirers
- creative thinkers
- reflective learners
- team workers
- self-managers
- effective participants.

A mapping grid showing coverage of these skills in each unit appears in *Annexe A* of the specifications.

Contextualised English and mathematics

The new BTEC First qualifications have been designed to help learners to develop their essential skills in English and mathematics.

It is recognised that good literacy and numeracy skills are highly valued by employers and by wider society and that achievement of English and mathematics at GCSE level is key to progression through the education system and into employment. The current Government has refocused attention on this need with a number of education policy announcements, and development of English and mathematics was a key recommendation in the Wolf Report.

Research has shown that for many learners the most effective way of developing their mathematical skills and of improving their functional skills in English is to learn them within the context of a specific area of vocational interest. Therefore, in the new suite of BTEC Firsts we have provided opportunities for contextualised maths and English so that learners can practise these essential skills in a meaningful way within naturally occurring contexts.

GCSEs in mathematics and English are the current benchmark of achievement, so we have signposted the assessment criteria of the BTEC Firsts to content from these GCSE qualifications, specifically to the more functional parts of their content. This signposting, which is indicated by a * sign for maths and a # sign for English, shows where learners should be able to practise and develop their skills. These instances occur naturally within the BTEC Firsts, for example when communicating or compiling reports, but can be emphasised and drawn out during teaching and learning. More detail on how this can be done is given on a unit-by-unit basis in the qualification specification.

Where signposting does occur in the unit specification, it indicates that English and mathematics knowledge and skills are a constituent part of the assessment requirements of the units. This does not mean that the BTEC assessment criteria cover the whole of the GCSE or Key Stage 4 requirements but that learners can practise specific areas of English and mathematics. You may want to highlight this opportunity to learners during delivery.

Annexe B and *Annexe C* in the specification show the exact relationship between the BTEC assessment criteria and the GCSE subject content. The mathematics content listed is a consolidation of the full requirements in GCSE Mathematics. Note that GCSE English and GCSE Mathematics already cover functional skills.

The following example demonstrates when learners will be able to develop their mathematics skills within the context of a specific vocational area.

Unit 3: Scientific and Mathematical Applications for Construction – 1B.4, 2B.P3, 2B.P4, 2B.M3, 2B.D2 – where learners use lengths, areas and volumes, along with mensuration and algebraic techniques to solve practical construction problems.

Delivery tips: examples of good practice

There are a number of different ways that centres can effectively manage the delivery of units to strengthen the provision of English and mathematics. Here are two examples.

Collaboration between the vocational teacher and mathematics/English teachers

- In this example the actual mathematics and English concepts are taught by subject teachers but they use contextualised examples from the vocational sector to make the learning meaningful. The learners are in timetabled slots where they attend mathematics and English lessons.
- This approach works well in larger centres where there are many learners taking the same vocational route. It works less well when there is a range of vocational sectors in the same mathematics/English class, although it can still be effective if the respective teachers work closely together to plan the learning programme.

Mathematics and English contextualised by the vocational teacher

- In this example, the learners have timetabled slots, as part of their vocational contact time, in which their vocational teachers focus on presenting and practising mathematics and English concepts. This model is particularly motivating for learners because they see the direct link between skills and application, but it relies on the vocational teachers being comfortable with teaching mathematics and English concepts and theories.

Whichever model is chosen, we recommend that timetables include specific slots to focus on the teaching of mathematics and English in the context of the vocational course.

Supporting learners who are unable to achieve their level 2 qualification

The new suite of BTEC Firsts is for learners aiming to achieve a level 2 qualification. Most will achieve this, but some will not. These learners may have struggled to provide sufficient evidence in their assignments or they may have failed their external assessment.

The new BTEC First qualifications give you the opportunity to assess your learners at level 1 if they are not able to reach level 2 standards, recognising their learning and achievements.

All the assessments you create must be written against the level 2 criteria and be reliable and fit for purpose. You should not create a separate level 1 assignment. If a learner does not provide sufficient evidence to meet the level 2 criteria, only then should you assess their work against the level 1 criteria. The grade given will be Unclassified if the learner does not meet the level 1 criteria.

An example of a learner being assessed against a level 1 criterion

Below is an example of an assessment grid, taken from *Unit 5: Construction Drawing Techniques*. Each assessment grid includes level 1 assessment criteria.

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.		

In the scenario below learners are given the following assignment:

Assignment title: Producing Construction Drawings

Scenario: 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.

Assessment evidence: A portfolio containing two floor plans, one front and one rear elevation, one section showing staircase details, one foundation detail and one roof detail.

To achieve the criteria at Level 2 Pass, the evidence produced must show that the learner is able to produce a drawn portfolio of drawings listed within the assessment criteria using standard graphical techniques. The drawings have to be produced at level 2 to a suitable scale and technically accurate for the merit and distinction grades.

To achieve the criteria at level 1, learners have to produce drawings to meet a given brief drawn to a suitable scale using some standard drawing conventions.

Learners who achieve at level 1 can consider the following progression routes.

- Use the skills, knowledge and experience they have gained to retake their level 2 qualification.
- Choose to study a different subject at level 2.
- Work towards an apprenticeship at level 2.

3 Assessment guidance

Assessment for the new BTEC Firsts

BTEC assessment has always been about:

- ensuring that learners are assessed for their skills as well as their knowledge
- ensuring that learners are given the chance to show what they have learned in vocational and applied contexts
- allowing learners to be assessed when they are ready and when a centre is able to fully support them
- providing learning through doing, opportunities for formative assessment and opportunities to extend performance by learning from assessment feedback.

While updating the BTEC Firsts, we have not changed these fundamentals – BTEC assessment will remain a positive statement of achievement.

The introduction of external assessment will reinforce learner engagement, giving them clear goals and targets in a way that helps them to understand the challenges of working life.

Experienced BTEC teachers should think about whether or not they need to change their delivery pattern to make sure they can provide access to external assessment at the best time. At the same time, there are some important developments in internal assessment that you should also be aware of as you plan your assessment for the year.

External assessment

After careful discussion with centres and other stakeholders, we have tailored the type of external assessment to meet the needs of the sector. All the assessments will be distinctively vocational, enabling learners to apply their learning in vocational or applied contexts.

For your sector you need to check:

- which unit(s) are to be externally tested
- the assessment method
- the availability of assessment for the first time
- the availability of retake opportunities (allowing for results)

For the construction sector, completion of the externally assessed Construction Technology unit could be undertaken after the unit has been delivered at the beginning of the calendar year following the first term. The GLH for the unit is 30 guided learning hours and so this could be covered within the first term and then following a programme of revision prior to the examination. Taking this unit first fits well with the following core then optional units that you might wish to explore with your learners. It will provide a foundation of knowledge and understanding of construction that they can build upon with the other units.

The externally assessed unit will often be one that provides a core of knowledge that will be enhanced, developed and applied through other units. Learners' depth of understanding of the content of externally assessed units is likely to be enhanced by applying knowledge through other units. Therefore, when you are planning and delivering your units, think about how you can bring out examples that would be useful illustrations of issues covered in the external unit(s).

Each specification has details about when assessment is available. To gain access to the assessments, learners have to be registered for a programme – the arrangements for this will be the same as for all BTECs. Please refer to our *Information Manual* on the website.

We will do everything we can to make external assessments relevant, engaging and suited to learner needs so that they support the overall development of the learner rather than being a hurdle or distraction. You should not enter learners for external assessment to check how they are doing or to give them practice – we provide sample materials for use in learner preparation.

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

This assessment is designed to be completed at the end of the period of guided delivery for the unit when learners can apply the broad range of what they have learnt to a specific vocational application set within the external assessment.

Unit 1: Construction Technology	
Type of external assessment	This unit is assessed externally using a paper-based exam marked by Edexcel. The assessment must be taken by the learner under examination conditions.
Length of assessment	The external assessment will be one hour.
No. of marks	50
Assessment availability	January and June
First assessment availability	June 2014

Unit 11: Sustainability in Construction	
Type of external assessment	This unit is assessed externally using a paper-based exam marked by Edexcel. The assessment must be taken by the learner under examination conditions.
Length of assessment	The external assessment will be one hour and 15 minutes.
No. of marks	50
Assessment availability	January and June
First assessment availability	June 2014

Assessment and grading for internally assessed units

Internal assessment remains the main assessment method for BTEC qualifications because we believe that assignments set and marked within the centre provide the most relevant vocational learning experience for your learners.

You should guide both the teaching and the learning to ensure that learners are assessed validly and reliably in a way that is relevant for a vocational qualification. Your teaching of the knowledge, skills and vocational applications will underpin a learner being able to demonstrate achievement through assessed assignments. An assessed assignment must have a clear structure and timescale, and encourage the learner to show relevant evidence. You can then make a qualitative judgement on the evidence using the assessment criteria.

For those who are used to teaching BTEC not much has changed, but we are putting more emphasis on some requirements and helping to build good practice.

- You should use the new presentation of units, where learning aims are placed with associated assessment criteria, to provide building blocks for assessment – these are clear and simple to use and we recommend that you work through them with your learners.
- Your assessment plan for units and for the programme must be clear at the outset of the programme and signed off by your centre Lead Internal Verifier.
- Your centre's Lead Internal Verifier must authorise your assignments. If you don't have a centre Lead Internal Verifier who has been through standardisation, you should use support from us to ensure that your assignments are fully fit for purpose. You can use our endorsed assignments or you can access the assignment checking service through our website.
- You need to be explicit about the timescales and the evidence for assignments – there is nothing new about this but we will be expecting centres to follow best practice and to be very clear for their learners.
- You need to set out expectations through tasks and evidence – remember that the criteria are used to judge evidence and are not tasks in their own right.
- You need to be clear with your learner about the type of assessment – **formative** assessment takes place during the assignment and after the interim submission date, whereas **summative** assessment takes place after the final submission date and can only then be revisited **once**. A learner may be given **one** opportunity to retake a completed assessment after a summative grade has been given. You should also highlight what each of the dates on an assignment means.
- You should ensure that all work has been produced authentically so you will need to have checks in place to ensure that learners are submitting their own work.

How assignments are used

Assignments are used to assess learner achievement. You may also use assignments as a tool for learning, particularly where practical demonstration or application is involved. You should work with the other people in your programme team to design a plan of activity for the year, or the programme as a whole so that assignments have a clear schedule for the start, the finish and for internal verification.

A key question to ask is, 'How many assignments do I need?' Your assessed assignments should cover at least one learning aim within a unit. You may choose to set an assignment for a whole unit or even bring units together for assessment. Remember that this means your **assessed** assignments – of course you may set small activities before assessed assignments to provide learning opportunities and

build skills. These preparatory activities may often use group work and research as a preparation for undertaking the assessment itself.

In making a decision about how many assignments to use, consider the resources you have in your centre, what is available in the locality, how you could use links with local employers, and what opportunities there are for relating assessment to realistic vocational themes.

Top tips

- If a unit builds up – for example by ‘plan’ and then ‘do’ and then ‘review’ – then one large assignment may work best.
- If a unit requires several forms of evidence then several assignments may be best.
- It is good to emphasise the links between units but it is harder to manage assessment across units – if you feel this is a good approach then be clear on how you will reach one decision for a unit.

You need to think about how the evidence that the learner will produce can be verified and about how you will know that what each learner has done is authentic. You can only accept for assessment learner work that you know has been produced in a way that demonstrates the learner’s own achievement.

Assignment ‘warm-up’ – active teaching and learning

Your learners will do their best if they are motivated through engaging and realistic activities. All units involve ‘teaching the basics’ but learners need to get involved in order to understand where what they are learning fits in.

You can use your resources and your imagination to really bring learning alive. You can encourage learners to try things out in groups, role plays, presentations and practical demonstrations. You can use visits and talks for research – remember you will need to structure what you do so that learners get the information they need by, for example, providing a question sheet for them to use during a talk or visit.

You can encourage learners to ‘get their hands dirty’ by trying something out. You can build up their skills so that they will be able to show them off confidently in the assessed assignment.

You can use this ‘warm-up’ time to emphasise practical links between units, so that when learners are carrying out tasks they appreciate that they are often simultaneously drawing on skills/understanding from different units. It is difficult to set up assessed assignments that span multiple units, but it is important that learners appreciate the holistic way that their learning prepares them for further study or employment.

Introducing the assignment

Your teaching and learning phase is going to lead directly into the assessed assignment. You may be setting this up in a very specific way – such as everyone completing a practical activity in a timed slot – or this may be independent work spread over a number of weeks.

It is important to remind learners preparing work for assessment that they have to produce it themselves and that they have to meet the deadlines you give them. You need to give them feedback on their progress at defined points – this helps you to know that what they are doing is authentic, and helps them to know how they can extend their evidence.

Remember that you should be guiding learners so that they know their work must be their own. Look at each unit carefully for how the evidence generated will be judged using the assessment criteria, and what degree of input you can make.

Evidence for assignments

You can use different types of evidence for assignments. A description does not have to be written and a presentation could be given in a number of styles – for example PowerPoint®, verbal or a digital/video recording. You need to think about what is fit for purpose. So, if learners need to explain a plan, why not have them present it to an audience with a question and answer session?

You should check that the type of evidence you are planning is feasible – for example, if you ask learners to ‘write a memo’, the coverage of one or two sides of A4 in a mainly written format must be capable of generating sufficient evidence. Remember that whatever evidence your learners produce must be capable of being verified as well as assessed. So, if they are actually producing a model, a performance, a meal, a coaching session, a demonstration etc, you need to think about how it will be recorded or observed so that it can be checked during verification.

Learning aims and assessment criteria

A learning aim sets out what you should be covering in order to prepare the learners for assessment. It may define knowledge, understanding, skills and contexts, and the wording of the aim will suggest appropriate learning experiences. You may set an assessed assignment on more than one learning aim but you should not normally split a learning aim over assignments. The evidence produced in the assignment is judged using the assessment criteria, so you must make sure that what is produced will match those criteria.

What about the final grade for a unit?

The final grade for a unit is at Level 2 (Distinction, Merit or Pass), Level 1 or Unclassified. The assessment criteria are detailed in each unit so that you can clearly see what is required. You need to be aware that a unit grade can only be given once all the activities and assignments for that unit are complete. In giving assessment decisions to learners, you need to be clear about when you are giving a formal decision and how this relates to the assessment for the unit as a whole.

If you choose to include a learning aim in more than one assignment, you should be very clear with learners how a judgement will be reached through looking at the evidence *across* the assignments. For example, the learner may be asked to show the same skills in two different contexts. If so, they need to know if their performance in either is sufficient for assessment or if they must perform to the same standard in both.

Keeping clear assessment records

You can only use assignments as assessment instruments effectively if you work closely with other members of the assessment team and keep accurate records of what you are doing. Your records help you and the team to plan, review, monitor and support learners and ensure that assessment is authentic and accurate.

The centre Lead Internal Verifier has a very important role in ensuring that each teacher, assessor and internal verifier on the programme understands the standards and the processes for keeping assessment documents.

Your records are there to help you get it right for your learners. The main documents that you use, which can be used electronically, are:

- an assessment and verification plan for the programme, showing when each assignment starts and finishes, when it is verified, and which unit(s) or learning aims it covers
- an assignment brief template ensuring that all the key requirements of an assignment are covered
- a record of internal verification for the assignment brief
- a record that the learner completes when submitting an assignment, which should include the date and a declaration of authenticity
- a record of internal verification for an individual sample of learner work
- a record of progress for each learner, showing the assignments that have been completed and the assessment decisions given.

Giving interim feedback

Assessed assignments are used both as part of the learning and development process and as a formal assessment. You need to give two clear deadlines for an assignment: one for when interim feedback will be given; and one for when a final (summative) decision will be given.

Interim feedback should indicate how a learner is performing up to that point and give a clear indication of how the learner can improve. Take care when providing feedback or support that you are not compromising what the learner can achieve, because the criteria may require them to show independent selection or demonstration. The interim feedback point is the final chance for the learner to be given direction.

Between the interim feedback and the final provision of evidence, the learner should work independently.

Giving summative grades

At the end of an assignment you will need to reach a decision on assessment. If an assignment covers a whole unit then this will be a final summative grade; if it covers part of a unit then it will be a component of a final summative grade. In either case, it counts as a summative decision and should be internally verified and finalised.

Your decisions must be checked according to the plan signed off by the centre Lead Internal Verifier. For each assignment, a sample of learner work must be reassessed fully by the centre Lead Internal Verifier or another person acting as an Internal Verifier who has been directed by the centre Lead Internal Verifier. Once your decisions have been checked you can give these to the learners as 'final'. Remember that you will then be able to accept only **one** further attempt from the learner to provide further or better evidence for the learning aim(s) covered in that assignment.

You can only award higher grades if a learner has demonstrated the requirements of lower grades. This does not mean that the criteria represent different tasks or stages – you should be able to apply the criteria to the same evidence if the assignment is structured carefully.

A summative 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 the Level 2 Pass, Merit and Distinction criteria, providing evidence 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 evidence 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. The award of Level 1 is not achieved through a 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 a unit.

Improving performance

Your assignments should provide opportunities for learners to achieve at the highest level and should promote stretch and challenge. Not all learners will achieve a Distinction or a Merit, but it is important that they are provided with the opportunity to do so.

Where possible you should be looking to structure centre-devised assignments so that learners can produce evidence that can be used across the grade levels – don't assume that learners have to 'get pass out of the way first'. To 'aim high' your learners should be well prepared before they start the assignment and be encouraged to attempt to reach the highest standards.

Assignment design

Your centre devised assignments are a tool for encouraging learners to provide evidence for you to make assessment judgements. Good assignments are interesting and motivate learners.

The components of an assignment are:

- **scope** – outlines which unit(s) and learning aims are being covered and which criteria are being addressed
- **a scenario** – provides a setting and rationale for the assessment
- **tasks** – set out what a learner needs to do to provide the evidence required
- **evidence requirements** – set out exactly what the learner is expected to produce and how the assessment will take place
- **a timescale** – sets out start and hand-in dates and interim points for review.

Assignment briefs

Your assignments must be given to a learner formally as an assignment brief so that the learner knows they are being assessed and what is required of them.

The assignment brief includes:

- the qualification title
- the title and number of the unit(s)
- an assignment title and number (if more than one per unit)
- the learning aims
- the assessment criteria coverage

- the evidence requirements
- the start date
- the submission deadline
- any key dates, including a date for interim assessment.

You should include a record that it has been given to the learner, normally by inserting the learner's name into a copy of the assignment brief, but this could be recorded electronically.

Your learners should be provided with a form or other record for declaring that their work is their own and for confirming the date of submission.

Using an authorised assignment brief

We are preparing a bank of authorised assignment briefs that you will be able to access at www.btec.co.uk/authorisedassignments. It will include at least one authorised assignment brief for each internally assessed unit. For mandatory units, there will be enough authorised assignment briefs to cover all unit assessment criteria.

We ask you to internally verify every assignment to be used with learners every year, regardless of whether it is your centre devised assignment or one sourced from elsewhere. Once your assignment is internally verified, you can put it in your timetable and check that you have planned delivery of the appropriate unit content. This can be as simple as making sure you have planned an event, visit or performance as suggested.

- The centre Lead Internal Verifier should fit these assignments into the overall plan and know when they will be assessed.
- You may want to adjust the assignment to make it fit your learners' needs and your centre's resources.
- You should think about exactly how the evidence is going to be produced and whether or not your learners need guiding to relevant activities that they have already completed.
- You may need to plan for practical activities to be carried out and recorded.

It is important that you are as familiar with the authorised assignment brief as you would be if you had created the assignment yourself. Understanding the assignment will ensure that you plan activities that fully reflect the scenario given in the assignment and that you are prepared for the evidence learners submit.

The scenario

The assignment should be set in a vocational context that helps your learners to show what they have learned in a relevant way. This can often be achieved by asking learners to imagine they are in an appropriate job setting with a job role and job tasks. It could involve providing them with a brief of an activity that would be of value to a local employer, or without using a job context directly. It could draw on a real case study in order to allow application and analysis. You can draw on understanding of your sector to develop appropriate assessment contexts.

Evidence

You can choose suitable forms of evidence – it is possible to use a wide range of forms, from reports to presentations, from performances to diaries, from observation record to digital/video recordings.

You should match the evidence type(s) selected to the requirements of the unit(s) or learning aims(s). For example, if a learning aim requires the learner to undertake a practical demonstration then you should think about how that is going to be set up and recorded.

Be careful not to suggest a type of evidence that may be too short – for example, a ‘leaflet for new buyers’ may be a realistic form of assessment for business learners to produce but may not provide for sufficient breadth in itself, depending on the assessment requirements.

For some evidence, the period for its production must be time-constrained and in some cases you may want to ensure authenticity by having some evidence produced under supervised conditions.

The tasks

The tasks should be a clear statement of what a learner needs to do to produce the evidence. You may explain the tasks to learners in more detail during delivery, but the assignment itself should be clear. You should remember to relate tasks to the scenario and to the evidence required. If learners have been carrying out preparatory work – such as visits, rehearsals or skills exercises – then you may want to refer to this in the tasks.

Your tasks must:

- specify the nature and extent of the evidence
- be clear and include any specific materials or steps with times or dates when necessary
- refer to the assessment criteria that the evidence will be judged against
- encourage the generation of evidence that can be judged against the assessment criteria
- be presented in a way the learner can understand – remember that the assessment criteria are not in themselves tasks
- fit together to cover the learning aim sensibly, allowing learners to achieve to the best of their ability.

You must make sure that the tasks can generate evidence which cover the target assessment criteria. When you create tasks, you don’t have to use the exact wording of the assessment criteria, but you should pay close attention to it.

You should always list the assessment criteria covered by each assignment – and also normally within each task. When you quote the assessment criteria, please don’t change their wording. You can, of course, use a glossary of the wording of tasks to highlight to your learners what certain words mean. Many words will be repeated across criteria for different grades and your learners may find it useful if you highlight what the changes require.

You should remember that the assessment criteria are used to judge the evidence, so completion of a task related to identified assessment criteria does not automatically imply achievement.

Scope

You can choose the scope of an assignment provided that it fits well into the overall assignment plan for the unit(s) and the programme. For some qualifications it is normal practice to bring several units together for large-scale projects, while for others initial coverage of a topic in one unit may then be picked up in later, more specialist units.

When planning a unit-by-unit approach to assessment, you should make sure that learners understand through their learning how the units relate to each other, and that the requirements for synopticity are addressed.

Assignments that span several units should be carefully controlled, and you need to decide whether it is only the learning or both learning and assessment that is considered together.

If you assess a learning aim several times using different assignments then you, as part of the programme team, and the learners must be aware of when the summative grade can be given, and from what evidence. There is never any 'averaging' of achievement or 'aggregating' of separate decisions – a single decision should be reached based on the relevant evidence.

Learner responsibility

You should make sure that learners know they must meet their deadlines and provide work that is genuinely their own, otherwise their grades will be affected. To support learners, you should explain how to reference the work of others and how to work in such a way that ensures they can declare that their work is their own.

We recommend that learners are given a guide to their assessment at induction to the programme. You can reinforce the expectations when assessed assignments are handed out.

Quality assurance

What is quality assurance?

Quality assurance is at the heart of vocational qualifications. For many BTEC units, assessment is completed by your centre and your centre is responsible for the grading and standard of assessments.

- You use quality assurance to ensure that your managers, internal verifiers and assessors are standardised and supported.
- We use quality assurance to check that all centres are working to national standards. This is done by sampling your marked assignments.

What is the purpose of quality assurance?

In your centre, quality assurance allows you to monitor and support your BTEC delivery staff and to ensure that they understand, and are working to, national standards. It gives us the opportunity to identify and provide centre support where it is needed in order to safeguard certification. It also allows us to recognise and support good practice.

How does it work?

First of all, you need approval to deliver BTEC qualifications. By signing the approval declaration you confirm that you have in place all necessary resources, appropriately experienced staff, and quality-assurance policies and procedures. You should have standardised systems and procedures for registering and certifying learners, tracking learner achievement and monitoring assessment and internal verification.

During the delivery of a programme, internal verification is the quality-assurance system that you use to monitor assessment practice and decisions, ensuring that:

- assessment is consistent across the programme

- assessment tools are fit for purpose
- assessment decisions judge learner work accurately using assessment criteria
- standardisation of assessors takes place.

Internal verification is a recorded discussion between two or more professionals to ensure accuracy, fairness, consistency and quality of assessment. Internal verification procedures must:

- check all the assignment briefs or assessment tools used in every internally assessed unit
- check a sample of assessment decisions made for every internally assessed unit
- check a sample of assessment decisions from every assessor
- ensure that within the sample:
 - the range of assessment decisions made is covered
 - the experience of the assessor is taken into account when setting the sample size
 - the sample size is sufficient to assure the accuracy of the assessment decisions for the whole group of learners
- plan and document the process.

Our external quality-assurance processes include:

- annual visits to each centre to look at quality-assurance systems and procedures (Quality Review and Development)
- standards verification by a subject specialist to sample assessment and internal verification of learner work
- standardisation activities to support assessors, internal verifiers and lead internal verifiers.

Every year we publish an updated *BTEC Quality Assurance Handbook* to explain our external quality-assurance process for the next academic year. Along with the programme specification, the handbook should provide your programme team with everything they need to run vocational programmes successfully.

Centre roles and responsibilities

• Senior managers

The Head of Centre is formally responsible for ensuring that your centre acts in accordance with our terms and conditions of approval. These include ensuring the provision of appropriate resources, recruiting learners with integrity, providing full and fair access to assessment, maintaining full and accurate records of assessment, complying with all quality-assurance processes, and ensuring that all certification claims are secure and accurate. Day-to-day responsibility is normally delegated to the centre's BTEC Quality Nominee.

• BTEC Quality Nominee

Each centre is asked to identify a member of staff as its Quality Nominee for BTEC provision. This person is the main point of contact for information relating to quality assurance. Quality Nominees will receive regular information from us about all aspects of BTECs, which they should share with the relevant staff in their centre. Therefore, it is very important that Quality Nominee details are kept up to date on Edexcel Online. We recommend that your Quality Nominee is someone with responsibility for the BTEC curriculum because they will be involved in monitoring and supporting staff in your centre. The Quality Nominee should ensure that BTEC programmes are managed effectively and actively encourage and promote good practice in your centre.

- **Examinations Officer**

The Examinations Officer is the person designated by the centre to take responsibility for the correct administration of Edexcel learners. This person normally acts as the administrator for Edexcel Online – our system for providing direct access to learner administration, external reports and standardisation materials.

- **BTEC Programme Leader**

The Programme Leader (or Programme Manager) is the person designated by your centre to take overall responsibility for the effective delivery and assessment of a BTEC programme. The Programme Leader may also act as the centre Lead Internal Verifier.

- **Lead Internal Verifier**

The Lead Internal Verifier is the person designated by your centre to act as the sign-off point for the assessment and internal verification of programmes within a principal subject area (for example, BTEC Firsts and Nationals in Business, or BTEC Firsts and Level 1 in Engineering). We provide Lead Internal Verifiers with access to standardisation materials. The Lead Internal Verifier should be someone with the authority to oversee assessment outcomes. Ideally this would be the Programme Leader, because this would normally be a key part of their role. They should be directly involved in the assessment and delivery of programmes and able to coordinate across assessors and other internal verifiers for a principal subject area.

- **Assessors and internal verifiers**

The *programme team* consists of the teachers who are responsible for the delivery, assessment and internal verification of the BTEC qualification. An assessor is anyone responsible for the assessment of learners. An internal verifier can be anyone involved in the delivery and assessment of the programme. Please note that if a teacher writes an assignment brief, they cannot internally verify it. Someone else should perform this function. Where there is a team of assessors, it is good practice for all to be involved in internally verifying each other. If there is only one main person responsible for delivery and assessment then arrangements must be made for their assignments and assessment decisions to be internally verified by someone appropriately experienced.

Tips for successful BTEC quality assurance

- Recruit with integrity. Ensure that the learners you register on the programme are able to achieve at level 2 and have a specific interest in the vocational sector.
- Ensure that you have sufficiently qualified and vocationally experienced staff involved in delivery and assessment. BTECs are vocational qualifications, designed to be delivered by staff with expertise in their subject.
- Provide induction, training and ongoing development opportunities for your staff. Best practice comes from having staff that understand the BTEC ethos and assessment methodology and have up-to-date knowledge of their vocational sector.
- Use the free resources available. There is a wealth of guidance in the specifications and delivery guides that will help you with delivery and assessment.
- Make quality assurance part of everyone's role. Quality assurance is a fundamental aspect of every role, from assessor to senior manager. Recognising this and providing time and resources to support quality assurance is the key to success.
- Plan ahead. You should begin a programme with a clear schedule for handing out assignments, assessment deadlines and internal verification, so that you are well prepared to ensure ongoing quality and able to address any issues quickly.

- Ensure good communication. Assessors, internal verifiers, Lead Internal Verifiers and managers should all be clear on their roles and how they interact. The Lead Internal Verifier must have a clear overview of the plan of assessment and how it is being put into practice.
- Provide clear, consistent feedback to learners, based on the grading criteria. This allows learners to know exactly how they are achieving on the programme, identifies areas for development, and encourages them to take responsibility for their own learning.
- Undertake internal verification in a timely way. Assignment briefs must be internally verified before they are given to learners. A sample of assessment decisions should be internally verified as soon after assessment as possible to ensure that learners receive accurate and supportive feedback on their achievement.
- Track assessment and internal verification accurately as you go along. Assessment records should be kept at the level of the learning aim and assessment criterion/criteria. This gives a clear confirmation of individual achievement and identifies areas for improvement.
- Using standardised templates for all quality-assurance documents helps to ensure a consistent approach. We provide templates via our website that you can use for:
 - internal verification of assignment briefs
 - internal verification of assessment decisions
 - observation records and witness statements.
- These templates are not mandatory and you are free to design your own, but using them will help to ensure that you are meeting requirements.
- Ensure that learner work is kept secure but is accessible during the programme. You will be required to provide learner work for external quality assurance while learners are on programme.

Units

Unit 1: Construction Technology

Delivery guidance

Approaching the unit

You could base the delivery of this unit around a locally focused building project or structured case study. This would place the unit content into a realistic scenario in a useful and effective way, where you could direct learners to different aspects of a building, whether it is in a stage of construction or is a completed structure.

Developing a relationship with a main building contractor could pay dividends. This may help provide resources and opportunities for supervised and risk-assessed site visits where learners will benefit from motivated and focused learning in a live construction environment. This includes the opportunity for the use of visual materials from photographs taken during the visit. It is especially important when taking young adults around a construction site that they are aware of the risks associated with the site and have fully met the requirements of any site induction. Properly conducted site visits can be a rewarding experience for learners and give them an insight into their future qualification and career guidance requirements where they are considering a career within the construction industry. You could also video a local project so real-life construction examples can be brought into the classroom to engage the learners in the development of their knowledge and understanding of how buildings are assembled and constructed.

This unit will be externally assessed in the form of an examination paper lasting for one hour. It is important that you are familiar with the sample assessment materials (SAMs) from the Edexcel website, and prepare learners for the format of the paper and the different types of objective, short answer and extended writing questions, along with the need to demonstrate sketching techniques.

Delivering the learning aims

In **learning aim A**, the first topic area is on structure performance and its function. Aspects of strength, stability, fire resistance, thermal insulation, sound insulation, weather resistance and sustainability could be applied using a case study structure to show learners how these are incorporated within the foundations, walls, floors, roof and supporting structure of a building. Taking a building element, such as orientation, where light and heat can be examined, you could direct learners and question them on how this element functions and supports itself, what properties it must retain and how it must perform, for example, the required understanding of why building orientation is important. The different forms of structures will require some examples to illustrate their properties and characteristics, for example cross-wall construction could be examined through its use in pre-cast concrete technology.

The second topic area covers common structural forms for low-rise construction. You should explain processes from the use of traditional cavity wall construction in masonry through to the current developments in modern methods of construction. Through contacting suppliers for the prefabricated elements of cross-wall construction, structural insulated panels (SIPs) and timber-framed construction you may obtain valuable resources on the construction of the superstructure using the different techniques specified within the unit content. Suppliers' websites can be especially useful for giving details of the external elements of the superstructure technique. Site visits during the construction of the superstructure phase of a

development could prove especially valuable, along with any promotional materials from suppliers or manufacturers.

The first topic area in **learning aim B** starts by examining the work that would be known as 'office-based' or 'desk-based preconstruction'. This is the element of construction that has to be completed before work can commence onsite and includes many elements of planning and legislation, including essential health and safety aspects. You could encourage engagement by using a case study or a live construction project on which to base the preconstruction activities. This moves on to preconstruction works that must be undertaken on site, in 'site-based pre-construction'. This may involve the demolition of any existing structures or buildings that may have to be cleared from the site. Enabling works to services has to be undertaken at this stage to support the electrical power requirements that are used during construction and to establish the final services for a building. The site set up is the final stage, including the erection of hoardings, fencing, gates, site accommodation, car parking, access roads and any temporary works that may be required.

The second topic principally covers the parts of a building that are not normally visible due to being within the ground or sub-structure. This requires visual illustrations for learners to grasp the concepts of the different types of foundations and the construction of the ground floor, as the technology of their construction is often hidden from view and can be seen only if you time a site visit during the groundwork phase of construction. Availability of architects' design detail drawings would help learners to grasp the requirement of the learning content, with cross sections and photographs taken from construction sites. These visual stimuli can be used to provide interesting live examples of the typical foundations covered within the unit content so that learners can understand individual details of each foundation.

Site visits during the construction phase of sub-structure groundworks would prove especially valuable, along with DVDs from the suppliers or manufacturers, or videos promoted on construction websites.

Learning aim C covers the external envelope of a building and includes the walls and roof structures. Contained within each topic is a section on the functionality of each element and how it is detailed. This will include its cross section, the materials used to construct the element and types of finishes. Learners will need to identify the individual components of each element, and small-scale models or 3D sketches could prove beneficial to their understanding of the components that make up a wall, roof and floor.

You could also put together a brief for a teamwork presentation on the different aspects of superstructure, to ensure that all the content is covered and shared with all learners. This could include aspects of presentation and ICT skills, as well as making it motivational by employing team competition.

Getting started

This provides you with a starting point for one way of delivering the unit, using suggested activities that help prepare learners for the Edexcel-set external examination.

Unit 1: Construction Technology

Introduction

You could introduce this unit by asking learners to place themselves in the role of an assistant to a designer. Ask the learner to design the home of the future that they would want to live in, and then produce sketch designs of their ideal house. You can then use these in a group discussion to draw out many of the construction technology features and functions that will be required to support their designs. You could then examine a low-rise construction, which can be detailed, analysed and evaluated in relationship to the aspects covered in the unit.

Learning aim A: Understand the structural performance required for low-rise construction

- For all three learning aims you could hold workshop sessions that are built around motivating scenarios, and complement these with delivery sessions on theoretical knowledge and understanding of construction technology as required by the specification.
- Learners will need access to cross-section details of features that meet the current building regulation requirements. Visual materials could help learners understand the 'how' and 'why' of particular elements, for example how a solid ground floor is constructed and what are the dimensions and sequence of its construction; how components such as a timber framed building is assembled. You could use web based video materials to help with this. Manufacturers and suppliers can prove especially useful in providing construction details of how elements are assembled and many have coloured and informative diagrams to download. Some may also have 3D diagrams.
- Learners will also need teaching to develop the required sketching techniques.
- For **workshop 1**, for example, you could invite a guest speaker such as an architect or designer, ensuring they are prepared on the aspects of the element design within the unit content.
- You could then use a scenario for learners, e.g. to consider the **design of an element** (wall, floor, roof) of a low-rise construction and to consider carefully how their design must function. Learners could work in teams, each taking different elements.
- Using questions and answer
rs, each design could then be analysed in terms of how, why and where it would meet the requirements of, for example, strength and stability, resistance to fire, thermal and sound insulation, weather resistance, sustainability.
- For **workshop 2**, learners could then **sketch a section**. You could develop the above scenario, where the architect/designer is not sure about a construction form/detail they are going to use within their low-rise construction. Learners could then select one of the following, producing a detailed and labelled sketch for all the components that form this detail, for example:
 - traditional cavity wall constructed from masonry with an opening for a door and window
 - cross-wall construction
 - structural insulated panel (SIP) external wall detail
 - timber-framed construction external wall detail.

Learning aim B: Explore how sub-structures are constructed

- Hold **workshop 3** with a focus on **setting up a construction site**. You could use a scenario where a local project is going to commence shortly and your learners need to provide a checklist of all the elements that will need to be put in place before the work begins. The checklist will then need to cover the contents of the topic for preconstruction activities, such as:
 - legal requirements such as health and safety plans, risk assessments
 - planning, such as a scaled site layout plan to organise the site
 - contract programme of work
 - demolition and clearing of existing structures
 - enabling work
 - site set-up such as fencing and gates, car parking and hard-standing areas, storage and site accommodation.
- For **workshop 4**, learners could focus on **constructing the foundations** and understanding how sub-structures are constructed safely. You could use a scenario that includes a number of hazards that might be expected when a foundation is constructed.
- Learners could bring together a checklist to cover the contents of the topic for pre-construction activities.
- For **workshop 5**, move on to **detailing the foundations**. You could provide a set of foundation cross-section drawings through the different types of foundations detailed within the unit content (e.g. strip, deep strip, trench or mass fill, raft, etc). Learners will need to complete the annotation of each cross section by labelling each component, and will need to know the advantages and disadvantages of each foundation type, and how to appropriately select foundation types for the soil or ground conditions occurring on a proposed site. You could take a similar approach for understanding how ground floors are detailed, and learners could produce a detailed and annotated cross-section through a floor that complies with current building regulations.
- Extend this further into the **function of a foundation** along with which foundation could be used for what type of conditions. You could examine a typical foundation by looking at a cross section followed by discussions on how it carries the loads, transferring these down to the sub soil, the chemical resistance a foundation may have to endure, coping with the presence of any trees and resistance to heave from ground freezing.

Learning aim C: Explore how superstructures are constructed

- Hold **workshop 6** on **superstructures**. You could split learners into groups of three and allocate each group an element, with the following task: provide a 10-minute presentation on the element that you have been given. The presentation needs to contain enough information on aspects listed in the unit content, for example:
 - detailing and components – learners will need to research and detail cross sections through typical superstructures.
 - functions of a wall and roof – details through a wall and its components, obtaining a roof drawing and labelling all of the components would prove a valuable reference tool for learners
 - materials used for the construction of walls and roofs
 - finishes – both external and internal openings and detailing around them – reference to lintel manufacturers websites and the technical information would provide assistance in the detailing of openings at the head and jambs.

Preparing for the written examination

- The external examination is set and marked by Edexcel, and taken by the learner under examination conditions.
- It lasts for 1 hour and contains 50 marks; all questions are compulsory.
- There will be different types of objective, multiple choice, short answer and extended writing questions. Learners will need to be able to demonstrate the use of sketching techniques.
- The paper will cover all aspects of the specification over a number of examination series and is designed to enable learners to demonstrate their knowledge and understanding of the unit content.
- It will be useful for learners to practise completing answers in the class environment to reinforce learning and develop test technique. You should ensure that learners know the meanings of the command words commonly used in the paper, so they use the time available effectively. As further useful practice, you could set examination-style questions for homework on a regular basis, ensuring that each part of the specification is covered.
- Alternatively, examination-style questions could be used as starter or plenary activities with learners peer assessing one another's responses.
- You should set aside time for final revision for the examination. It would be useful for your learners to complete a past paper, or sample paper, before they sit the live examination so they are fully aware of what they will need to do in examination conditions. This experience will also give them the opportunity to practise using their time effectively and build their confidence.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 2: Construction and Design*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding and/or as a revision technique in preparation for the paper-based test.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Chudley, R. and Greeno, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-061-5)

Chudley, R., Greeno, R., Hurst, M., Topliss, S., *Construction Technology* (5th edition), Pearson, 2011 (ISBN 978-0-43504-682-8)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Websites

www.brick.org.uk/resources/useful-links/brick-manufacturers

The Brick Development Association gives case studies and useful links on masonry wall construction.

www.britishprecast.org

The Federation for Pre-cast Concrete in the UK has links to cross-wall construction.

www.cbeq.co.uk

The Construction Built Environment Qualifications website, produced by the leading author and writer of Pearson qualifications and construction textbooks, offers many additional resources that support those published by Pearson.

www.nhbcfoundation.org

The national House Building Council's website, in conjunction with the Building Research Establishment, has information on modern methods of construction.

www.tek.kingspan.com/uk/index.htm

The manufacturer's website for its SIPs panels has lots of useful information, including case studies.

www.trada.co.uk

The Timber Research and Development Association website has information on timber-framed and SIPs panel systems.

www.uksips.org

The UK Structural Insulated Panel Association website.

Unit 2: Construction and Design

Delivery guidance

Approaching the unit

This unit gives learners the opportunity to gain a clear understanding of the scope and scale of the construction industry together with the benefits that the industry brings to local communities and to society in general. Establishing vocational links with design professionals is an invaluable way of building learners' understanding of the work of the construction industry and their work in developing a design brief and producing a range of sketch ideas to meet the requirements of a client brief. You could develop contacts with design professionals/architects through your centre's existing links for maintenance or construction work, through learner contacts or through the local authority, for example. Most larger companies and practices welcome the opportunity to be involved.

Delivering the learning aims

The first part of this unit covering **learning aim A** focuses on the types of project and activities that form the broad scope of construction work in the UK. Learners will need to investigate how the construction industry contributes to and impacts upon a wider society. One effective way they could do this would be to turn the bullets under topics A1 and A2 into a series of questions that could then be put to a panel of 'experts', either in a discussion forum or in the context of a 'speed dating' scenario where each learner has a limited time with each expert before moving to the next in line.

For **learning aims B and C** a visit to an architects' practice would be an invaluable means of providing realism and a source of current and relevant information. Alternatively, it may be possible to invite an architect or an architectural technician as a visiting speaker. During such an event your learners may also have the opportunity to see some of the architect's initial sketches and concepts that they have produced for a variety of projects. Whichever method you adopt, your learners need to be well prepared, with focused and relevant questions that should ideally be provided to the speaker in advance of the event. Key questions that your learners could ask include:

- How do you gain an understanding of your clients' needs?
- How do you categorise and prioritise your clients' needs?
- What are the main constraints that you face when designing a building?
- How do planning and building control impact upon your designs?
- How do you turn a client brief into concept ideas?
- Could you show me some concept ideas and explain how they meet the client's needs and expectations?

In order to assist with the requirements of learning aim C your learners would benefit from focused inputs on single and two-point perspective drawing and sketching techniques. This may be based around the sketching of 3D box shapes that will form the 'crates' supporting the 3D sketch ideas. Learners could also conduct an investigation into building design styles over the years, both within the local area and nationally, or even internationally. Remember that for this final learning aim, learners are producing annotated sketch ideas or concepts and not detailed construction drawings.

Note that you will need to have someone taking the role of the client and have a specific site with constraints that can be established and identified by your learners.

Investigation and research will be a key focus for learners, and developing independent learning skills in a focused and supported way will be a key pathway to success, along with revising and building on prior learning. Remind learners of the importance of the assessment criteria when they are preparing for and working on assignments, so they always keep the focus on the exact requirements of the assessment and put effort where it is needed, rather than into something of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 2: Construction and Design
<p>Introduction</p> <p>You could introduce the unit by asking your learners in groups to come up with as many different types of building, structure or activity that the construction industry constructs or maintains. This will form a starting place for understanding the scope and scale of the construction industry together with the benefits that the industry brings to local communities and to society in general.</p>
Learning aim A: Understand the work of the construction industry
<p>Assignment 1: The Scale of the Construction Industry</p> <p>Scenario: You have been asked to provide a home page of an interactive website that outlines the UK construction industry. Produce for the web designer an outline that describes the different types of work the construction industry undertakes and its contribution to the UK and local communities.</p> <p>Some suggested methods to cover the key elements of the specification content are shown below and will reinforce your input and didactic elements when introducing each topic.</p> <ul style="list-style-type: none"> • Once learners in groups have come up with as many different types of building, structure or activity that the construction industry constructs or maintains, build this into an overall map of construction activities by guiding them into broad classifications as detailed in the specification. For the assessment learners will need to describe a range of three activity areas of the sector classifications as listed in the specification content, e.g. housing, civil engineering and so on. • Give your learners a sector or sectors to investigate and to produce a presentation for the whole group covering categories of construction projects. This should include the following areas: civil engineering, industrial, residential, commercial, retail, health; education, leisure and recreation. • You could follow this with a supported group discussion covering the scope of the specification on the benefits or contributions that each sector of construction or type of project brings to local communities and to society in general. Note that for the assessment, learners must cover one economic and one social contribution in depth, and their evaluation will need to include three economic and three social benefits, both local and national. • Learners could conduct a survey of the built environment within their locality and categorise the building types, record details of the design styles and comment on the scale, age and general construction methods, e.g. traditional, contemporary, or on the era of construction. • During office visits, e.g. to an architect practice, design office of a housing developer or building surveyor practice, or when visiting speakers are available, the learners could carry out interviews to find out how designers (architects and architectural technologists) incorporate aesthetics, sustainability, functionality and occupant and public safety into their designs. • Learners bring together their learning, with an outline/website brief/storyboard that describes the different types of work the construction industry undertakes and its contribution to the UK and local communities.

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

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

Assignment 2: Construction Design

Scenario: You are working in an Architectural Practice and the practice has been commissioned to design a new building for a client. You have been asked to assist one of the partners responsible for the commission. You will be required to analyse a client's needs and the requirements or constraints of the site and locality in order to produce a client brief. You will produce a range of sketch designs and receive feedback from a client who will select an idea for development. You will then refine the chosen idea to comply with the client feedback. This could give a clear starting point for the production of working drawings.

Learning aims B and C are best combined into a single assignment that investigates a client's needs and constraints in order to produce a client brief and a range of sketch proposals or concept designs.

- Learners could interview an appropriate adult, such as a family member or a family friend, who is taking the role of a potential client to find out what their needs and desirable design features would include for a new home. They could use the content of topic B1 as a series of prompts for areas to consider during questioning. In the next lesson they could feed back to the whole group and you could guide the groups' responses into the generic understanding of client needs. Note that when learners have brought together a range of sketch design ideas, the client will need to provide feedback and select one of the concept ideas for development.
- You could consider the use of visiting and/or in-house professionals for 'expert panel' or 'speed dating' activities which will refine and develop this understanding and allow investigation and analysis of the constraints on design, including planning and building control requirements.
- A visit to a local design practice would enable your learners to discuss with design professionals the effect of both external constraints and their client's needs and desires upon design outcomes. The content of topic B2 could provide the focus for learners' questions and research during the visit.
- You could organise a visit to the local planning department, which would enable your learners to gain a better understanding of the work of town planners and the underlying reasons for constraints and limitations upon development. You could also direct learners to visit the 'planning portal' website to gain an insight into what is generally allowed and does/does not need planning permission.
- Learners should have developed skills in single and two-point perspective drawing techniques in both Art and Design Technology in Key Stage 3, but it would be wise to have a focused lesson in these techniques, including the use of 'crating' to assist with 3D freehand perspective drawing.
- You could facilitate research homework to investigate the design styles of both historical and contemporary architects and the design styles prominent in different localities and periods of history, including recent history. This research will then assist your learners in the generation and development of concept ideas for their assignment.
- Learners will need to be able to generate four different fully annotated design ideas that are influenced by different design styles. They could practise developing ideas and use peer feedback to check compliance with a client brief and suggest improvements to the design and annotations. Learners could use a table to record both subjective and objective comments against each of the requirements of the client brief.

- Learners take forward their learning to analyse client needs and develop an appropriate client brief that facilitates the production of a range of a minimum of four different concept ideas that can be further refined following client feedback. Encourage learners to develop a range of designs that are substantially different.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 5: Construction Drawing Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Ching, F., *Architectural Graphics* (3rd edition), Van Nostrand Reinhold, 1996 (ISBN 978-0-47039-911-8)

Greeno, R., and Chudley, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-061-5)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Journals

AJ Journal

This journal from the Royal Institute of British Architects provides inspirational ideas by showcasing the latest design concepts.

AT Magazine

This Chartered Institute of Architectural Technologists magazine showcases the work and concepts of architectural technologists.

Building

This publication has information about and showcases projects, both nationally and internationally.

Websites

www.planningportal.gov.uk

The government's 'Planning Portal' website gives information about planning and building control issues that link with the constraints on design and how designers design for public safety.

Unit 3: Scientific and Mathematical Applications for Construction

Delivery guidance

Approaching the unit

In approaching this unit the focus is on 'applications', while keeping the pure science and mathematics as simple as possible. This will ensure that your learners are engaged and motivated to progress through the unit. To enable this, support the delivery with examples drawn from the industry as well as from other units of this qualification. Throughout the unit you should relate delivery to a number of units from this qualification to reinforce the learning process.

Delivering the learning aims

Learning aim A introduces the nature and type of forces acting upon construction materials. This leads to the concept of various stresses and resulting strain following Hooke's law and explaining elasticity. The aim is that learners should develop an understanding of materials' properties.

You could introduce the learning aim with an activity where learners produce a list of common construction materials and their properties. Build upon this work to develop learners' understanding of material properties and forces these are subject to.

You can then start with a presentation on the nature of forces, supported with examples and demonstrations in class, followed by simple calculations. There are many free web-based interactive materials and these are really helpful in engaging learners.

Once your learners have developed an understanding of material properties, engage them in a whole-group discussion on topics such as effects of expansion of water on porous construction materials. It is important that you continuously relate scientific principles with their practical application so it becomes a normal part of learners' understanding.

The intention of **learning aim B** is to introduce mathematical concepts, develop learners' skills and apply these concepts in analysing and solving construction related situations and problems. It covers algebraic methods, mensuration techniques and trigonometry.

Keep learners engaged with this learning aim by contextualising your delivery. To explain basic algebra, you could start by discussing a simple problem such as calculating the cost of bricks required to construct a certain area of walling. You might relate this to the delivery of material properties to reinforce learners' understanding of why and how formulae should be rearranged. Practise drawing straight-line graphs with learners, determining gradients and intercepts so that they can solve the same problems using graphical methods.

A similar approach could be adopted in the delivery of mensuration. You could use either objects/sections cut into various shapes or a physical area which your learners can measure and calculate. With trigonometry, staircases and pitched roofs are relevant examples with which you can deliver the mathematical principles and applications in context to show their interrelatedness.

Throughout this unit, you should emphasise the manual checking of results and interpolating and predicting values.

Remind learners of the importance of the assessment criteria when they are preparing for and working on assignments, so they always keep the focus on the exact requirements of the assessment and put effort where it is needed, rather than into something of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 3: Scientific and Mathematical Applications for Construction
<p>Introduction</p> <p>You could introduce the unit by giving a simple example of construction of a small dwelling, showing clearly the range of materials used, properties related to their use and mathematical skills required to calculate areas, volumes, material quantities and costs. Your aim should be that learners develop an appreciation of the importance of science and mathematics in construction. You could use DVDs or web-based resources for this purpose.</p>
Learning aim A: Understand the effects of forces and temperature changes on materials used in construction
<p>Assignment 1: The Use of Science in Construction</p> <p>Scenario: 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.</p> <ul style="list-style-type: none"> ● Start by asking learners to produce a list of construction materials with which they are familiar, e.g. bricks, concrete, glass and so on. Expand to ensure coverage of construction materials listed in the specification content. ● Prepare a series of questions for learners that will help them develop an understanding of the materials' use and properties. For example: what should be the properties of a material if it is to be used externally, or where it is subject to heat, or where smaller sizes are required to carry large loads? ● Give some in-class demonstrations about the nature of forces and their effects on materials, such as compression and tension, with reference to the specification requirements, e.g. different construction materials, Hooke's law, and contextualising in different situations. You could use laboratory equipment if available or alternatively you could use web-based free resources demonstrating compression and tension in an animated manner. ● Follow this with calculations determining the effect of forces. For example you could start by calculating tensile and compressive stress and use some worksheets to allow students to work in small groups and provide support where necessary. Encourage learners to make a sketch to demonstrate their understanding of the questions. ● Using a group activity, learners could investigate effects of temperature changes on materials' properties such as thermal expansion, latent heat required to change state and sensible heat causing a change in temperature. ● You could then contextualise with some common examples such as steel and concrete followed by in-class group discussion and calculations. The group discussion should focus upon the thermal properties of the materials and their fitness-for-purpose. ● Learning could then be taken forward for the comparison of construction materials, including, e.g. a presentation to include text, diagrams, tables, graphs, test results and calculations as appropriate, accompanied by a written report.

Learning aim B: Use mathematical techniques to solve construction problems**Assignment 2: The Use of Mathematics in Construction**

Scenario: 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.

- For rearranging formulae and substituting values, you could make reference to the formulae covered in **learning aim A**, such as stress and strain.
- Properties of materials graphs might be used to deliver solutions to construction problems, using linear equations where learners can appreciate the concept of gradient and intercept in practical terms. For example, you could provide learners with the test results carried out on two different materials such as steel and concrete. Learners could draw these results and determine modulus of elasticity using graphical as well as algebraic methods. Learners can comment about the accuracy and reliability of both methods.
- When calculating areas, you might take your learners to measure a plot of land, a classroom or a sports facility. The context could be, for example, surface area required for decoration, stripping off the topsoil, or tiling. For volume calculations, you might start with the example of a concrete cube. You could then introduce more complex shapes such as a cone where, while calculating areas and volumes, learners could apply Pythagoras' theorem as well.
- For trigonometry, you could give common construction examples such as setting out corners and building staircases. Learners could measure a staircase and develop an understanding of the trigonometric relationships. You might also use examples of pitched roofs as well as a 3-4-5 triangle to check whether walls have been built 'square' to each other (at 90 degree angles).
- Learning could then be taken forward for the calculations required if refurbishing and adapting the old building into modern office accommodation, including, e.g. a presentation to include calculations, diagrams, tables, graphs and text as appropriate.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 4: Construction Processes and Operations*
 - *Unit 5: Construction Drawing Techniques*
 - *Unit 6: Exploring Carpentry and Joinery Principles and Techniques*
 - *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques*
 - *Unit 8: Exploring Painting and Decorating Principles and Techniques*
 - *Unit 9: Exploring Plumbing Principles and Techniques*
 - *Unit 10: Exploring Electrical Principles and Techniques*
 - *Unit 13: Exploring Roofing Principles and Techniques*
 - *Unit 14: Exploring Wall and Floor Tiling Principles and Techniques*
 - *Unit 15: Exploring Plastering and Dry Lining Principles and Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Lyons, A., *Materials for Architects and Builders* (4th edition), Routledge, 2010 (ISBN 978-1-85617-519-7)

McMullan, R., *Environmental Science in Building* (6th edition), Palgrave Macmillan, 2007 (ISBN 978-0-23052-536-8)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Viridi, S., and Baker, R., *Construction Mathematics*, Routledge, 2006 (ISBN 978-0-75066-792-0)

Websites

www.technologystudent.com/joints/matprop2.htm

This webpage contains explanations of materials' properties supported with interesting animations and an exercise sheet.

www.wiziq.com/online-tests/21-maths-mensuration

This website contains free online tests on mensuration.

www.yourteacher.com

This website contains online lessons on every mathematics topic covered in this unit.

Videos

www.youtube.com/watch?v=XFh_JC7OSrg

This video contains explanations of basic trigonometry, including sine, cosine and tangent.

www.youtube.com/watch?v=JA5nTvEU3MA

This video contains interesting real-world examples to explain the stress-strain relationship.

Unit 4: Construction Processes and Operations

Delivery guidance

Approaching the unit

Delivery of this unit could focus around the construction of a typical low-rise building, which would help learners to appreciate the interrelationship of the various crafts and activities.

A site visit would enable learners to develop an understanding of key elements, processes and materials being used, and a case study would demonstrate how planning activities are carried out on construction projects. You could make this part of a site visit where learners can actually see Gantt charts and discuss production problems.

Throughout this unit you should relate to a number of units on this qualification to reinforce the learning process.

Delivering the learning aims

Learning aim A is about sequencing and planning. It introduces various stages of the construction process and the construction operations typically undertaken for low-rise buildings. It also covers the order in which these operations are performed, how they are planned and the potential problems.

You could start by introducing various construction activities using DVDs, pictures or illustrations. Ask learners to do some simple sequencing tasks such as painting a small room followed by more complex tasks such as construction of foundations. Build on this work to develop Gantt charts, exploring production problems and consequences of poor planning.

Learning aim B introduces key elements of a low-rise building and their function. It provides opportunities to compare traditional and modern methods of construction.

Planning a site visit could be a useful part of delivery for this learning aim, with the appropriate safeguards in place. Speak to the site personnel before the visit so that planning of activities and key construction elements are the focus of the visit. Reinforce this learning in class through contrasting examples of traditional and modern construction. Make use of case studies, DVDs and learners' research in a group.

You could introduce **learning aim C** with an activity where learners produce a list of common construction materials and their properties. Build on this work to develop learners' understanding of material properties and suitability for use, engaging them through use of free web-based interactive materials.

It is important that you relate the delivery to scientific principles covered in *Unit 3: Scientific and Mathematical Applications for Construction* so that it reinforces the learning in a practical context.

Throughout this unit you should use real and credible case studies, especially local projects of interest to your learners.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 4: Construction Processes and Operations
<p>Introduction</p> <p>Introduce learners to the unit using a simple example of construction of a low-rise building, highlighting the construction stages and activities. Your aim should be that learners develop an understanding of the complexity and interrelationship of construction activities, and the importance of planning. Use the same project to deliver key elements of structure and type and properties of materials used. You might arrange a site visit, or use DVDs or web-based resources for this purpose.</p>
<p>Learning aim A: Understand planning and sequencing of construction work</p>
<p>Assignment 1: Planning and Sequencing of Construction Work</p> <p>Scenario: You have been asked by your manager to consider the building operations sequence involved with a given low-rise building.</p> <ul style="list-style-type: none"> • You could start by giving your learners a presentation on stages of a construction project. Suitable DVDs or web-based resources might enhance this. • In groups, give learners one stage each to discuss and investigate, using a case study or documentation related to a real project. Each group then gives an in-class presentation of their findings, including drawing, sketches and tables as appropriate. • Hold a whole-group discussion on various craft operations involved. • In small groups, learners could then relate various craft operations with different stages of construction. A case study or documentation relating to a real project such as construction of a single storey building might be useful. Drawings, sketches and tables might be useful to understand the type of craft operations required at various stages. Each group then gives an in-class presentation of their findings. • Use the group-work as a starting point to deliver planning and sequencing. Provide some information sheets regarding labour outputs as well as examples of Gantt charts. To emphasise the significance of planning and sequencing, ask learners to interpret a Gantt chart in terms of time allocated to each operation as well as their sequencing. • Ask learners in small groups to investigate effects of poor planning, incorrect sequencing or unforeseen events. You could provide documentation related to a real project covering factors like materials shortage, bad weather, trench collapse, vandalism, flooding. You could allocate different factors to each group. • Learners then present their findings to the whole group, supported by annotated drawings, sketches and/or tables, graphs. Lead a whole-group discussion on the findings of each group.

Learning aim B: Know about traditional and modern construction processes and operations used in low-rise construction

Assignment 2: Traditional and Modern Methods of Construction

Scenario: You have been asked by your line manager to investigate the differences between the construction methods used on two building sites, one modern and one traditional.

- A site visit to a traditional site and a site that uses modern processes might be useful for learners, with the appropriate safeguards. Give them checklists so that they can record details of key elements, processes and operations. Alternatively, you could use project examples through DVDs or other project data.
- Split learners into two groups: traditional and modern. Provide them with construction details in addition to what they have already recorded during the site visit or earlier project examples. Learners could extract the information relating to key features for each type of building. Both groups then present features, key elements and associated processes and operations of each type of building. Add to this discussion at appropriate times as learners' knowledge might be limited to what they have seen so far.
- Introduce group work to differentiate, compare and evaluate the construction processes and operations used in traditional and modern construction. Learners could specifically focus on the impact of onsite and offsite production through case studies that allow the factors indicated in the higher level criteria. Considerations might include overall productivity, environmental impact, performance in use and costs.
- Ask learners to present their findings. You could then lead a whole-group discussion to evaluate, based on the earlier case studies as well as additional examples, traditional and off-site construction, taking into account the above mentioned factors.

Learning aim C: Understand the properties and uses of construction materials

Assignment 3: Construction Materials

Scenario: As part of your professional development, your manager has asked you to carry out research on common construction materials. You have also been asked to investigate how material properties determine the uses to which they are put.

- Start by asking learners to produce a list of construction materials they are familiar with and group these as natural, processed and manufactured, ensuring coverage of those listed in the specification content. Learners should be able to describe at least three examples of each type, showing they understand how they are processed and manufactured.
- Prepare a series of questions for learners that start them developing an understanding of the materials' use and properties, for example: Why and where do we use ceramic tiles? Why and where do we use plastics?
- You could reinforce the above by asking learners to explore different construction materials, examining information from websites, manufacturers' information and literature as appropriate. Allocate several materials per group, and each group then gives a presentation on their potential use, relating it to the properties outlined in the specification content.
- Hold a group activity where learners investigate materials in terms of their performance in use. Build on this work to explain why certain materials are suitable for certain situations. You could then reinforce with some common examples, such as bricks, blocks, stone and concrete as structural materials where compression is the main force, steel beams to take tensile forces, and ceramic tiles as hard-wearing water-resistant surfaces.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 3: Scientific and Mathematical Applications for Construction*
 - *Unit 5: Construction Drawing Techniques*
 - *Unit 6: Exploring Carpentry and Joinery Principles and Techniques*
 - *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques*
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 - *Unit 14: Exploring Wall and Floor Tiling Principles and Techniques*
 - *Unit 15: Exploring Plastering and Dry Lining Principles and Techniques*

Resources

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Chudley, R., Greeno, R., Hurst, M. and Topliss, S., *Construction Technology* (5th edition), Pearson, 2011 (ISBN 978-0-43504-682-8)

Greeno, R. and Chudley, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-061-5)

Cooke, B., William, P., *Construction Planning, Programming and Control* (3rd edition), John Wiley and Sons, 2009 (ISBN 978-1-40518-380-2)

Lyons, A., *Materials for Architects and Builders* (4th edition), Routledge, 2010 (ISBN 978-1-85617-519-7)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Websites

<http://civilengineerblog.com/construction-planning>

This webpage gives a brief overview of construction planning and how to approach it.

www.the-self-build-guide.co.uk/house-construction-methods.html

The website explains traditional and modern construction processes in a structured way.

Videos

www.youtube.com/watch?v=NYCOwue0bMQ&feature=related

This video explains the construction of a building and is a good resource for explaining sequencing.

Journals

Construction Manager

This journal is published by the Chartered Institute of Building and contains updates on construction projects, methods and materials.

Journal of Green Building

The journal is published by College Publishing and addresses sustainability, new materials and modern methods of construction.

Unit 5: Construction Drawing Techniques

Delivery guidance

Approaching the unit

This unit gives learners opportunities to develop knowledge, understanding and skills to produce a variety of construction drawings. The primary focus is on manual drawing techniques, although the unit allows learners to use computer aided design (CAD) techniques, where facilities are available.

You could provide case studies and examples of various types of high-quality drawings covering a wide variety of resources and techniques. Delivery of this unit could relate to or integrate with a range of other units on the qualification.

Throughout this unit you should relate to a number of other units on this qualification to reinforce the learning process.

Delivering the learning aims

Learning aim A is about understanding the requirements to produce construction drawings. You could start by introducing various construction stages using DVDs, pictures or illustrations. Engage learners in a group discussion about the information required at each stage. Build on this work to deliver various types of drawings and their purpose.

Consider whether it would benefit learners to integrate the delivery with *Unit 4: Construction Processes and Operations* as well as with other craft units.

You could introduce the materials and equipment required to produce drawings manually, and give your learners a set of drawings to appreciate the requirements. Where local facilities allow, introduce learners to the CAD environment also by practical demonstration followed by individual support as required. This unit does not require the learner to produce drawings using CAD but the learner must be able to understand the features of a CAD system and be able to evaluate its use in the production of drawings.

Learning aim B is about actual production of construction drawings. Offer your learners enough opportunities to practise drawing standard conventions in accordance with industrial standards. However, you should allow learners to work independently once they are undertaking their assessment tasks.

Remind learners of the importance of the assessment criteria when they are preparing for and working on assignments. Ensure they always keep the focus on the exact requirements of the assessment by putting effort in where it is needed, rather than into something of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 5: Construction Drawing Techniques
<p>Introduction</p> <p>Introduce the unit by giving your learners a set of drawings relating to the construction of a small dwelling, showing clearly the stages and information required at each stage by various parties involved. Your aim should be to develop learners' appreciation of the purpose and types of various drawings, materials and equipment required to produce these and an understanding of the standard conventions used.</p>
<p>Learning aim A: Understand the requirements to produce construction drawings</p>
<p>Assignment 1: Construction Drawings and Resources</p> <p>Scenario: 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.</p> <ul style="list-style-type: none"> ● You could start by giving learners a presentation on stages of a construction project, supporting delivery with suitable DVDs or web-based resources. In a group activity, give one stage to each group of learners to discuss and investigate the information required at each stage, e.g. information required to construct foundations. Each group then gives an in-class presentation of their findings. You could collate their findings and relate these to various types of drawings. ● Provide learners with a set of drawings, including location, assembly, presentation, component and working drawings relating to the construction of a small dwelling. Split learners into groups, allocating each group a certain type of drawing and a checklist of information that can be extracted from these drawings. Each group should present their findings to the whole group, supported with annotated drawings and checklists. ● Hold a group activity where your learners investigate materials and equipment required to produce manual drawings. You could relate this to the previous activity and use the same set of drawings to understand the production requirements. For example, the requirements to produce presentation drawings as compared with component drawings. ● Give a practical demonstration of CAD, starting with basic drawing and editing commands, manipulation of views and saving files in appropriate formats. Ensure learners can identify and describe the features of the system and are aware of health and safety requirements. Show your learners CAD drawings related to a real project. Learners will need to develop a drawing template containing the features indicated in the specification. ● Lead into a whole-group discussion of CAD and traditional drafting techniques, evaluating resources and design skills learnt in terms of costs and benefits. Ensure that you include the time and resources required to produce a drawing as well as what is needed to carry out any amendments and updates. ● Learning could then be taken forward for a report as part of an induction programme, that could include text, images, tables and charts as appropriate.

Learning aim B: Explore the production of construction drawings

Assignment 2: Producing Construction Drawings

Scenario: 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.

- You could introduce the drawing standards by providing your learners with examples of conventions. You might use the same drawings as in **learning aim A**, though this time your focus would be on conventions. Ask learners to produce a sheet of conventions and add descriptions where appropriate. Learners should clearly understand that conventions are a way of complying with the standards, for example, dimension lines and extension lines.
- To start the actual production of drawings, give a practical demonstration on how to use the required equipment.
- Allow adequate time for learners to practise the art of drawing manually or using CAD and monitor their progress by supporting them in their practice tasks. The focus of the practice tasks should be to develop skills, to draw to an appropriate scale, use correct dimensioning, page layout and other related conventions.
- Learning could then be taken forward to produce a portfolio of construction drawings of a local building of interest, e.g. producing plans, elevations, sections and details typical of a domestic dwelling: floor plans, front and rear elevations, one section, one foundation and one roof detail.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 2: Construction and Design*
 - *Unit 3: Scientific and Mathematical Applications for Construction*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Cooper, B. and Dieltz, K., *Level 1–3 NVQ/SVQ Diploma Brickwork Interactive Drawings*, Heinemann, 2012 (ISBN 978-0-43512-735-0)

Huth, M., *Understanding Construction Drawings* (5th edition), Cengage Learning, 2009 (ISBN 978-1-43546-447-6)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Topliss, S. and Reid, M., *Level 1–3 NVQ/SVQ Diploma Carpentry and Joinery Interactive Drawings*, Heinemann, 2012 (ISBN 978-0-43512-736-7)

Websites

https://environment7.uwe.ac.uk/resources/constructionsample/cd_assetcon_sampler/drawing/section2.htm

This website contains a drawing guide, which provides a simple but comprehensive introduction to construction drawing. It also has a number of examples of drawing conventions and techniques.

Videos

www.5min.com/Video/How-to-Draw-a-Floor-Plan-234381385

This video explains how to draw a floor plan.

www.5min.com/Video/How-to-Draw-an-Architectural-Wall-Section-240857237

This video explains how to draw an architectural wall section.

Journals

AT Magazine

This journal is published by Chartered Institute of Architectural Technologists (CIAT) and contains updates on regulations and technical issues.

Construction Manager

This journal is published by the Chartered Institute of Building and contains updates on construction projects, methods and materials.

Programs/software

Google SketchUp®

Unit 6: Exploring Carpentry and Joinery Principles and Techniques

Delivery guidance

Approaching the unit

This unit enables learners to explore the basics of carpentry and joinery, including learning about tools, materials and equipment. Throughout the unit there is significant emphasis on health and safety in order to work safely and avoid accidents. Activities for carpentry and joinery tasks should be set within an appropriate workshop with joinery workbenches with vices.

Delivering the learning aims

For part of **learning aim A**, learners need access to tools, materials and equipment used to construct a timber frame. They will need to learn about:

- their names and uses
- hazards associated with using them
- correct storage.

This learning aim should be delivered in a carpentry and joinery workshop or practical area where learners can handle tools, materials and equipment and observe demonstrations of their use.

To engage learners, you could give them various items and ask them to sort them into categories, for example, those used for cutting, sawing, measuring and marking out and holding things. Learners could also be given a set of name tags to attach to the relevant tool, material, item of equipment or information.

Learning aim A also requires that learners understand material properties and characteristics. You could show learners different samples of woods/types of trees and ask them to identify them. You could also show them examples of defects in timber, supported by a PowerPoint® presentation explaining defects.

Before practical work commences for **learning aim B**, learners need to conduct a risk assessment in the carpentry and joinery workshop. Guidance as to the hazards and risks with respect of tools, materials and so on needs to be thoroughly understood by the learners and applied.

Learners will initially need to practise marking out and cutting timber joints, and you will need to demonstrate this. An isometric drawing of the joint with measurements will help learners visualise the joint, and a pre-cut example of a completed joint is useful to pass around the group before the demonstration. You should be aware of your learners preferred styles of learning, especially visual and kinaesthetic approaches.

Provide a setting-out rod for the frame and demonstrate 'taking off' techniques from it. You will also need to demonstrate the cutting of the frame and correct assembly at the appropriate time. 3D examples of basic joints and a simple frame would enable learners to visualise the task and also the standards required. The frame itself could be a small spice/plate rack, stool, footstool or small exterior door frame – an artefact to take home would encourage your learners. Pre-prepared planed all-round timber will be required for the tasks – learners are not required to prepare the timber.

Regularly remind your learners of the assessment criteria when they are preparing for and working on assignments. Learners can very easily lose focus over the exact requirements of the assessment and can easily put a lot of effort into something that is of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 6: Exploring Carpentry and Joinery Principles and Techniques
<p>Introduction</p> <p>You could introduce the unit by talking about the work of a carpenter/joiner, to introduce the trade. Look around your building and pick out examples such as doors, windows, skirting board and architrave. This will help learners to understand why they are undertaking various tasks in the unit, and the skills and techniques they will develop that are highly relevant to the workplace.</p>
<p>Learning aim A: Understand tools, materials and equipment used in carpentry and joinery</p>
<p>Learning aim B: Develop practical skills using safe techniques to produce a timber frame</p>
<p>Assignment 1: Safe Use and Storage of Tools</p> <p>Scenario: As part of an induction you have to explain to a new employee about the safe use and storage of tools, materials and equipment.</p>
<p>Assignment 2: Produce a Timber Artefact</p> <p>Scenario: As an employee in a joinery business you are required to make a small, useful timber item to go in a shop display to advertise the high standard of craft skills and work in the joinery shop.</p> <p>For the basis of the artefact, you need to produce a 300 × 300 mm timber frame which includes four different types of joint.</p> <p>You will need to include several stages in your production of the frame, including:</p> <ul style="list-style-type: none"> ● a risk assessment ● how to work safely ● selecting and justifying appropriate materials ● reviewing alternative materials ● measuring and marking up ● production of the frame itself.
<p>Part 1</p> <ul style="list-style-type: none"> ● Start with a safety briefing before entering the workshop area for the first time. The briefing should cover workshop rules and procedures, use of personal protective equipment (PPE), general housekeeping (e.g. maintaining a safe and tidy work area, and recognition of hazards, etc). Learners should be able to explain how to safely use and store the tools, materials and equipment, and how to move them. ● Remember to cover the correct use of all the setting-out tools and equipment and the hand tools listed within the specification. Learners will need to know about them for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B. ● To familiarise learners with the tools, materials and equipment used for carpentry and joinery, you could set out a range of tools on one bench, and equipment and materials on another bench.

- Each learner could then photograph the items, import them into a Word® document, and correctly label each item with its name, what it is used for in carpentry and joinery, and associated health and safety aspects, and elements of risk. Learners will need to explain how tools, materials and equipment are used and selected, with a minimum of twelve tools, five types of fixing, two types of glue, three types of wood/wood composites, and three different types of equipment.
- To build on this work, outline the scenario and requirements for an artefact and when learners have made a choice of artefact, ask them to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be used.
- Each learner could then complete a risk assessment in the carpentry and joinery area before starting work. A hazard identification exercise might include, for example, use of saws and chisels, moving materials, especially long lengths of timber, waste removal (shavings, off-cuts, dust), slips and trips, awareness of other people around you, and putting in place appropriate control measures to minimise the risk, in the context of their assignments. Remind learners that they will need to demonstrate compliance with safe working practices and use of PPE throughout their work in this unit.
- The above work could then allow learners to meet the requirements of the induction as outlined in the assignment.

Part 2

- When learners have completed the safety briefing and appropriate risk assessments for practical activity, a key element for success in this unit is effective teacher demonstrations and introducing drawings showing basic joints, measurements and sizes to help learners mark out and cut basic joints. Demonstrate the correct techniques, and give learners adequate time to practise and develop these key skills.
- It is essential that focused demonstrations continue throughout the learning experience.

Part 3

- Once learners have developed hand skills and completed the risk assessment, they can then progress through requirements for producing a 300 × 300 mm timber frame which includes four different types of joints, measuring, marking up and producing a timber frame from a given working drawing or setting-out rod, provided by you. The frame itself could be a small spice/plate rack, stool, footstool or small exterior door frame.
- Learners should be taught how to measure and mark up frames accurately, dimensionally square to within 3 mm (Pass), 2 mm (Merit), or 1 mm (Distinction).
- Following mark up and measurement, check that the learner is in an appropriate position to move on to cutting the timber for the frame, and provide guidance during the cutting to ensure learners can move on to producing the frame itself.
- When producing the final frame, the gap tolerance should be ± 3 mm (Pass), ± 2 mm (Merit), or ± 1 mm (Distinction).
- Remember to embed the teaching of the properties and uses of materials to enable learners to consider, justify and evaluate the use of alternative materials. For example, they could consider the avoidance of knots in timber joints.
- You will need to provide evidence as outlined in the specification, e.g. a full set of quality control and assessment/photographic records, including main dimensions compared against rod dimensions. The degree of error should be recorded for easy comparison with the tolerances specified within the assessment grids.
- For use through the unit, you might like to give learners theory handouts relating to:
 - photographs of the tools, materials and equipment with adjacent boxes for adding written information

- the format/template of a typical risk assessment document
- questions about the safe use and storage of the selected tools, materials and equipment
- Programme for the Forest Stewardship Certification (FSC) with questions related to the FSC website.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Brett, P., *Book 1: Job Knowledge Carpentry and Joinery* (2nd edition), Nelson Thornes, 2005 (ISBN 978-1-40850-650-9)

Brett, P., *Book 2: Practical Activities Carpentry and Joinery* (2nd edition), Nelson Thornes, 2005 (ISBN 978-1-40850-648-6)

The above two books are particularly easy to read, with clear diagrams for additional clarification.

Jarvis, K., *Level 1 NVQ/SVQ Diploma Carpentry and Joinery Candidate Book*, Heinemann, 2010 (ISBN 978-0-43502-702-5)

Jarvis, K., *Level 2 NVQ/SVQ Diploma Carpentry and Joinery Candidate Handbook* (3rd edition), Heinemann, 2010 (ISBN 978-0-43502-704-9)

Jarvis, K., *Level 1 NVQ/SVQ Diploma Carpentry and Joinery Training Resource Disk*, Heinemann, 2010 (ISBN 978-0-43502-703-2)

Jarvis, K., *Level 2 NVQ/SVQ Diploma Carpentry and Joinery Training Resource Disk* (3rd edition), Heinemann, 2010 (ISBN 978-0-43502-705-6)

All four of the above titles are written by industry experts. They are full of high-quality illustrations and step-by-step procedures. The disks give a wealth of delivery material to assist in varying teaching to suit your learner needs.

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Topliss, S. and Reid, M., *Level 1-3 NVQ/SVQ Diploma Carpentry and Joinery Interactive Drawings*, Heinemann, 2013 (ISBN 978-0-43512-736-7)

This disk has ready-made drawings and animations with accompanying worksheets to demonstrate how products and constructions are made in carpentry and joinery.

Journals

Good Woodworking and *The Woodworker* magazines (www.getwoodworking.com)

These journals contain a wealth of ideas, resources and plans.

Websites

www.fsc.org

The Forest Stewardship Certification – offers information about the logo on products and the chain of custody of products.

www.geoffswoodwork.co.uk

Geoff's Woodwork – a useful site containing lots of resources and information (plans, theory, knowledge) specifically designed for carpentry and joinery learners.

www.hse.gov.uk

Health and Safety Executive – contains risk assessment advice and examples of small woodworking workshop risk assessments.

Unit 7: Exploring Brickwork and Blockwork Principles and Techniques

Delivery guidance

Approaching the unit

This unit should be taught in a practical context. It is essentially a taster unit to introduce brickwork and blockwork and to develop some basic skills. In the time available, your learners will not be expected to develop skills to occupational competencies or commercially acceptable standards.

Depending on the facilities in your centre, it may be beneficial to form partnerships and links with, for example, CITB-Construction Skills, local training organisations, local construction companies and the training departments of national contractors. This might result in:

- access to fully equipped brickwork training facilities and specialist brickwork tutors
- possible sponsorship of the centre's construction programme, and/or provision of materials, focused site visits, samples or loan of/assistance with specialist equipment
- access to specifications, construction drawings, quality control documentation and health and safety documentation
- assistance with the development of links with other sources of help, including specialist brickwork contractors, brick manufacturers and suppliers, architects, clerk of works consultancies, trade associations, consultants, and so on, along with access to visiting speakers who will put learners' knowledge into an industrial context; specific content level and expected outcomes would need to be discussed in advance
- sponsorship of individual learners and direct recruitment onto Modern Apprenticeships and training schemes.

It is essential that you cover health and safety prior to entering a workshop or construction site and that you focus continually on working safely, including identifying hazards and risk assessment.

Delivering the learning aims

For **learning aim A**, the knowledge and understanding of tools and materials together with associated health and safety issues are best delivered during learner briefings, prior to entering the workshop, and during your demonstrations of techniques and skills. Sample materials could be available and where possible, on permanent display within the classroom, to enable learners to become readily familiar with their identification, use and application. Wall charts provided by brick manufacturers are valuable classroom resources to illustrate different types of bricks, including standard 'special' bricks.

For **learning aim B** learners must undertake risk assessments for the practical activity, where the key to success is the development of trowel skills in rolling and spreading mortar, including the preparation of the bed joint, application of mortar to the bricks for the vertical joints, and laying to line and level. Learners will need to understand how to set out their work accurately and use a gauge rod and a spirit level in order to maintain this accuracy. A large proportion of the time allocated to this unit should be used for the development and practice of these key skills.

The unit could be assessed by a single assignment that covers both **learning aims A and B**. Regularly remind your learners of the assessment criteria when they are preparing for and working on assignments. Learners can very easily lose focus over the exact requirements of the assessment and can easily put a lot of effort into something that is of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 7: Exploring Brickwork and Blockwork Principles and Techniques
<p>Introduction</p> <p>Brickwork and blockwork can be an exciting new experience for learners and takes place in a very different learning environment. You could introduce the unit by touring the brickwork facilities so that learners gain an understanding of resources and equipment, including the mortar mill.</p>
<p>Learning aim A: Understand tools, materials and equipment used for brickwork and blockwork</p>
<p>Learning aim B: Develop practical skills using safe techniques to construct brickwork and blockwork</p>
<p>Assignment 1: Construction of a Cavity Wall</p> <p>Scenario: 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>Part 1</p> <ul style="list-style-type: none"> • Start with an initial safety briefing before entering the workshop for the first time. The briefing should cover workshop rules and procedures, use of personal protective equipment (PPE), general housekeeping, including maintaining a safe and tidy work area, and recognition of hazards. • A key element for success in this unit is effective teacher demonstrations introducing the walling trowel and how to roll and spread mortar. Learners should be given adequate time to practise and develop these key skills. • Remember to cover the correct use of all the setting-out tools and equipment and the hand tools listed within the specification. Learners will need to know about them for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B. Learners should be able to explain how to safely use and store the tools and equipment. • The focus on tools, materials and equipment can be effectively taught and embedded within practical demonstrations throughout the skills development and practice sessions. It is essential that during these sessions you look at the properties and uses of the materials covered within the specification, including associated health and safety aspects and elements of risk. For assessment, learners will need to explain how the tools are used and provide supported reasons as to when they would be selected, with 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. When the assignment requirements are known, learners will also need to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be used. • The only bond that needs to be taught for this unit is the stretcher bond. Learners are not expected to cut bricks within this unit and pre-cut bricks, known as half bats and half blocks, can be provided for them to use in both practice and assessment tasks.

- It is essential that focused demonstrations continue throughout the learning experience.
- Learners will need to conduct their own risk assessment that identifies hazards and considers the risks associated with the practical activity. This will include identifying who are potentially at risk and appropriate control measures to remove or reduce the risk, including PPE. You could provide a template for learners to use when completing this assessment.

Part 2

- Learners should progress through 3, 6, 10, 15 and 21 brick pyramids, 3, 6 and 10 block pyramids, setting up corners using a gauge rod and spirit level, using a line and corner blocks, and forming a cavity, including the correct spacing of wall ties and a simple jointing technique, i.e. a tooled 'bucket handle' joint.
- It is recommended that learners practise work to the height and dimensions required by the assessment criteria, i.e. a minimum of nine courses (675 mm). The recommended minimum length of the wall is 1340 mm, which equates to six bricks and three blocks.
- Adequate time needs to be allowed for the dismantling of learners' work and for preparing the bricks for reuse.
- Learners should be taught how to select and blend bricks to produce an aesthetically pleasing outcome and how to maintain a clean brick face.
- Learners may use corner profiles when setting out and producing their work but are expected to position them and use a gauge rod for the levelling of each course.
- Your centre will need to provide appropriate materials for both the development of skills and the final assessment exercise. Ensure that sand lime mortar is used so that the learners' work can be dismantled, the bricks cleaned for reuse and the mortar recycled and reused via a mortar mill.
- It is recommended that centres allow a full day for the completion of the assessment activity and that where possible new bricks are provided for this task.
- Remember to embed the teaching of the properties and uses of materials to enable learners to consider, justify and evaluate the use of alternative materials (alternative bricks, blocks and mortar). For example, they could consider the aesthetics, strength, density, porosity and associated durability of bricks, blocks and mortar for different locations or scenarios.
- A full set of quality control and assessment/photographic records should be completed and retained by the teacher prior to the work being taken down. This should cover main dimensions compared against drawing dimensions, face plane deviation, and plumb and level. The degree of error should be recorded for easy comparison with the tolerances specified within the assessment grids.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Brick Development Association, *The BDA Guide to Successful Brickwork* (2nd edition), Butterworth-Heinemann, 2000 (ISBN 978-0-34075-899-1)

Cooper, B. and Diett, K., *Level 1–3 NVQ/SVQ Diploma Brickwork Interactive Drawings*, Heinemann, 2012 (ISBN 978-0-43512-735-0)

This resource provides ready-made drawings and animations to demonstrate how products and constructions are put together. They can be uploaded onto your VLE and can be used flexibly to teach techniques and explore different construction ideas.

Manley S., et al., *Construction and the Built Environment Level 2 Higher Diploma*, Pearson, 2008 (ISBN 978-0-43549-991-4)

This has useful topic sections covering the core skills required by this unit.

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Whitten, D., *Level 1 NVQ/SVQ Diploma Brickwork Candidate Handbook*, Heinemann, 2010 (ISBN 978-0-43502-707-0)

Whitten, D., *Level 2 NVQ/SVQ Diploma Brickwork Candidate Handbook* (3rd edition), Heinemann, 2010 (ISBN 978-0-43502-709-4)

The two texts above are illustrated and accessible for learners at this level.

Training resources

Whitten, D., *Level 1 NVQ/SVQ Diploma Brickwork Training Resource Disk*, Heinemann, 2010 (ISBN 978-0-43502-708-7)

Whitten, D., *Level 2 NVQ/SVQ Diploma Brickwork Training Resource Disk* (3rd edition), Heinemann, 2010 (ISBN 978-0-43502-714-8)

These provide a wealth of delivery materials for the NVQ which are easily customised for BTEC learner needs and are VLE compatible.

Websites

www.brick.org.uk

Brick Development Association – provides advice on brickwork design and techniques.

www.hse.gov.uk

Health and Safety Executive – provides information and guidance on health and safety both in general and industry specific.

Unit 8: Exploring Painting and Decorating Principles and Techniques

Delivery guidance

Approaching the unit

This unit should be taught in a practical context. It is essentially a taster unit to introduce painting and decorating and to develop some basic skills. In the time available, your learners will not be expected to develop skills to occupational competencies or commercially acceptable standards.

Activities for both painting and paperhanging operations should be set within an appropriate work area that simulates a domestic setting where learners can develop the practical skills required to produce finished work to the standards identified within the assessment criteria.

Delivering the learning aims

Learning aim A

Learners need to have access to a wide range of tools, materials and equipment for both painting and paperhanging. They will need to learn about their purposes and properties, and safe usage and correct storage to prevent loss, damage or injury. Ensure that your learners have access to a range of tools, materials and equipment beyond those items that they will use for the given practical tasks. This will ensure that they are able to make selections in order to meet the assessment criteria. Wherever possible, this learning aim should be delivered in a workshop or practical area where learners can handle tools, materials and equipment and observe demonstrations of their use.

To make this learning more engaging, learners could be given various items and asked to sort them into categories, for example those used for surface preparation, those used for applying paint and those used for hanging wallpaper. Learners could also be given a set of name tags that they are required to attach to the relevant tool, material or item of equipment.

Learning aim B

This covers the four areas of health and safety, preparing surfaces, applying paints and hanging wallpaper. This is a very practical learning aim and needs to be delivered in a workshop or other practical area where learners can develop their skills.

Topic B.1 relates to health and safety and requires learners to carry out risk assessments before starting practical activities. To assist your learners, you could produce a risk assessment template, perhaps in the form of a table, that shows risks, hazards, people at risk, and control measures as the areas that need to be considered when assessing risk.

Topic B.2 is a practical one and learners will need access to a suitable range of surfaces and surface defects. You could introduce the topic by demonstrating various skills such as cleaning surfaces, filling large and minor surface defects and imperfections, and abrading surfaces to prepare them for surface finishes. Learners will need to practise these skills several times before completing practical assignments.

Topic B.3 could be introduced with a practical demonstration of paint application techniques using both brushes and rollers to paint walls and skirting boards. As with Topic B.2, learners will need to practise these activities several times in order to develop their skills prior to assessment.

Topic B.4 is a practical skills development topic that could also be introduced through a practical demonstration. Learners will need to know about measuring and cutting wallpaper, pasting wallpaper, hanging wallpaper, trimming after hanging and keeping adjacent surfaces clean during paperhanging activities. As with B.2 and B.3, learners will need the opportunity to undertake these activities on a number of occasions prior to assessment in order to allow time for skills development.

Regularly remind your learners of the assessment criteria when they are preparing for and working on assignments. Learners can very easily lose focus over the exact requirements of the assessment and can easily put a lot of effort into something that is of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 8: Exploring Painting and Decorating Principles and Techniques
<p>Introduction</p> <p>You could introduce the unit by leading a group discussion on the sequence of activities that should be followed when decorating a room. Learners would need to consider the selection of tools, materials and equipment, the preparatory works that are required prior to painting and wallpapering, and the associated risks, hazards and control measures to ensure that safe working practices are followed.</p>
<p>Learning aim A: Understand tools, materials and equipment used in painting and decorating</p>
<p>Learning aim B: Develop practical skills using safe working techniques to complete surface preparation tasks and apply surface finishes</p>
<p>Assignment 1: Painting and Paperhanging</p> <p>Scenario: 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 select the required tools, materials and equipment, justify your choices, and describe how to use and store each item safely.</p> <p>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.</p> <p>Making sure that you work safely and use appropriate personal protective equipment (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.</p> <p>The last part of your task is to apply emulsion paint to the wall area using a roller and brush for cutting in and to apply one coat of undercoat and one of gloss finish to the skirting board.</p> <p>Your supervisor has also 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.</p>
<p>Part 1</p> <ul style="list-style-type: none"> • Start with an initial safety briefing before entering the workshop for the first time. The briefing should cover workshop rules and procedures, use of personal protective equipment (PPE), general housekeeping including maintaining a safe and tidy work area, and recognition of hazards. Learners should be able to explain how to safely use and store the tools, materials and equipment and will need to demonstrate appropriate usage throughout. • Remember to cover the correct use of all the tools, materials and equipment for painting and decorating listed within the specification. Learners will need to know about them for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B. • To familiarise learners with the tools, materials and equipment used for painting and decorating, you could set out a range of tools on a bench and ask learners to divide them into those used in surface preparation, paint application and wallpaper hanging. On another bench you could place equipment and ask learners to identify

the different kinds of personal protective equipment and access equipment. You could place materials in an adjacent area and ask learners to divide them into surface preparation materials, types of paint (including water-based and solvent-based) and their uses, types of wallpaper and their uses and types of wallpaper adhesives and their uses. In doing this, make careful reference to the specification content and assessment criteria.

- Learners could then correctly label each item with its name, what it is used for in painting and decorating, associated health and safety aspects, and elements of risk, or set a quiz for each other in small groups. For assessment, learners will need to explain how tools, materials and equipment are used and selected, with 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.

Part 2

- To build on this work, outline the scenarios and requirements for painting and decorating, and ask learners to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be suitable, and why.
- Ensure learners are familiar with regulations related to hazardous substances and working at height as cited in the specification, and understand the safe use of the selected tools, materials and equipment. For assessment, learners will need to bring together a report/table to describe their safe use and include explanations as to why the activities are undertaken such as the correct handling of tools that have sharp blades, to minimise injury, and so on.
- Before starting any practical activities, learners must carry out a risk assessment for the activity and identify hazards, risks, people at risk and appropriate control measures that can be used to minimise the level of risk.
- A key element for success in this unit is effective teacher demonstrations, introducing surface preparation, application of paint and hanging wallpaper. Demonstrate the correct techniques, and give learners adequate time to practise and develop these key skills. It is essential that focused demonstrations continue throughout the learning experience.

Part 3

- Once learners have developed their skills and completed the risk assessment, they can then progress through requirements. Learners should be taught how to:
 - prepare surfaces, so they can make good large surface defects using powder-based fillers that they will mix prior to use, moving on to minor surface imperfections using ready-mixed fillers and fine-grade abrasives, and extending to sanding smooth with no visible scoring or scratching of the surface
 - apply paint to surfaces, so they can apply undercoat, gloss and emulsion surface finishes by brush and roller, with increasing skill (e.g. in relationship to roller skid marks, bristles, orange peel effect, cutting in, runs and sags)
 - measure wallpaper to a required length, allowing 50 mm (or 75 mm for Level 1) at each end for trimming, prior to hanging; and to hang patterned wallpaper straight to walls with no air bubbles, creases or wrinkles and with increasing skill (e.g. in relationship to gaps and overlaps, and pattern mismatch).
- Remember to embed the teaching of the properties and uses of materials to enable learners to consider, justify and evaluate the use of alternative materials. For example, they could consider the aesthetics, durability, washability, requirement to be painted over, type of adhesive required and stripability.

- A full set of quality control and assessment/photographic records should be completed and retained by the teacher covering, e.g. main tolerances in terms of deviation from plumb, size of gaps or overlaps in joints, visibility of air bubbles, creases or wrinkles and any pattern mismatch.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Jarvis, K. and Olsen, S., *Level 1 NVQ/SVQ Diploma Painting and Decorating Candidate Handbook*, Heinemann, 2011 (ISBN 978-0-43504-833-4)

Jarvis, K. and Olsen, R., *Level 2 NVQ/SVQ Diploma Painting and Decorating Candidate Handbook* (3rd edition), Heinemann, 2011 (ISBN 978-0-43504-834-1)

These two textbooks provide accessible and professional information for learners at this level.

Manley, S., Charters, M., Francis, C., Topliss, S. and Doyle, M., *Construction and the Built Environment: Level 2 Higher Diploma Student Book*, Heinemann, 2008 (ISBN 978-0-43549-991-4)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-446906-46-0)

Topliss, S., Doyle, M. and Stokes, A., *BTEC Level 2 First Construction Student Book*, Edexcel, 2010 (ISBN 978-1-84690-658-9)

Training resources

Jarvis, K. and Olsen, S., *Level 1 NVQ/SVQ Diploma Painting and Decorating Training Resource Disk*, Heinemann, 2011 (ISBN 978-0-43504-842-6)

Jarvis, K. and Olsen, S., *Level 2 NVQ/SVQ Diploma Painting and Decorating Training Resource Disk* (3rd edition), Heinemann, 2011 (ISBN 978-0-43504-843-3)

Websites

www.hse.gov.uk

The Health and Safety Executive – updated regularly. You can download regulations free. Has a useful PowerPoint® presentation on the regulations covering working at height.

Unit 9: Exploring Plumbing Principles and Techniques

Delivery guidance

Approaching the unit

This unit should be taught in a practical context. It is essentially a taster unit to introduce plumbing and to develop some basic skills. In the time available, your learners will not be expected to develop skills to occupational competencies or commercially acceptable standards.

A workshop induction and risk assessment must be undertaken for the practical aspect of this unit, to ensure that all hazards are identified and that control measures are adequate. Ensure that learners understand the introductory knowledge of working safely in plumbing, and the materials, tools and equipment they will use, before using workshop facilities to develop the skills to work with different plumbing materials.

Delivering the learning aims

Learning aim A requires learners to focus initially on understanding the tools, materials and equipment needed for plumbing operations. This is complemented through practical application in learning aim B where learners apply their knowledge for safe use when undertaking plumbing operations.

For **learning aim A** you will need to provide learners with access to a range of plumbing tools as outlined in the specification content, from which they can make appropriate choices. You will also need to supply the plumbing materials outlined, such as copper pipework, solder less fittings, brass compression fittings and elements of the waste pipework systems. You may find it efficient to make a number of tool sets available and rotate different tasks that require different tools among the group of learners.

You would find it beneficial to contact a local plumbing merchant and liaise with the sales representative to see what technical brochures and other supplier information they could make available to use as resources for delivering this learning aim. You could also liaise with other local centres or colleagues, or undertake an online selection of tools with websites such as those listed under 'Resources' for this unit. The safe use of plumbing tools and equipment needs exploring within this learning aim along with their storage and cleaning after use. Plumbing materials covering pipework, soldering, fluxes and other ancillaries can be researched through a supplier's website, so learners have an understanding of the large variety of materials available for modern plumbing operations. Sample boards can often be sought from manufacturers that would give a visual, hands-on understanding of the materials and components available. You may find websites suggested under 'Resources' to be of use.

Learning aim B develops the theoretical knowledge and then applies it to practical exercises in a vocational context where work must be completed to a quality standard. Pipework, for example, must be watertight and fixed to minimum tolerances. You will need to produce a drawing of the pipework frame that you want your learners to construct, with careful reference to the assessment criteria in the specification that gives guidance on what it will need to contain by way of bends, soldered fittings and compression fittings. The drawing will require some dimensional

elements within it, so that learners can produce an accurate frame. A pressure tester will need to be obtained when the final frames have been completed. This would be better hired for a day when testing is required. The pressure tester contains a hydraulic dial indicating the pressure obtained when hand pumping water into each learner's pipe rig.

Health and safety is important, especially when developing pipe bending and jointing skills in Topic 2. This will involve the use of 'hot working' with blowtorches and melting solder for jointing, for which the health and safety assessments in Topic 1 and in the workshop induction and risk assessment are essential. Dedicate an area of a workshop as a hot working area free of combustibles and with appropriate work benches to assemble and solder together joints. Gloves should be provided for handling any hot work along with appropriate eye protection. Learners should wear suitable overalls while undertaking plumbing operations, along with safety footwear. A full risk assessment must be undertaken by the centre prior to any hot working with learners to highlight any risks and establish appropriate control measures.

Regularly remind your learners of the assessment criteria when they are preparing for and working on assignments. Learners can very easily lose focus over the exact requirements of the assessment and can easily put a lot of effort into something that is of little value in terms of assessment of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 9: Exploring Plumbing Principles and Techniques
<p>Introduction</p> <p>You could introduce this unit to learners through examination of the pipework, waste and drainage systems associated with a domestic installation to a house. Three-dimensional drawings showing a typical layout to a house would start the process. You could then drill down into the detail involved with the plumbing connections required.</p> <p>Engage learners by providing actual examples of the pipework frames that they have to construct. This will also give them a reference against which to check progress. Many manufacturers and suppliers are willing to provide samples of fittings and materials that you can mount on sample boards to place on workshop and classroom walls.</p>
<p>Learning aim A: Understand tools, materials and equipment used for plumbing operations</p>
<p>Learning aim B: Develop practical skills using safe techniques to undertake plumbing operations</p>
<p>Assignment 1: Resources Required for Plumbing Operations</p> <p>Scenario: You have been asked to plumb in a sink unit within a busy commercial kitchen. As part of this task you have been asked to provide a safety pack containing information about materials, and risk assessments for the work.</p>
<p>Assignment 2: Construction of Plumbing Test Rig</p> <p>Scenario: 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.</p>
<p>Part 1</p> <ul style="list-style-type: none"> ● To familiarise learners with the tools, materials and equipment used for plumbing operations, you could set out a range of plumbing tools on one bench, and equipment and materials on another bench, with careful reference to the specification content and assessment criteria. ● Each learner could then photograph the items, import them into a Word document, and correctly label each item with its name, what it is used for in plumbing applications, and associated health and safety aspects, and elements of risk. A toolbox talk around the hot working area could provide a focus to identify several hazards and their associated risks along with the appropriate control measures to reduce the risk from the hazards, including use of personal protective equipment (PPE). This would also prepare learners for the safe use and storage of tools and equipment that could be demonstrated. ● By using an outline of the scenario where learners have been asked to plumb in a sink unit in a busy commercial kitchen workplace, you could ask them to fetch the tools, equipment and materials they may need for this operation. ● Learners will need to produce a list of tools, equipment and materials by selecting the correct ones from the work benches and providing a written explanation on why they have selected those tools. This could be accomplished by the use of a requisition order that they have to complete independently to establish what tools, materials and equipment are required for the complete operation. Where the centre has limited resources, this selection could be undertaken electronically using photographs and annotation into the requisition order. Ensure that your learners

identify, select and explain the tools, equipment and materials, to meet the assessment criteria of 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. At level 1, learners need to 'identify', without explanation, the use of tools, equipment and materials for plumbing operations.

- To build on this work, learners could justify in some detail the selection of the tools, equipment and materials. You could extend this by asking learners to evaluate the advantages and disadvantages of alternative materials for plumbing the sink, for example, the use of plastic water pipework instead of traditional copper pipework installations where plastic is more hygienic for food preparation purposes and cleaning underneath the sink.
- Learners need to carry out a risk assessment before starting the plumbing activity. Hold a hazard identification exercise in which learners list the practical risks from the hazards, the people at risk and put in place appropriate control measures to minimise the risk, in the context of their assignments. You might find suitable templates from the internet that could be downloaded and used for this purpose. Remind learners that they will need to demonstrate compliance with safe working practices and use of PPE throughout their work in this unit. You could start with the risk assessment for Assignment 1, and use the work so far to bring together a safety pack including a risk assessment for plumbing in a sink unit within a busy commercial kitchen workplace.

Part 2

- When learners have completed the safety briefing and appropriate risk assessments for practical activity, a key element for success in this unit is effective teacher demonstrations and giving learners the 'hands-on' experience in plumbing operations. Demonstrate the correct techniques, and give learners adequate time to practise and develop these key skills.
- You will need to plan for the production of the pipework framework, and give learners a detailed drawing that they can use as a template for measuring and marking out and cutting materials. Indicate dimensions on the drawing for setting out of the pipe rig, so you can assess learner accuracy of pipe bending and working to tolerances. These dimensions could be centre lines of pipes and or the outside dimensions. The pipework frame needs to be a small-scale model to reduce the resources that you will need to provide in its manufacture.
- The design of the pipework frame is not fixed by the unit specification, so you have a certain amount of freedom to include what you feel is appropriate. At a minimum, it will need to contain a made bend using pipe benders, a soldered 't' joint, some elbow joints and a compression fitting.

Part 3

- Ensuring that learners have completed the safety briefing and that the risk assessment is in place, outline the practical elements to undertake the construction of the simple pipe rig framework to include one compression fitting, two manual made bends, at least one soldered bend, one soldered t-junction, and tested to 1 × the working pressure which is normally the mains pressure of the local water supply.
- You could provide learners with a marking sheet for tolerances that are required for the merit and distinction criteria, so they can mark their own work and then ask for a counter signature to check their work against the drawn dimensions.
- The testing phase of their completed test rigs should be undertaken as a separate exercise. Learners will need to understand that their work is going to be tested to above the working or operating pressure of a typical system. This has not been defined within the specification but is left for the tutor to state the operating pressure that the rigs will be tested from. This is normally the local water pressure measured in bars.

- Let the learners undertake their own testing as this aspect is very engaging for them and can contain a competitive element based around the quality of the work produced. The tolerances are ramped as outlined in the merit and distinction criteria, with two different testing pressures that their work must hold without failure.
- You will need to provide evidence as outlined in the specification, e.g. observation/quality control/photographic records, including the accuracy element of length and height tolerances which could be marked by the learner using the diagram to check against and a tape measure, then checked by the observing tutor. The degree of error should be recorded for easy comparison with the tolerances specified within the assessment grids. The operating pressure is the local water pressure at the stopcock as it enters a building, which will obviously vary with location.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

These resources give learners a wealth of background learning and wider reading on topics covered in the unit content.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Blower, G. J., *Plumbing: Mechanical Services Book 1* (5th edition), Pearson Education, 2006 (ISBN 978-0-13197-620-7)

Although this is less contemporary than the 2013 publication above, it may be useful for some alternative information on basic plumbing.

JTL Training, *NVQ Level 2 Diploma Plumbing* (3rd edition) Pearson Education, 2011 (ISBN 978-0-43503-131-2)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Training materials

Blair, S., *Level 2 NVQ/SVQ Plumbing Interactive Animations CD-ROM (Plumbing NVQ)*, Pearson, 2010 (ISBN 978-0-43503-115-2)

This contains detailed visual animations of key subjects, with interactive quizzes and worksheets. It is VLE compatible and editable.

JTL Training, *NVQ Level 2 Diploma Plumbing Training Resource Disk* (2nd edition), Pearson, 2011 (ISBN 978-0-43503-116-9)

This contains a wealth of materials for helping deliver basic plumbing concepts, including interactive quizzes and PowerPoint® presentations.

Websites

www.pegleryorkshire.co.uk

A supplier's website for materials and fittings for jointing.

www.plumbcenter.co.uk

A supplier's website that provides images of materials and fittings for plumbing to use as resources.

www.screwfix.com

A website giving online information on various plumbing tools, equipment and materials. They also have a catalogue that can be requested in paper format.

www.yorkshirecopper.com

A supplier's website specialising in copper pipework.

Journals

HIP! Magazine

This is published quarterly. It is full of industry-focused information and is student friendly.

Unit 10: Exploring Electrical Principles and Techniques

Delivery guidance

Approaching the unit

This unit contains two learning aims, the first requiring some theoretical knowledge and the second being the application of this knowledge in a vocational context. You will need to engage learners on the theory required to perform electrical operations by the use of demonstration, and a hands-on approach to investigating and selecting tools and equipment. Regularly remind learners of the assessment criteria when they are preparing for and working on assignments. Learners can very easily lose focus over the exact requirements of the assessment and can easily put a lot of effort into something that is of little value in terms of assessment of the unit.

Note: this unit **does not** provide the requirements needed for electrical occupational competence.

Delivering the learning aims

For **learning aim A** you will need to provide learners with access to a range of electrical installation tools as outlined in the specification content, from which they can make appropriate choices. The electrical installation materials outlined in the specification will be needed, including, e.g. 1.5 mm lighting circuit cable and singles, 2.5 mm final ring main circuit power cable, singles cable; miscellaneous fittings such as plastic conduit, conduit elbows and T-junctions, conduit saddle clips; electrical fittings such as switch and power sockets with boxes. You may find it efficient to make a number of tool sets available and rotate different tasks that require different tools among the group of learners. You might also find it beneficial to contact a local electrical wholesaler and liaise with the sales representative to see what technical brochures and other supplier information they could make available to use as resources for delivering this learning aim.

Learners will need to develop appropriate practices when working with electricity, for the safe use and storage of tools, materials and equipment. As part of this approach, the electrical tools used for the practical tasks for this unit must be VLE Certified. In this way, learners will become used to using electrical tools that are insulated against accidental contact with a live conductor. Although the circuits that learners will perform will be 'dead' to electrical current, they should still use the correct hand tools as they would within industry. With storage, learners will need to correctly store electrician's tools and equipment within a toolbox to protect against damage, and terminal screwdrivers will need to be kept in good condition, so the blades do not become damaged. Any tool found to be defective should be replaced and any requiring maintenance should be repaired.

Learning aim B develops the theoretical knowledge and then applies it to practical exercises in a vocational context that will need to be completed to a quality standard in respect of their setting out and installation. Installation, for example, will require manual dexterity skills in stripping electrical insulation from cables and correctly terminating them so the completed circuit contains no faults. The ability to read, understand and interpret the drawn information is an essential skill learners will need to acquire for the setting out and following wiring instructions. The technical standard that is industry recognised is the IET 17th Edition Regulations, with a certified course

that all electricians should take as part of their industrial updating and for health and safety reasons.

Dealing with electricity is a hazardous operation and should be risk assessed and controlled properly to minimise hazards. Learners' work areas will need careful supervision and must incorporate locked-off isolation from the mains supply to ensure safety. Miniature circuit breakers (MCBs) must be employed to reduce the risk of electric shock when testing circuits, along with residual current devices (RCDs).

When developing electrical operation skills, you will need to produce a layout drawing of the electrical circuit that you want your learners to construct, with careful reference to the assessment criteria in the specification that guides on what electrical circuits will have to contain, by way of number of sockets, light switches and fittings. The drawing will require some dimensional elements within it, so that learners can produce their work accurately, cleanly and safely. For the practical element, wiring boards manufactured from chipboard will need to be provided so that a circuit can be fixed to the board using conduit and then wired up safely. These boards can be racked for storage and during the assessment phases.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 10: Exploring Electrical Principles and Techniques		
Introduction		
This unit could be introduced through examination of the electrical installation associated with a domestic installation of a house. Three-dimensional drawings showing a typical layout to a house would start the process, and then you could drill down into the detail involved with the electrical wiring of the ring final mains circuit and the lighting circuits from the supply.		
Learning aim A: Understand tools, materials and equipment used for electrical operations		
Learning aim B: Develop practical skills using safe techniques to undertake electrical operations		
Assignment 1: Resources Required for Electrical Operations		
Scenario: You have been asked to wire a small electrical circuit for power and lighting. As part of this task you have been asked to provide a safety pack containing information about materials, and risk assessments for the work.		
Assignment 2: Construction of Electrical Test Rig		
Scenario: 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.		
Part 1		
<ul style="list-style-type: none"> You could give a handout to learners that includes photographs of a range of electrical tools, equipment and materials as per the specification. Ask them to identify and label correctly each tool, material and equipment item after undertaking some research. To help with identification, you could point learners to a supplier's website. Learners then add the reason why each item would be selected, and its use. For assessment, learners will need to explain 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. Introduce the assignments to learners, then extend the research to evaluating alternative materials that could be used for the tasks, stating the reasons why. 		
Item photograph	Identify the purpose of this What this is used for The reason for its selection Justification for its selection	Evaluate the use of alternative materials for a specified electrical operation task
Tool		
Equipment		
Material		

- Hold an initial safety briefing on appropriate practices when working with electricity, as outlined in the specification, including workshop rules and procedures, use of personal protective equipment (PPE), general housekeeping, safe handling, lifting and moving, cleaning tools and reporting any defects. Learners should be able to explain how to safely use and store the tools, materials and equipment. You could introduce learners to a set of electrician's tools and equipment taking a toolbox talk approach to their use and function.
- Learners need to carry out a risk assessment before starting electrical activity. Hold a hazard identification exercise in which learners list the practical risks from the hazards, the people at risk and put in place appropriate control measures to minimise the risk, in the context of their assignments. You might find suitable templates from the internet that could be downloaded and used for this purpose. Remind learners that they will need to demonstrate compliance with safe working practices and use of PPE throughout their work in this unit. You could start with the risk assessment for Assignment 1, and use the work so far to bring together a safety pack including a risk assessment for wiring a small electrical circuit for power and lighting.

Part 2

- When learners have completed the safety briefing and appropriate risk assessments for practical activity, a key element for success in this unit is effective teacher demonstrations and giving learners 'hands-on' experience in the use, feel and manual dexterity required when cutting and stripping cable insulation where great care must be taken. Demonstrate the correct techniques, and give learners adequate time to practise and develop these key skills.
- To prepare learners for setting out the practical test rig circuit, you could demonstrate the process, so they understand how to maintain accuracy and can take dimensions from a scaled drawing and transfer these to the test rig board and produce an accurate setting out of the circuit.
- For marking out electrical runs and sockets, you will need to prepare a drawing with the layout of the electrical items in order to establish the accuracy of learners' setting out. Learners will then need to interpret requirements and transfer this over to the circuit board. A laminated A3 sheet would prove beneficial within a workshop environment.

Part 3

- Ensuring that learners have completed the safety briefing and that the risk assessment is in place, outline the practical elements of constructing and installing 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. The test rig must:
 - *have no exposed electrical conductors*
 - *no exposed copper conductors*
 - *have conduits neatly fixed in position*
 - *have correct colour coding*
 - *have all earth sleeving to be in position*
 - *have sockets and other fittings within a specified tolerance*
 - *pass tests for continuity, insulation resistance and polarity.*
- You will need to provide suitable workshop facilities for these practical installations, along with tools, and any equipment. If the lighting circuit installation involves any working at height, then suitable access provisions must be established.

- Prior to commencement of the test rig, learners could prepare a schedule of all of the resources they will require for the completed practical task. This should contain sufficient detail for all materials that will be required, appropriately described as they would be within a specification for electrical installations. Learners could undertake some element of independent research in order to establish how to describe a material or fitting correctly.
- Tests learners' circuits for continuity, insulation, resistance and polarity. To ensure learners' safety, they should not perform these tests themselves.
- When learners have started work on the test rig, progress should be checked regularly against the specification requirements. You could use directive questioning to challenge errors so that progressive learning takes place.
- You will need to provide evidence as outlined in the specification, e.g. observation/quality control/photographic records, including main dimensions compared against drawing dimensions of the ring final mains circuit and lighting circuit regarding the socket positions and level. The accuracy element of the setting out and completed circuit could be marked by the learner and then checked by the observing teacher. The degree of error should be recorded for easy comparison with the tolerances specified within the assessment grids. The merit and distinction assessment criteria contain greater depth regarding the quality of the installation which will need to be exposed so checks can be made on terminal connections and jointing.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

This reading list gives learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their own understanding.

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC First in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Textbooks

Allen, D. and Blaus, J., *Electrical Installations NVQ and Technical Certificate Book 1 Student Book* (2nd edition), Heinemann, 2008 (ISBN 978-0-43546-704-3)

Allen, D., Blaus, J., Harman, N. and Tucker, B., *Electrical Installations Level 2 2330 Technical Certificate Student Book – Revised Edition*, Heinemann, 2008 (ISBN 978-0-43540-109-2)

The above two textbooks provide a useful introduction to the level 2 electrical knowledge and understanding that will be required should learners wish to progress within this career field.

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Websites

www.eda.org.uk/about-us.cfm

The website of the Electrical Distributors Association (EDA) is where you may find a local supplier to help with resources.

Unit 11: Sustainability in Construction

Delivery guidance

Approaching the unit

The construction industry makes a significant contribution to the sustainability of our environment and communities. You could focus delivery around the concepts and benefits of sustainability and the issues that the construction industry faces during the lifecycle of a development project. The goal of a sustainable physical, social and economic environment can be achieved by adapting various construction techniques and methods.

A site visit would enable learners to see sustainability in practice, especially in the management of waste, the use of sustainable design, construction techniques and materials use. You could use a case study or design study to demonstrate how good design practices can result in a sustainable product. If there is the opportunity to do so, learners could also assess the environmental impact of a local building under construction.

Throughout this unit you should refer to other units in this qualification to reinforce the learning process, such as *Unit 3: Scientific and Mathematical Applications for Construction*. This will help reinforce learning from previous units, such as the scientific principles covered in Unit 3, in a more practical context. Throughout this unit you should use real and credible case studies, especially local projects of interest to your learners.

The unit will be externally assessed in the form of an examination paper lasting for one hour and 15 minutes. It is important that you are familiar with the sample assessment materials (SAMs) from the Edexcel website, and that you prepare learners for the format of the paper and the different types of objective, short answer and extended writing questions, and questions based on source material contained within the examination paper.

Delivering the learning aims

Learning aim A introduces sustainability concepts and the benefits of following sustainable approaches and practices. It covers physical, social and economic issues arising with construction activities. It also addresses specifically the issues related to production and disposal of waste as well as pollution and relevant reduction measures. There is an emphasis on the need to consider the natural environment and the social and economic impact of the construction industry.

You could consider delivering the learning aim non-sequentially as there is the potential for crossover within the unit and this could avoid potential repetition of the concepts. For example, you might start by introducing the lifecycle of a development from concept to demolition, highlighting various issues related to the physical, social and economic environment. DVDs, pictures or illustrations might also be helpful for learning delivery. Build on this work to develop an understanding of the concepts and benefits of sustainability.

Learning aim B introduces the techniques and methods used to reduce the impact of construction during the lifecycle of a development. It covers design approaches to include sustainable materials, energy-efficient building services and minimising air pollution. It also covers alternative energy resources as one of the major drivers of sustainability. Construction methods and site practices which ensure sustainability are discussed as well.

Arranging a site visit could be a useful part of delivery for this learning aim, with the appropriate centre visit safeguards in place. Agree with site personnel before the visit that the emphasis is on sustainable design features and site practices that ensure less wastage, noise and pollution. Reinforce this learning through contrasting examples of older developments with contemporary ones.

Getting started

This provides you with a starting point for one way of delivering the unit, using suggested activities that help prepare learners for the Edexcel-set external examination.

Unit 11: Sustainability in Construction
<p>Introduction</p> <p>Introduce learners to the unit using a simple example of a sustainable construction development, highlighting the phases and activities during its lifecycle. Your aim should be that learners develop an understanding of how activities likely to take place during the lifecycle of a development can create, mitigate or reduce sustainability issues. They will also understand the significance of construction activities for economic and social wellbeing. You could use the same project to study various methods and techniques adopted to reduce the impact of construction. You might arrange a site visit or use DVDs or internet-based resources.</p>
Learning aim A: Understand the sustainability issues of construction for the physical, social and economic environment during the lifecycle of a development
Learning aim B: Understand the techniques and methods used to reduce the impact of construction during the lifecycle of a development
<p>Part 1: Concepts and benefits of sustainability</p> <ul style="list-style-type: none"> You could start by giving learners a presentation on various phases of a development project and potential sustainability issues at each phase. Suitable DVDs or web-based resources might enhance this. This presentation could introduce the definition of sustainability given in the specification (Topic A.1), but it could also make learners aware that there are different definitions of sustainability. In groups, give learners one phase each to discuss and investigate, using a case study or documentation related to a real project. The focus would be on physical, social and economic issues. Each group then gives an in-class presentation of their findings. Do a short test (multiple choice, short questions and answers), using peer marking, on physical, social and economic issues arising out of construction. Reinforce learning by review and/or recap of those topics where learners' responses show common misunderstandings and misconceptions. Hold a whole-group discussion on the concepts and benefits of sustainability. Conduct a short quiz using examples to reinforce the concepts and benefits of adopting a sustainable approach. <p>Part 2: Issues and solutions for sustainable development</p> <ul style="list-style-type: none"> Move on to introduce techniques and methods that could reduce the impact of construction activities, considering the social, economic and physical aspects. You could focus initially on the design stage and address some 'what if?' scenarios. For example, 'what will be the benefit if a designer specifies recycled materials?' or 'what will happen if the dimensions are not modular?' In small groups, learners could then investigate various sustainable design and technology solutions for a given construction project. Groups could be allocated areas such as materials, water savings, efficient heating, natural lighting and maintenance. A case study or documentation relating to a real project might be useful. Drawings, sketches and tables might be useful to understand what is being proposed. Each group then gives an in-class presentation of their findings.

- Use the group work as a starting point to deliver 'design for sustainability'. You could introduce alternative energy sources and how these can help to achieve sustainability goals. You could also ask them to consider the 'embedded energy' of different materials and the impact this might have on a sustainable project.
- Carry out a short test (multiple choice, short questions and answers), using peer marking, on sustainable features.
- A visit to a modern, sustainable site might be useful for learners, with the appropriate centre safeguard requirements. Give the learner checklists so that they can record sustainable features and/or technologies being used.
- Ask learners in small groups to investigate sustainable design features of two contrasting developments: one traditional development and one 21st century development. Ask learners to specifically include energy efficiency and energy sources. Add to this discussion at appropriate times as learners' knowledge might be limited to what they have seen so far. Learners could produce a poster to communicate their findings.

Part 3: Sustainable practices

- You could introduce various techniques and methods for sustainability. You might include the structural materials, passive systems and recycling techniques. There are a number of examples available on the web.
- In small groups, learners could then investigate details, applications and advantages/ disadvantages of using these techniques. You might allocate each group a specific topic such as straw bale construction or green roof technology. Each group then gives an in-class presentation of their findings, which could include drawings, sketches and illustrations.
- Introduce how site practices could be more sustainable. Your focus would be the physical environment and how issues such as waste disposal, dust and noise could be managed.
- Hold a short quiz using examples to reinforce the concepts and benefits of adopting sustainable site practices.

Preparing for the written examination

- The external examination is set and marked by Edexcel, and taken by the learner under examination conditions.
- It lasts for 1 hour and 15 minutes and contains 50 marks, and all the questions are compulsory.
- There will be different types of objective, multiple choice, short answer and extended writing questions, and questions based on source material contained within the examination paper.
- It will be useful for learners to practise completing answers in the class environment to reinforce learning and develop test technique. You should ensure that learners know the meanings of the command words commonly used in the paper so they use the time available effectively. As further useful practice you could set examination-style questions for homework on a regular basis as each part of the unit specification is covered.
- Alternatively, examination-style questions could be used as starter or plenary activities, with learners peer assessing each other's responses. You should set aside time for final revision for the examination. It would be useful for learners to complete a past paper, or sample paper, before they sit the live examination so they are fully aware of what they will need to do in examination conditions. This experience will also give them the opportunity to practise using their time effectively and will build their confidence.

- Reinforce learning by providing individual feedback, sharing good practice and reviewing/recapping those topics where learners' responses show common misunderstandings and misconceptions.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 2: Construction and Design*
 - *Unit 4: Construction Processes and Operations*
 - *Unit 6: Exploring Carpentry and Joinery Principles and Techniques*
 - *Unit 7: Exploring Brickwork and Blockwork Principles and Techniques*

Resources

These resources give learners a wealth of background learning and wider reading on topics covered in the unit content. Learners may choose to undertake wider reading to broaden their understanding.

Textbooks

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC Firsts in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Chudley, R., Greeno, R., Hurst, M. and Topliss, S., *Construction Technology* (5th edition), Pearson Education, 2011 (ISBN 978-0-43504-682-8)

Although a higher-level text, this provides excellent illustrative content and some useful descriptions which might be helpful for more able learners.

Greeno, R. and Chudley, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-0610-5)

This handbook has been used by construction students over a number of years. It covers construction processes in a comprehensive manner.

Lyons, A., *Materials for Architects and Builders* (4th edition), Butterworth-Heinemann, 2010 (ISBN 978-1-85617-519-7)

This is an excellent resource to understand materials' properties and their uses in construction.

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Websites

www.environment-agency.gov.uk/business/sectors/136252.aspx

This webpage provides useful information, including water usage and sustainable drainage systems (SuDS).

<http://sustainableconstruction.co.uk/>

This website explains sustainable construction, giving examples of some relevant projects.

www.bre.co.uk/filelibrary/rpts/sustainable_construction_simpleways_to_make_it_happen.pdf

A very useful document from the Building Research Establishment (BRE) highlighting sustainable construction techniques.

<http://www.wrap.org.uk/category/sector/construction>

This website provides plenty of information and resources about site waste management and

<http://www.greenspec.co.uk/>

This website has particularly useful sections on sustainable materials and building techniques.

Videos

www.youtube.com/watch?v=Hogg5CwuUqg

This video explains the construction of a straw bale house.

<http://www.youtube.com/playlist?list=PLxKoZsbIPUTGEYDZIUSIeBhOdOPvGhTq9>

This is WRAP's YouTube channel and contains videos about waste management in construction.

Journals

Construction Manager

This journal is published by the Chartered Institute of Building and contains updates on construction projects, methods and materials.

Journal of Green Building

This journal is published by College Publishing and addresses sustainability, new materials and modern methods of construction.

Unit 12: The Construction Industry

Delivery guidance

Approaching the unit

This unit contains two learning aims, the first examining the range of roles and responsibilities within the industry and the second exploring approaches to gaining employment in the construction industry. It gives learners the opportunity to understand the many career and professional pathways available to them and the critical importance of health and safety. The approaches to gaining employment will equip learners to be prepared for construction recruitment, methods of application and preparing for an interview.

The unit can engage learners with the exciting, challenging and rewarding opportunities within the construction industry and help them secure a career that has the potential to take them anywhere in the world.

Delivering the learning aims

Learning aim A provides an excellent opportunity to mind map the variety of jobs within the construction industry. By asking learners in small groups to draw out the various jobs they are aware of, you can build up a substantial collective list. From this list the jobs can be categorised into the roles and responsibilities contained within the topic content, such as design, financial control, management and supervision, construction personnel, safety personnel, and the team who will manage, operate and maintain the finished construction project.

You could take this groundwork forward when investigating the professional pathways within the industry and establish the function of professional associations for each category. For example:

- design – the Royal Institute of British Architects (RIBA)
- financial and cost control – the Royal Institute of Chartered Surveyors (RICS)
- management and supervision – the Chartered Institute of Building (CIOB)
- building services – the Chartered Institute of Building Services Engineers (CIBSE)
- civil engineering – the Institute of Civil Engineers (ICE).

There is no professional association for trades or operatives – although there are trade associations, these are not covered within the content of this unit. Delivery of the professional routes could be achieved by reference to their entry qualifications and the route to professional membership, available from the professional institution websites.

The use of case studies would prove very useful when exploring the roles and responsibilities covering the four areas of design, construction, finance and maintenance. These would allow learners to read, understand and examine the various roles and responsibilities of, say, an architect, quantity surveyor, contracts manager and facilities manager. Alternatively, this could be supplemented with guest speakers from local architects, estates management or construction contractors. Learners would need to prepare a series of questions and the speakers would need to be briefed in advance.

Understanding the importance of health and safety requirements will necessitate the examination of health and safety responsibilities of employees and employers. The Health and Safety at Work Act 1974 (HASWA) will need to be delivered in an outline

format to identify both employer and employee responsibilities. Three other primary areas of legislation will need to be examined with regard to responsibilities on safety management (CDM Regulations), chemical use (COSHH Regulations) and movement (Manual Handling Regulations). The Health and Safety Executive (HSE) publishes many suitable leaflets and guides on each of these regulations. Encouraging small-group presentations on each would reduce learners' workload and give them an opportunity to prepare and deliver a presentation on each regulation. These could then be printed for distribution or held electronically.

Learning aim B covers the pathways to obtaining employment within the construction industry. Independent research by learners would prove a valuable tool here. You could establish the areas of the construction industry each learner is interested in and ask them to produce a 'life plan' that includes the best ways of achieving their goals. Directing learners to the CITB-Construction Skills website would be a good starting point for this topic.

Exploring how learners would apply for a position within a construction organisation will require examination of aspects of documentation such as CVs. Learners could examine and discuss exemplar materials, which would aid the production of their own CVs and covering letters and help them complete their job application.

As part of preparation for an interview, mock interviews would be a useful engagement exercise for learners. Asking a local contractor to sit in on the interview panel would generate feedback on strengths and weaknesses and would help learners develop their transferable skills.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 12: The Construction Industry
<p>Introduction</p> <p>You could introduce this unit by making use of an iconic construction project to engage learners in discussion. Take an overview of the roles required in achieving such a project, and the career pathways and professional associations that are involved.</p>
Learning aim A: Examine the job roles and responsibilities in the construction industry
<p>Assignment 1: Careers and Health and Safety in Construction</p> <p>Scenario: You have been asked to provide a marketing tool for your employer for learners who are interested in construction as a career. Produce a leaflet that gives potential learners an insight into the types of jobs available, the qualifications you would need, and the professional career options.</p> <p>You have also been asked to investigate health and safety in the construction industry to provide a briefing for a group of supervisors and managers. Prepare briefing materials describing the different responsibilities of an employee in a craft role, a construction manager and a supervisor.</p>
<p>Part 1</p> <ul style="list-style-type: none"> ● You could start by enabling learners to grasp the enormity of the range of personnel who can work within the industry, from design through the whole supply chain. Mind map a range of career opportunities by using spider diagrams to allow learners to work on classifications such as design, financial control, management and supervision, construction personnel, safety personnel, and the team who will manage, operate and maintain the finished construction project. ● Learners could then select one managerial, craft and operative job role to be described within their promotional leaflet, and build up the detailed descriptions in full. ● Build on this to investigate the function and role of professional associations and the progression opportunities from achieving professional status. Learners could work in small groups that reflect their areas of interest and report back on their research to the whole group. They could structure their findings under headings, including the association's function, what it does for its members, types of membership and how members' opportunities are enhanced, for example. ● Learners could then use detail from their findings on professional associations and pathways to inform their leaflet. ● Taking this further, learners could compare the different skills and qualifications required for an operative, craft, managerial and professional position, and compare the functions and roles of the professional associations. Research could be divided among small teams, with learners then presenting their findings back to the group. ● Learners could use their findings to extend their leaflets to include a comparison table examining the different skills and qualifications required for their selected managerial, craft and operative personnel, and the selected professional associations.

- Lead a discussion on how a combination of skills, qualifications and experience enables progression from craft roles through to managerial or professional job roles. In small teams, learners could then investigate two alternative progression routes and present to the whole group, sharing their notes.
- Learners could include guidance on options and progression routes in their leaflets.
- Encourage learners to enhance their leaflets with images and diagrams to make them attractive for a potential student who is interested in the construction industry as a career. Links to functional skills in English could be of great benefit here, as could IT skills in graphics and word processing using a publisher software package.

Part 2

- Discuss with learners the critical importance of health and safety to all levels and roles involved in the construction process. You could include examples where health and safety has not been adhered to sufficiently, e.g. falls from height are a major cause of fatalities in the UK construction industry, along with crushing injuries from working with construction plant. Reference to the HSE website will provide many examples to aid learning on health and safety importance.
- You could then divide the group into teams, each with a specific focus on outlining one piece of legislation and its application to different roles, such as an employee in a craft role, a construction manager and a supervisor. Each team could structure their feedback using headings that reflect the unit content, e.g. personnel responsibilities, method statements, site inductions, policy statements. Relate the work to current legislation, including the Health and Safety at Work Act, Construction Design and Management Regulations, Control of Substances Hazardous to Health Regulations and Manual Handling Operations Regulations. Learners should look specifically for individual and employer duties that are different within each regulation. The HSE publishes many suitable leaflets and guides on each of these regulations.
- Provide formative feedback to each group as they progress, then ask learners to present and share their findings.
- Learners then bring together their learning to provide a briefing for a group of supervisors and managers as outlined in the assignment. Using engaging scenarios with the briefing, such as 'the briefing that you prepare will be used nationally by the company', will help focus learners on this very important aspect. The description of an employee in a craft role and supervisor's responsibilities for a project must be detailed from at least two different pieces of health and safety legislation or regulations.

Learning aim B: Explore approaches for gaining employment in the construction industry

Assignment 3: My job search

Scenario: You are looking for a job in construction and need to ensure that you can submit a high-quality application and be well prepared for interview. As an applicant for a construction vacancy, investigate sources of construction job vacancies, write your CV and covering letter and prepare for an interview. Evaluate all your application documentation against that of another applicant.

- Learners could start by examining the national construction press to find out about the different careers that are available and the salaries they attract. They could then move on to investigate wider sources of construction recruitment, as outlined in the unit content.
- You could give learners a number of exemplary CVs so they understand what is required in a high-quality application. To engage and motivate learners you could give them a job advertisement and ask them to shortlist from the CVs those who they would consider for interview as suitable candidates, so they gain a clear understanding of the importance of a CV.

- To assist learners in matching their skills to the requirements of a job description, they could undertake a SWOT analysis and identify strengths, weaknesses, opportunities and threats within their skills base. This could be used to help identify suitable vacancies and develop their career pathway.
- Learners should then select a suitable construction vacancy that particularly engages and motivates them for use as a basis for their job application and create their own CV in response. Explain to learners that this document is the first impression they will make with a potential employer. Learners should look again at the exemplary CVs and the aspects outlined in the unit content, so they can focus on the professional production required for this task. They could read each other's CVs and provide feedback on content and technical accuracy, or you might invite a PR consultant as a guest speaker to provide an evaluative feedback opportunity and give learners an insight into the real world and job recruitment.
- Give examples of covering letters so that learners understand what is required in terms of format and content. When preparing their own covering letter, remind them of the importance of using the correct format and technical accuracy, and ensuring the content is relevant to the job application. Ask learners to imagine that they are hiring a specialist craftsperson for a new project. What would they want to see in a covering letter?
- Learners should evaluate their application documentation against that of another applicant for the job, which you may need to provide. You could guide learners in a role play where one team member acts as the employer seeking to recruit the employee and provides post-application feedback using the two sets of application documentation.
- To prepare for the interview, learners could research and discuss a suitable bank of questions that might be asked and develop their answers. You could base an activity on a specific job application from the local press and ask learners to anticipate potential questions through analysing, for example, details of the company, vacancy requirements and details in the learners' application documentation, including personal qualities and skills. This would also give learners valuable insight into preparing questions to ask during the interview and how they might make the best impression.

Resources

The suggested resources support and broaden learners' understanding of the topics covered in the unit content.

Textbooks

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC Firsts in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Topliss, S. and Hurst, M., *Construction and the Built Environment Level 3*, Pearson Education, 2010 (ISBN 978-1-84690-656-5)

Topliss, S., Doyle, M. and Stokes, A., *Construction Level 2*, Pearson Education, 2010 (ISBN 978-1-84690-658-9)

Websites

www.cnplus.co.uk

This is the website of *Construction News*, a magazine that contains jobs, articles and news.

www.bconstructive.co.uk

Supported by CITB Construction Skills, this website contains information on the different careers available in construction.

www.careersinconstruction.com

This general recruitment website is full of construction opportunities.

www.hse.gov.uk

The Health and Safety Executive website provides useful guides on legislation.

<http://www.cskills.org/>

The Construction Industry Training Board (CITB-Construction Skills) website

Unit 13: Exploring Roofing Principles and Techniques

Delivery guidance

Approaching the unit

This unit should be taught in a practical context. The knowledge and understanding of roofing tools, materials, properties and uses, together with associated health and safety issues, can effectively be delivered during learner briefings (prior to entering the workshop) and during demonstrations of techniques and skills by the teacher. This use of focused inputs at appropriate points, interspersed with the practical sessions, will reinforce and embed your learners' understanding of the theory. ICT could also be used in materials investigations.

Sample roofing materials should be available and, where possible, on permanent display to enable learners to become readily familiar with their identification, use and application. It may be beneficial to form links with local, regional or national construction companies or specialist roofing subcontractors to establish what help they could provide. For example:

- possible sponsorship of the centre's construction programme and/or provision of materials or samples and access to specifications, construction drawings, quality control documentation and health and safety documentation; possible sponsorship of individual learners and direct recruitment onto Apprenticeships and other training schemes
- assistance with the development of links with other sources of help, including specialist roofing contractors, roofing material manufacturers and suppliers, architects, clerk of works consultancies, trade associations, consultants and so on, along with access to visiting speakers who will put learners' knowledge into an industrial context – specific content level and expected outcomes would need to be discussed in advance with speakers.

The unit could be assessed by a single assignment that covers both learning aims A and B. Learners will need to understand how to set out their work accurately, including setting tile battens to the correct gauge, parallel, appropriate to the tiles used and lap requirements. Learners will need adequate time to practise practical skills. All work, both practice and assessment activities, should be completed in a simulated site environment using a roof 'mock-up' at ground level.

Delivering the learning aims

It is essential that you cover health and safety prior to entering the workshop and that there is continual focus on working safely, including the identification of hazards and risk assessment.

Learning aim A focuses on the tools, materials and equipment used when tiling a pitched roof. This will also cover their safe use and storage, which is best delivered via your practical demonstrations. You will also need to cover knowledge of the purpose and use of access equipment, but learners should not be expected or required to use this equipment in order to complete either skills development or assessment activities as all work should be completed at ground level. Learners should develop an understanding of the key vocabulary used within pitched roofing work in order to complete their assessment effectively, including where writing is an option for the production of assessment evidence.

Learning aim B requires learners to complete a risk assessment and then use safe working practices to complete a pitched roofing task. Learners will also need to be taught how to calculate the gauge (spacing of tile battens) and number of courses using manufacturers' technical information.

Your centre will need to provide appropriate materials and time for both the development of skills and the final assessment exercise.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignments in the specification.

Unit 13: Exploring Roofing Principles and Techniques
<p>Introduction</p> <p>Health and safety are of paramount importance in roofing work. You could introduce the unit by showing learners the ground-level roof 'mock-ups' that they will be using and ask them to consider the different health and safety issues when comparing working at ground level with working at height. Learners could also investigate how methods of tile lapping reduce the risk of water penetration and it would be motivating to 'wet' test their own lapping methods and compare with the established methods.</p>
Learning aim A: Understand tools, materials and equipment used for roofing tasks
Learning aim B: Develop practical skills using safe techniques to carry out roofing tasks
<p>Assignment: Fixing Plain Tiles to a Sloping Surface</p> <p>Scenario: You are a roofer working on a construction site and have been asked by the site manager to tile a pitched roof at ground level. The roof will later be transported to a fixed structure for finishing for approval along with quality control comparisons throughout the contract period.</p> <p>Before you begin you should explain the tools, equipment and materials you will be using and complete a risk assessment.</p>
<p>Part 1</p> <ul style="list-style-type: none"> ● Note that all work, both practice and assessment, should be completed in a simulated site environment using a roof 'mock-up' at ground level. ● Start with an initial safety briefing before entering the workshop for the first time. The briefing should cover workshop rules and procedures, use of general and task-specific personal protective equipment (PPE), general housekeeping including maintaining a safe and tidy work area, and recognition of hazards. ● A key element for success in this unit is effective teacher demonstrations introducing the setting out of tiles, including spacing of tiling battens, to achieve the correct bonding and gauge. Learners should be given adequate time to practise and develop these key skills. ● Learners will need to research and investigate the correct use of all the tools, including hand tools and access equipment used for roofing operations, listed within the specification. Learners will need to know about hand tools and access equipment for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B. They should not need to use access equipment to complete the work. Independent learning followed by presentations could boost learner confidence, and they should be able to explain how to safely use and store the tools, materials and equipment, including the reasons why. They could provide written evidence, make an individual presentation, or respond to teacher questioning accompanied by a teacher record of the questioning outcomes.

- The focus on tools, materials and equipment can be effectively taught and embedded within both practical demonstrations and focused teacher inputs throughout the skills development and practice sessions. It is essential that during these sessions you look at the properties and uses of the materials covered within the specification, including associated health and safety aspects and elements of risk. For assessment, learners will need to explain how the tools are used and provide supported reasons as to when they would be selected.
- When learners are planning their response to the given assignment, they will need to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be used.
- Learners could conduct focused research into roof slates and tiles, including ridge tiles, so that they will be able to justify the use of materials for specified roofing tasks. Access to the internet will enable learners to access to manufacturers' information on their roofing products.
- Mortars are used for the bedding of verges and ridge tiles. The normal mix is a 1:3 cement mortar using ordinary Portland cement and building sand. You will need to make learners aware of the risk of cement or lime burns, as cement and lime are highly alkali. A 'sharp' sand can be used to aid the bond between materials with an open texture.
- You should use sand lime mortar for the bedding of verges so that learners' work can be dismantled and materials cleaned for re-use. The mortar can also be recycled via a mortar mill.
- It is essential that focused demonstrations continue throughout the learning experience.
- Before starting roofing tasks, learners will need to carry out their own risk assessment that identifies hazards and considers the risks associated with the practical activity (especially working at height). This will include identifying who is potentially at risk. You should alert learners of the need to use control measures to eliminate risk and that the use of PPE is not the primary method. You could provide a template for learners to use when completing this assessment. Learners will need to show they comply with these safe working practices throughout their practical work, including the use of PPE.

Part 2

- In making known the assignment requirements, learners will need to know that the practical assessment is a 3 m² roof with a minimum pitch of 30°, underlay neatly fixed with no ridges, and tile battens fixed with 5 mm parallel to each other. Learners will need to fix plain roof tiles to the sloping roof surface to produce a watertight roof finish, with all joints correctly bonded. Some learners working towards the higher grades will also show that all tiles are laid to the correct lap and gauge, and show a half-bond bedded at both verges.
- Learners could investigate manufacturers' technical information to gain an awareness of the suitability of the materials for different locations, recommended fixing methods for different situations and dimensions including number of fixings required and courses to the correct lap and gauge.
- Learners will need to calculate the gauge and layout of tile battens, taking into account the required tile laps and the dimensions of the roof 'mock-up' to be tiled.
- Remember to teach your learners the correct method of lapping the roofing felt to ensure water runoff.
- During your practical demonstration of fixing methods you could show learners how the correct staggered pattern with overlapping side joints generates water runoff and prevents leaks even though joints are not sealed.

- Learners should be allowed sufficient time to practise their practical skills before starting the assessment activity. You should intervene and provide appropriate advice throughout the practice period. A focused plenary at the end of each session could highlight common mistakes and methods for improving.
- Learners should conduct peer assessment of practice tasks so that they are able to identify quality control issues and learn from each other's experiences in order to make improvements to future work.
- For the practical assessment, ensure that you include enough time for the completion of risk assessments and gauge calculations before starting the work and making records of quality control checks on completion of the practical work.
- A full set of quality control records should be completed and retained by the teacher prior to the work being taken down. This could be records of a dimensional and/or visual check of lap, bonding and gauge and a water test to check that the work does not leak water. You should ensure that a full and accurate observation record is made of each learner's performance in the assessment activity.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

Textbooks

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC Firsts in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Manley, S. *et al.*, *Construction and the Built Environment Level 2 Higher Diploma*, Pearson Education, 2008 (ISBN 978-0-43549-991-4)

This has useful topic sections covering roofs and roof finishes, including key terminology.

Taylor, K., *Roof Tiling and Slating*, Crowood Press, 2008 (ISBN 978-1-84797-023-7)
This provides a practical guide to roof tiling and slating.

Websites

www.hse.gov.uk/pubns/indg284.pdf

HSE's *Working on roofs* covers key safeguards when working on a roof.

www.hse.gov.uk

The website of the Health and Safety Executive provides information and guidance on health and safety both in general and industry specific.

www.instituteofroofing.org

The Institute of Roofing provides news from the roofing sector and information on standards and codes of practice.

www.nfrc.co.uk

The National Federation of Roofing Contractors website includes a news section giving up-to-date information on the industry.

www.roofingtoday.co.uk

Roofing Today provides a wealth of information about roofing.

www.rcimag.co.uk

The Roof Cladding and Insulation website provides a wide range of information on all aspects of roofing.

www.marleyeternit.co.uk

The Marley Eternit website is a valuable source of information on roofing materials.

www.sandtoft.com

Sandtoft provides a valuable source of information on roofing materials.

Unit 14: Exploring Wall and Floor Tiling Principles and Techniques

Delivery guidance

Approaching the unit

This unit may give learners their first experience of carrying out practical activities related to wall and floor tiling, along with the knowledge required to underpin such practical skills. Delivery could focus around extensive use of supervised practical workshop activities, group teaching, and demonstrations of the tools, materials, techniques and personal protective equipment (PPE) involved. This will help develop learners' knowledge as well as their practical skills.

A construction site visit could be useful, with the appropriate safeguards in place. Consult with site personnel before the visit so that the emphasis is on safe working practices as well as on selection and use of correct tools and equipment for wall and floor tiling activities. This would enable learners to observe the health and safety practices, potential hazards and importance of following safe systems of work. Reinforce this learning in class through examples of accidents and near misses.

Throughout this unit you should relate to a number of units in this qualification to reinforce the learning process, especially to the scientific principles in *Unit 3: Scientific and Mathematical Applications for Construction* so that it reinforces the learning in a practical context.

Delivering the learning aims

For **learning aim A**, learners need access to a wide range of tools, materials and equipment for wall and floor tiling. They will need to learn about their purposes and properties, and safe usage and correct storage to prevent loss, damage or injury. Ensure that learners have access to a range of tools, materials and equipment beyond those items that they will use for the given practical tasks. This will ensure that they are able to make selections in order to meet the assessment criteria.

Wherever possible, this learning aim should be delivered in a workshop or practical area where learners can handle tools, materials and equipment and observe demonstrations of their use. When demonstrating the safe use of various hand tools, materials and equipment you could highlight the potential dangers of not following the correct procedures and techniques, and you could exclusively address the requirements for the safe use of hazardous substances such as adhesives. Use of multimedia resources such as DVDs could reinforce this aspect.

Learning aim B is about developing practical skills to carry out wall and floor tiling tasks and needs to be delivered in a workshop or other practical area. As this involves working with hazardous substances, particular attention should be paid to associated risks and the adoption of safe working practices. You could engage learners in carrying out a risk assessment by providing them with enough details so that they can identify hazards and suggest the control measures.

You could then start a practical wall and floor tiling activity with the learners, developing their skills in setting out and preparing the areas for tiling, then fixing the tiles to a given specification, as outlined in the unit content. Allow sufficient time for learners to practise before putting them through the assessed activities.

Remind learners of the importance of the assessment criteria when they are preparing for and working on assignments so they focus on the exact requirements of the assessment and put their effort where it is needed to meet the assessment requirements of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignment in the specification.

Unit 14: Exploring Wall and Floor Tiling Principles and Techniques

Introduction

You could introduce the unit by leading a group discussion on the sequence of activities that should be followed when fixing wall and floor tiling. Learners would need to consider the selection of tools, materials and equipment, the preparatory works that are required prior to fixing the tiles, and the associated risks, hazards and control measures to ensure that safe working practices are followed.

Learning aim A: Understand tools, materials and equipment used for wall and floor tiling tasks

Learning aim B: Develop practical skills using safe techniques to carry out wall and floor tiling tasks

Assignment: Fixing Tiles to Wall and Floor Areas

Scenario: A client has awarded you a contract to perform wall and floor tiling. You will be working with your team. Before you begin, you are required to explain the tools, equipment and materials they will be using, safe working techniques to be used, producing and complying with health and safety risk assessments, general preparation for, and planning of, wall and floor tiling tasks.

Part 1

- Start with a safety briefing before entering the workshop for the first time. The briefing should cover workshop rules and procedures, use of PPE, general housekeeping, including maintaining a safe and tidy work area, and recognition of hazards. Learners should be able to explain how to safely use and store the tools, materials and equipment and will need to demonstrate appropriate usage throughout.
- Remember to cover the correct use of all the tools, materials and equipment for tiling walls and floors listed within the unit content. Learners will need to know about them for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B.
- To familiarise learners with the materials you could start by giving them a presentation, making use of manufacturers' brochures, sample materials, pictures, suitable DVDs or web-based resources. They could also consider the different requirements of aesthetic, waterproofing and hygienic applications of tiles. Discuss in groups the requirements of tiles on a hospital wall, a domestic kitchen wall and a swimming pool.
- Learners could then work in small groups to discuss and investigate one material each, such as adhesives or tiles, researching the different types available and their suitability for various situations. They could use examples related to a real project and web resources. The focus would be why a certain type of material is used – for example, what would be the reason to use a certain type of adhesive? Learners should also investigate the storage of materials. Each group could then give a presentation of their findings to the whole group.
- Hold a whole-group discussion on how fixing wall and floor tiling tasks are carried out.

- In small groups, learners could be given one task each to investigate, such as setting out and grouting, using examples related to a real project. You could also provide them with suitable documentation, including drawings, sketches and so on. Each group could give a presentation of their findings to the whole group.
- Build on this work to introduce the purpose of various tools and equipment. You could conduct a short quiz including pictures of tools to ensure that all learners correctly identify the tools required for a specific task.
- You could follow this by demonstrating safe use and storage of various tools, equipment and PPE, in an appropriate and safe setting. Use questioning or individual demonstration to ensure that all learners can safely use and store tools, equipment and PPE.
- Conduct a short quiz to ensure that all learners know and can identify correct PPE for a specific task.

Part 2

- To build on this work, outline the scenario and requirements for wall and floor tiling, and ask learners to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be suitable, and why.
- Ensure learners are familiar with regulations related to hazardous substances and working at height, and understand the safe use of the selected tools, materials and equipment.
- Before starting any practical activities learners must carry out a risk assessment for the activity and identify hazards, risks, people at risk and appropriate control measures that can be used to minimise the level of risk. You could start by introducing various examples of risk assessments from the real projects. The focus of delivery could be the steps involved in a risk assessment rather than explaining the template. In small groups, provide learners with suitable documentation such as drawings, sketches and method statements so that they can carry out a risk assessment. Add to this work at appropriate times, as learners' knowledge might be limited at this stage.
- Each group could give an in-class presentation of their findings and assessment of risk. Use the group work to collate and reinforce the significance of health and safety and of following safe working methods.
- A visit to a construction site might be useful for learners, with the appropriate safeguards. Give them checklists so that they can record materials, tools, equipment and activities on site. Ask each learner to submit a brief visit report.
- A key element for success in this unit is effective teacher demonstrations, introducing surface preparation, application of adhesive and fixing tiles. Demonstrate the correct techniques, and give learners adequate time to practise and develop these key skills before they start their assessed activities. It is essential that focused demonstrations continue throughout the learning experience.

Part 3

- Once learners have developed their skills and completed the risk assessment they can then progress through requirements as appropriate, as detailed and specified in the unit. Ensure that all health and safety requirements are being complied with. For example, learners should be taught how to:
 - prepare and set up wall and floor areas for tiling, using spirit level, plumb line, chalk line, pencil and tape measure; prepare background surface and apply adhesive, using pre-mixed adhesive or mixing their own adhesive, spreading adhesive and making quality checks

- fix tiles and finish to wall and floor areas using tile spacers, vertical and horizontal adjustment, grouting and polishing off, to a given specification: fully bonded to the background for 1 m² of wall and 1 m² of floor area; tiles fixed with full beds; a joint tolerance of ±5 mm for merit grade or ±3 mm for distinction grade; cutting trim with 3 mm for merit grade or 2 mm for distinction grade; grout uniform for 1 m² of wall and 1 m² of floor area.
- Remember to embed the teaching of the properties and uses of materials to enable learners to consider, justify and evaluate the use of alternative materials. For example, they could consider the functional requirements such as a wet room or kitchen areas, durability and types of adhesives.
- A full set of quality control and assessment/photographic records should be completed and retained by the teacher, covering, for example, quality of finished surfaces, line and level, any pattern mismatch and grout thickness.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

These resources give learners a wealth of background learning and wider reading on topics covered in the unit content, to broaden their understanding.

Textbooks

In addition to the resources listed below, publishers are likely to produce Edexcel-endorsed textbooks that support this unit of the BTEC Firsts in Construction and the Built Environment. Check the Edexcel website (www.edexcel.com/resources) for more information as titles achieve Edexcel endorsement.

Chudley, R., Greeno, R., Hurst, M. and Topliss, S., *Construction Technology* (5th edition), Pearson Education, 2011 (ISBN 978-0-45034-682-8)

Although a higher-level text, this provides excellent illustrative content and some useful descriptions that might be helpful for more able learners.

Greeno, R. and Chudley, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-061-5)

The handbook has been used by construction students over a number of years. It covers construction processes in a comprehensive manner.

Lyons, A., *Materials for Architects and Builders* (4th edition), Butterworth-Heinemann, 2010 (ISBN 978-1-85617-519-7)

This is an excellent resource to understand materials' properties and their uses in construction.

Skills2Learn, *Wall and Floor Tiling*, Cengage Learning Vocational, 2011 (ISBN 978-1-40804-189-5)

Schweit, M., *Tiling Complete: Expert Advice from Start to Finish* (Taunton's Complete), Taunton, 2008 (ISBN 978-1-56158-812-1)

Mohyuddin, S.A., Murray-Smith, J., Stokes, A. and Topliss, S., *BTEC First Construction and the Built Environment Student Book*, Pearson Education, 2013 (ISBN 978-1-44690-646-0)

Videos

www.youtube.com/watch?v=H5EUTkWN2G4

This video shows the World Skills competition in London 2011.

www.youtube.com/watch?v=XizEuy1tq68

The link provides details of how to tile a wall.

Journals

Tile and Stone Journal

This professional journal highlights industry updates and job opportunities.

Websites

<http://www.tiles.org.uk/index.shtml>

This is the Tile Association's website and contains information about the industry, links to other useful websites, tips for tiling and case studies.

Unit 15: Exploring Plastering and Dry Lining Principles and Techniques

Delivery guidance

Approaching the unit

This unit may give learners their first experience of carrying out practical activities related to plastering and dry lining, along with any job knowledge required to underpin such practical skills. Delivery could focus around extensive use of supervised practical workshop activities, group teaching, and demonstrations of the tools, access equipment, materials, techniques and personal protective equipment (PPE) involved. This could apply to developing learners' knowledge as well as practical skills.

A construction site visit could be useful, with the appropriate safeguards in place. Consult with site personnel before the visit so that the emphasis is on safe working practices as well as on selection and use of correct tools and equipment. This would enable learners to observe the health and safety practices, potential hazards and importance of following safe systems of work. Reinforce this learning in class through examples of accidents and near misses.

Throughout this unit you should relate to other units in this qualification to reinforce the learning process, especially to the scientific principles in *Unit 3: Scientific and Mathematical Applications for Construction* so that it reinforces the learning in a practical context.

Delivering the learning aims

For **learning aim A** learners need to have access to a wide range of tools, materials and equipment for plastering and dry lining. They will need to learn about the purposes and properties of these tools, materials and equipment, as well as safe usage and correct storage to prevent loss, damage or injury. Ensure that learners have access to a range of tools, materials and equipment beyond those items that they will use for the given practical tasks. This will ensure that they are able to make selections in order to meet the assessment criteria.

Wherever possible, this learning aim should be delivered in a workshop or practical area where learners can handle tools, materials and equipment and observe demonstrations of their use. When demonstrating the safe use of various hand tools, materials and equipment you could highlight the potential dangers of not following the correct procedures and techniques, and you could exclusively address the requirements for the safe use of access equipment, including extension ladders, mobile scaffold towers and mobile elevated working platforms. You could also emphasise the requirements for the safe use of dangerous substances such as various types of plasters. You could make use of multimedia resources such as DVDs to reinforce the learning.

Learning aim B is about developing practical skills to carry out plastering and dry lining tasks; these need to be delivered in a workshop or other practical area. As this involves working with hazardous substances as well as use of access equipment, particular attention should be paid to associated risks and adoption of safe working practices. You could engage learners in carrying out a risk assessment by providing them with enough details so that they can identify hazards and suggest the control measures.

You could then start practical plastering and dry lining activities with the learners, developing their skills in methods used, preparing and setting up a working area, mixing materials, wet finishes and dry finishes as outlined in the unit content. Allow sufficient time for learners to practise before putting them through the assessed activities.

Remind learners of the importance of the assessment criteria when they are preparing for and working on assignments, so they always keep the focus on the exact requirements of the assessment and put effort where it is needed to meet the assessment requirements of the unit.

Getting started

This provides you with a starting point for one way of delivering the unit, based around the suggested assignment in the specification.

Unit 15: Exploring Plastering and Dry Lining Principles and Techniques
<p>Introduction</p> <p>You could introduce the unit by leading a group discussion on the sequence of activities that should be followed when plastering and dry lining. Learners would need to consider the selection of tools, materials and equipment, the preparatory works that are required prior to applying plaster and dry lining, and the associated risks, hazards and control measures to ensure that safe working practices are followed.</p>
Learning aim A: Understand tools, materials and equipment used for plastering and dry lining tasks
Learning aim B: Develop practical skills using safe techniques to carry out plastering and dry lining tasks
<p>Assignment: Carrying Out Plastering and Dry Lining Work</p> <p>Scenario: A client has awarded you a contract to plaster a section of wall and dry line another section. You will be working with your team. Before you begin, you are required to explain the tools, equipment and materials they will be using, including possible alternatives, the safe working techniques to be used, producing health and safety risk assessments, and the general preparation for, and planning of, plastering and dry lining tasks. You will then carry out the plastering and dry lining task.</p>
<p>Part 1</p> <ul style="list-style-type: none"> ● Start with a safety briefing before entering the workshop for the first time. The briefing should cover workshop rules and procedures, use of PPE, general housekeeping including maintaining a safe and tidy work area, and recognition of hazards. Learners should be able to explain how to safely use and store the tools, materials and equipment and will need to demonstrate appropriate usage throughout. ● Remember to cover the correct use of all the tools, materials and equipment for plastering and dry lining listed within the unit content. Learners will need to know about these tools, materials and equipment for the assessment of learning aim A, even if they don't need to use all of the tools and equipment indicated for the practical activity assessed under learning aim B. For assessment, learners will need to explain how tools, materials and equipment are used and selected, with a minimum of sixteen tools, four types of plaster, one type each for tape and angle bed, and three different types of equipment. ● To familiarise learners with the materials you could start by giving them a presentation, making use of manufacturers' brochures, sample materials, pictures, suitable DVDs or web-based resources. ● Learners could then work in small groups to discuss and investigate one type of material each, such as plasterboards and plasters, using examples related to a real project and web resources. The focus would be on why a certain type of material is used – for example, where would a browning plaster be used compared with a bonding plaster? Learners should also investigate the storage of materials. Each group could then give a presentation of their findings to the whole group. ● Hold a whole-group discussion on how plastering and dry lining tasks are carried out.

- In small groups, learners could be given one task each to investigate, such as fixing plasterboards and applying finishing plaster, using examples related to a real project. You could also provide them with suitable documentation, including drawings, sketches and so on. Each group could then give a presentation of their findings to the whole group.
- Build on this work to introduce the purpose of various tools and equipment. You could conduct a short quiz, including pictures of tools, to ensure that all learners correctly identify the tools required for a specific task.
- You could follow this by demonstrating safe use and storage of various tools, equipment and PPE, in an appropriate and safe setting. Use questioning or individual demonstration to ensure that all learners can safely use and store tools, equipment and PPE.
- Conduct a short quiz to ensure that all learners have adequate knowledge and could identify correct PPE for a specific task.

Part 2

- To build on this work, outline the scenario and requirements for plastering and dry lining and ask learners to select and justify the tools, equipment and materials they will need. This could be expanded with an evaluation of alternative materials that could be suitable, and why.
- Ensure learners are familiar with regulations related to hazardous substances and working at height, and understand the safe use of the selected tools, materials and equipment.
- Before starting any practical activities learners must carry out a risk assessment for the activity and identify hazards, risks, people at risk and appropriate control measures that can be used to minimise the level of risk. You could start by introducing various examples of risk assessments from the real projects. The focus of delivery could be the steps involved in a risk assessment rather than explaining the template. In small groups, provide learners with suitable documentation such as drawings, sketches and method statements so that they can carry out a risk assessment. Add to this work at appropriate times, as learners' knowledge might be limited at this stage.
- Each group could then give an in-class presentation of their findings and assessment of risk. Use the group work to collate and reinforce the significance of health and safety and of following safe working methods.
- A visit to a construction site might be useful for learners, with the appropriate safeguards. Give them checklists so that they can record materials, tools, equipment and activities on site. Ask each learner to submit a brief visit report.
- A key element for success in this unit is effective teacher demonstrations, introducing plastering and dry lining methods, preparation, mixing and finishing. Demonstrate the correct techniques and give learners adequate time to practise and develop these key skills before they start their assessed activities. It is essential that focused demonstrations continue throughout the learning experience.

Part 3

- Once learners have developed their skills and completed the risk assessment they can progress through requirements as appropriate for the level, as detailed and specified in the unit. Ensure that all health and safety requirements are being complied with. For example, learners should be taught how to:
 - apply render and skim finishes to a wall area of 4 m² to a given specification: fully bonded to the background; flat to within ± 4 mm/3 mm/2 mm depending on the grade, with no trowel marks

- measure and cut plasterboard, correct to within 5 mm, and measure and cut angle beads for a corner correct to within 4 mm; for the dry lining task, a partition of studwork using either metal or timber studs of 2.4 m high and 1.2 m wide
- apply plasterboard dry lining finishes, fully bonded or fixed to wall areas, with angle beads fixed to an external plasterboard corner, all angle beads plumb and the work ready for decoration.
- Remember to embed the teaching of the properties and uses of materials to enable learners to consider, justify and evaluate the use of alternative materials. For example, they could consider the types of adhesives, angle beads and surfaces.
- A full set of quality control and assessment/photographic records should be completed and retained by the teacher, covering, for example, quality of finished surfaces, including scrimming and taping of joints, alignment and verticality.

Details of links to other BTEC units

- Edexcel BTEC Level 1/Level 2 Firsts in Construction and the Built Environment:
 - *Unit 1: Construction Technology*
 - *Unit 5: Construction Drawing Techniques*

Resources

These resources give learners a wealth of background learning and wider reading on topics covered in the unit content, to broaden their understanding.

Textbooks

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Although a higher-level text, this provides excellent illustrative content and some useful descriptions that might be helpful for more able learners.

Ferguson, M.R., *Drywall: Professional Techniques for Great Results* (3rd edition), Taunton, 2008 (ISBN 978-1-56158-955-5)

Greeno, R. and Chudley, R., *Building Construction Handbook* (9th edition), Butterworth-Heinemann, 2012 (ISBN 978-0-08097-061-5)

The handbook has been used by construction students over a number of years. It covers construction processes in a comprehensive manner.

Lyons, A., *Materials for Architects and Builders* (4th edition), Butterworth-Heinemann, 2010 (ISBN 978-1-85617-519-7)

This is an excellent resource to understand materials' properties and their uses in construction.

Matthews, R. and Reading, B., *All About Selfbuild: A Comprehensive Guide to Building Your Own Unique Home*, Blackberry Books, 2002 (ISBN 978-0-95152-952-2)

Skills2Learn, *Plastering*, Cengage Learning Vocational, 2011 (ISBN 978-1-408-04186-4)

Websites

www.fpdc.org/

Federation of Plastering and Dry Wall Contractors (FPDC) is a national trade association with both specialist contractor and associate members. The website contains useful information including updates and awards.

<http://www.british-gypsum.com/>

The British Gypsum website is very useful, with details of relevant products and updates.

Videos

www.youtube.com/watch?v=yKc3y9aBGc8

This video shows how to plaster a wall.

www.youtube.com/watch?v=FR8hPGiF8yA

The video shows how to do dry lining.

Journals

Spec Finish

The FPDC magazine contains the latest industry, health and safety, product, legal and technical articles written by industry experts.

Annexe

Definitions of terms used in assessment criteria grids

Most assessment criteria start with a command word – ‘describe’, ‘explain’, ‘evaluate’ etc. These words relate to how complex a learner’s answer should be.

Learners will need to provide evidence that meets the command-word requirements of a criterion. Some terms in the assessment criteria grids have particular meanings in the construction sector. For clarification, definitions are given below for each of the terms used.

You can use this glossary with your learners to:

- help them understand what the language used in the criteria means
- what they will need to do to attain a specific grade
- give further clarification on how their work has been assessed.

You may also find it useful as a means of providing further guidance when you are assessing learner work against the assessment criteria.

Assessment word	Definition
Analyse	Identify the factors that apply and state how these are related. Explain the importance of each one.
Answer	Provide responses to customer queries. Meet customers’ needs by providing responses to routine questions/enquiries.
Apply	Put skills/knowledge/understanding into action in a particular context.
Appraise	Consider all aspects of a point and give a reasoned judgement.
Assess	Give careful consideration to all the factors or events that apply, and identify which are the most important or relevant.
Carry out	Apply skills and knowledge to do a specified task.
Calculate	Use appropriate techniques to calculate e.g. quantities, amounts or values.
Compare	Identify the main factors relating to two or more items/situations, and explain the similarities and differences, and in some cases say which is best and why.
Comply	Follow rules, regulations and procedures when doing practical activities or producing designs and plans.
Construct	Develop an argument or a physical product.
Create	Produce the evidence indicated in the assessment criterion
Define	Clearly explain what a particular term means and give an example, if appropriate, to show what is meant.

Assessment word	Definition
Demonstrate	Provide several relevant examples or related evidence that clearly support the arguments being made. This may include showing practical skills.
Describe	Give a clear description that includes all the relevant features – think of it as ‘painting a picture with words’.
Design	Create a plan, proposal or outline to illustrate a relatively complex concept or idea.
Develop	Apply knowledge and skills to propose solutions.
Discuss	Consider different aspects of a topic and how they interrelate, and the extent to which they are important.
Draw up	Assemble a business document or financial statement.
Evaluate	Bring together all information and review it to form a conclusion. Give evidence for each view or statement.
Explain	Provide details and give reasons and/or evidence to support the arguments being made. Start by introducing the topic, then give the ‘how’ or ‘why’.
Identify	Point out or select the correct option or give a list of the main features.
Illustrate	Use examples or a diagram or a sketch to show what you mean.
Interpret	Define or explain the meanings of words or actions.
Justify	Give reasons or evidence to support opinion, to show how conclusions have been arrived at.
List	Provide information in a list.
Organise	Arrange or manage an activity/documentation.
Outline	Provide a clear description, but not a detailed one.
Prepare	Take the required actions and carry out research to put together a fit-for-purpose document, such as a business plan. Take the required actions and carry out research to get ready to undertake a specific activity.
Present	Show in an organised manner.
Prioritise	Select into a sequential list, table, description or schedule, with the primary items highlighted at the top.
Produce	Create a specific business document or plan or product/artefact resulting from a practical activity.
Provide	Supply somebody with something, e.g. an interviewer with answers to questions (<i>transitive</i>). Supply the required help to ensure the smooth running of an activity, e.g. administrative support for a meeting (<i>intransitive</i>).

Assessment word	Definition
Research	Investigate a topic/subject in order to find out information/answers.
Refine	Improvement to a design based on critique and feedback (e.g. client feedback).
Review	Examine a topic or an item to make sure that it is correct or to provide a report on the quality of a document/report/item.
Set out	Use measurements obtained from drawings or descriptions to plot, measure, or set out a shape, structure or form.
Select	Choose the best or most suitable option.
Summarise	Provide main points or features.
Use	Put something into action, or use it to achieve a specific goal/target.
Work safely	When carrying out practical activities in a workshop or work environment, uses relevant PPE and own practice promotes the health and safety of self and others

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