



Pearson
BTEC



Cover image © JJFarq / Shutterstock

Pearson Level 3 Alternative Academic Qualification
BTEC National in

L3

Construction and the Built Environment (Extended Certificate)

Planning and Teaching Guide

First teaching from September 2025

First certification from 2027

Qualification Number: 610/3959/7

About Pearson

We are the world's leading learning company operating in countries all around the world. We provide content, assessment and digital services to students, educational institutions, employers, governments and other partners globally. We are committed to helping equip students with the skills they need to enhance their employability prospects and to succeed in the changing world of work. We believe that wherever learning flourishes so do people.

References to third-party material made in this Planning and Teaching Guide are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

All information in this Guide is correct at time of publication.

All the material in this publication is copyright
© Pearson Education Limited 2025

Contents

1. Introduction	1
What's new	1
2. BTEC Calendar of Key Dates	3
3. Planning the Delivery of your Course	5
Induction	5
Overview of Assessment Availability	6
Delivery and Assessment Planning	7
4. Qualification Unit Delivery Guides	12
Unit 1: Construction Principles	12
Unit 2: Construction Technology	66
Unit 3: Design for Construction and the Built Environment	119
Unit 4: Construction Commercial Management	146
Unit 5: Retrofit in Construction and the Built Environment	175
Unit 6: Modelling in Construction	217
5. Pearson Qualification Support and Resources	248
Exam Wizard	248
Pearson Set Assignments Briefs (PSABs)	248
Purpose Statement	248
Results plus	248
Sample Assessment Material (SAMs)	249
Specification	248
Subject Adviser	249
Training	249
Transferable Skills Guide for Teachers	249
Transition Guides	249
Annexe	250
Curriculum Planning	250

BTEC Key Terms	250
Transferable Skills	251

1. Introduction

This Planning and Teaching Guide complements your Pearson Level 3 Alternative Academic Qualification BTEC National in Construction and the Built Environment (Extended Certificate) specification, Pearson Set Assignment Briefs (PSABs), Sample Assessment Materials (SAMs) and the Pearson BTEC Level 3 National Alternative Academic Qualification Administrative Support Guide. This Planning and Teaching Guide provides:

- an overview of dates and deadlines for key events and activities relevant to qualification delivery – from registration to assessment and review of marking – throughout the academic year
- suggestions for planning and delivering your course including induction and unit sequencing
- creative and realistic teaching and learning ideas as well as links to resources for each unit to support and inspire you in creating a dynamic learning environment to keep your students engaged and motivated to learn.
- wider delivery support such as guidance on study programme planning and descriptions and links to qualification resources and materials.

The guide was designed and written in collaboration with current practitioners to ensure that the planning and delivery suggestions and teaching and learning ideas are feasible, pedagogically sound and appropriate for the vocational area and the purpose of the qualification.

We recognise that delivery contexts will vary from one centre to the next and that practitioners are the best decision-makers for what works best for them and their students. Therefore, teachers can tailor the suggestions and ideas proposed in this guide to meet the specific needs of their students and the available resources in their centre. There are, however, requirements that have to be met in relation to assessment plans and to teaching and learning preceding assessment, which will be clarified/covered in this guide.

We hope you will find this guidance relevant and useful, and you enjoy teaching this this qualification!!

What's new

When creating these BTEC Nationals, in addition to ensuring the sector technical content was current and up-to date, we have also focused on developing the skills and personal attributes students need to navigate the future. We have worked with many higher education providers, professional bodies, colleges and schools to ensure these qualifications also meet their needs. Employers are looking for future employees with a thorough grounding in the latest industry requirements and work-ready skills such as critical thinking and problem solving. Higher education needs students who have

experience of research, extended writing and meeting deadlines to be successful on their undergraduate programmes.

We have addressed these requirements by:

- Facilitating and guiding the development of transferable skills through the design and delivery of the qualifications, using a holistic and practical framework which is based on recent research into the most critical skills needed to navigate the future. A Transferable Skills framework has been used to embed transferable skills in the qualifications where they naturally occur and to signpost opportunities for delivery and development as a part of the wider BTEC learning experience. Please refer to the BTEC Transferable Skills Guide for Teachers for further information on this framework, its relevance and how it has been implemented in the qualifications.
- Supporting the delivery of Sustainability Education and development of Digital Skills naturally through the content design of the qualifications. Mapping is provided in the specification to identify where these opportunities for teaching and learning exist.
- Updating sector-specific content to ensure it is current, relevant and future-facing.
- Implementing a consistent approach to assessment with a balanced combination of internal and external assessments to better engage students, make the qualifications more accessible for them and more manageable for centres to deliver.

We are providing a wealth of support, both resources and people, to help ensure that you and your students have the best possible experience during their course. Please see the section on Pearson Qualification Support and resources on page 249 *for* details of the available resources and support with links to access these.

Notes:

The qualification specification provides the content that must be taught and what must be assessed. This planning and teaching guide provides suggestions and ideas for how the content could be delivered. The suggestions given in this guide link with the Pearson Set Assignment Briefs provided by Pearson, which are mandatory for internal assessment and cannot be amended or contextualised by centres.

2. BTEC Calendar of Key Dates

Each academic year there are some key dates and deadlines in the delivery of BTEC qualifications that teachers need to be aware of, and act on appropriately, to ensure:

- the smooth running of student registration, assessment and the quality assurance process, and
- effective timetable planning to fully prepare students for assessments and ensuring timely completion of administrative tasks.

Here is an overview of the key dates and deadlines for this qualification.

The specific date for each activity or event will vary each academic year and so only the month is provided. For the specific dates for the current academic year, please go to our webpage: [Teachers | Pearson qualifications](#)

Month	General related dates	Internal Assessment related dates	External Assessment related dates
September	Student registration		
October		Lead IV registered and completion of team standardisation	Entry deadline for January external assessment
November	Late student registration fee		
December	Late student registration fee Deletion deadline: delete student registrations for any learner withdrawn from the qualification		
January		Standards Verification Window opens	January External Assessment Series
February			

Month	General related dates	Internal Assessment related dates	External Assessment related dates
March			Restricted release of results to centres Release of results to students Entry deadline for Summer external assessments Review of Marking
April			Review of Marking
May		Standards Verification for first sample closes	Summer External Assessment
June		Standards Verification for second sample closes	
July	Deadline for full qualification claim for summer certification		
August			Restricted release of results to centres Release of results to students Review of marking

3. Planning the Delivery of your Course

Planning your course ensures a coherent and logical approach to teaching that helps students to connect concepts effectively and build their knowledge progressively.

Effective assessment planning is also essential to allow for timely evaluation of student progress and adjustment of teaching strategies or interventions as needed.

This section offers recommended approaches to support practitioners with planning and implementation of this qualification

Induction

Students

An induction period at the start of the course is recommended to help students understand and prepare for the demands of their chosen course, as well as familiarise them with the BTEC ethos and methodology. This induction aims to not only equip students with the necessary knowledge and skills but also to create a welcoming environment where they feel safe, supported and gain a sense of belonging as they begin their course in a new setting.

Centres will have their own induction programmes, and to support this, Pearson have provided a range of adaptable resources that can be integrated into this existing programmes. These resources cover areas such as welcome activities and information to include in the induction, with supporting slides. As we believe that every opportunity should be taken to develop transferable skills across the wider BTEC learning experience, we have also provided guidance on which transferable skills could be delivered as a part of the induction process including Managing Own Learning, Continuous Learning, goal setting and personal strength and resilience. The resources are designed to help students develop the relevant transferable skills through learning how to manage their course workload, completing their assessments successfully and meeting deadlines whilst also building their confidence and ability to thrive on their BTEC journey.

Tutors/Teachers

In addition to the annual standardisation training that all BTEC teaching staff are required to complete at the beginning of each academic year using the Pearson provided materials, an induction period for new tutors is also recommended. This will help new tutors familiarise themselves with the specific demands and expectations of the BTEC curriculum, equipping them with the necessary knowledge and skills to effectively plan and support their students from the outset.

Overview of Assessment Availability

Internal Assessments

Pearson Set Assignments (PSABs) are provided by Pearson for all internally assessed units and must only be used for summative assessment.

These are available for the lifetime of the qualification and are accessible through our website. Teachers with a Pearson online account can log in through the sign-in portal to access them. Any teacher with students registered for this qualification can create a Pearson online account.

Please note that new PSABs are released each year for units 3, 4 and 6, but that will closely relate to the sample assignments on our website [Construction and the Built Environment \(AAQ\) | Pearson qualifications](#). This is because they contain specific information that the student will need to respond to (such as a technical requirements for a design).

The assignment brief for unit 5 'Retrofit in Construction and the Built Environment' is set for the lifetime of the qualification because students will choose the building upon which to carry out a survey and retrofit proposal, which will be unique to that building.

External Assessments

External assessments are available in two series each academic year as shown below:

Dates	Jan	Mar	May/June	Aug
Assessment	External Assessments Series 1 *Not available in Jan 2026	External assessment Series 1 Results	External assessment Series 2	External Assessment Series 2 Results

Delivery and Assessment Planning

Clear unit planning and understanding is essential for a successful qualification delivery. This helps students to build on prior learning and reinforce concepts to develop a deeper understanding of the unit content and progressively develop their knowledge, understanding and skills throughout the course delivery.

We have produced a sample delivery plan showing how the BTEC National in Construction and the Built Environment (Extended Certificate) **could** be delivered over **two** years, highlighting ordering of units and assessment milestones.

This plan is intended to be used as guidance.

Key

Del = Unit content delivery

PSAB = Pearson Set Assignment Brief

Rev = Revision for External assessment

Ext = External assessment

Resit Ext = Resit External assessment opportunity

Sequence of delivery

Year One

Unit	Unit Title	GLH	Assessment method	Term 1	January exam series	Term 2	Term 3	Summer exam series
1	Construction Principles	120	Ext	Del	-	Del	Del & Rev	Ext
2	Construction Technology	60	Ext		-	Del	Del & Rev	Ext

Unit 1: This mandatory unit, assessed through an external examination, is designed to develop a thorough understanding of construction materials and their pivotal role in structural integrity and environmental comfort. Students will investigate the properties of various materials, delve into manufacturing processes, and prioritise sustainability, considering how these factors affect their appropriateness for different construction applications. By applying scientific and mathematical techniques, students will evaluate forces, loads, heat, and sound to ensure that materials are suitable and effectively utilised in construction projects. Situated in Year 1, term 1, this unit establishes a solid foundation of knowledge vital for subsequent units such as Construction Technology (Unit 2) and Design (Unit 3) while allowing ample time for comprehensive revision and preparation for external assessments.

Unit 2: This mandatory unit, assessed through an external exam, introduces students to the core principles of construction technology, focusing on the design and construction of low-rise buildings. Students will study construction methods, sustainable technologies, foundation types, superstructure design, and key factors influencing material and design choices. Through this knowledge, students will understand how construction components interact and perform within different site conditions and client requirements. Delivered in Year 1, term 2, the unit builds on the material science and structural knowledge established in Unit 1 (Construction Principles), allowing students to apply this understanding to practical construction scenarios.

The knowledge gained from this unit underpins several other areas of the programme, such as Unit 3 (Design for Construction), where students apply construction techniques within client-driven design briefs, and Unit 5 (Retrofit in Construction), where understanding existing structures and sustainable technologies is critical. Its placement ensures that students have the technical competence to succeed in practical design, modelling, and project management tasks in later units. Additionally, the timing allows for effective revision and preparation for external assessment.

Year Two

Unit	Unit Title	GLH	Assessment method	Term 1	January exam series	Term 2	Term 3	Summer exam series
4	Construction Commercial Management	60	Int	Del & PSAB				
5	Retrofit in Construction and the Built Environment	60	Int			Del	Del & PSAB	
3	Design for Construction and the Built Environment	60	Int	Del & PSAB				
6	Modelling in Construction	60	Int			Del	Del & PSAB	

Unit 3: This unit focuses on the essential principles and practices of designing low- and medium-rise buildings and structures, addressing client requirements, sustainability, and practical construction constraints. Students will explore key factors influencing design decisions, such as spatial requirements, materials selection, and environmental considerations. They will apply design techniques, including manual sketching and computer-aided design (CAD), to develop creative and efficient building solutions that align with a specific client brief. Delivered in Year 2, Semester 1, this unit builds on foundational knowledge from Unit 1 (Construction

Principles) and Unit 2 (Construction Technology). It is closely linked to Unit 6 (Modelling in Construction), where students refine design concepts digitally, and Unit 5 (Retrofit), which focuses on sustainable upgrades to existing buildings. Teaching Unit 3 first ensures students understand core design principles, client briefs, and spatial requirements before applying them in digital modelling or retrofit contexts. This sequencing allows students to apply comprehensive design knowledge to practical tasks, preparing them for complex design challenges and real-world construction projects.

Unit 4: This unit focuses on the financial and contractual aspects of construction projects, covering cost estimation, procurement processes, contract management, and project budgeting. Students will learn to assess project costs, monitor financial performance, and allocate resources effectively. Delivered in Year 2, Semester 1, alongside Unit 3 (Design for Construction and the Built Environment), this unit builds on the technical and design knowledge from Units 1 (Construction Principles) and 2 (Construction Technology) by applying it to cost-effective decision-making. The integration with Unit 3 enables students to align budget considerations with design outputs, ensuring projects meet financial constraints and client requirements. Its placement equips students with the critical financial management skills to deliver practical, cost-conscious construction projects while supporting sustainable and efficient design development.

Unit 5: This unit explores the principles and processes of retrofitting existing buildings to improve performance, sustainability, and functionality. Students will assess existing structures, identify retrofit opportunities, and propose solutions that balance environmental, economic, and design considerations. Delivered in Year 2, Semester 2, alongside Unit 6 (Modelling in Construction), the unit builds on knowledge from Unit 1 (Construction Principles) and Unit 2 (Construction Technology), providing the technical basis for assessing structural performance. It follows Unit 3 (Design), allowing students to apply sustainable design concepts within retrofit proposals. The integration with Unit 6 enables students to use digital modelling tools to evaluate and visualise retrofit options effectively. This placement ensures students can apply retrofit techniques to real-world scenarios while integrating design, cost management, and sustainability into practical construction projects.

Unit 6: This unit uses digital modelling tools, including Building Information Modelling (BIM), to represent building components and systems accurately. Students will explore how models enhance collaboration, visualisation, and design optimisation, supporting project planning and delivery. Delivered in Year 2, Semester 2, following Unit 3 (Design for Construction and the Built Environment), this unit builds on Unit 2 (Construction Technology) knowledge and the design outputs developed in Unit 3. By sequencing it after Unit 3, students can refine their design concepts digitally and apply modelling techniques effectively. The unit also supports sustainable construction by enabling students to model and evaluate retrofit solutions from Unit 5 (Retrofit in Construction), ensuring practical and comprehensive applications of BIM across various construction projects.

Alternatively centres may deliver the qualification over a one-year period if required, to provide flexibility to meet student or centre qualification planning needs.

4. Qualification Unit Delivery Guides

This section contains support for delivery of all the units in this qualification. The focus of these guides is on structuring and supporting the teaching and learning process. You will find ideas for activities and guidance on how best to use the activities to develop student's understanding of the topics in each unit. This section also includes activities and information on how to deliver transferable skills which are embedded or signposted in the qualification.

Unit 1: Construction Principles

Unit overview

Unit 1: Construction Principles	
Assessment type: External	
Content Area	Topics
A: Construction Materials	A1 Technical properties of materials A2 Technical properties of construction materials A3 Sustainability of construction materials A4 Degradation of construction materials
B: Solving practical construction problems	B1 Algebraic techniques B2 Trigonometric techniques B3 Mensuration techniques B4 Statistical techniques B5 Calculus techniques B6 Structural analysis
C: Human comfort	C1 Heat C2 Acoustic C3 Lighting
Assessment overview The unit will be assessed through one examination of 90 marks lasting 1 hour and 45 minutes. Students will be assessed through a number of short- and long-answer questions. Students will need to explore and relate to contexts and data presented. The assessment availability is twice a year in January and May/June. The first assessment availability is May/June 2026. Sample assessment materials will be available to help centres prepare students for	

Common student misconceptions

Below are some common student misconceptions related to the content of this unit by students and ideas for how you can help your students to avoid and overcome these.

What is the misconception?	How to help students overcome it
Embedded energy vs Embedded carbon (also sometimes referred to as 'embodied'). These terms are sometimes conflated but refer to slightly different things	Clearly define each term and give examples outlining the differences such as focus, measurement units.

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., [IS-WC].

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
A: Construction Materials A1 Technical properties of materials A1.1 Mass and density#	<p>Whole class teaching and learning - Introduction Begin by introducing the concept of properties of materials using visual aids and examples (# these technical properties will not be assessed as discrete topics in isolation)</p> <ul style="list-style-type: none"> o Ask the students to suggest different properties of materials they may know. o List these on a board. o Discuss how these properties may have units such as Kilogrammes (kg) or cubic metres (m³) o Technical properties of materials -Research and show video clips which can introduce the concept of technical properties of materials. <p>Small group activity – Finding the density of materials</p> <ul style="list-style-type: none"> o In small groups using a range of regular shaped materials e.g. block of timber, lead, plastic, steel, concrete or brick measure the dimensions and calculate the volume of the different materials. 	

	<ul style="list-style-type: none"> o Using a set of scales weigh the different materials. o Students record the results on a table. o Students use the masses and volumes determined to calculate the density of each material. o Students carry out internet searches to check their calculated values of density against actual expected values. 	
<p>A1 Technical properties of materials</p> <p>A1.2 Tensile strength#</p> <p>A1.3 Compressive strength#</p> <p>A1.4 Shear strength#</p> <p>A1.5 Bending strength#</p>	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> o Introduce the technical property of materials of Strength using visual aids and examples. o Outline the process for each strength and discuss how they impact on materials. <p>Small group activity: Strength</p> <ul style="list-style-type: none"> o Assign each group a different type of strength. o Each group creates a visual summary (e.g. poster or infographic) that explains the points of the type of strength. o Groups present their findings to the class, to generate discussion. o Targeted questioning during the presentation to measure understanding. o Review the students' presentations to check for accuracy. o In their notes create a table which states the type of strength, a description of it and also provide an illustration of each type of strength. o In their notes create a folder for "Key terms" to define e.g. Simply supported 	<p>BBC Bitesize Provides introduction forces and stresses. https://www.bbc.co.uk/bitesize/guides/z6d48mn/revision/2_Characteristics_and_properties_-_Metals_-_Edexcel_-_GCSE_Design_and_Technology_Revision_-_Edexcel_-_BBC_Bitesize</p> <p>Tensile Stress & Strain, Compressive Stress & Shear Stress - Basic Introduction -Video provides a basic introduction to stress and strain. https://youtu.be/c6ndD5kTkP4</p> <p>Properties of Materials Video provides introduction properties of materials. https://youtu.be/XbX4xY1sqQo</p>

<p>A1 – Technical properties of materials</p> <p>A1.6 Hardness#</p> <p>A1.7 Toughness#</p> <p>A1.8 Malleability#</p> <p>A1.9 Workability#</p> <p>A1.10 Stiffness#</p> <p>A1.11 Fatigue and creep#</p>	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> o Recap the properties already introduced. o Introduce the technical properties of materials of Hardness, Toughness, Malleability, Workability, Stiffness, Fatigue and creep. <p>Small group activity: Hardness, Toughness and Malleability</p> <ul style="list-style-type: none"> o Assign each group a different property. o Each group creates a visual summary (e.g. poster or infographic) that explains the property o Groups present their findings to the class, to generate discussion. o Targeted questioning during the presentation to measure understanding. o Review the students’ presentations to check for accuracy. o In their notes create a table which states the property and a short description of each. o Continue to add to their “Key Terms” section of notes. (e.g. curing, cyclic loading, ferrous metals, necking etc) 	<p>Concrete Slump Test-Test for Workability of Concrete#1</p> <p>Explains the procedure for determination of concrete slump test. https://youtu.be/IJMSlu7B8ko</p> <p>Intro to curing concrete</p> <p>Explains why curing is important for concrete https://youtu.be/8XApTsnDmgY</p>
<p>A1 Technical properties of materials</p> <p>A1.12 Fire Resistance #</p> <p>A1.13 Resistance to degradation #</p>	<p>Whole class teaching and learning – A1 Technical properties of materials</p> <ul style="list-style-type: none"> o Quickly recap the properties covered. o Discuss the importance of fire resistance in buildings. o Discuss examples of fires in buildings e.g. Grenfell Tower. 	<p>BBC News (29 Oct 2019)</p> <p>Article on the Grenfell Tower fire Grenfell Tower: What happened - BBC News (please note that some students may find this content disturbing)</p>

	<ul style="list-style-type: none"> o Briefly discuss the property and what is meant by degradation. This will be covered in greater detail in section A4. <p>Individual Activity: Fire Resistance and Resistance to degradation.</p> <ul style="list-style-type: none"> o Research the properties fire resistance and resistance to degradation. o Students create a set of notes on these properties and what materials they may impact. o Review the students' presentations to check for accuracy. o Continue to add to their "Key Terms" section of notes. 	
<p>A1 Technical properties of materials</p> <p>A1.14 Embedded energy #</p> <p>A1.15 Embedded carbon #</p> <p>A1.16 Recycling potential' #</p>	<p>Whole class teaching and learning - A1 Technical properties of materials</p> <ul style="list-style-type: none"> o recap the properties covered previously. o briefly outline the concept of sustainability. o Focus on the properties of embedded energy, embedded carbon and recycling potential. o Discuss the importance of identify the embedded energy of all materials. o Discuss embedded carbon, provide a definition, outline what contributes to it such as material production, transportation, assembly, maintenance and end of life. o Explain the difference between embedded energy and embedded carbon using definitions, focus (e.g. climate impact or energy consumption), units of measurement and simple examples. o Throughout identify Key Terms which the students will need to understand and define. 	<p>A Brief guide to calculating embodied carbon (The Institution of Structural Engineers) Article on calculating embodied carbon A brief guide to calculating embodied carbon</p> <p>Sustainable Build Article on understanding embedded energy. Understanding Embedded Energy - Sustainable Build</p> <p>Renewable Energy World Article on embodied and operational carbon</p>

	<p>Paired activity: Embedded energy, embedded carbon and recycling potential.</p> <ul style="list-style-type: none"> ○ In pairs research the properties of embedded energy, embedded carbon and recycling potential. ○ Define embedded energy and create a list of materials and identify the embedded energy in each material. ○ Place the materials in order of highest to lowest. ○ Review the students' presentations to check for accuracy. ○ Continue to add to their "Key Terms" section of notes. 	<p>Embodied carbon vs operational carbon: What's the difference, and why does it matter?</p> <p>Designing Buildings - The Construction wiki Article on embodied carbon Embodied carbon - Designing Buildings</p> <p>BBC Future -Article on recycling How recycling can help the climate and other facts - BBC Future</p>
<p>A2 – Technical properties of construction materials</p>	<p>Whole class teaching and learning – A2 Technical properties of construction materials</p> <ul style="list-style-type: none"> ○ Begin by recapping the technical properties covered in section A1. ○ Introduce construction material properties such as: strength, stability, fire resistance, thermal resistance, sound resistance, weather resistance, sustainability, durability, impermeability, density, flexibility, malleability, workability, embedded energy etc. (have a definition/short explanation for each) <p>Small Group Activity:</p> <ul style="list-style-type: none"> ○ In small groups student create a list of construction material properties. ○ For the list of construction material properties produce a definition or short explanation for each 	<p>Build-construct.com Article on building material properties Building Materials and Their Properties: A Comprehensive Overview</p>

	<ul style="list-style-type: none"> o Think about the buildings you use every day, your home, school, sports centre shops etc, and write down a range of materials and properties that they need to have. o Each group create a list of properties related to construction materials. o Each group create a list of the 15 materials which will be discussed in the unit. o Review the students' work to check for accuracy. o Continue to add to their "Key Terms" section of notes. <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet with properties and definitions and mix them up. Ask the students to link the properties to the definitions. o Create a quiz asking the students where they might find the different materials in buildings they use (home, school, shops, community centres sports facilities etc) 	
<p>A2.1 Bricks and blocks</p> <p>A2.1.1. facing bricks</p> <p>A2.1.2 Class A engineering bricks</p> <p>A2.1.3 Class B engineering bricks</p> <p>A2.1.4 common bricks</p>	<p>Whole class teaching and learning - Bricks</p> <ul style="list-style-type: none"> o Recap the full range of construction material properties (strength stability, fire resistance, thermal resistance etc etc) o Discuss using questioning with the students where they have seen bricks being used. Using their lists of construction material properties, which do they think are important for bricks? o Describe the four categories of bricks. o Outline the manufacturing process and the raw materials needed to make them. 	<p>Different types of bricks used in Construction</p> <p>YouTube video - Explains the different types of bricks https://youtu.be/IGx7LcMQIZ4</p> <p>Buildingmaterials.co.uk</p> <p>Article on brick types and properties Brick Types and Properties: Everything You Need to Know - BuildingMaterials.co.uk</p>

	<ul style="list-style-type: none"> o Outline the characteristics/properties of each and give examples of where and why each would be used. o Identify Key terms <p>Individual activity: Bricks</p> <ul style="list-style-type: none"> o Each student create a table for the first construction material bricks to be considered. o Headings for the columns could be Type /Characteristics / Use and include an image of each. o Review the students' work to check for accuracy. o Continue to add to their "Key Terms" section of notes. <p>Revision: Bricks</p> <ul style="list-style-type: none"> o Create a worksheet on the types and properties of bricks. (use past papers or sample assessment material to help) 	
<p>A2.1 Bricks and blocks</p> <p>A2.1.5 aerated concrete blocks</p> <p>A2.1.6 high-density concrete blocks</p> <p>A2.1.7 insulated concrete blocks.</p>	<p>Whole class teaching and learning - Blocks</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where they have seen blocks being used. Using their lists of construction material properties, which do they think are important for blocks? o Describe the three categories of blocks. o Outline the manufacturing process and the raw materials needed to make them. o Outline the characteristics/properties of each and give examples of where and why each would be used. o Identify Key terms 	<p>Buildingmaterials.co.uk Article on concrete blocks Concrete Blocks Guide Types, Benefits and Uses Explained</p> <p>Designing Buildings - The Construction wiki Article on blockwork Blockwork - Designing Buildings</p> <p>A Complete Guide to choosing Insulated concrete forms Insulating Concrete Formwork Association</p>

	<p>Individual activity: Blocks</p> <ul style="list-style-type: none"> o Each student create a table for the first construction material blocks to be considered. o Headings for the columns could be Type /Characteristics / Use and include an image of each. o Review the students’ work to check for accuracy. o Continue to add to their “Key Terms” section of notes. <p>Revision: Blocks</p> <ul style="list-style-type: none"> o Create a worksheet on the types and properties of blocks. (use past papers or sample assessment material to help) 	<p>Article on insulated concrete forms A Complete Guide to Choosing Insulated Concrete Forms - ICFA</p>
<p>A2.2 Concrete</p> <p>A2.2.1 prescribed mixes</p> <p>A2.2.2 design mixes</p> <p>A2.2.3 new mixes using additives and admixtures</p>	<p>Whole class teaching and learning – Concrete Mixes</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where they have seen concrete being used. Using their lists of construction material properties which do they think are important for concrete. o Outline the manufacturing process and the raw materials needed to make them. o Outline the characteristics/properties of concrete and give examples where and why it would be used. o Introduce the different types of concrete mixes :Prescribed mixes / design mixes / new mixes using additives and admixtures. o Identify Key terms <p>Individual activity: Concrete</p> <ul style="list-style-type: none"> o Each student create a table of the different types of concrete mixes set out in the unit specification. o Review the students’ work to check for accuracy. 	<p>Introduction to concrete mix design</p> <p>YouTube video by Tyler Ley on concrete https://youtu.be/rv-jwoRfV0E</p> <p>What is concrete?</p> <p>YouTube video by Tyler Ley on concrete https://youtu.be/o3h-j7So9I0</p>

	<ul style="list-style-type: none"> o Continue to add to their “Key Terms” section of notes. <p>Revision: Concrete Mixes</p> <ul style="list-style-type: none"> o Create a worksheet on the types and properties of concrete and concrete mixes. (use past papers or sample assessment material to help) 	
<p>A2.2 Concrete</p> <p>A2.2.4 smart concrete</p> <p>A2.2.5 hempcrete</p> <p>A2.2.6 reinforced concrete</p> <ul style="list-style-type: none"> • steel reinforcement • glass reinforcement • fibre reinforcement • graphene reinforcement. 	<p>Whole class teaching and learning – Concrete</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where they have seen concrete being used. Using their lists of construction material properties which do they think are important for concrete. o Outline the characteristics/properties of the different types of concrete and give examples where and why it would be used. o Introduce the different types of concrete. o Identify Key terms <p>Individual activity: Concrete</p> <ul style="list-style-type: none"> o Each student create a table of the different types of concrete set out in the unit specification. o Review the students’ work to check for accuracy. o Continue to add to their “Key Terms” section of notes. <p>Revision: Concrete</p> <ul style="list-style-type: none"> o Create a worksheet on the types and properties of concrete. (use past papers or sample assessment material to help) 	<p>Science of Innovation- Smart Concrete</p> <p>Video on smart concrete https://youtu.be/dpMh0crBZtY</p> <p>Designing Buildings – The Construction wiki</p> <p>Article on smart concrete Smart concrete - Designing Buildings</p> <p>Secret of Reinforcement</p> <p>Video on designing reinforced concrete Tytler Ley https://youtu.be/vbrQaQltVRA</p>
A2.3 Stone	<p>Whole class teaching and learning – Stone</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where stone is used in construction projects. 	<p>Designing Buildings – The Construction wiki</p> <p>Article on natural stone</p>

<p>A2.3.1 natural stone</p> <p>A2.3.2 reconstituted stone.</p>	<ul style="list-style-type: none"> o Identify Key terms <p>Individual activity: Stone</p> <ul style="list-style-type: none"> o Research the different types of stone set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on the types of stone (use past papers or sample assessment material to help) 	<p>Natural stone - Designing Buildings</p>
<p>A2.4 Mortar mixes</p> <p>A2.4.1 cement mortar</p> <p>A2.4.2 lime mortar</p> <p>A2.4.3 cement lime mortar</p> <p>A2.4.4 coloured mortar and render.</p>	<p>Whole class teaching and learning – mortar mixes</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where mortar is needed in construction projects. o Outline the different types o Identify Key <p>Individual activity: mortar mixes</p> <ul style="list-style-type: none"> o Research the different types of mortar mixes set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on the mortar mixes (use past papers or sample assessment material to help) 	<p>Upgradedhome.com Article differences between lime and cement mortar Lime Mortar Vs. Cement Mortar: What Are The Major Differences? Upgradedhome.com</p> <p>Designing Buildings – The Construction wiki Article on mortar Mortar - Designing Buildings</p>

<p>A2.5 Sand</p> <p>A2.5.1 building sand</p> <p>A2.5.2 sharp sand</p> <p>A2.5.3 silver sand.</p>	<p>Whole class teaching and learning – Sand</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where sand is needed in construction projects. o Outline the different types. o Identify Key terms. <p>Laboratory activity: sand</p> <ul style="list-style-type: none"> o Carry out inspection of the different types of sand available for use in construction projects. <p>Paired activity: sand</p> <ul style="list-style-type: none"> o Research the different types of sand set out in the unit specification. o Create a table for the different types and list their properties and uses. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on sand (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki</p> <p>Article on sand</p> <p>Sand - Designing Buildings</p>
<p>A2.6 Plasterboard</p> <p>A2.6.1 sound block</p> <p>A2.6.2 fire resistant</p> <p>A2.6.3 standard</p> <p>A2.6.4 thermal insulating.</p>	<p>Whole class teaching and learning – Plasterboard</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where plasterboard is needed in construction projects. o Outline the different types. o Identify Key terms <p>Individual activity: plasterboard</p> <ul style="list-style-type: none"> o Research the different types of plasterboard set out in the unit specification. 	<p>Designing Buildings – The Construction wiki</p> <p>Article on plasterboard</p> <p>Drywall construction - Designing Buildings</p> <p>Buildingmaterials.co.uk</p> <p>Article on plasterboard</p> <p>What is Plasterboard and What is it Made Of? A Simple Guide</p>

	<ul style="list-style-type: none"> o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on the mortar mixes (use past papers or sample assessment material to help) 	<p>Plasterboard- Why all the colours? Video on the different types of plasterboard https://youtu.be/bJMEedNcLjA</p>
<p>A2.7 Glass and glass finishes:</p> <p>A2.7.1 structural</p> <p>A2.7.2 smart</p> <p>A2.7.3 laminated</p> <p>A2.7.4 tempered</p> <p>A2.7.5 float</p> <p>A2.7.6 clear</p> <p>A2.7.7 obscured</p> <p>A2.7.8 low emissivity (low-e glass).</p>	<p>Whole class teaching and learning – LASS and glass finishes</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where glass is needed in construction projects. o Outline the different types. o Identify Key terms <p>Guest Speaker – glass</p> <ul style="list-style-type: none"> o Guest speaker to explain and demonstrate the different types of glass and glass finishes used in construction projects. <p>Individual activity: glass and glass finishes</p> <ul style="list-style-type: none"> o Research the different types of glass and glass finishes set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on glass and glass finishes (use past papers or sample assessment material to help) 	<p>The Constructor Building ideas Article on types of glass 10 Types of Glasses [PDF]: Engineering Properties, and Applications in Constructions – theconstructor.org</p> <p>Stevenage-glass.co.uk Article on types of glass What are the different types and uses of Glass? Stevenage Glass</p> <p>Mccoymart.com Article on smart glass Benefits of using Smart Glass at Home McCoy Mart.</p>
A2.8 Insulation materials:	Whole class teaching and learning – Insulation materials	Bobvila.com

<p>A2.8.1 fibreglass</p> <p>A2.8.2 expanded polystyrene</p> <p>A2.8.3 PIR (polyisocyanurate) boards</p> <p>A2.8.4 mineral wool</p> <p>A2.8.5 cellulose</p> <p>A2.8.6 straw bales</p> <p>A2.8.7 sheep's wool.</p>	<ul style="list-style-type: none"> o Discuss using questioning with the students where insulation materials are needed in construction projects. o Outline the different types. o Identify Key terms. <p>Individual activity: insulation materials</p> <ul style="list-style-type: none"> o Research the different types of mortar mixes set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on insulation materials (use past papers or sample assessment material to help) 	<p>Article on types of insulation for homeowners</p> <p>10 Types of Insulation All Homeowners Should Know - Bob Vila</p> <p>Homebuilding & renovating</p> <p>Homebuilding.co.uk</p> <p>Article on straw bale insulation</p> <p>Straw bale insulation: Pros, cons, costs and more Homebuilding</p>
<p>A2.9 Plastics used for polythene damp-proof membranes (DPM) and damp-proof courses (DPC).</p>	<p>Whole class teaching and learning – Plastics used for DPM and DPC</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where DPM and DPC are needed in construction projects. o Identify Key terms which are important in relation to DPM and DPC. <p>Individual activity: mortar mixes</p> <ul style="list-style-type: none"> o Research the different types of mortar mixes set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p>	<p>Structville.com</p> <p>Article on DPC and DPM.</p> <p>Damp Proof Course (DPC) and Damp Proof Membranes (DPM) in Building Construction - Structville</p> <p>Designing Buildings - The Construction wiki</p> <p>Article on DPM</p> <p>Damp proof membrane DPM - Designing Buildings</p>

	<ul style="list-style-type: none"> o Create a worksheet on the mortar mixes (use past papers or sample assessment material to help) 	
<p>A2.10 Plastics used for doors and window frames, soffits, bargeboards, fascia and guttering:</p> <p>A2.10.1 polyvinylchloride (PVC)</p> <p>A2.10.2 unplasticised polyvinylchloride (uPVC).</p>	<p>Whole class teaching and learning – Plastics for doors and window frames</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where plastics are used in construction projects. o Identify Key terms <p>Visit – Plastics</p> <ul style="list-style-type: none"> o Visit a local housing development/construction project. o Identify the locations where plastics are used in the project. <p>Small group activity: Plastics used for doors and window frames, soffits, bargeboards, fascia and guttering:</p> <ul style="list-style-type: none"> o Research the different locations where plastics are used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on the plastics used for doors and window frames, soffits, bargeboards, fascia and guttering: (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki Article on PVC Polyvinyl chloride PVC - Designing Buildings</p> <p>What is the difference between PVC and uPVC pipes used in construction Youtube video on PVC vs uPVC pipes https://youtu.be/eF6MjsnzuD4</p> <p>Diffen.com Article on PVC vs uPVC PVC vs uPVC - Difference and Comparison Diffen</p>
<p>A2.11 Timber and manufactured boards:</p> <p>A2.11.1 hardwoods</p>	<p>Whole class teaching and learning – Timber</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where timber is used in construction projects. 	<p>BBC BITESIZE Material categories and properties</p>

<p>A2.11.2 softwoods</p>	<ul style="list-style-type: none"> o Identify Key terms. <p>Paired activity: Timber</p> <ul style="list-style-type: none"> o Research the different locations where timber is used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on timber (use past papers or sample assessment material to help) 	<p>Natural and manufactured timbers - Material categories and properties - AQA - GCSE Design and Technology Revision - AQA - BBC Bitesize</p> <p>Designing Buildings – The Construction wiki Article on timber The differences between hardwood and softwood - Designing Buildings</p>
<p>A2.11 Timber and manufactured boards: A2.11.3 plywood A2.11.4 chipboard A2.11.5 particle board A2.11.6 medium-density fibreboard (MDF).</p>	<p>Whole class teaching and learning – Manufactured boards</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where manufactured boards are used in construction projects. o Identify Key terms. <p>Paired activity: Manufactured boards</p> <ul style="list-style-type: none"> o Research the different locations where manufactured boards are used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on manufactured boards (use past papers or sample assessment material to help) 	<p>GCSE Design Technology: Manufactured Boards YouTube video on manufactured boards https://youtu.be/dD5fsS5LjyQ</p> <p>Archdaily.com Article on difference between MDF, MDP, Plywood and OSB Wooden Boards: Differences Between MDF, MDP, Plywood, and OSB ArchDaily</p>

<p>A2.12 Roofing materials:</p> <p>A2.12.1 slate tile</p> <p>A2.12.2 concrete tile</p> <p>A2.12.3 pantile</p> <p>A2.12.4 roofing felt</p> <p>A2.12.5 thatch</p> <p>A2.12.6 lead flashing</p> <p>A2.12.7 green/living roofs</p> <p>A2.12.8 smart roofing materials</p> <p>A2.12.9 coverings with built-in PV cells.</p>	<p>Whole class teaching and learning – Roofing materials</p> <ul style="list-style-type: none"> o Discuss using questioning with the students why roofing materials are used in construction projects. o Identify Key terms. <p>Individual activity: Roofing materials</p> <ul style="list-style-type: none"> o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on roofing materials (use past papers or sample assessment material to help) 	<p>Homebuilding & renovating Homebuilding.co.uk Article on pantile roof What is a Pantile Roof? Everything You Need to Know Homebuilding</p> <p>Roofevolution.com Article on future of roofing 14. The Future of Roofing: Exploring Smart Roofing Technology - Roofing Evolution</p> <p>Homebuilding & renovating Homebuilding.co.uk Article on solar panels Are solar panels on a flat roof a good idea? Homebuilding</p>
<p>A2.13 Engineered timber:</p> <p>A2.13.1 SIPS (Structural Insulated Panels)</p> <p>A2.13.2 glulam beams</p> <p>A2.13.3 engineering joists</p> <p>A2.13.4 cross laminated timber (CLT).</p>	<p>Whole class teaching and learning – Engineered Timber</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where engineered timber is used in construction projects. o Identify Key terms. <p>Paired activity: Engineered Timber</p> <ul style="list-style-type: none"> o Research the different locations where timber is used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms 	<p>Designing Buildings – The Construction wiki Article on engineered timber Engineered timber - Designing Buildings</p> <p>Structural Insulated Panel Association Article on SIPS Structural Insulated Panel Association</p>

	<p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on engineered timber (use past papers or sample assessment material to help) 	
<p>A2.14 Metals</p> <p>A2.14.1 Steel:</p> <ul style="list-style-type: none"> • low carbon steel (mild steel) • stainless steel • high strength steel. <p>A2.14.2 Aluminium alloys.</p> <p>A2.14.3 Copper.</p> <p>A2.14.4 Brass.</p>	<p>Whole class teaching and learning – Metals</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where metals are used in construction projects. o Identify Key terms. <p>Small group activity: Metals</p> <ul style="list-style-type: none"> o Research the different locations where metals are used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on metals (use past papers or sample assessment material to help) 	<p>National Steel Buildings Article on why steel is used Why Is Steel Used In Construction? National Steel Buildings</p> <p>Designing Buildings – The Construction wiki Article on stainless steel Stainless steel in construction - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on aluminium Aluminium - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on copper Copper in construction - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on brass</p>

		Brass - Designing Buildings
<p>A2.15 Modern construction materials:</p> <p>A2.15.1 graphene</p> <p>A2.15.2 liquid granite</p> <p>A2.15.3 self-healing concrete</p> <p>A2.15.4 translucent timber</p> <p>A2.15.5 paper-based fibre composite material.</p>	<p>Whole class teaching and learning - Modern Construction Materials</p> <ul style="list-style-type: none"> o Discuss using questioning with the students where and what Modern construction materials are used in construction projects. o Identify Key terms. <p>Guest Speaker: Modern Construction Materials</p> <ul style="list-style-type: none"> o Guest speaker to explain the different types of modern construction materials and where they could be used. <p>Individual activity: Modern Construction Materials</p> <ul style="list-style-type: none"> o Research the different locations where modern construction materials could be used in a building project and link this to the types set out in the unit specification. o Create a table for the different types and list their properties. o Add to your list of Key Terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Modern Construction Material (use past papers or sample assessment material to help) 	<p>Nanografi.com Use of graphene in construction Article on graphene Use of Graphene in Construction</p> <p>Designing Buildings - The Construction wiki Article on graphene Graphene - Designing Buildings</p> <p>The Engineer.co.uk Article on liquid granite Liquid granite reduces fire risk</p> <p>Designing Buildings - The Construction wiki Article on self-healing concrete Self-healing concrete - Designing Buildings</p>
<p>A3 Sustainability of construction materials</p>	<p>Whole class teaching and learning - Sustainability</p> <ul style="list-style-type: none"> o Discuss the new topic sustainability and what it means for the construction industry. o Outline extraction/transport/manufacture/disposal <p>Small group activity: Sustainability</p>	<p>Designing Buildings - The Construction wiki Article on life cycle costing Utilising life cycle costing and life cycle assessment - Designing Buildings</p>

	<ul style="list-style-type: none"> o Research sustainability in construction industry. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o In groups ask the students to present their key terms and definitions. Collate the information together. o Ask the students how this information relates to the range of construction materials covered in section A2. 	<p>Product Life Cycle Assessment and the Environmental Impact YouTube video on life cycle assessment https://youtu.be/-9JRowylCbo</p> <p>Designing Buildings - The Construction wiki Article on life cycle in the Built environment Life cycle in the built environment - Designing Buildings</p>
<p>A3 Sustainability of construction materials</p> <p>A3.1 Extraction of materials:</p> <p>A3.1.1 mining</p> <p>A3.1.2 quarrying</p> <p>A3.1.3 forestry</p>	<p>Whole class teaching and learning - Extraction</p> <ul style="list-style-type: none"> o Discuss the different methods of extraction of materials <p>Small group activity: Extraction</p> <ul style="list-style-type: none"> o Research methods of material extraction for the construction industry o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Sustainability: Extraction (use past papers or sample assessment material to help) 	<p>Earth.org The Environmental Problems Caused by mining Article on the Environmental Problems Caused by mining The Environmental Problems Caused by Mining Earth.Org</p> <p>Ukgbc.org What are the environmental impacts of construction materials. What are the environmental impacts of construction materials?</p> <p>Designing Buildings - The Construction wiki Article on embodied energy</p>

		<p>Embodied energy in construction - Designing Buildings</p> <p>The Institute of Quarrying Article on quarrying What is Quarrying?</p> <p>Ukgbc.org Timber Article on environmental impact of timber Environmental Impacts of Timber Logging for Construction</p>
<p>A3.2 Transportation of materials:</p> <p>A3.2.1 road</p> <p>A3.2.2 rail</p> <p>A3.2.3 sea</p> <p>A3.2.4 air.</p>	<p>Whole class teaching and learning - Transportation of materials</p> <ul style="list-style-type: none"> o Discuss the different methods of transportation of materials. <p>Small group activity: Extraction</p> <ul style="list-style-type: none"> o Research methods of material transportation for the construction industry o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Sustainability: Transportation (use past papers or sample assessment material to help) 	<p>Environment Go! Article on the impact of transportation 7 Impacts of Transportation on the Environment - Environment Go!</p> <p>How do buildings affect the environment YouTube video on how buildings affect the environment https://youtu.be/ap65Hnddfv4</p>
A3.3 Manufacturing processes for materials	Whole class and individual activity - Manufacturing processes for materials	<p>Clickmetal How steel is made step by step</p>

<p>A3.3.1 Metals:</p> <ul style="list-style-type: none"> • steel • aluminium alloys. <p>A3.3.2 Concrete:</p> <ul style="list-style-type: none"> • plain • reinforced. <p>A3.3.3 Bricks and blocks:</p> <ul style="list-style-type: none"> • facing bricks • aerated concrete blocks. <p>A3.3.4 Glass:</p> <ul style="list-style-type: none"> • laminated • float. <p>A3.3.5 Timber:</p> <ul style="list-style-type: none"> • natural • manufactured boards. 	<ul style="list-style-type: none"> o Discuss the different manufacturing processes for materials. <p>Individual activity:</p> <ul style="list-style-type: none"> o Each individual/group is given a manufacturing process of a different material. o Each individual/group present their summary to the rest of the group. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Sustainability: manufacturing processes for materials (use past papers or sample assessment material to help) 	<p>Article on manufacture of steel How Steel Is Made, Step by Step Full Process</p> <p>Clickmetal How aluminium is made step by step Article on manufacture of steel How Aluminium Is Made, Step by Step Full Process Overview</p> <p>Designing Buildings - The Construction wiki Article on concrete manufacture Concrete - Designing Buildings</p> <p>How Products are made Article on how concrete is made How concrete is made - material, manufacture, making, how to make, used, processing</p> <p>How Products are made Article on how bricks are made How brick is made - material, production process, manufacture, making, used, processing, dimensions</p> <p>Designing Buildings - The Construction wiki</p>
---	---	---

		<p>Article on glass Glass for buildings - Designing Buildings</p> <p>Designing Buildings - The Construction wiki Article on timber The use of timber in construction - Designing Buildings</p>
<p>A3.4 Disposal: A3.4.1 recycle A3.4.2 reuse A3.4.3 landfill A3.4.4 incineration.</p>	<p>Whole class teaching and learning – Disposal</p> <ul style="list-style-type: none"> o Discuss the different methods of disposal of materials. <p>Small group activity: Extraction</p> <ul style="list-style-type: none"> o Research methods of material disposal for the construction industry o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Sustainability: Disposal (use past papers or sample assessment material to help) o Add to your list of Key Terms. 	<p>How Products are made Article on waste disposal Construction waste disposal - Designing Buildings</p> <p>Ugreen Article on recycled construction materials Recycled Construction Materials: Path to Zero-Waste Construction</p> <p>5 Construction Waste recycling methods which save building costs YouTube video on recycling construction waste https://youtu.be/tl0S5PHAoBY</p>

<p>A4 Degradation of construction materials</p> <p>A4.1.1 Natural agents</p> <ul style="list-style-type: none"> • ageing • ultraviolet (UV) radiation • timber infestation • insect attack • fungal. 	<p>Whole class teaching and learning – Degradation of construction materials</p> <ul style="list-style-type: none"> o Discuss the different methods of degradation of construction materials and provide detail on natural agents. <p>Individual activity: Natural agents</p> <ul style="list-style-type: none"> o Research natural agents for material degradation in the construction industry. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Degradation of construction materials – natural agents (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki</p> <p>Article on degradation of materials</p> <p>Degradation of construction materials - Designing Buildings</p>
<p>A4.1.2 Timber decay:</p> <ul style="list-style-type: none"> • wet rot • dry rot • lichens and mosses. <p>A4.1.3 Moisture movement:</p> <ul style="list-style-type: none"> • capillary action • shrinkage. 	<p>Whole class teaching and learning – Timber decay</p> <ul style="list-style-type: none"> o Discuss the different methods of timber decay. <p>Individual activity: Timber decay</p> <ul style="list-style-type: none"> o Research timber decay in the construction industry. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on timber decay (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki</p> <p>Article on wet rot</p> <p>Wet rot - Designing Buildings</p> <p>Designing Buildings – The Construction wiki</p> <p>Article on dry rot</p> <p>Dry rot - Designing Buildings</p> <p>Designing Buildings – The Construction wiki</p>

<p>A4.1.4 Exposure conditions:</p> <ul style="list-style-type: none"> • weathering • freeze-thaw • thermal ageing • creep • humidity • loadings. <p>A4.1.5 Chemical degradation:</p> <ul style="list-style-type: none"> • acid rain • sulphate • alkalis • leaching. <p>A4.1.6 Corrosion in metals:</p> <ul style="list-style-type: none"> • oxidation. 		<p>Article on capillary action Capillary action - Designing Buildings</p> <p>Designing Buildings - The Construction wiki Article on frost action Frost attack - Designing Buildings</p> <p>Designing Buildings - The Construction wiki Article on humidity Humidity - Designing Buildings</p>
<p>A4.2 Remedial measures to prevent and reduce degradation and their benefits and drawbacks:</p>	<p>Whole class teaching and learning - Degradation - remedial measures</p> <ul style="list-style-type: none"> o Discuss the different methods of degradation and remedial measures <p>Small group activity: Degradation and remedial measures</p>	<p>The Constructor Building ideas Article on cracking in concrete Causes and Remedies of Cracks in Concrete Buildings – theconstructor.org</p> <p>Homebuilding & Renovating</p>

<p>A4.2.1 use of special paints</p> <p>A4.2.2 protective coatings.</p> <p>A4.3 Material failure:</p> <p>A4.3.1 concrete and reinforced concrete</p> <p>A4.3.2 brickwork</p> <p>A4.3.3 timber – external and internal applications</p> <p>A4.3.4 steel</p> <p>A4.3.5 mortars.</p>	<ul style="list-style-type: none"> o Research remedial measures for the range of construction materials. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on degradation - remedial measures (use past papers or sample assessment material to help) 	<p>Homebuilding.co.uk</p> <p>Article on wet rot</p> <p>How to spot wet rot — plus how to treat it Homebuilding</p> <p>BBC BITESIZE</p> <p>Corrosion of metals</p> <p>Article on corrosion of metals</p> <p>Preventing corrosion - Corrosion of metals - GCSE Chemistry (Single Science) Revision - OCR Gateway - BBC Bitesize</p>
<p>A Construction Materials</p> <p>A1 Technical properties of materials</p> <p>A2 Technical properties of construction materials</p> <p>A3 Sustainability of construction materials</p> <p>A4 Degradation of construction materials</p>	<p>Revision</p> <ul style="list-style-type: none"> o Create a mock exam on Section A Construction Materials (use past papers or sample assessment material to help) 	<p>Pearson BTEC</p> <p>AAQ Sample assessment material</p> <p>Sample assessment material (SAMs) - Unit 1: Construction Principles</p>

<p>C: Human comfort C1 Heat</p> <p>C1.1 Scientific principles and their application in the built environment</p> <p>C1.1.1 Air temperature.</p> <p>C1.1.2 Mean radiant temperature.</p> <p>C1.1.3 Relative humidity.</p> <p>C1.1.4 Air movement.</p> <p>C1.1.5 Dry and wet bulb temperatures.</p> <p>C1.1.6 Mechanisms of heat transfer:</p> <ul style="list-style-type: none"> • conduction • convection • radiation. 	<p>Whole class teaching and learning – Human Comfort</p> <ul style="list-style-type: none"> o Introduce the new topic of human comfort heat/acoustics/lighting. Vital to link these to section A. How the materials selected influence human comfort. o Focus initially on heat. o Discuss each parameter outlined in the specification. o Outline each mechanism of heat transfer. <p>Laboratory activity: Human Comfort</p> <ul style="list-style-type: none"> o Using equipment such as environmental meters measure and record a range of parameters for different rooms within the teaching facility. <p>Small group activity: Human Comfort</p> <ul style="list-style-type: none"> o Create a table to identify each parameter/ definition/ units/equipment to measure it. o Create a table to explain each mechanism of heat transfer (include an explanation and image) o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Human Comfort- heat parameters and mechanisms of heat transfer (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki Article on thermal comfort Thermal comfort in buildings - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on humidity Humidity - Designing Buildings</p> <p>BBC BITESIZE Article on heat transfer Heat transfer - BBC Bitesize</p> <p>Heat Transfer – Condition, Convection and Radiation YouTube video providing a basic introduction t heat transfer. https://youtu.be/bRZwzy0xvhM</p> <p>Health and Safety Executive Article on thermal comfort Lighting, thermal comfort, working space, noise and vibration - HSE</p>
---	---	--

<p>C1.2 Thermometers and their application in determining human heat comfort conditions.</p> <p>C1.3 Control instruments and their application in determining human comfort conditions in domestic and commercial properties:</p> <p>C1.3.1 electronic control systems</p> <p>C1.3.2 thermostats</p> <p>C1.3.3 remote monitoring systems</p> <p>C1.3.4 smartphone applications.</p> <p>C1.4 Factors that affect acceptable thermal comfort</p> <p>C1.4.1 Current building regulations.</p> <p>C1.4.2 combination of personal factors and</p>	<p>Whole class teaching and learning – Heat</p> <ul style="list-style-type: none"> o Introduce heating control and monitoring equipment. o Discuss what are acceptable thermal comfort parameters? o Discuss the Building Regulations relating to thermal comfort parameters. o Discuss personal factors and thermal comfort requirements <p>Individual activity: Heat</p> <ul style="list-style-type: none"> o Create a table to identify measurement instruments with advantages/disadvantages of each. o Create a table of personal factors influencing thermal comfort. o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on the equipment used to measure and monitor thermal comfort. o Create a worksheet on personal factors influence on thermal comfort. (use past papers or sample assessment material to help) 	<p>Thermal Comfort in Buildings Explained – HVACR Design</p> <p>YouTube video on different factors that affect thermal comfort.</p> <p>https://youtu.be/yEWT_XmqCtQ</p>
--	---	---

<p>thermal comfort requirements:</p> <ul style="list-style-type: none"> • age • gender • disability • clothing • state of health • level of activity • metabolic rate. 		
<p>C1.5 Principles of heat losses and gains in buildings and methods to control them to provide human comfort in residential, commercial and industrial buildings.</p> <p>C1.5.1 Causes and impacts of heat loss:</p> <ul style="list-style-type: none"> • fabric heat losses • ventilation heat losses • thermal bridges • air changes. 	<p>Whole class teaching and learning – Principles of Heat Losses and gains</p> <ul style="list-style-type: none"> o Introduce heat loss and gains in buildings o Discuss causes and impact of heat loss: Fabric Heat loss / Ventilation Heat loss / Thermal bridges / Air changes o Outline factors contributing to heat gains and losses : Insulating materials and its thickness / surface area of external shell / exposure and impact of local climate / temperature difference between inside and outside / air change rate / building use. o Define the three key terms: Thermal Conductivity k/Thermal resistance R/Thermal Transmittance U o Create examples of calculations for thermal conductivity k, thermal resistance R, thermal transmittance U. <p>Small group activity: Principles of Heat Losses and gains</p>	<p>Designing Buildings – The Construction wiki Article on heat loss Heat loss - Designing Buildings</p> <p>BBC BITESIZE Article on Energy and heating Thermal conductivity - Energy and heating - AQA - GCSE Physics (Single Science) Revision - AQA - BBC Bitesize</p> <p>Designing Buildings – The Construction wiki Article on thermal insulation Thermal insulation for buildings - Designing Buildings</p> <p>The Engineering Toolbox Article on Heat loss from Buildings</p>

<p>C1.5.2 Factors contributing to heat gains and losses:</p> <ul style="list-style-type: none"> • insulating materials and its thickness • surface area of the external shell • exposure and impact of local climatic conditions on a building • temperature difference between inside and outside • air change rate • building use. <p>C1.5.3 Calculation of thermal values for materials, walls and building elements in isolation and in combination.</p> <p>C1.5.3.1 Calculate thermal conductivity</p> <p>C1.5.3.2 Calculate thermal resistance.</p>	<ul style="list-style-type: none"> ○ Create a table to explain the factors contributing to heat gains and losses: Insulation, surface area, climate conditions, temperature difference inside and outside, building use. ○ Create a table of personal factors influencing thermal comfort. ○ Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> ○ Create a worksheet on causes and impact of heat loss, factors contributing to heat gains and losses and example calculations for thermal conductivity k, thermal resistance R, thermal transmittance U. (use past papers or sample assessment material to help) 	<p>Heat Loss from Buildings</p> <p>Firstinarchitecture.co.uk Article on U values A Quick and Easy Guide to U-Values</p>
---	---	--

C1.5.3.3 Calculation of U values.		
<p>C1.6 Methods for controlling heat loss from residential and commercial buildings:</p> <p>C1.6.1 roof, wall and floor insulation</p> <p>C1.6.2 double/triple glazing</p> <p>C1.6.3 low emissivity glass</p> <p>C1.6.4 secondary glazing</p> <p>C1.6.5 draught reduction</p> <p>C1.6.6 insulated building materials.</p> <p>C1.7 Methods of heating a building and the factors affecting their location:</p> <ul style="list-style-type: none"> • radiator • underfloor heating • storage heaters 	<p>Whole class teaching and learning – Controlling Heat loss from buildings</p> <ul style="list-style-type: none"> ○ Introduce methods of controlling heat loss from buildings: Insulation / glazing/ emissivity glass / secondary glazing / draught reduction ○ Explain methods of heating a building and factors affecting their location. :Radiator / underfloor heating / storage heaters / infrared panels / solid fuel stoves/fires. <p>Individual activity: Controlling Heat loss from buildings</p> <ul style="list-style-type: none"> ○ Create a table to explain the methods for controlling heat loss from buildings ○ Create a table identifying the methods of heating a building. ○ Add to the list of Key terms <p>Revision</p> <ul style="list-style-type: none"> ○ Create a worksheet on methods of controlling heat loss from buildings and methods of heating building and factors affecting their location (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki Article on heat loss Heat loss - Designing Buildings</p> <p>Archi-house.co.uk The main aim of eco-minimalism: reduce heat loss Article on heat loss The main aim of Eco-Minimalism: Reduce heat loss Archi-HOUSE</p> <p>BBC BITESIZE Article on Heat transfer Reducing heat transfers – houses - Heat transfer - CCEA - GCSE Physics (Single Science) Revision - CCEA - BBC Bitesize</p>

<ul style="list-style-type: none"> • infrared panels • solid fuel stoves/fires. 		
<p>C1.8 The source and causes of condensation, the consequences of its occurrence and potential impact on the building fabric and methods of control to provide human comfort in residential and commercial buildings.</p> <p>C1.8.1 Sources of water vapour in buildings.</p> <p>C1.8.2 Causes and effects of condensation in buildings.</p> <p>C1.8.3 Impact of structural temperature profiles.</p> <p>C1.8.4 Impact of dew-point temperature profiles</p>	<p>Whole class teaching and learning – Source and causes of condensation</p> <ul style="list-style-type: none"> o Discuss sources of water vapour / causes and effects of condensation / impact on structural temperature profiles / impact of dew point temperature profiles / prediction and prevention of condensation / interstitial condensation / methods of controlling condensation in buildings o Discuss :Air conditioning / heating and ventilation / dehumidification / extract fans. <p>Individual activity: Source and causes of condensation</p> <ul style="list-style-type: none"> o Create a table of sources of water vapour in a building o Create a table of causes and effects of condensation o Create sketches of dew point temperature profiles through walls. o Create a table of methods of controlling condensation in a building. o Add to the list of Key terms <p>Revision</p>	<p>Designing Buildings – The Construction wiki Article on condensation Condensation in buildings - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on interstitial condensation Interstitial condensation - Designing Buildings</p>

<p>C1.8.5 Prediction and prevention of condensation.</p> <p>C1.8.6 Interstitial condensation.</p> <p>C1.8.7 Methods for controlling condensation in buildings:</p> <ul style="list-style-type: none"> • air conditioning • heating and ventilation • dehumidification • extractor fans. 	<ul style="list-style-type: none"> o Create a worksheet on Source and causes of condensation (use past papers or sample assessment material to help) 	
<p>C Human Comfort</p> <p>C1 Heat</p>	<p>Revision:</p> <ul style="list-style-type: none"> o Create a mock exam on section C Human Comfort C1 Heat. (use past papers or sample assessment material to help) 	
<p>C2 Acoustic</p> <p>C2.1 Scientific principles, their relationship to human comfort and their application in the built environment:</p>	<p>Whole class teaching and learning – Acoustic</p> <ul style="list-style-type: none"> o Outline the difference between sound and noise, explain the frequency of sound, define how sound is measured and the standard units and o Explain reverberation times. o Outline current Building Regulations relating to acoustics (Part E). o Discuss Noise criteria indices and provide examples. 	<p>Designing Buildings – The Construction wiki Article on acoustics Building acoustics - Designing Buildings</p> <p>The Engineering ToolBox Article on acoustics Acoustics</p>

<p>C2.1.1 difference between sound and noise</p> <p>C2.1.2 frequency of sound</p> <p>C2.1.3 standard units</p> <p>C2.1.4 reverberation times.</p> <p>C2.2 Acceptable acoustic comfort parameters of an area relative to its intended use</p> <p>C2.2.1 Current building regulations.</p> <p>C2.2.2 Noise criteria indices.</p> <p>C2.2.3 Personal factors:</p> <ul style="list-style-type: none"> • age • disability • previous exposure to noise • state of health • activity. 	<ul style="list-style-type: none"> o Discuss (as with C1 Heat) personal factors which affect the impact of sounds: Age / disability / previous exposure to noise / state of health / activity. <p>Individual activity: Acoustic</p> <ul style="list-style-type: none"> o Create a table to identify samples of common sounds and their corresponding sound pressure level. o Summarise the Building Regulations 2010 Part E: Resistance to the passage of sound. o Create a table of typical noise criteria for different buildings. o Create a table of the personal factors influencing acoustic comfort. o Create a list of Key terms. <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Human Comfort – Acoustics relating to sound, noise and reverberation times, noise criteria indices and personal factors (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki Article on Building regulations Building regulations - Designing Buildings</p> <p>The Engineering ToolBox Article on noise criterion NC - the Noise Criterion</p> <p>Health and Safety Executive Article on noise at work HSE: Noise at work – health and safety in the workplace</p>
--	---	---

<p>C2.3 Measurement of sound levels.</p> <p>C2.4 Difference between sound insulation and sound absorption.</p> <p>C2.5 Difference between airborne and impact sound.</p> <p>C2.6 Issues associated with flanking transmission.</p> <p>C2.7 Reasons why sound insulation and sound reduction is required.</p> <p>C2.8 Understanding and application of sound insulation approaches:</p> <p>C2.8.1 source-path-receiver approach</p> <p>C2.8.2 improving structural elements</p> <p>C2.8.3 controlling flanking sound</p>	<p>Whole class teaching and learning – Acoustic</p> <ul style="list-style-type: none"> o Outline the equipment used to measure sound levels. o Clearly explain the difference between: sound insulation and sound absorption/ airborne and impact sound o Define flanking sound and how it is transmitted and ways to prevent it. o Explain sound insulation and sound reduction to reduce unwanted sound (noise) o Outline the various methods to provide sound insulation: source path receiver/ improving structural elements/ controlling flanking sound/ use of appropriate materials to reduce sound. <p>Individual activity: Acoustic</p> <ul style="list-style-type: none"> o Create brief summary of measurement of sound levels o Create a table to summarise the approaches to sound insulation. o Add to the list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Human Comfort – Acoustics relating to measurement of sound levels, sources of sound, flanking sound insulation approaches. (use past papers or sample assessment material to help) 	<p>Designing Buildings – The Construction wiki Article on Building acoustics Building acoustics - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on flanking sound Flanking sound - Designing Buildings</p> <p>Designing Buildings – The Construction wiki Article on sound insulation Sound insulation in buildings - Designing Buildings</p>
---	--	---

C2.8.4 use of appropriate materials to reduce sound.		
C Human Comfort C2 Acoustic	<p>Revision:</p> <p>Create a mock exam on section C Human Comfort C2 Acoustic. (use past papers or sample assessment material to help)</p>	
<p>C3 Lighting</p> <p>C3.1 Scientific principles and their application in the built environment:</p> <p>C3.1.1 Differences between natural and artificial light.</p> <p>C3.1.2 Illuminance levels.</p> <p>C3.1.3 Daylight factors.</p> <p>C3.1.4 Glare and glare indices.</p> <p>C3.1.5 Direct and reflected light.</p> <p>C3.1.6 Power of a light source.</p>	<p>Whole class teaching and learning - Lighting</p> <ul style="list-style-type: none"> o Introduce the new topic Human comfort – Lighting. o Discuss the differences between natural and artificial light. o Define the three key terms Luminous intensity, luminous flux and illuminance and identify the standard unit of measurement of each. o Identify acceptable illuminance levels for different activities and building use. o Define daylight factor and provide the formula and some worked examples. o Define glare and glare indices. o Explain the power of a light source and the flow of light energy. <p>Individual activity: Acoustic</p> <ul style="list-style-type: none"> o Create a table to explain the standard units of measure for lighting quantities. o Note examples of calculations of daylight factor. 	<p>Designing Buildings – The Construction wiki Article on lighting Lighting - Designing Buildings</p> <p>Health and Safety Executive Article on Lighting at work Lighting at work - HSG38</p> <p>Designing Buildings – The Construction wiki Article on glare Glare in buildings - Designing Buildings</p> <p>The Engineering ToolBox Article on illuminance Illuminance - Recommended Light Levels</p>

<p>C3.1.7 Flow of light energy.</p> <p>C3.1.8 Standard units of measurement:</p> <ul style="list-style-type: none"> • candela – power of a light source • lumen – flow of light energy • lux – illumination on surface. <p>C3.1.9 Acceptable illuminance levels for different activities and building use.</p>	<ul style="list-style-type: none"> o Create a list of Key terms <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Human Comfort – Lighting relating to natural and artificial light, luminous intensity, luminous flux and illuminance, daylight factor, and glare. (use past papers or sample assessment material to help) 	
<p>C3.1.10 Variation of daylight factors in a room</p> <p>C3.1.11 Principal components of daylight factor:</p> <ul style="list-style-type: none"> • sky component (SC) • externally reflected component (ERC) • internally reflected component (IRC). 	<p>Whole class teaching and learning – Lighting</p> <ul style="list-style-type: none"> o Discuss daylight factor, outline the three distinct components and how the daylight factor can vary within a room. o Discuss the range of artificial light sources available and identify the advantages and disadvantages of each and where they might be used. (e.g. life span, energy efficiency, type of light provided, maintenance requirements) <p>Individual activity: Acoustic</p>	<p>Designing Buildings – The Construction wiki Article on daylight factor The daylight factor - Designing Buildings</p> <p>Civil Engineering Projects Article on Importance of Daylighting/ Components of daylight factor https://civilprojectsonline.com/building-construction/lighting/importance-of-</p>

<p>C3.2 Sources of artificial lighting:</p> <p>C3.2.1 incandescent lamps</p> <p>C3.2.2 compact fluorescent lamps (CFLs)</p> <p>C3.2.3 discharge lamps</p> <p>C3.2.4 ballast lamps</p> <p>C3.2.5 light-emitting diodes (LEDs)</p> <p>C3.2.6 wi-fi lamps</p>	<ul style="list-style-type: none"> o Create a table to explain the three components of Daylight factor. o Create a table of the different types of artificial lighting and their advantages and disadvantages. o Add to the list of Key terms. <p>Revision</p> <ul style="list-style-type: none"> o Create a worksheet on Human Comfort – daylight factor and sources of artificial light. (use past papers or sample assessment material to help) 	<p>daylighting-components-of-daylight-factor/</p>
<p>C3 Lighting</p>	<p>Revision:</p> <p>Create a mock exam on section C Human Comfort C3 Lighting (use past papers or sample assessment material to help)</p>	
<p>B: Solving practical construction problems</p> <p>B1.1 Solving pair of simultaneous linear equations in two unknowns:</p>	<p>Whole class teaching and learning – Simultaneous Equations</p> <ul style="list-style-type: none"> o Introduce the topic of solving simultaneous equations. Elimination method/substitution method. <p>Individual activity:</p> <ul style="list-style-type: none"> o Carryout worksheets on calculations of simultaneous equations with two unknowns. 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p>

<p>B1.1.1 elimination method</p> <p>B1.1.2 substitution method.</p>	<p>Revision:</p> <ul style="list-style-type: none"> o Create a worksheet on Simultaneous equations. (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	
<p>B1.2 Factorisation and quadratics:</p> <p>B1.2.1 by extraction of a common factor $a(x + y)$, $a(x + 2) + b(x + 2)$</p> <p>B1.2.2 by grouping $ax - ay + bx - by$</p> <p>B1.2.3 quadratic expressions $a^2 + 2ab + b^2$</p>	<p>Whole class teaching and learning – Factorisation and quadratics</p> <ul style="list-style-type: none"> o Introduce the factorisation and quadratics. <p>Individual activity:</p> <ul style="list-style-type: none"> o Carryout worksheets on factorisation and quadratics <p>Revision:</p> <ul style="list-style-type: none"> o Create a worksheet on factorisation and quadratics. (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths Solving Quadratics Factorising</p>
<p>B1.3 Solving quadratic equations:</p> <p>B1.3.1 factorisation</p> <p>B1.3.2 quadratic formula</p> <p>B1.3.3 rearranging formulae to change subject of formulae.</p>	<p>Whole class teaching and learning – Solving Quadratic equations</p> <ul style="list-style-type: none"> o Introduce the solving quadratic equations. o Introduce rearranging formula. o Introduce degree of accuracy. <p>Individual activity: Solving Quadratic equations</p> <ul style="list-style-type: none"> o Carryout worksheets on solving quadratic equations. o Carryout worksheets on rearranging formula. o Carryout worksheets on degree of accuracy. 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p>

<p>B1.4 Substituting values into and evaluating formulae.</p> <p>B1.5 Accuracy of calculations to an appropriate degree of accuracy.</p>	<p>Revision:</p> <ul style="list-style-type: none"> o Create a worksheet on solving quadratic equations o Create a worksheet on rearranging formula o Create a worksheet on degree of accuracy (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	
<p>B2.1 Trigonometric ratios:</p> <p>B2.1.1 sine</p> <p>B2.1.2 cosine</p> <p>B2.1.3 tangent</p> <p>B2.1.4 Pythagoras's theorem.</p>	<p>Whole class teaching and learning - Trigonometric ratios</p> <ul style="list-style-type: none"> o Introduce the trigonometric ratios o Introduce Pythagoras's theorem. <p>Individual activity: Trigonometric ratios</p> <ul style="list-style-type: none"> o Carryout worksheets on trigonometric ratios o Carryout worksheets on Pythagoras's theorem <p>Revision:</p> <ul style="list-style-type: none"> o Create a worksheet on trigonometric ratios o Create a worksheet on Pythagoras's theorem (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets - Corbettmaths</p> <p>BBC BITESIZE Support for Trigonometry Trigonometric ratios - Trigonometry - Edexcel - GCSE Maths Revision - Edexcel - BBC Bitesize</p> <p>BBC BITESIZE Support for Pythagoras theorem Pythagoras' theorem - Pythagoras' theorem - Edexcel - GCSE Maths Revision - Edexcel - BBC Bitesize</p>

<p>B2.2 Application of trigonometry to determine dimensions in 2D:</p> <p>B2.2.1 use of the sine rule</p> <p>B2.2.2 use of the cosine rule</p> <p>B2.2.3 triangular area rule.</p>	<p>Whole class teaching and learning – Application of Trigonometry</p> <ul style="list-style-type: none"> o Introduce sine rule, cosine rule and triangular area rule. <p>Individual activity: Application of Trigonometry</p> <ul style="list-style-type: none"> o Carryout worksheets on sine rule, cosine rule and triangular area. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on sine rule, cosine rule and triangular area (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p> <p>Sine and Cosine Rule</p> <p>BBC BITESIZE Support for sine and cosine rules The sine rule - Using the sine and cosine rules to find a side or angle in a triangle - National 5 Maths Revision - BBC Bitesize</p>
<p>B2.3 Circular measure:</p> <p>B2.3.1 arc length</p> <p>B2.3.2 area of sector.</p>	<p>Whole class teaching and learning – Circular measure</p> <ul style="list-style-type: none"> o Introduce arc length and area of sector. <p>Individual activity: Circular measure</p> <ul style="list-style-type: none"> o Carryout worksheets on arc length and area of sector. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on arc length and area of sector (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p> <p>BBC BITESIZE Support for Circles, sectors and arcs Arc length - Circles, sectors and arcs - Edexcel - GCSE Maths Revision - Edexcel - BBC Bitesize</p>

<p>B3 Mensuration techniques</p> <p>B3.1 Calculation of perimeters and centre lines.</p> <p>B3.2 Calculation of diameter, radius and perimeter of circles.</p> <p>B3.3 Calculation of areas of compound and irregular shapes that consist of:</p> <ul style="list-style-type: none"> • rectangles # • squares # • triangles # • circles # • trapeziums. # 	<p>Whole class teaching and learning – Mensuration techniques</p> <ul style="list-style-type: none"> o Introduce calculation of perimeters and centre lines. o Introduce calculation of diameter, radius and perimeter of circles. o Introduce calculation of areas of compound and irregular shapes. <p>Individual activity: Mensuration techniques</p> <ul style="list-style-type: none"> o Carryout worksheets on perimeters and centre lines. o Carryout worksheets on diameter, radius and perimeter of circles. o Carryout worksheets on areas of compound and irregular shapes. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on perimeters and centre lines o Create worksheets on diameter, radius and perimeter of circles. o Create worksheets on areas of compound and irregular shapes (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) <p>Note - # will not be assessed as discrete topics in isolation.</p>	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p>
<p>B3 Mensuration techniques</p> <p>B3.4 Calculation of surface areas and volumes of:</p>	<p>Whole class teaching and learning – Mensuration techniques</p> <ul style="list-style-type: none"> o Introduce calculation of surface areas and volumes. <p>Individual activity: Mensuration techniques</p> <ul style="list-style-type: none"> o Carryout worksheets on calculation of surface areas and volumes. 	<p>Corbettmaths Corbettmaths.com Range of videos and exercises on maths topics Videos and Worksheets – Corbettmaths</p>

<p>B3.4.1 cuboids</p> <p>B3.4.2 triangular prisms</p> <p>B3.4.3 spheres</p> <p>B3.4.4 pyramids</p> <p>B3.4.5 cones</p> <p>B3.4.6 cylinders</p> <p>B3.4.7 compound shapes and areas.</p>	<p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on calculation of surface areas and volumes (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>BBC BITESIZE</p> <p>Support for surface area</p> <p>Cuboids - Surface area and volume - WJEC - GCSE Maths Numeracy (WJEC) Revision - BBC Bitesize</p>
<p>B4 Statistical techniques.</p> <p>B4.1 Methods of visual presentation of statistics and data:</p> <p>B4.1.1 scatter diagrams</p> <p>B4.1.2 pie charts</p> <p>B4.1.3 histograms</p> <p>B4.1.4 cumulative frequency.</p> <p>B4.2 Averages and measures of central tendency for discrete, continuous,</p>	<p>Whole class teaching and learning – Statistical techniques</p> <ul style="list-style-type: none"> o Introduce methods of presenting statistical data. o Introduce measures of central tendency <p>Individual activity: Statistical techniques</p> <ul style="list-style-type: none"> o Carryout worksheets on presenting statistical data. o Carryout worksheets on measures of central tendency. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on presenting statistical data o Create worksheets on measures of central tendency (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Corbettmaths</p> <p>Corbettmaths.com</p> <p>Range of videos and exercises on maths topics</p> <p>Videos and Worksheets – Corbettmaths</p> <p>BBC BITESIZE</p> <p>Support for representing data</p> <p>Tally charts - Representing data - Eduqas - GCSE Maths Revision - Eduqas - BBC Bitesize</p> <p>BBC BITESIZE</p> <p>Support for Mean, median, mode range</p> <p>Mean, median, mode, range - BBC Bitesize</p>

<p>ungrouped and grouped data sets</p> <p>B4.2.1 Mean:</p> <ul style="list-style-type: none"> • discrete data • continuous data. <p>B4.2.2 Median:</p> <ul style="list-style-type: none"> • discrete data • continuous data. <p>B4.2.3 Mode</p> <ul style="list-style-type: none"> • discrete data • continuous data. <p>B4.3 Dispersion of data:</p> <p>B4.3.1 range</p> <p>B4.3.2 standard deviation.</p>		<p>BBC BITESIZE</p> <p>Support for comparing distributions</p> <p>Comparing distributions - Standard deviation - National 5 Application of Maths Revision - BBC Bitesize</p>
<p>B5 Calculus techniques</p> <p>B5.1 Differential calculus to solve construction related problems:</p>	<p>Whole class teaching and learning – Calculus techniques</p> <ul style="list-style-type: none"> o Introduce differential calculus/product rule/quotient rule/function of a function <p>Individual activity: Calculus techniques</p> <ul style="list-style-type: none"> o Carryout worksheets on differential calculus/ product rule/quotient rule/function of a function <p>Revision:</p>	<p>BBC BITESIZE</p> <p>Support for differentiation</p> <p>Differentiation from first principles - Differentiation - Higher Maths Revision - BBC Bitesize</p>

<p>B5.1.1 Basic differentiation techniques:</p> <ul style="list-style-type: none"> • algebraic functions # • trigonometric functions (sine and cosine) # <p>B5.1.2 product rule #</p> <p>B5.1.3 quotient rule #</p> <p>B5.1.4 function of a function. #</p> <p>B5.2 Be able to use differential calculus to solve construction-related problems related to:</p> <p>B5.2.1 determine maximum and minimum values in relation to construction contextualised problems</p> <p>B5.2.2 areas</p> <p>B5.2.3 volumes</p>	<ul style="list-style-type: none"> o Create worksheets on differential calculus product rule/quotient rule/function of a function (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) <p>Note - # will not be assessed as discrete topics in isolation.</p>	
--	--	--

B5.2.4 beam deflection.		
<p>B5.3 Use of integral calculus to determine areas and volumes of materials, sites and excavations:</p> <p>B5.3.1 indefinite and definite integration techniques:</p> <ul style="list-style-type: none"> • algebraic functions # • trigonometric functions. # <p>B5.3.2 constant of integration. #</p> <p>B5.4 Be able to use integral calculus to solve construction-related problems related to:</p> <p>B5.4.1 area</p> <p>B5.4.2 volume.</p>	<p>Whole class teaching and learning – Use of calculus to determine areas and volumes</p> <ul style="list-style-type: none"> o Introduce Use of calculus to determine areas and volumes <p>Individual activity: Use of calculus to determine areas and volumes</p> <ul style="list-style-type: none"> o Carryout worksheets Use of calculus to determine areas and volumes <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on Use of calculus to determine areas and volumes (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) <p>Note - # will not be assessed as discrete topics in isolation.</p>	<p>BBC BITESIZE</p> <p>Support for Mean, median, mode range</p> <p>Integrating simple algebraic expressions - Integration - Higher Maths Revision - BBC Bitesize</p>
<p>B6 Structural analysis</p> <p>B6.1 Types of structural members:</p>	<p>Whole class teaching and learning – Structural analysis</p> <ul style="list-style-type: none"> o Introduce types of structural members, types of structural materials and types of load. <p>Individual activity: Application of Trigonometry</p>	<p>Designing Buildings – The Construction wiki</p> <p>Article on types of load</p>

<p>B6.1.1 beams #</p> <p>B6.1.2 lintels #</p> <p>B6.1.3 columns #</p> <p>B6.1.4 walls #</p> <p>B6.1.5 struts #</p> <p>B6.1.6 ties. #</p> <p>B6.2 Types of structural materials:</p> <p>B6.2.1 concrete #</p> <p>B6.2.2 reinforced concrete #</p> <p>B6.2.3 timber #</p> <p>B6.2.4 steel. #</p> <p>B6.3 Types of load:</p> <p>B6.3.1 dead loads</p> <p>B6.3.2 live loads</p> <p>B6.3.3 imposed loads</p> <p>B6.3.4 point loads</p> <p>B6.3.5 uniformly distributed loads (UDL)</p>	<ul style="list-style-type: none"> o Carryout worksheets on types of structural members. o Carryout worksheets on types of structural materials (link back to section A) o Carryout worksheets on types of types of loads. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on types of structural members o Create worksheets on types of structural materials o Create worksheets on types of load <p>Note - # will not be assessed as discrete topics in isolation, as it is assumed that students will have an underpinning awareness of material properties.</p>	<p>Types of structural load - Designing Buildings</p> <p>Designing Buildings - The Construction wiki</p> <p>Article on point loads</p> <p>Point load - Designing Buildings</p>
<p>B6 Structural analysis</p>	<p>Whole class teaching and learning – Structural analysis</p>	<p>The Efficient Engineer</p>

<p>B6.4 Types of force:</p> <p>B6.4.1 tension</p> <p>B6.4.2 compression</p> <p>B6.4.3 shear</p> <p>B6.5 Types of structural failure that can occur in different structural members:</p> <p>B6.5.1 overstressing</p> <p>B6.5.2 overturning</p> <p>B6.5.3 creep</p> <p>B6.5.4 fatigue</p> <p>B6.5.5 bending</p> <p>B6.5.6 buckling</p> <p>B6.5.7 shear</p> <p>B6.5.8 tensile.</p>	<ul style="list-style-type: none"> o Introduce types of force o Introduce types of structural failure <p>Small group activity: Structural analysis</p> <ul style="list-style-type: none"> o Create table of types of force o Create table of types of structural failure o Add to Key Terms o <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on types of force o Create worksheets on types of structural failure. (use maths textbooks, construction maths textbooks, past papers or sample assessment material to help) 	<p>Article on understanding Shear force and bending moment diagrams</p> <p>Understanding Shear Force and Bending Moment Diagrams The Efficient Engineer</p>
<p>B6 Structural analysis</p> <p>B6.6 Students will apply knowledge of appropriate mathematical methods and techniques to analyse and complete calculations related to</p>	<p>Whole class teaching and learning – Structural analysis</p> <ul style="list-style-type: none"> o Introduce calculations relating to structural members and loadings : elasticity/direct stress/direct strain o Introduce calculations of reactions, shear forces and bending moments. o Introduce Using equilibrium equations to calculate reactions and create Shear Force Diagrams SFD and Bending Moment Diagrams BMD. 	

<p>structural members and loadings</p> <p>B6.7 Calculation of elasticity:</p> <p>B6.7.1 direct stress</p> <p>B6.7.2 direct strain.</p> <p>B6.8 Calculation of shear force values for point loaded simply supported beams.</p> <p>B6.9 Calculation of bending moments for point loaded simply supported beams:</p> <p>B6.10 production of shear force diagrams</p> <p>B6.11 interpretation of shear force diagrams</p> <p>B6.12 production of bending moments diagrams</p> <p>B6.13 interpretation of bending moments diagrams</p> <p>B6.14 calculation of equilibrium conditions</p>	<p>Individual activity: Structural analysis</p> <ul style="list-style-type: none"> o Carryout worksheets on calculations relating to structural members and loadings elasticity/direct stress/direct strain o Carryout worksheets on calculations of reactions, shear forces and bending moments. o Carryout worksheets on using equilibrium equations to calculate reactions and create Shear Force Diagrams SFD and Bending Moment Diagrams BMD. <p>Revision:</p> <ul style="list-style-type: none"> o Create worksheets on calculations relating to structural members and loadings : elasticity/direct stress/direct strain o Create worksheets on calculations of reactions, shear forces and bending moments. o Create worksheets on using equilibrium equations to calculate reactions and create Shear Force Diagrams SFD and Bending Moment Diagrams BMD. 	
--	--	--

to ensure stability of a beam.		
	Practice Past Papers	

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
SP – PS Problem Solving	<p>A review of their school/ college facilities management systems for example how temperature, sound insulation lighting is managed in the building/ classrooms.</p> <p>Focusing on the materials used, the construction type of the building, occupancy and purpose, students can explore how the building's materials and construction help to maintain human comfort for it's users.</p> <p>Identifying where there are specific deficiencies or challenges that the school or college faces, due to it's structural form and materials used.</p> <p>Students should be encouraged to consider how to improve comfort and / or energy efficiency of the building</p>
SP – PS Problem Solving	<p>A simple exercise to introduce/ revisit structural properties of materials and different foces (tension, compression, shear).</p> <p>Students could test and measure a variety of materials to assess how well each copes with different weights of loads, in a simply-supported beam, in a scaled-down classroom exercise.</p> <p>They may then use this information to produce shear force or bending moment diagrams.</p>

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

A Complete Guide to Choosing Insulated Concrete Forms - ICFA

Article on insulated concrete forms. <https://www.icfa.org.uk>

Archdaily.com

Article on the difference between MDF, MDP, Plywood, and OSB. <https://www.archdaily.com>

BBC Bitesize

Material categories and properties – Natural and manufactured timbers.

<https://www.bbc.co.uk/bitesize>

Support for Trigonometry – Trigonometric ratios. <https://www.bbc.co.uk/bitesize>

Support for surface area – Cuboids. <https://www.bbc.co.uk/bitesize>

BBC News

Article on the Grenfell Tower fire. <https://www.bbc.com/news>

Buildingmaterials.co.uk

Article on brick types and properties. <https://www.buildingmaterials.co.uk>

Article on concrete blocks. <https://www.buildingmaterials.co.uk>

Build-construct.com

Article on building material properties. <https://www.build-construct.com>

Corbettmaths

Range of videos and exercises on maths topics. <https://www.corbettmaths.com>

Designing Buildings – The Construction Wiki

Article on blockwork. <https://www.designingbuildings.co.uk>

Article on embodied carbon. <https://www.designingbuildings.co.uk>

Article on timber. <https://www.designingbuildings.co.uk>

Article on damp proof membrane (DPM). <https://www.designingbuildings.co.uk>

Article on PVC. <https://www.designingbuildings.co.uk>

Article on smart concrete. <https://www.designingbuildings.co.uk>

Article on sand. <https://www.designingbuildings.co.uk>

Article on mortar. <https://www.designingbuildings.co.uk>

Article on plasterboard. <https://www.designingbuildings.co.uk>

Article on engineered timber. <https://www.designingbuildings.co.uk>

Article on smart glass. <https://www.designingbuildings.co.uk>

Earth.org

The Environmental Problems Caused by Mining. <https://earth.org>

Firstinarchitecture.co.uk

Article on U-values. <https://www.firstinarchitecture.co.uk>

Health and Safety Executive

Article on lighting at work. <https://www.hse.gov.uk>

Homebuilding & Renovating

Article on straw bale insulation. <https://www.homebuilding.co.uk>

How Products Are Made

Article on how concrete is made. <https://www.howproductsaremade.com>

Article on how bricks are made. <https://www.howproductsaremade.com>

Institution of Civil Engineers (ICE)

Education and inspiration resources to help introduce and explain structural engineering concepts in the built environment. <https://www.ice.org.uk/>

IET Secondary School Free Teacher STEM Resources

Provides posters, videos, handouts, lesson plans, teaching ideas, and worksheets. Includes suggested activities to make STEM teaching more engaging. <https://www.theiet.org/>

Mccoymart.com

Article on smart glass. <https://www.mccoymart.com>

Nanografi.com

Use of graphene in construction. <https://www.nanografi.com>

Product Life Cycle Assessment and the Environmental Impact

YouTube video on life cycle assessment. <https://youtu.be/-9JRowyICbo>

Renewable Energy World

Article on embodied and operational carbon. <https://www.renewableenergyworld.com>

Roofevolution.com

Article on the future of roofing. <https://www.roofevolution.com>

Science of Innovation - Smart Concrete

Video on smart concrete. <https://youtu.be/dpMh0crBZtY>

STEM Learning

Covers the basic scientific and mathematical principles for post-16 students, which are particularly relevant when introducing topics related to engineering, materials, and construction.

<https://www.stem.org.uk>

Stevenage-glass.co.uk

Article on types of glass. <https://www.stevenage-glass.co.uk>

Sustainable Build

Article on understanding embedded energy. <https://www.sustainablebuild.co.uk>

Structville.com

Article on DPC and DPM. <https://www.structville.com>

The Constructor Building Ideas

Article on cracking in concrete. <https://www.theconstructor.org>

The Engineering ToolBox

Article on acoustics. <https://www.engineeringtoolbox.com>

The Engineer.co.uk

Article on liquid granite. <https://www.theengineer.co.uk>

Upgradedhome.com

Article on differences between lime and cement mortar. <https://www.upgradedhome.com>

Ugreen

Article on recycled construction materials. <https://www.ugreen.com>

Ukgbc.org

What are the environmental impacts of construction materials. <https://www.ukgbc.org>

What is the difference between PVC and uPVC pipes used in construction

YouTube video on PVC vs uPVC pipes. <https://youtu.be/eF6MjsnzuD4>

YouTube

Video on curing concrete. <https://youtu.be/8XApTsnDmgY>

Video on concrete slump test. <https://youtu.be/IJMSlu7B8ko>

Textbooks

An official textbook has been created by Pearson to support this new qualification. However teachers who have copies of the previous version may use this to support teaching of this unit, due to the similarities of content to the 2017 BTEC National [BTEC Nationals Construction Student Book + Activebook](#)

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

Unit 2: Construction Technology

Unit overview

Unit 2: Construction Technology	
Assessment type: External	
Content Area	Topics
A Forms of low-rise construction	A1 Structural form of low-rise construction A2 Fire compartmentalisation and protection A3 Health and safety associated with construction form
B Foundation design and construction	B1 Subsoil investigation B2 Foundation design principles B3 Types of foundation B4 Health and safety associated with working in foundations
C: Superstructure design and construction	C1 Walls C2 Floors C3 Roofs C4 Internal finishes C5 Health and safety associated with working on superstructures
D: Sustainable construction	D1 Sustainable urban drainage systems D2 Sustainable design D3 Sustainable site practice
<p>Assessment overview</p> <p>The unit will be assessed through one examination of 70 marks lasting 1 hour and 45 minutes.</p> <p>Students will be assessed through a number of short- and long-answer questions which will include some sketching of construction details. Students will need to explore and relate to contexts, scenarios and construction drawings. The questions will assess understanding of construction technology and sustainability in the context of low-rise construction.</p> <p>The assessment availability is twice a year in January and May/June. The first assessment availability is May/June 2026.</p> <p>Sample assessment materials will be available to help centres prepare students for assessment</p>	

Common student misconceptions

Below are some common student misconceptions related to the content of this unit by students and ideas for how you can help your students to avoid and overcome these.

What is the misconception?	How to help students overcome it
The difference between 'Portal' and 'Skeletal' steel frames building	Students should be should examples of exam type of frame construction, either via digital resource or scale model
Students should be able to identify the difference between Passive fire protection (including the sub categories of 'reactive' and 'Non reactive'), the Active fore protection	Matching activities, where the categories are provided and the students need to match the Fire Protection method into the correct category.

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., [IS-WC].

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
<p>A1.1 Framed structures</p> <p>A1.2 Structural insulated panels (SIPs)</p> <p>A1.3 Traditional construction, constructed wholly on site</p>	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> ○ Visual aids, diagrams and small scale models used to introduce the different methods of construction ○ Teacher led discussion about the advantages, disadvantages and scenarios in which each method of construction is suitable <p>Small group activity – Split into 3 groups</p> <ul style="list-style-type: none"> ○ Each group provided with a plan of one of the methods of construction, as well as suitable modelling materials. In small groups the student’s construct a scale model of the superstructure of a small building ○ Each group then presents their scale model to the other groups for a class discussion about the method of construction used <p>[IS-WC, IS-V&NC, IS-T, EL-SRS]</p>	<p>The Construction Industry knowledge base https://www.designingbuildings.co.uk</p> <p>RICS standards and guidance https://www.rics.org/profession-standards/rics-standards-and-guidance/sectorstandards/constructi-on-standards</p> <p>Pearson Introductory Case Study and teaching materials for modular building Modular Building Case Study Materials (requires Edexcel Online Pearson centre account)</p>

	<p>Visit</p> <ul style="list-style-type: none"> ○ Opportunity to include site visit to a building site and explore the structural forms being constructed 	
A1.4 modular construction	<p>Project based learning [EL-MOL, IS-WC, SP-PS]</p> <ul style="list-style-type: none"> ○ Students provided with a real world scenario (hotel, student accommodation, temporary school building). Students are challenged to research modular construction techniques, and produce a design for a Modular Constructed Building which will enable a repetitive design to be built to meet a client specification. <p>[EL-MOL, IS-WC, SP-PS]</p> <p>Visit</p> <ul style="list-style-type: none"> ○ Opportunity to visit a low rise building which has been constructed using modular construction techniques 	
A2.1 Fire compartmentalisation	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> ○ Visual aids, diagrams and building designs used to introduce the different methods of construction ○ Teacher led discussion linked to building design which does not incorporate fire compartmentalisation, and how it could be improved <p>Paired Activity</p> <ul style="list-style-type: none"> ○ Students provided with the draft floorplans for the ground floor of a new build office space. 	<p>Uk Government Fire Safety Regulations 2022 https://www.gov.uk/government/publications/fire-safety-england-regulations-2022</p>

	<ul style="list-style-type: none"> ○ Students also provided with a lists of client needs and wants for the special requirements. ○ Students work in pairs to modify the drawing to meet the clients needs and wants, while also including the concept of fire compartmentalisation. [IS-WC, IS-V&NC, IS-T, EL-SRS] <p>Whole Class Activity</p> <ul style="list-style-type: none"> ○ Complete a tour of the college/school and identify where the concept of fire compartmentalisation could be incorporated into the building. 	
A2.2 Fire mitigation measures	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> ○ Visual aids, diagrams and small scale models used to introduce the different fire mitigation measures ○ Students are given one method of fire mitigation to research and create a one page revision resource which are to be cloud shared with the other students. ○ Students present their one page revision resource with the rest of the group <p>[IS-V&NC]</p>	

	<p>Whole Class Activity</p> <ul style="list-style-type: none"> ○ Complete a tour of the college/school and identify the fire mitigation measures which are in place and how they could be improved. 	
<p>A2.3 Fire protection to structural elements</p>	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> ○ Visual aids used to introduce different types of passive fire protection which can be applied to structural elements. <p>Individual learner activity</p> <ul style="list-style-type: none"> ○ Students research fire protection of structural elements which are impractical to test in a laboratory (eg – fire barriers) [EL-MOL, IS-WC, SP-PS] 	
<p>A3.1 Specific hazards and risks relevant to different forms of low-rise construction</p>	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> ○ Teacher led class discussion about the range of documentation required before, and during construction (Risk assessment, method statement, etc) <p>Project Based Learning</p> <ul style="list-style-type: none"> ○ Students provided with a construction project scenario, they will need to complete all tasks relating to maintaining Health and safety, including <ul style="list-style-type: none"> ○ Construction Phase Plan 	<p>Health and safety executive website, www.hse.gov.uk</p> <p>Royal society for the prevention of accidents, www.rospa.com</p> <p>Construction Industry Training Board https://www.citb.co.uk/</p>

	<ul style="list-style-type: none"> ○ Risk Assessment ○ Method statement ○ Site layout plan, identifying welfare, materials store, site security, etc <p>[EL-MOL, IS-WC, SP-PS]</p>	
A3.2 General site health and safety	<p>Guest Speaker</p> <ul style="list-style-type: none"> ○ Invite a guest speaker from a live construction site to deliver a toolbox talk on a specific aspect of their construction project 	
B1.1 Investigation methods and their benefits and drawbacks	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Teacher-led demonstration on different subsoil investigation methods, explaining their purpose, benefits, and drawbacks. ○ Use real-world examples, images, or short video clips to illustrate each method: <ul style="list-style-type: none"> ○ Desk study (reviewing existing records) ○ Walkover survey (observing site conditions) ○ Trial pits and auger holes (shallow investigations) ○ Percussion drilling and window sampling (deep soil sampling) ○ Plate bearing test (assessing soil strength) 	

	<ul style="list-style-type: none"> ○ Engage students with questioning to compare methods and discuss when each would be used. <p>Small Group Activity:</p> <ul style="list-style-type: none"> ○ Students analyse a given construction scenario, such as a new housing development on a sloped site. ○ Groups identify potential ground risks and select the most suitable investigation methods. ○ Each group justifies their choice and presents their findings. ○ Class discussion follows, comparing different approaches and their effectiveness. 	
<p>B1.2 Information used for foundation design: B1.2.1 bearing capacity B1.2.2 subsoil classification</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Teacher-led explanation of how bearing capacity and subsoil classification influence foundation design. ○ Use diagrams and real-world examples to show how different soil types (clay, sand, silt, rock) affect load-bearing capacity. ○ Discuss common misconceptions, such as assuming all soils have similar strength or that deeper foundations always solve poor soil conditions. <p>Small Group Activity:</p> <ul style="list-style-type: none"> ○ Students are given a set of soil classification data (e.g., particle size distribution, plasticity index, moisture content). 	<p>The National Soil Map and Soil Classification This document offers an in-depth overview of the UK's soil classification system Soil Classification.pdf</p> <p>Geotechdata.info – Soil Bearing Capacity This resource provides typical values for the bearing capacity of various soil types, including dense gravel, sand, and clay. https://www.geotechdata.info/parameter/bearing-capacity</p> <p>UK Soil Observatory (UKSO) – Soilscape Viewer The UKSO offers an interactive map</p>

	<ul style="list-style-type: none"> ○ Each student classifies the soil using a standard system (e.g., BS 5930 or the Unified Soil Classification System). ○ They then determine an approximate bearing capacity value based on the classification and justify their choice. ○ Teacher reviews students' classifications, discussing common errors and real-world implications in foundation design. 	<p>called 'Soilscapes' that presents the broad regional differences in soil types across England and Wales. This tool allows users to explore various soil classifications and their geographical distribution.</p> <p>https://www.landis.org.uk/soilscapes/</p> <p>LandIS: The Land Information System</p> <p>For a practical application, the UK Soil Observatory provides an interactive Soil Texture Triangle Tool. This tool allows users to input the percentages of sand, silt, and clay to determine the soil texture class according to UK conventions. LandIS - Land Information System - Tools and utilities</p>
<p>B1.2 Information used for foundation design</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Teacher-led explanation of how groundwater levels, soil chemistry, and obstructions impact foundation design. ○ Use diagrams, case studies, or real-world examples to illustrate: <ul style="list-style-type: none"> ○ How groundwater levels affect soil stability and foundation choice. ○ Why chemical analysis is necessary to detect sulphates that could degrade concrete. 	<p>Stuart Wells Limited – Groundwater Monitoring & Sampling</p> <p>This UK-based company provides insights into groundwater level monitoring techniques, including manual measurements using dipmeters and automated systems with data loggers.</p> <p>Groundwater Monitoring & Sampling</p>

	<ul style="list-style-type: none"> ○ The impact of natural obstructions (e.g., large boulders, tree roots) and man-made obstructions (e.g., old foundations, buried utilities) on site investigations. ○ Discussion of industry methods for detecting and mitigating these factors, such as borehole monitoring for groundwater, laboratory soil testing for sulphates, and ground-penetrating radar for obstructions. ○ Class Q&A session to address misconceptions, such as the belief that groundwater presence always requires deep foundations. <p>Small Group Activity:</p> <ul style="list-style-type: none"> ○ Students are given a construction scenario (e.g., a commercial building site with known groundwater issues and past industrial use). ○ Each group analyses the potential risks associated with groundwater, soil chemistry, and obstructions. ○ They propose investigation methods to assess these risks, such as borehole testing, chemical analysis, or geophysical surveys. ○ Groups present their findings, and the teacher facilitates a discussion comparing different approaches and their feasibility. 	
B2.1 Factors used during design to minimise settlement	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain how building load, soil bearing capacity, foundation depth, and groundwater affect settlement and why they must be considered in design. 	<p>Cedengineering.com Settlement of the Foundation Structures: Types, Signs, Causes: This document delves into the causes of foundation settlement, emphasizing the reduction</p>

	<ul style="list-style-type: none"> ○ Use simple real-world examples to show how ignoring these factors can lead to excessive settlement or foundation failure. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is given a construction scenario with different soil conditions and groundwater levels. ○ They identify potential settlement risks and discuss how to minimise them using the given factors. ○ Groups present their findings, and the class discusses the best approaches. 	<p>of air voids in soil and how soil type and foundation structure influence settlement magnitude.</p> <p>crackx.com+2CED Engineering+2therealsealllc.com+</p>
<p>B2.2 Design to minimise other movement</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain different types of ground movement (soil shrinkage, ground heave, differential settlement, effects of tree growth/removal, and cut and fill on slopes) and their impact on structures. ○ Use real-world examples of buildings or infrastructure affected by these movements to highlight risks. ○ Discuss common design strategies used to minimise movement, such as heave protection, flexible foundations, proper tree management, and reinforced cut-and-fill techniques. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is given a site scenario with a potential ground movement issue and must identify the cause of movement. 	<p>British Geological Survey (BGS) – Swelling and Shrinking Soils This resource discusses how clay-rich soils in the UK can cause significant structural damage due to shrink-swell behaviour, leading to subsidence or heave. Swelling and Shrinking Soils</p> <p>LABC Warranty – Reducing the Effects of Ground Heave Following Tree Removal This article explains how the removal of trees affects soil moisture levels, potentially causing the soil to swell and lift structures. Reducing the Effects of Ground Heave Following Tree RemovalLabC</p>

	<ul style="list-style-type: none"> ○ They propose design solutions to reduce or prevent movement. ○ Groups present their findings, and the class discusses the best approaches. 	<p>Warranty+1bgs.ac.uk+1NHBCStandards+1ITRC+1</p> <p>NHBC Standards – Building Near Trees</p> <p>Chapter 4.2 of the NHBC Standards provides guidance on designing foundations that account for the effects of trees, hedgerows, and shrubs on shrinkable soils.. nhbc2018-4.pdf</p>
B2.3 Building Regulations	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain that Building Regulations – Part A (Structure) set minimum requirements for strip foundations, including width, thickness, and overlap where foundations are stepped, to ensure structural stability. ○ Discuss how these parameters prevent foundation failure by ensuring load distribution, soil suitability, and step continuity. ○ Introduce Approved Document A as the official reference for foundation design requirements. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ In groups, review a simplified excerpt or summary of Approved Document A and identify the minimum values for strip foundations. ○ Discuss why each parameter (width, thickness, overlap) is essential for foundation stability. ○ Share findings with the class and compare interpretations. 	<p>Approved Document A – Structure (England) Official guidance on structural design, including strip foundation requirements. Structure: Approved Document A - GOV.UK</p> <p>LABC – Technical Guidance</p> <p>Practical interpretation of building regulations with additional insights on foundation requirements. LABC Technical Guidance Section 3 Foundations.pdf</p>

	<p>Small Group Activity – Scenario-Based Task)</p> <ul style="list-style-type: none"> ○ Each group is given construction scenarios with different soil types, building loads, and stepped foundation layouts. ○ Using Approved Document A, they determine the correct foundation width, thickness, and overlap for each case. ○ Groups present their solutions and justify their choices based on regulation requirements. ○ Teacher facilitates class discussion to compare different approaches and ensure accurate interpretation of the regulations. 	
<p>B3 Types of foundation B3.1 Strip. B3.2 deep strip. B3.3 Raft. B3.4 Pad.</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the different foundation types (strip, deep strip, raft, and pad) and their suitability for varying building loads and soil conditions. ○ Discuss the methods of support, substructure detailing, benefits, and drawbacks of each type, using real-world examples. ○ Highlight the factors affecting foundation choice, such as soil bearing capacity, construction cost, and structural requirements. 	<p>LABC – Technical Guidance Practical interpretation of building regulations with additional insights on foundation requirements. LABC Technical Guidance Section 3 Foundations.pdf</p>

	<p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is assigned a foundation type (strip, deep strip, raft, or pad) and researches its uses, characteristics, advantages, and limitations. ○ Groups present their findings, explaining when their foundation type is most appropriate and what factors influence its selection. ○ Class discussion compares the suitability of each foundation for high and low loading scenarios and different soil conditions. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Groups are given different building projects (e.g., a lightweight residential house on clay soil, a heavy commercial building on weak ground). ○ Using Approved Document A, they must select the most suitable foundation type and justify their choice based on load requirements and ground conditions. ○ Groups present their decisions, and the class evaluates the pros and cons of each choice. 	
B3.5 Pile	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the difference between replacement and displacement piles, including their use in end bearing and friction support scenarios. ○ Discuss the role of pile caps and ground beams in distributing loads effectively across a pile foundation. 	<p>LABC – Technical Guidance Practical interpretation of building regulations with additional insights on foundation requirements. LABC Technical Guidance Section 3 Foundations.pdf</p>

	<ul style="list-style-type: none"> ○ Use real-world examples to illustrate where and why pile foundations are chosen over shallow foundations. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Groups are given different ground conditions and building loads (e.g., a high-rise on weak soil, a bridge foundation in waterlogged ground). ○ Groups present their reasoning, and the class discusses the most effective solutions. 	
B4.1 Working in excavations	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the main hazards and risks when working in foundation excavations, including unstable ground, falls, water ingress, and overburden collapse. ○ Discuss control measures such as earthwork support, safe access, barriers, signage, and dewatering techniques to prevent accidents. ○ Use case studies of excavation failures to highlight the importance of safe working practices. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is assigned a specific excavation hazard (unstable ground, safe access, fall prevention, overburden risks, or water ingress). ○ Groups research and present the risks, control measures, and best practices for minimising their assigned hazard. ○ Class discussion on how these control measures work together to ensure a safe excavation site. 	<p>Health and Safety Executive (HSE) – Excavation Safety: This resource outlines legal obligations and practical advice for maintaining safety in excavation work. HSE Excavation Safety</p> <p>CITB – Safe Excavation Techniques in Construction: Provides guidance on safe excavation practices, including risk assessments and protective measures. CITB Safe Excavation Techniques</p> <p>CITB – Excavations Checklist (GD11): Offers a comprehensive checklist to ensure all safety aspects are considered before and during excavation work. CITB Excavations Checklist</p>

	<p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Groups are given a realistic excavation scenario with hazards such as deep trenches, unstable soil, or nearby heavy loads. ○ Using HSE excavation safety guidelines, they must identify potential risks, propose suitable control measures, and outline a safe working plan. ○ Groups present their solutions, and the class evaluates the most effective approaches. 	
<p>B4.2 Working in confined spaces</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the dangers of working in confined spaces within foundation construction, including poor air quality, gas ingress, oxygen depletion, and fire/explosion risks. ○ Discuss real-world incidents to highlight the importance of risk assessments, ventilation, and monitoring equipment in preventing accidents. ○ Introduce UK regulations for working in confined spaces, including HSE Confined Spaces Regulations 1997 and best practices for ensuring worker safety. <p>Paired Activity</p> <ul style="list-style-type: none"> ○ Each pair is given a specific confined space hazard (air contamination, gas ingress, oxygen depletion, or fire/explosion). 	<p>HSE – Confined Spaces Regulations 1997</p> <p>Official UK regulations outlining safety requirements for working in confined spaces, including risk assessments and control measures.</p> <p>https://www.hse.gov.uk/confinedspace/index.htm</p>

	<ul style="list-style-type: none"> ○ They create a short risk assessment identifying potential dangers and control measures for their assigned hazard. ○ Pairs then swap assessments with another pair, review their findings, and provide feedback on any missing risks or additional safety measures. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and give each group a realistic confined space scenario (e.g., a deep foundation trench near damaged gas services). ○ Using HSE guidelines, they must identify potential hazards, propose risk mitigation strategies, and outline a safe working method. ○ Groups present their safety plans, and the class evaluates the most effective solutions. 	
B4.3 Working with insitu concrete	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the health risks associated with working with insitu concrete, including cement burns, respiratory problems, and eye irritation. ○ Discuss why cement is hazardous, focusing on alkaline reactions, silica dust, and chemical exposure. ○ Highlight control measures such as PPE (gloves, goggles, masks), proper handling techniques, and first aid responses. 	<p>Health and Safety Executive (HSE) – Construction Hazardous Substances: Cement: This resource outlines the health risks associated with cement and provides guidance on control measures. HSE – Construction Hazardous Substances: Cement</p> <p>HSE – Cement and Concrete Manufacture: Lung Disease: This page discusses respiratory risks related to cement and concrete work and suggests methods to control exposure.</p>

	<p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Groups are given a construction scenario involving in-situ concrete work with potential hazards (e.g., prolonged skin contact, lack of ventilation, no eye protection). ○ Using HSE guidelines, they must identify risks, suggest control measures, and outline a safe working method. ○ Groups present their safety plans, and the class evaluates the most effective solutions. 	<p>HSE – Cement and Concrete Manufacture: Lung Disease HASpod – Concrete and Cement Dust Health Hazards: This article delves into the various health hazards posed by cement and concrete dust and offers practical advice on protection. HASpod – Concrete and Cement Dust Health Hazardshaspod.com</p>
<p>C1.1 External cavity walls</p>	<ul style="list-style-type: none"> ○ Whole Class Teaching and Learning ○ Explain the construction methods and materials used in traditional brickwork and blockwork cavity walls and blockwork with an external rendered skin, highlighting their structural stability and insulation properties. ○ Discuss the function of the cavity, including thermal insulation, moisture control, and prevention of cold bridging. ○ Introduce DPC requirements, external finishes, vapour control, and sustainability considerations for both wall types. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is assigned one wall type (brickwork and blockwork cavity wall or blockwork with a rendered skin) and researches: <ul style="list-style-type: none"> ○ Construction method and materials 	<p>NHBC Technical Guidance Documents: Access a range of technical guidance documents related to masonry walls, including movement joints, wall ties, and other critical construction details. 6.1.7 Thermal insulation - NHBC Standards 2024 NHBC Standards 2024</p> <p>Brick Development Association – Good Site Practice and Workmanship: Provides insights into best practices for brickwork, covering aspects like workmanship, material selection, and site practices to ensure quality construction. Good Site Practice and Workmanship</p> <p>MPA Masonry – Housing Easy Guide: Cavity Walls: A practical introduction</p>

	<ul style="list-style-type: none"> ○ Stability and detailing requirements ○ Damp proofing and insulation considerations ○ Performance benefits and drawbacks ○ Groups present their findings, comparing the practical applications and advantages of each method. 	<p>to cavity wall construction, detailing characteristics, performance benefits, and design guidance. Housing Easy Guide: Cavity Walls</p> <p>Weber – External Rendering on Blockwork - Covers types of render, application techniques, and best practices for durability and weather protection. https://www.uk.weber/render-systems</p>
C1.2 Solid wall with rainscreen cladding	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the structure of solid walls and the purpose of rainscreen cladding in moisture management and insulation. Discuss key performance factors, including thermal efficiency, weather resistance, and durability. ○ Explore benefits and drawbacks, considering cost, maintenance, and sustainability. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches a rainscreen cladding system and its materials, installation, and performance. ○ Groups compare advantages and limitations of different systems. ○ Findings are presented, and the class discusses the best applications for each system. 	<p>NHBC Standards – Cladding and Rainscreen Systems NHBC standard specification for rain screen cladding 6.9.18 Rainscreen cladding - NHBC Standards 2025 NHBC Standards 2025</p> <p>Contemporary Structures Provides a comprehensive guide on rainscreen cladding, explaining its structure, benefits, and material options. Covers how the ventilated cavity system improves moisture control, thermal efficiency, and durability in buildings. https://contemporarystructures.co.uk/what-is-rainscreen-cladding/</p>

<p>C1.3 Internal walls and partitions</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the different internal wall and partition types (blockwork, timber stud, metal stud, and demountable) and their construction methods. ○ Discuss key performance factors, including structural stability, sound insulation, fire resistance, and flexibility. ○ Compare the benefits and drawbacks of each partition type in terms of cost, installation speed, durability, and adaptability. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one partition type, covering materials, construction method, performance characteristics, and common applications. ○ Groups compare their findings, discussing which partition type is most suitable for different building uses. ○ Findings are presented to the class, followed by a discussion on real-world applications and selection criteria. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Groups are given different building scenarios (e.g., an office requiring flexible partitions, a residential home needing good sound insulation). ○ They must select the most appropriate partition type, justify their choice based on structural and 	<p>NHBC Standards – Internal Non-Load-Bearing Partitions Provides guidance on acceptable constructions for internal non-load-bearing partitions, including masonry and timber partitions, with specifications on materials and dimensions. https://nhbc-standards.co.uk/6-superstructure-excluding-roofs/6-3-internal-walls/6-3-8-partitions-internal-non-load-bearing/NHBC Standards</p> <p>British Gypsum – Internal Partition Systems Offers a range of lightweight, non-load-bearing partition systems, detailing their fire resistance, sound insulation, and impact resistance, suitable for various building applications. https://www.british-gypsum.com/specification/white-book-specification-selector/internal-partitions-wallsBritish Gypsum+2British Gypsum+2</p> <p>British Gypsum – Timber Stud Partition Systems Describes non-load-bearing timber frame partitions lined with plasterboard as a lightweight alternative to masonry construction, suitable for various building types. https://www.british-</p>
---	--	--

	<p>performance requirements, and outline installation considerations.</p> <ul style="list-style-type: none"> Groups present their recommendations, and the class evaluates the advantages and limitations of each choice. 	<p>gypsum.com/Systems/timber-frame/timber-stud-partitionsBritish Gypsum</p> <p>British Gypsum – GypWall Single Frame Details a versatile, lightweight, non-load-bearing metal stud and drywall partition system, optimized for various applications, offering fire and acoustic performance. https://www.british-gypsum.com/Systems/internal-partitions-walls/gypwall-single-frame</p>
C1.4 Prefabricated timber frame construction	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> Explain prefabricated timber frame construction, focusing on external and internal wall details and how they differ from traditional masonry construction. Discuss cladding options, including brickwork, timber, render, and composite panels, and their impact on aesthetics, durability, and weather resistance. Highlight the performance benefits and drawbacks, such as speed of construction, thermal efficiency, moisture control, and fire resistance. <p>Small Group Activity</p> <ul style="list-style-type: none"> Each group researches one aspect: external wall details, internal wall details, or cladding options and 	<p>Turner Timber – Cladding for Timber Frame Buildings Provides detailed information on various cladding types suitable for timber frame structures, including design requirements and installation guidelines. https://turnertimber.co.uk/cladding.pdf turnertimber.co.uk</p> <p>Fleming Homes – External Wall Build-Ups Explained Offers insights into the construction of timber frame external walls, detailing materials used and the layering process to achieve optimal performance. https://www.fleminghomes.co.uk/self-build-resources/self-build-articles/timber-frame-external-wall/</p>

	<p>presents findings on materials, construction techniques, and performance factors.</p> <ul style="list-style-type: none"> ○ Groups compare their findings and discuss which elements provide the best performance for different building types. ○ Findings are presented to the class, followed by a discussion on suitability and cost-effectiveness. <p>Paired Activity</p> <ul style="list-style-type: none"> ○ Each pair is given a scenario where they must design a prefabricated timber frame structure for a specific climate or building type. ○ They select the most suitable external wall details, internal wall design, and cladding option, justifying their choices. ○ Pairs swap their designs with another pair, who critique the selection based on performance, sustainability, and cost factors. 	<p>Vision Development – Open Panel Timber Frame System Explains the components and benefits of open panel timber frame systems, including insulation options and adaptability to project-specific energy requirements. https://www.timber-frame-suppliers.co.uk/open-panel-timber-frame-system/</p>
<p>C1.5 Openings in walls</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain how openings in walls affect structural integrity and the need for proper detailing at heads, jambs, sills, and thresholds to ensure stability and performance. ○ Discuss methods of supporting wall openings, including lintels, arches, and reinforced concrete beams, and their suitability for different materials. 	<p>NHBC Standards – Construction of Masonry Walls Provides guidance on the construction of masonry walls, including considerations for openings, bonding, and structural stability. https://nhbc-standards.co.uk/6-superstructure-excluding-roofs/6-1-external-masonry-walls/6-1-11-construction-of-masonry-walls/NHBC-Standards</p>

	<ul style="list-style-type: none"> ○ Explore windows and doors, covering installation methods, weatherproofing, insulation, and compliance with UK building regulations. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group is assigned a specific aspect of wall openings (head, jamb, sill/threshold, windows, or doors) and researches construction techniques, material choices, and performance considerations. ○ Groups compare their findings, discussing which methods provide the best structural support, thermal performance, and weatherproofing. ○ Findings are presented, followed by a discussion on best practices for designing and installing wall openings. <p>Peer Teaching Activity</p> <ul style="list-style-type: none"> ○ Pairs or small groups prepare a short presentation or demonstration on one aspect of wall openings. ○ Each group teaches the rest of the class, explaining why their detailing method is important, how it is constructed, and any common mistakes or challenges. ○ The class asks questions and discusses alternative approaches or improvements. 	<p>Keystone Lintels – Steel Lintels Installation Guide</p> <p>Offers detailed instructions on the correct installation of steel lintels, including minimum end bearing requirements and leveling procedures. https://keystonelintels.com/technical-support/steel-lintels-installation-guide/</p>
C2.1 Ground floors	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the construction methods and materials used in solid concrete, beam and block, pre-stressed 	<p>LABC Warranty Technical Manual – Ground Floors</p> <p>Provides comprehensive guidelines on the construction of ground floors,</p>

	<p>concrete, and suspended timber ground floors, highlighting their structural support and load distribution.</p> <ul style="list-style-type: none"> ○ Discuss Damp Proof Membrane (DPM) requirements, insulation methods, and finishes, focusing on moisture control and thermal performance. ○ Compare the benefits and drawbacks of each floor type in terms of installation, sustainability, cost, and suitability for different ground conditions. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one ground floor type, covering materials, construction process, insulation, DPM, and performance characteristics. ○ Groups present their findings, comparing advantages, disadvantages, and suitable applications. ○ Class discussion on how different ground conditions affect floor selection. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students create a technical sketch or diagram of one ground floor type, labelling key elements such as structural components, insulation layers, DPM placement, and finishes. ○ They write a brief explanation of how their chosen floor type functions, including its advantages and limitations. 	<p>including damp proof membrane (DPM) installation, insulation, and structural considerations. LABC Warranty Technical Manual – Ground Floors</p> <p>Homebuilding & Renovating – Floor Structure Guide Discusses various floor structures, including beam and block floors, and their suitability for different types of builds. Homebuilding & Renovating – Floor Structure Guide</p>
--	--	---

	<ul style="list-style-type: none"> ○ Students compare their work with a peer to discuss alternative construction techniques and improvements. 	
C2.2 Intermediate floors	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the construction methods and materials used in beam and block, pre-stressed concrete, timber, and platform floors within timber frame construction, highlighting their structural support and load distribution. ○ Discuss the performance factors, including fire resistance, sound insulation, span limitations, and load-bearing capabilities for different floor types. ○ Compare the benefits and drawbacks of each floor type in terms of installation, sustainability, cost, and suitability for different building types. <p>Peer Teaching Activity</p> <ul style="list-style-type: none"> ○ Each group prepares a short teaching session on their assigned intermediate floor type, including key construction details, advantages, and common challenges. ○ Groups teach their topic to another group, answering questions and providing examples to support understanding. ○ The class comes together for a Q&A session, where students discuss the strengths and limitations of each floor type. 	<p>H+H Celcon – Beam and Block Floors with Aircrete Provides insights into beam and block floor construction using aircrete blocks, highlighting benefits such as thermal efficiency and ease of installation. https://www.hhcelcon.co.uk/products-applications/applications/beam-and-block-floors-aircretehhcelcon.co.uk</p> <p>GreenSpec – Cross-Laminated Timber (CLT) Intermediate Floor Construction Explores the use of cross-laminated timber in intermediate floors, discussing construction methods, sustainability, and performance characteristics. https://www.greenspec.co.uk/building-design/crosslam-timber-intermediate-floors/</p> <p>First In Architecture – Introduction to Beam and Block Floors Offers an introduction to beam and block floors, demonstrating various details and configurations, along with a construction sequence. https://www.firstinarchitecture.co.uk/i</p>

	<p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students create a technical drawing or cross-section of one intermediate floor type, labelling structural components, insulation layers, and finishes. ○ They write a brief explanation of the function and benefits of their chosen floor type, including its best applications. ○ Students compare their work with a peer, discussing alternative materials or construction techniques. 	<p>Introduction-to-beam-and-block-floors/First In Architecture</p> <p>Forterra – Bison Precast Beam & Block Floors Details the Bison Precast beam and block flooring system, highlighting its suitability for intermediate flooring, sound reduction, fire resistance, and thermal mass benefits.</p> <p>https://www.forterra.co.uk/bison/beam-block-floors/milbank.co.uk+3forterra.co.uk+3forterra.cdn.cloud-infra.co.uk+3</p>
C2.3 Openings and stairs	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the process of forming openings in floors for stairs, services, or access points, ensuring structural integrity and compliance with regulations. ○ Discuss the construction methods, materials, and detailing for timber stairs and pre-cast concrete stairs, including support, fixing methods, and finishing options. ○ Compare the advantages and disadvantages of each stair type, focusing on cost, durability, installation complexity, and aesthetic considerations. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one aspect (forming openings, timber stairs, or pre-cast concrete stairs), covering 	<p>NHBC Standards – Joists and Openings Provides guidance on adequately sizing and supporting trimmer joists around openings in upper floors to maintain structural integrity.</p> <p>NHBC Standards – Joists and Openings NHBC Standards</p> <p>Milbank Concrete Products – Precast Concrete Stairs and Landings Offers design, manufacture, and installation services for precast concrete stairs and landings, emphasizing cost-effectiveness and fire resistance.</p> <p>Milbank Concrete Products – Precast Concrete Stairs and Landings</p>

	<p>materials, construction process, structural requirements, and finishes.</p> <ul style="list-style-type: none"> ○ Groups present their findings, comparing benefits, drawbacks, and applications of their assigned topic. ○ Class discussion on best practices for designing and installing openings and stairs. 	<p>kallistostairs.co.uk+2milbank.co.uk+2 Mexboro Concrete+2</p> <p>Atlas Concrete – Stairs and Steps Manufactures stairs and landings from steel and timber moulds, providing high-quality finishes and safe lifting features. Atlas Concrete – Stairs and Steps atlasconcrete.co.uk</p>
<p>C3.1 Pitched roofs including mono pitch, double pitch, gable ended and hipped</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the construction methods and materials used in pitched roofs, covering mono pitch, double pitch, gable-ended, and hipped roofs. ○ Discuss trussed rafter construction vs. traditional timber roofing, highlighting structural support, bracing, and lateral restraint requirements. ○ Explore key detailing at eaves, verge, abutments, and ridge, considering insulation, vapour control, and weatherproofing. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one pitched roof type or roof construction method, focusing on supporting structure, materials, detailing, and performance considerations. ○ Groups compare their findings, discussing the advantages, disadvantages, and best applications of each system. 	<p>Merronbrook – Trussed Rafters & Roof Trusses Explains various types of trussed rafters, such as fink trusses and attic trusses, and their applications in different roof designs. Merronbrook – Roof Trusses merronbrook.co.uk</p> <p>First In Architecture – Pitched Roof Details Guide Offers a collection of pitched roof details, including different types of roof construction with detail examples in both 2D and 3D. Pitched Roof Details Guide – First In Architecture First In Architecture</p> <p>NHBC Standards 2025 – Design of Pitched Roofs Provides guidelines on the design of pitched roofs, including considerations for trussed rafter construction and hipped roofs.</p>

	<ul style="list-style-type: none"> ○ Class discussion on how factors such as climate, cost, and building use influence roof selection. 	<p>NHBC Standards 2025 – Design of Pitched Roofs Roofing Superstore – Building a Pitched Roof Discusses the steps involved in building a pitched roof, from calculating the roof pitch to ordering materials and installation. Building a Pitched Roof – Roofing Superstoreroofingsuperstore.co.uk</p>
C3.2 Flat roofs	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the construction methods and materials used in flat roofs, covering warm deck and cold deck designs and their insulation and vapour control requirements. ○ Discuss methods of achieving falls in flat roofs, including firrings, laser-cut tapered insulation, and screed, and their role in drainage and preventing water pooling. ○ Compare the benefits and drawbacks of warm and cold deck roofs in terms of thermal efficiency, condensation risks, durability, and installation complexity. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students create a technical drawing or cross-section of a warm deck or cold deck roof, labelling key structural components, insulation layers, and drainage solutions. ○ They write a short explanation of their chosen method, including benefits, drawbacks, and best applications. 	<p>LABC Warranty – Good Practice Guide for the Installation of Timber Decks on Flat Roofs Provides guidance on flat roof build-ups, including warm deck roofs, and emphasizes the importance of correct installation to prevent issues such as ponding and waterproofing failures. Good Practice Guide for the Installation of Timber Decks on Flat Roofs LABC Warranty Bauder – Flat Roof Design Considerations Discusses the necessity of designing flat roofs with appropriate falls to ensure effective drainage, as stipulated by BS 6229 and BS 8217, and explores methods to achieve these falls, including tapered insulation. Flat Roof Design Considerations bauder.co.uk</p>

	<ul style="list-style-type: none"> ○ Students compare their work with a peer and discuss alternative detailing approaches. 	<p>Accuroof – Tapered Insulation and BS 6229: What You Need to Know Explores the benefits of using tapered insulation to achieve both thermal performance and necessary falls in flat roofs, aligning with BS 6229 guidelines. Tapered Insulation and BS 6229: What You Need to Knowaccuroof.co.uk</p> <p>Kingspan – Flat Roof Constructions Offers insights into different flat roof constructions, including warm and cold roofs, and discusses considerations for insulation and condensation prevention. Flat Roof Constructions</p> <p>Mannok – Insulating a Flat Roof with Timber Deck Provides guidance on insulating timber deck flat roofs using both warm deck and cold roof construction methods, with recommendations for best practices. Insulating a Flat Roof with Timber Deck mannokbuild.com</p>
C4.1 Wall finishes	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the application methods, characteristics, and benefits of different wall finishes, including traditional two-coat plasterwork, dry lining, ceramic tiling, wood panelling, and decorating (paint and wallpaper). 	<p>NHBC Standards – Wall and Ceiling Finishes Provides guidelines on the application of various wall finishes, including plastering and tiling, ensuring compliance with UK building standards. NHBC Standards – Wall and Ceiling Finishes</p>

	<ul style="list-style-type: none"> ○ Discuss performance considerations, including durability, maintenance, thermal and acoustic properties, and suitability for different building types. ○ Compare the benefits and drawbacks of each finish in terms of cost, installation time, aesthetic appeal, and long-term maintenance. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students create a step-by-step guide for applying one wall finish, including preparation, application techniques, drying/curing times, and finishing touches. ○ They write a short explanation of where their chosen finish would be most suitable, considering environmental factors, maintenance, and longevity. ○ Students compare their work with a peer and discuss alternative finishing methods. 	<p>B&Q – How to Dry-Line a Wall Offers a comprehensive guide on dry lining techniques, including preparation, installation, and finishing tips.</p> <p>B&Q – How to Dry-Line a Wall</p> <p>Little Greene – Paint FAQs Provides insights into paint selection, application techniques, and achieving the desired finish for interior walls.</p> <p>Little Greene – Paint FAQs</p>
C4.2 Ceiling finishes	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the application methods, characteristics, and benefits of different ceiling finishes, including plasterboard and skim, suspended ceilings, UPVC ceiling cladding, and timber boarded ceilings. ○ Discuss performance considerations, including acoustic properties, fire resistance, durability, and ease of installation. 	

	<ul style="list-style-type: none"> ○ Compare the benefits and drawbacks of each ceiling finish in terms of cost, maintenance, and suitability for different building types. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one ceiling finish, covering materials used, application process, advantages, and disadvantages. ○ Groups present their findings, comparing suitability for different environments (e.g., residential, commercial, high-humidity areas like bathrooms). ○ Class discussion on how ceiling finishes contribute to aesthetics, functionality, and overall building performance 	
C4.3 Floor finishes	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the application methods, characteristics, and benefits of different floor finishes, including natural timber, laminates, carpets, ceramic tiling, and sheet materials. ○ Discuss performance considerations, such as durability, maintenance, thermal and acoustic properties, and slip resistance. ○ Compare the benefits and drawbacks of each floor finish in terms of cost, ease of installation, and suitability for different building types and room functions. 	<p>Mr. Handyman – Flooring Types Pros and Cons Provides an overview of various flooring types, including hardwood, laminate, vinyl, and tile, discussing their advantages and disadvantages. Flooring Types Pros and Cons mrhandyman.com</p>

	<p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students create a step-by-step guide for applying one floor finish, including preparation, installation techniques, drying/curing times (if applicable), and finishing touches. ○ They write a short explanation of where their chosen finish would be most suitable, considering environmental factors, durability, and maintenance requirements. ○ Students compare their work with a peer and discuss alternative flooring materials. 	
<p>C5.1 Working at height and methods of mitigating hazards and risks</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the hazards and risks associated with working at height, including falls, instability, and equipment misuse, and the importance of mitigation strategies. ○ Discuss the safe use of mobile elevated working platforms (MEWPs) and scaffolding, covering stair towers, ladder access, handrails, intermediate rails, guards, platforms, toe boards, access gates, and scaffold inspections. ○ Examine materials distribution methods such as hoists, forklift trucks, and telehandlers, focusing on safe operation, load balancing, and avoiding falling materials. 	<p>Health and Safety Executive (HSE) – Working at Height: Provides comprehensive guidelines on working at height, including legal obligations and safety measures. Health and Safety Executive</p> <p>HSE – Lifting Operations and Lifting Equipment Regulations (LOLER) 1998: Offers detailed information on regulations governing lifting operations and equipment safety. Health and Safety Executive</p> <p>Lloyds British – LOLER Regulations Manual: A comprehensive guide to understanding and complying with LOLER regulations.</p>

	<p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one aspect of working at height or material distribution, covering safety regulations, control measures, and industry best practices. ○ Groups present their findings, discussing common accidents, case studies, and preventative measures. ○ Class discussion on the importance of regular inspections, worker training, and compliance with UK regulations (e.g., Work at Height Regulations 2005, LOLER 1998). 	<p>gartec.com+2robinsonsf.com+2hoistuk.com+2</p>
<p>C5.2 General site procedures to improve safety on site</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the importance of general site procedures in improving safety, including daily briefings, site inductions, toolbox talks, staff training, and safety signage. ○ Discuss the role of PPE (Personal Protective Equipment) in reducing risk and ensuring compliance with UK regulations, differentiating between standard site PPE (e.g., helmets, high-visibility jackets, safety boots) and task-specific PPE (e.g., eye protection, gloves, respirators). ○ Explore real-life case studies where proper site procedures and PPE use have prevented 	<p>Health and Safety Executive (HSE) – Site Rules and Induction: Guidance on the importance of site-specific inductions and the establishment of clear site rules to ensure safety. Health and Safety Executive</p> <p>British Safety Council – PPE at Work: Information on employers' duties to provide suitable PPE to employees, ensuring their health and safety at work. PPE at work – expansion of employers' duties British Safety Council</p>

	<p>accidents, contrasting with examples of incidents caused by poor safety compliance.</p> <p>Paired Activity</p> <ul style="list-style-type: none"> ○ Scenario Role-Play: In pairs, students take turns acting as a site manager and a new worker. The site manager must explain a specific site safety procedure or PPE requirement, while the worker asks questions to clarify regulations and understand best practices. ○ PPE Identification Task: One student describes a specific construction task, and their partner must identify the correct PPE required for that task and justify their choice. ○ Discussion & Reflection: Pairs discuss common mistakes made when following site safety procedures and propose ways to improve compliance on-site. 	<p>HSE – Personal Protective Equipment (PPE) at Work Regulations: Detailed explanation of the PPE regulations, including employers' responsibilities and the types of PPE required in various situations. Health and Safety Executive</p>
<p>D1.1 Methods of temporary storage of excess surface water</p>	<ul style="list-style-type: none"> ○ Whole Class Teaching and Learning ○ Explanation of why temporary storage of excess surface water is necessary, addressing flood prevention, water quality improvement, and climate change adaptation. ○ Overview of key SuDS methods: swales, infiltration basins, extended detention basins, wet ponds, and infiltration systems, highlighting their role in slowing, storing, and filtering water. 	<p>Susdrain – The Community for Sustainable Drainage Provides comprehensive resources, case studies, and guidance on implementing SuDS in urban areas,. https://www.susdrain.org/</p> <p>Anglian Water – SuDS for Schools Offers educational materials and activity packs designed to introduce students to the concepts and</p>

	<ul style="list-style-type: none"> ○ Real-world applications, using UK case studies to demonstrate effectiveness in managing urban water runoff sustainably. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one method, focusing on function, advantages/disadvantages, and real-world examples. ○ Groups create a short poster or digital presentation and present their findings to the class. ○ Class discussion comparing methods and evaluating their suitability for different urban environments. 	<p>benefits of SuDS, including lesson resources and fun activities. https://www.anglianwater.co.uk/your-local-area/education/schools/suds-for-schools/</p> <p>The Flood Hub – An Introduction to Sustainable Drainage Systems (SuDS) Provides detailed information on SuDS, including their importance, components, and implementation strategies, suitable for both educators and students. https://thefloodhub.co.uk/wp-content/uploads/2018/09/FT-Q-R121-An-Introduction-to-Sustainable-Drainage-Systems-SuDS.pdf</p>
<p>D1.2 Methods allowing natural percolation to groundwater</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explanation of how natural percolation to groundwater helps manage surface water, reduce flood risk, and improve water quality. ○ Overview of SuDS methods that enhance percolation, including filter strips and porous surfaces (porous block paving, permeable tarmac, porous concrete, and gravel). ○ Discussion on the benefits and limitations of these methods, with examples of their application in urban and rural environments. 	<p>Hackney Council – Sustainable Drainage Systems (SuDS) Discusses SuDS features such as filter strips, filter drains, green roofs, and pervious pavements, highlighting their natural cleaning and filtering processes. https://hackney.gov.uk/sustainable-drainage-systems/Wikipedia+4HackneyCouncil+4Susdrain+4</p>

	<p>Paired Activity</p> <ul style="list-style-type: none"> ○ Each pair selects one percolation method and researches its function, benefits, limitations, and real-world applications. ○ Pairs prepare a short argument either for or against the effectiveness of their chosen method in managing surface water. ○ Pairs engage in a structured mini-debate against another pair with a different method, discussing which solution is more effective in different urban and rural settings. 	
<p>D2.1 Alternative energy sources to reduce CO2 emissions</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Students brainstorm and discuss where they have seen alternative energy sources used in buildings and their potential impact. ○ Teacher facilitates a quick-fire discussion on the advantages and challenges of implementing these technologies in construction. ○ A real-world case study is presented, showing how a building integrates multiple sustainable energy sources. ○ Small Group Activity ○ Each group is assigned one alternative energy source (photovoltaic roof tiles/panels, ground source heat 	<p>Centre for Alternative Technology (CAT) – Solar Photovoltaic (PV) Panels Provides comprehensive information on solar PV panels, including their function, installation, and benefits.. https://cat.org.uk/info-resources/free-information-service/energy/solar-photovoltaic/</p> <p>Centre for Alternative Technology (CAT) – Heat Pumps Offers detailed guidance on ground source and air source heat pumps, covering their operation, efficiency, and suitability for UK homes. https://cat.org.uk/info-</p>

	<p>recovery, air source heat recovery, wind turbines, or solar hot water panels).</p> <ul style="list-style-type: none"> ○ Groups create a practical design proposal showing how their technology could be incorporated into a new or existing building, considering feasibility, cost, and efficiency. ○ Groups present and justify their proposals to the class, followed by a class discussion on which solutions would be most effective in different building types and locations. 	<p>resources/free-information-service/energy/heat-pumps/</p> <p>Community Energy England – Low Carbon Heat Discusses various low-carbon heating options, including biomass, ground source, and air source heat pumps. https://communityenergyengland.org/how-to-pages/low-carbon-heat</p>
<p>D2.2 Sustainable construction techniques and methods, their use, characteristics, benefits and drawbacks</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Students discuss and identify examples of sustainable construction techniques they have seen or heard of, considering their impact on energy efficiency and environmental sustainability. ○ Teacher facilitates a discussion on the benefits and drawbacks of key techniques, including green roofs, high insulation levels, airtight construction, building orientation, durable materials, recycled materials, and brise soleil. ○ A real-world case study is presented, showcasing a sustainable building that incorporates multiple techniques, followed by a discussion on how these strategies contribute to long-term sustainability. 	<p>Centre for Alternative Technology (CAT) Provides comprehensive information on sustainable building techniques, including green roofs, high levels of insulation, airtight construction, and the use of sustainable materials. https://cat.org.uk/</p> <p>BRE Group – Building Research Establishment Offers resources on sustainable construction practices, focusing on building orientation to maximise daylight and solar gain, as well as the use of durable construction materials to minimise future maintenance. https://www.bregroup.com/</p>

	<p>Individual Activity</p> <ul style="list-style-type: none"> ○ Each student selects one sustainable construction technique from the list. ○ They research its purpose, application, benefits, drawbacks, and real-world examples, considering its impact on energy efficiency, cost, and environmental sustainability. ○ Students produce a short report or infographic summarising their findings. ○ A few students volunteer to present their work to the class, followed by a class discussion comparing different techniques. 	<p>Green Roof Organisation (GRO) Dedicated to promoting green roofing in the UK, GRO provides technical guidance, case studies, and best practice examples of green roof technology. https://greenrooforganisation.org/</p> <p>Passivhaus Trust Focuses on promoting and adopting Passivhaus standards in the UK, which emphasise high levels of insulation and airtight construction. https://www.passivhaustrust.org.uk/</p> <p>Sustainable Traditional Buildings Alliance (STBA) Provides guidance on using sustainable and recycled materials in construction, with a focus on traditional UK building methods. https://stbauk.org/madaproperties.ae</p>
D3.1 Relocation of animal habitats	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on why relocation of animal habitats is necessary in construction projects, linking to legal requirements (e.g., Wildlife and Countryside Act 1981) and environmental responsibilities. 	<p>Barratt Developments – Enhancing Habitats Barratt Developments undertook initiatives to enhance habitats and improve outcomes for species affected by construction.. Enhancing habitats and improving outcomes for species – Barratt Developments Plc</p>

	<ul style="list-style-type: none"> ○ Overview of common methods used to relocate habitats, such as translocation of species, creation of alternative habitats, and use of wildlife corridors. ○ Case study example of a UK construction project that successfully relocated wildlife to minimise environmental impact. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Students research a real-world example of animal habitat relocation in the UK, focusing on the species involved, methods used, challenges, and success of the relocation. ○ They produce a brief report or infographic summarising their findings. ○ A few students volunteer to present their work to the class, followed by a discussion on the effectiveness and ethics of habitat relocation. 	<p>UK Government - Wallasea Island Wild Coast Project This UK Government document provides an overview of the Wallasea Island Wild Coast Project, a large-scale conservation and engineering initiative aimed at recreating wetland habitats. Wallasea Island Wild Coast Project</p> <p>Swift Colony Habitat - Wienerberger Wienerberger's Habibat Swift Boxes were installed to replace old nesting sites that were lost due to construction, ensuring the swifts had suitable nesting habitats post-development. wienerberger.co.uk</p> <p>Reintroduction and Conservation Translocations in the UK This resource provides case study summaries of selected reintroductions and conservation translocations carried out in the United Kingdom, offering insights into the methods and outcomes of various species relocations. pureportal.inbo.be</p>
--	--	--

<p>D3.2 Correct storage of fuels and chemicals to prevent ground contamination</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on the environmental risks of fuel and chemical spills, including groundwater contamination and soil degradation on construction sites. ○ Explanation of bund walls—their purpose, design features, and how they contain spills to prevent environmental harm. ○ Case study of a UK construction project where bund walls were used effectively to prevent contamination and meet environmental regulations. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Each student researches bund wall requirements in UK construction, including relevant regulations (e.g., Environmental Protection Act, Control of Pollution Regulations). ○ Students create a simple sketch or diagram showing an effective bund wall system and annotate it to explain how it prevents contamination. ○ The students present their designs to the class, followed by a discussion on the practicality and effectiveness of bund walls in different construction settings. 	<p>Health and Safety Executive (HSE) – Secondary Containment Provides guidance on secondary containment measures, including the design and capacity requirements for bunds to prevent environmental contamination from hazardous substances. Strandek+7Health and Safety Executive+7GPT Environmental+7</p> <p>NetRegs – Refueling on Construction Sites Offers environmental guidance on the storage and handling of fuels and oils on construction sites.. https://www.netregs.org.uk/environmental-topics/materials-fuels-and-equipment/materials-and-equipment-used-on-construction-sites/refueling-on-construction-sites/</p> <p>Strandek – Bund Linings: Repairs, Refurbishments & Guidelines Discusses the design requirements for bunds according to UK pollution control regulations. https://www.strandek.co.uk/articles/bund-linings-repairs-refurbishments-guidelines/</p> <p>Designing Buildings Wiki – Bund</p>
--	--	---

		<p>Offers a detailed explanation of bunds, including their purpose, design considerations, and capacity requirements.</p> <p>https://www.designingbuildings.co.uk/wiki/Bund</p>
<p>D3.3 Segregation of waste for recycling</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on the importance of waste segregation on construction sites, linking to UK regulations (e.g., Waste (England and Wales) Regulations 2011) and environmental benefits such as reducing landfill waste and improving material reuse. ○ Overview of common construction waste types (e.g., wood, metal, concrete, plastics, hazardous waste) and how they should be properly sorted for recycling. ○ Case study of a UK construction project that successfully implemented waste segregation practices, highlighting cost savings and environmental benefits. <p>Peer Teaching Activity</p> <ul style="list-style-type: none"> ○ The class is divided into small groups, and each group is assigned a specific type of construction waste (e.g., timber, metals, concrete, plastics, hazardous waste). ○ Each group researches their assigned waste type, focusing on, How it is generated on-site, How it should be segregated and recycled under UK regulations. ○ Challenges and benefits of recycling that waste type. 	<p>Health and Safety Executive (HSE) – Materials Storage and Waste Management</p> <p>Provides guidance on safe on-site waste management and storage of materials for the construction industry.</p> <p>Health and Safety Executive</p> <p>CPD Online College – Construction Waste Disposal Offers insights into different types of construction waste and best practices for managing and reducing waste on-site.</p> <p>https://cpdonline.co.uk/knowledge-base/health-and-safety/construction-waste-disposal/CPD Online</p> <p>Recycling Bristol – Onsite vs Offsite Waste Segregation for the Construction Industry</p> <p>Discusses the benefits of on-site waste segregation, including streamlined recycling processes, cost</p>

	<ul style="list-style-type: none"> ○ Groups then teach the rest of the class about their assigned waste type using a short interactive presentation, demonstration, or poster. ○ The session concludes with a class discussion on the challenges of implementing effective waste segregation on-site and possible solutions. 	<p>reduction, and regulatory compliance.</p> <p>https://www.recyclingbristol.com/on-site-vs-offsite-waste-segregation-for-construction/recyclingbristol.com</p> <p>Acorn Waste Management – Site Segregation</p> <p>Explores the advantages of segregating waste on construction sites using specific skips for different waste types.</p> <p>https://www.acornwaste.co.uk/services/site-segregation/</p>
D3.4 Dust reduction methods	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on why dust reduction is important on construction sites, linking to health risks (e.g., respiratory issues, silicosis) and environmental concerns (e.g., air pollution, visibility hazards). ○ Overview of common dust reduction methods, ○ Paired Activity ○ Each pair selects one dust reduction method from the list and researches its effectiveness, practical use, benefits, and challenges in construction. 	<p>Health and Safety Executive (HSE) – Construction Dust</p> <p>The HSE offers detailed information on the risks associated with construction dust and outlines control measures to mitigate these hazards.</p> <p>https://www.hse.gov.uk/construction/healthrisks/hazardous-substances/construction-dust.htm</p> <p>Dustcontrol UK – A Guide to Construction Dust Control Regulations</p> <p>This guide provides insights into the health risks posed by construction dust and highlights the importance</p>

	<ul style="list-style-type: none"> ○ Pairs create a visual representation (e.g., annotated diagram, flowchart, or infographic) explaining how their chosen method works. ○ Pairs present their findings to the class, followed by a discussion on which methods are most effective in different construction environments (e.g., urban vs. rural sites). 	<p>of compliance with UK regulations. https://dustcontrol.uk/construction-dust-control-regulations/</p>
<p>D3.5 Use of silt traps on temporary drains</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on why silt traps are essential in temporary drainage systems, focusing on preventing water pollution, sediment build-up, and compliance with environmental regulations. ○ Overview of how silt traps work, including settlement chambers, geotextile barriers, and gravel filtration, to remove sediment before water is discharged. ○ Case study of a UK construction site where silt traps were effectively used to control runoff and prevent environmental damage. ○ Small Group Activity ○ Each group is assigned a specific silt trap method (e.g., settlement ponds, filter socks, sediment fences, geotextile traps) and researches its function, effectiveness, and common uses in construction. ○ Groups create a visual representation (e.g., diagram, poster, or model) explaining how their method works and why it is beneficial. 	<p>NetRegs – Dealing with Silty Water from Construction Sites NetRegs offers guidance on managing silty water on construction sites to prevent pollution. Dealing with silty water from construction sites NetRegs Environmental guidance for your business in Northern Ireland & Scotland</p> <p>3. GOV.UK – Sediment Ponds and Traps (RP7) This resource from the UK government details the use of sediment ponds or traps to manage muddy runoff from fields or tracks, preventing sediment from entering watercourses. RP7: Sediment ponds and traps - GOV.UK</p> <p>Drainfast Ltd – A Guide to Silt Traps</p>

	<ul style="list-style-type: none"> Each group presents their findings to the class, followed by a class discussion on the suitability of different silt trap methods in various site conditions. 	<p>This guide explains what silt traps are, their importance in drainage systems, and how to install and maintain them. A Guide to Silt Traps Drainfast Ltd</p>
<p>D3.6 Correct storage and handling of materials to prevent damage</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> Discussion on the importance of correct storage and handling of materials to prevent damage, waste, and additional costs on construction sites. Overview of key storage and handling best practices, including protection from weather, stacking methods, rotation of materials, and safe manual/mechanical handling. Case study of a UK construction project where effective material storage reduced waste and improved efficiency. <p>Small Group Activity</p> <ul style="list-style-type: none"> Each group is assigned a specific construction material (e.g., timber, bricks, cement, steel, insulation materials) and researches best practices for its storage and handling. Groups create a visual guide (poster, diagram, or checklist) illustrating correct storage and handling procedures to prevent damage. Groups present their work to the class, followed by a discussion on common site issues and solutions for material storage. 	<p>Health and Safety Executive (HSE) – Materials Storage and Waste Management The HSE provides detailed guidelines on maintaining good order and cleanliness on construction sites. Health and Safety Executive</p> <p>Designing Buildings Wiki – Material Handling in Construction This resource offers insights into best practices for material handling systems in construction projects. It emphasizes the importance of a well-coordinated and organized approach to material handling. Designing Buildings</p> <p>NHBC Standards 2021 – Handling Materials The National House Building Council (NHBC) outlines standards for handling materials to ensure construction is neat, clean, and undamaged upon completion. nhbc-standards.co.uk</p>

<p>D3.7 Protective fencing around trees</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on why protective fencing is required around trees on construction sites and the importance of protecting tree roots and canopies. ○ Overview of types of protective fencing, including scaffold framework fencing, wooden hoarding, and metal mesh barriers, and how they prevent soil compaction and mechanical damage. ○ Case study of a UK construction project where effective tree protection measures were implemented to comply with planning regulations and environmental protection laws. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches a different type of protective fencing used in construction and its suitability for various tree protection needs. ○ Groups create a diagram or model illustrating correct fencing placement and minimum distance requirements from tree trunks. ○ Groups present their findings to the class, followed by a discussion on challenges and best practices for tree protection on construction sites. 	<p>Malvern Hills District Council – BS 5837:2012 Overview Offers an overview of the BS 5837:2012 standard, detailing steps to ensure trees are appropriately protected during development projects. malvern hills.gov.uk</p> <p>Tree Care Company – Protection of Trees During Site Development Discusses the importance of tree protection during site development, potential damages from construction activities, and methods to safeguard trees, including the use of protective fencing. https://treecarecompany.co.uk/protection-of-trees-during-site-development/</p> <p>Barrell Tree Consultancy – Fencing Protected Trees Provides guidance on erecting protective fencing around trees in line with BS 5837:2012, including recommendations for fencing types and installation practices. https://www.barrelltreecare.co.uk/assets/Uploads/SGN-2-Fencing-protected-trees.pdf</p>
---	--	---

<p>D3.8 Use of electric plant and vehicles</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on why electric plant and vehicles are being adopted in construction, focusing on reducing carbon emissions, lowering noise pollution, and meeting sustainability goals. ○ Overview of electric construction equipment, including excavators, dumpers, cranes, and forklifts, highlighting their benefits and limitations compared to traditional diesel-powered machinery. ○ Case study of a UK construction project using electric plant and vehicles, examining the impact on efficiency, costs, and environmental sustainability. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches a specific type of electric construction vehicle or plant, considering how it works, benefits, challenges, and real-world applications. ○ Groups create a comparison chart showing the differences between electric and diesel-powered alternatives in terms of cost, emissions, performance, and maintenance. ○ Groups present their findings to the class, followed by a discussion on the future of electric plant and vehicles in the construction industry. 	<p>Electrek.co CASE Construction Equipment's UK Demonstration of Electric Machinery In April 2024, CASE Construction Equipment showcased its electric construction machinery in the UK, featuring compact and large electric excavators, electric wheel loaders, and a cabless track loader. https://electrek.co/2024/04/25/case-shows-off-electric-construction-equipment-in-the-uk-cio-interview/</p> <p>iVT International Industrial Vehicle Technology Volvo Construction Equipment's Mid-Size Electric Machines Volvo Construction Equipment announced the development of electric wheel loaders showcasing the ongoing efforts to electrify construction machinery and reduce environmental impact. CASE STUDY: Volvo's mid-size electric machines Industrial Vehicle Technology International</p>
<p>D3.9 Use of alternative energy</p>	<p>Whole Class Teaching and Learning</p>	

<p>for site set-up and accommodation</p>	<ul style="list-style-type: none"> ○ Discussion on why alternative energy sources are used for site setup and accommodation, linking to reducing carbon footprint, lowering operational costs, and ensuring compliance with sustainability regulations. ○ Overview of alternative energy solutions for construction sites, such as solar panels, hydrogen fuel cells, battery storage, and hybrid generators. ○ Case study of a UK construction project that implemented alternative energy solutions, highlighting cost savings, practical challenges, and environmental benefits. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches a specific alternative energy source (e.g., solar, wind, hydrogen, battery storage) used for powering construction site setups. ○ Groups create a site energy plan, outlining how their chosen energy source could be integrated into a temporary site setup, considering power demand, cost, feasibility, and benefits. ○ Groups present their plans to the class, followed by a discussion on the most viable energy options for different types of construction sites. 	
--	---	--

<p>D3.10 The considerate constructor's scheme</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Discussion on the Considerate Constructors Scheme (CCS)—what it is, its purpose, and how it promotes best practices in construction, including respect for the community, safety, and environmental responsibility. ○ Overview of the CCS Code of Considerate Practice, covering key areas such as appearance, respect for the public, protection of the environment, safety, and valuing the workforce. ○ Case study of a UK construction project that adhered to the CCS, highlighting how it improved public perception, reduced complaints, and enhanced site management. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Each group researches one of the five key areas of the CCS Code of Considerate Practice and explores how it is applied on construction sites. ○ Groups create a short presentation or poster explaining their assigned area, with examples of how sites can comply and go beyond minimum requirements. ○ Groups present their findings to the class, followed by a discussion on why considerate construction is important for the industry's reputation and future development. 	<p>Considerate Constructors Scheme – Official Website The CCS's official site provides comprehensive information about the scheme's objectives, the Code of Considerate Practice, and resources for contractors and the public. Considerate Constructors Scheme</p> <p>cbsbestpractice.org.uk - Best Practice Hub – Case Studies The CCS's Best Practice Hub offers a library of case studies from registered sites, companies, and suppliers. » Case Studies Best Practice Hub</p>
---	---	---

Exam Preparations	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Exam Structure Breakdown: Teacher outlines the format of the exam, including question types and mark allocations. ○ Time Management Tips: Discussion on how long to spend on each section, common pitfalls (e.g., spending too long on short-answer questions), and how to structure extended responses. ○ Common Mistakes and How to Avoid Them: Teacher provides examples of poor answers and discusses how to improve them. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Mock Exam Questions: Students answer a selection of past paper questions under timed conditions. ○ Teacher marks a sample of responses and provides targeted feedback on content depth, exam technique, and structure. ○ Students self-assess their work using a mark scheme, identifying areas where they lost marks and planning how to improve. 	
-------------------	---	--

○

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
<p>SP-CT</p> <p>Critical thinking</p>	<p>Debate: "Is Electric Construction Equipment the Future?"</p> <p>Activity Setup:</p> <ul style="list-style-type: none"> • Assign students into two teams: one supporting the transition to electric construction equipment and one arguing for continued use of diesel-powered machinery. • Provide a mix of sources, including government policies, industry reports, cost-benefit analyses, and real-world case studies. • Some sources should highlight the advantages of electric vehicles (e.g., lower emissions, noise reduction), while others should discuss challenges (e.g., cost, battery life, charging infrastructure). <p>Task:</p> <ul style="list-style-type: none"> • Each team critically evaluates the information they've been given, deciding which points strengthen their argument. • They develop a structured argument based on their analysis of the issue. • Teams engage in a structured debate, presenting their reasoned conclusions while challenging the opposing team's points. <p>"What If?" – Scenario-Based Decision Making</p> <p>Activity Setup:</p> <ul style="list-style-type: none"> • Present students with "What If?" scenarios related to substructure construction. <p>Examples:</p> <ol style="list-style-type: none"> 1. What if the site investigation reveals weak soil after the foundation work has begun? 2. What if an existing building nearby has shallow foundations—how would this impact foundation design? 3. What if water ingress is discovered under a basement floor after construction?

	<p>Task:</p> <ul style="list-style-type: none"> • Students work in pairs to analyse the scenario, identify risks, and propose a solution. • They must defend their decisions to the class, justifying why their approach is the best considering cost, safety, and feasibility. • The class challenges or refines each response, fostering critical discussion. <p>"Build the Best Foundation" - Comparative Analysis Task</p> <p>Activity Setup:</p> <ul style="list-style-type: none"> • Present students with three different site conditions (e.g., stable clay soil, loose sand, high water table). • Provide them with four foundation options (e.g., strip foundation, raft foundation, piled foundation, pad foundation). • Include cost, time, and environmental impact factors for each foundation type. <p>Task:</p> <ul style="list-style-type: none"> • Each group analyses the conditions and ranks the foundations from most to least suitable for each site. • Groups justify their choices, considering structural stability, cost-effectiveness, and environmental impact. <p>A class debate follows where groups challenge each other's selections, encouraging evaluative discussion.</p>
--	---

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

The Royal Institution of Chartered Surveyors

Construction standards governing aspects of surveying, fire safety, carbon assessment and more <https://www.rics.org/profession-standards/rics-standards-and-guidance/sectorstandards/construction-standards>

Designing Buildings

Information on the building design process <https://www.designingbuildings.co.uk>

Health and Safety Executive

Government website on requirements for Health and Safety in Construction <https://hse.gov.uk/>

Building Research Establishment

Sources of training and expert advice on Building Energy, Health and Safety and Environmental standards <https://bregroup.com/>

Textbooks

An official textbook has been created by Pearson to support this new qualification. However teachers who have copies of the previous version may use this to support teaching of this unit, due to the similarities of content to the 2017 BTEC National [BTEC Nationals Construction Student Book + Activebook](#)

Riley M., Cotgrave A., Total Sustainability in the Built Environment, Bloomsbury Publishing PLC, (ISBN:9780230390584)

Riley M., Cotgrave A., Construction Technology 1: House Construction, Bloomsbury

Publishing Plc, (ISBN:9781352001891)

Emmitt S., Barry's Introduction to Construction of Buildings, Wiley-Blackwell; 5th edition (ISBN: 1119730996)

Chudley R., Greeno R., Kovac, K., Chudley and Greeno's Building Construction Handbook, Routledge; 13th edition, (ISBN:978-1032492889)

Duncan Marshall, Derek Worthing, Nigel Dann, Roger Heath – The Construction of Houses, 5th Edition, (Taylor and Francis, 2013) ISBN 9780080971001

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

Unit 3: Design for Construction and the Built Environment

Unit overview

Unit 3: Design for Construction and the Built Environment	
Assessment type: Internal	
Learning Aim	Topics
A Explore how construction design and building concepts and processes contribute to a building's fitness for purpose	A1 Stages involved in the process of briefing, designing, delivering, maintaining, operating and the use of a building A2 Factors that influence the design process A3 Designing for sustainability A4 Understanding problem solving
B Produce a building design to meet requirements of a specific client/end user brief	B1 Project information B2 Initial project brief B3 Initial design production B4 Computer-aided design
C Review the success of own building design in meeting requirements of a specific client/end user brief	C1 Production, construction, handover and use phase C2 Review of design
Assessment overview This unit is Internal assessed through a Pearson-Set Assignment Brief (PASB). Pearson sets the assignment for the assessment of this unit. The PSAB will take approximately 15 hours to complete. The PSAB will be marked by centres and verified by Pearson. The PSAB will be valid for the lifetime of this qualification.	

Common student misconceptions

There are no common misconceptions for this unit.

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., [IS-WC].

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
A1 - Introduction to Unit 3 and the RIBA Plan of Work	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> ○ Introduce Unit 3 with a focus on construction design and the processes that contribute to a building's fitness for purpose. ○ Explain the RIBA Plan of Work as a structured framework for managing building projects from inception to completion. ○ Use a flowchart or timeline to visually outline the eight stages of the RIBA Plan of Work. ○ Presenting real-life examples, such as the Elizabeth Line (Crossrail) project. ○ Highlight how each stage ensures client needs are met and construction projects are delivered efficiently. 	<p>RIBA Website - guidance on managing the delivery of buildings through each RIBA Plan of Work stage Plan for Use guide –</p> <p>The Construction Wiki – An explanation of the stages of the RIBA plan of work RIBA plan of work - Designing Buildings</p>

	<p>Small group activity – RIBA Plan of Work stages</p> <ul style="list-style-type: none"> ○ Assign each group one stage of the RIBA Plan of Work framework. ○ Each group creates a visual summary (e.g., a poster or infographic) that explains the purpose, key activities, and challenges of their assigned stage. ○ Groups present their findings to the class, fostering peer learning and discussion about how the stages interconnect. ○ Targeted questioning during the group presentations to gauge understanding e.g. , "What happens if this stage is skipped?" or "How does this stage influence the next one?" ○ Collect and review the students' visual summaries to check for accuracy and clarity. ○ Students write an exit ticket answering, "What is the most critical stage of the RIBA Plan of Work and why?" This will help identify areas for follow-up in future lessons. 	
<p>A1 - Strategic Definition and Preparation & Briefing</p>	<ul style="list-style-type: none"> ● Small group activity – Project purpose research <ul style="list-style-type: none"> ○ Each group is assigned a hypothetical project e.g. , designing a community library or a local sports centre. ○ Ask the groups to: <ul style="list-style-type: none"> ○ identify general strategic goals for their project, considering its purpose and target users. 	<p>Austin Fletcher - Key elements of the RIBA Plan of work Stage-1-preparation-and-brief</p>

	<ul style="list-style-type: none"> ○ discuss what types of information they would need during the preparation phase e.g., such as location details or the intended user demographic. ○ Each group will then present a high-level "project purpose statement" and outline the key information they would seek in preparation. ○ Review each group's statements for logical reasoning and clarity, ensuring their findings align with the principles of the early RIBA stages. 	
A1 Concept Design and Spatial Coordination	<p>Individual activity - Hand-sketching designs</p> <ul style="list-style-type: none"> ○ Provide students with a simple brief e.g. designing a small community library. ○ Students research examples of concept plans and spatial layouts. ○ Students create a hand-sketched concept design that incorporates key spaces (e.g., reading rooms, offices, storage) and considers user flow. ○ Annotation sketches to explain spatial choices e.g. why certain rooms are adjacent or how circulation is facilitated. 	<p>Library Design Guide - First In Architecture Offers insights into different types of libraries Library-design-guide</p>
A1 - Completing the RIBA Plan of Work (Stages 5–8)	<p>Small group activity - Understanding Technical Design, Production and Construction, Handover, and Use</p> <ul style="list-style-type: none"> • Divide students into groups, assigning each group one of the following stages from the RIBA Plan of Work: Technical Design (Stage 4), Production and Construction (Stage 5), Handover (Stage 6), Use (Stage 7) 	<p>The Construction Wiki - How to read technical drawings</p> <p>Architecture for London</p>

	<ul style="list-style-type: none"> • Each group researches their assigned stage and prepares a poster or short presentation. The presentation should cover, the purpose of the stage, key activities involved, challenges that might arise and their potential impact, and how the stage links to the previous and next stages in the process. • After all presentations, ask students to write a short reflection answering on what they have learnt 	<p>Explores the RIBA Plan of Work stages with practical examples, RIBA-plan-of-work</p> <p>Go Construct Website - A case study of the Eden Project Eden Project Construction: Challenges and Legacy in Cornwall Go Construct -</p>
A2 - Factors that influence the design process	<p>Whole Class Teaching and Learning – Introduction</p> <ul style="list-style-type: none"> • Introduce the factors influencing the design process (e.g., environmental, economic, and social factors) and their impact on the project brief and initial design. • Discuss how requirements and constraints differ across settings: <ul style="list-style-type: none"> ○ Rural, Urban, Greenfield, Brownfield • Present examples for each setting. <p>Individual Activity - Student Investigation</p> <ul style="list-style-type: none"> • Provide a brief overview of project requirements for each setting. • Facilitate a discussion on how these requirements influence the design process and decision-making. 	<p>Royal Institute of British Architects – Case Study RIBA Client Adviser case study: One Angel Square</p> <p>Ministry of Housing , Communities and Local Government National design guide.pdf</p> <p>Brownfield Site: Salford Astley Road Regeneration, UK – constraints associated with Brownfield sites Salford Astley Road Brownfields Regeneration Case Study.pdf</p>
A2 Client/end user requirements for the project outcomes:	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> • Introduce the importance of client/end user requirements in ensuring project success. 	<p>Ministry of Housing , Communities and Local Government National design guide.pdf</p>

	<ul style="list-style-type: none"> Using visual aids and real-world examples (e.g., cultural centres, retail stores), present the key considerations, including e.g. Building use: Spatial requirements, Flexibility and future extensions, etc. Discuss the impact of these requirements on the project design process. Facilitate interactive discussions where students analyse provided examples and share ideas about how these factors influence design decisions. <p>Small group and Individual Activity</p> <ul style="list-style-type: none"> Small group activity – Research and presentation. Divide students into small groups and assign each a case study. The students are to create a poster illustrating the end user requirements and how the final design met these. 	<p>ARCO₂ Sustainable Architecture Case-study</p> <p>RIBA Client Adviser Case Study: One Angel Square https://www.architecture.com/working-with-an-architect/client-adviser/2019/client-adviser-case-study-one-angel-square</p>
A2 - Planning Requirements	<p>Whole class and small group activity – Understanding Planning Requirements</p> <ul style="list-style-type: none"> Introduce the importance of planning requirements in project feasibility and compliance, highlighting key elements in the UK, such as local authority plans, conservation areas, flood risks, and community objections. Use a case study to illustrate how planning requirements influenced its scope, design, and timeline. Encourage interactive discussions “Why are planning regulations critical to project success?”, “What challenges can arise from ignoring planning constraints?” etc. 	<p>Planning portal – Information on the planning process in England Planning Portal</p> <p>Historic England Design in the Historic Environment Good Practice for Design in the Historic Environment: Principles and Case Studies Historic England</p>

	<ul style="list-style-type: none"> • Provide students with a mock planning scenario (e.g., designing a housing estate near a greenbelt). • In their groups the students identify key planning constraints and propose strategies to address issues like conservation, flood risks, and objections. • Submit a brief written report explaining their findings and justifications. 	
A2 - Statutory constraints and Building Regulations	<p>Peer Teaching – Statutory Constraints</p> <ul style="list-style-type: none"> • Divide the class into small groups and assign each group one statutory constraint: Building regulations, Building safety regulations, Disability, laws/regulations, Restrictive covenants, and Hackitt Report-related restrictions (e.g., cladding specifications). <p>Group Task:</p> <ul style="list-style-type: none"> • The students will research the assigned statutory constraint using the provided resources. [SP-PS] • Then prepare a short teaching session (e.g., 5 minutes) for the rest of the class to cover the key features of the constraint. Real-world examples of how it influences building design and implications for architects and builders. • Each group presents their topic to the class. • Encourage other groups to ask questions or discuss how the constraints interconnect. 	

A2 - Environmental constraints	<p>Whole Class Teaching and Learning Activity – Environmental Constraints</p> <ul style="list-style-type: none"> • Explain the importance of avoiding air, water, and noise pollution in construction projects, and discuss how these factors influence building design and site selection. • Present the NPPF 2021 guidance: Use visual aids to highlight key parts of the framework, • Discuss projects that successfully addressed these constraints, such as the Thames Tideway Tunnel for water pollution or eco-friendly housing developments. 	<p>National Planning Policy Framework – GOV.UK Official document outlining planning policies for England.</p> <p>NPPF</p>
A2 - Social constraints	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> • Discuss the role of social constraints in construction, such as community objections, green spaces, and mixed-use development challenges. Use the HS2 rail project or something local to illustrate delays, redesigns, and stakeholder dissatisfaction. • Give the students a local development project and ask them to produce a report on the social constraints that may affect the project 	
A2 – Project budget and economic constraints	<p>Whole Class Teaching and Learning Activity – Economic Factors</p> <ul style="list-style-type: none"> • Present the five economic factors—cost planning, available funds, government incentives, local land prices, and lifecycle costs. Provide simple definitions and examples for each factor, explaining their relevance to construction. Emphasise how understanding these factors helps designers balance quality, cost, and long-term value. 	<p>Wikipedia - Provides an overview of the Scottish Parliament Building, discussing budget overruns and how financial challenges influenced design and public perception. <i>This Wikipedia link is intended to be illustrative of an example of a project going over budget</i></p>

	<ul style="list-style-type: none"> Assign students to research construction projects in the UK and identify how the budget has impacted the design and the solutions found to overcome the issues. E.g. the Scottish Parliament, HS2etc. 	<p><i>and should not be relied upon as a detailed source of factual information</i></p> <p>https://en.wikipedia.org/wiki/Scottish_Parliament_Building</p> <p>Designing Buildings Wiki - An article discussing how budget constraints influence design decisions in construction projects.</p> <p>https://www.designingbuildings.co.uk/wiki/Cost_control_in_building_design_and_construction</p>
<p>A3: Designing for sustainability</p> <p>A4 Understanding problem solving</p>	<p>Whole class teaching and learning – Introduction</p> <ul style="list-style-type: none"> Using visual aids, define sustainability and its importance globally. Discuss with the class the impact human activity is having on the planet e.g. the carbon footprint and embodied energy, the effect on water use, waste,etc. Assign the students to investigate the construction industry's impact in particular on the environment. The students are to produce a poster showing the impact of construction activities. 	<p>Bioregional BedZED - the UK's first major zero-carbon community – Bioregional</p>

	<p>Project-based learning- Design for Sustainability</p> <ul style="list-style-type: none"> • Provide the students with a simple building scenario, including the building plan, site location and site boundaries. • Each group is given a sustainable topic to investigate and apply to the design .e.g. passive design techniques, water reduction, alternative energy sources etc. • The group will annotate the layout with their proposed solutions and present it to the class, justifying their decisions (e.g., larger south-facing windows to maximize winter solar heat). 	
B1 Project information	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • Deliver a teacher-led presentation on the different types of constraints and requirements (e.g., client/end user needs, site, planning, statutory, environmental, social, and economic). Include real-life case studies and visuals such as building plans and project timelines. • Provide students with a hypothetical building design scenario. Individually, they must identify and list all the relevant constraints and requirements that would apply to the scenario. • Reconvene as a class to discuss individual findings, highlighting key constraints and exploring how they affect design decisions. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Assign each group a real-world construction project or case study. Groups must identify and categorise all the constraints and requirements impacting the project, using online research or provided documents. 	

	<ul style="list-style-type: none"> • Groups create a short design brief addressing the identified constraints and requirements, ensuring they reflect realistic solutions for the scenario. • Each group presents their findings and design brief to the class, followed by a peer review where other groups provide feedback and suggest additional considerations. [SP-PS] 	
B2 Initial project brief - Content of an initial project brief	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • Conduct a presentation covering information used in the production of building designs, focusing on how client/end user requirements, site constraints, planning constraints, statutory constraints, and environmental, social, and economic factors influence design decisions. Include examples from actual projects to provide context. • Distribute a set of building design documents (e.g., floor plans, client briefs) and ask students to individually identify how each constraint is addressed in the documents. • Discuss individual findings as a class, correcting misunderstandings and emphasising how addressing these constraints ensures successful project outcomes. 	
B2 Initial project brief -Site information	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • Use diagrams to explain how underground services, trees, and watercourses affect design decisions. Include examples of solutions for integrating or avoiding these features. 	

	<ul style="list-style-type: none"> • Assign students a specific feature (e.g., rights of way, watercourses) and have them research legal and design considerations. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Groups are assigned different sites, each with unique features, and must prepare a presentation outlining the issues that will impact the design. 	
<p>B2 Initial project brief - Formal writing tone</p>	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • The teacher introduces the importance of language in professional communication, highlighting how precise and formal language ensures clarity and credibility in technical fields. Use examples of informal vs formal communication. • Groups are assigned distinct sites characterised by specific features (e.g., topography, existing structures, environmental constraints). They analyse their assigned site and identify key issues that could influence the design process. • Each student individually prepares a written summary of the identified issues and their potential impact on design decisions, using formal and professional language. 	
<p>B3 Initial design production - Introduction to Design Development</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Teacher delivers a presentation introducing the stages of initial design production for low- and medium-rise buildings, focusing on meeting the project brief and client communication. • Use real-world examples of domestic, commercial, and industrial projects to demonstrate design development considerations and challenges. 	<p>ArchDaily Provides insights into developing effective project briefs, emphasizing clear communication between clients and design teams to ensure project success.</p> <p>https://www.archdaily.com/895643/bri</p>

	<ul style="list-style-type: none"> Engage students in identifying potential client/end user needs and site constraints in a given scenario, encouraging questions. 	efing-for-buildings-a-practical-guide-for-clients-and-their-design-teams
B3 Initial design production – Hand sketching	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> The teacher demonstrates the basics of 2D and 3D freehand sketches, including plans, elevations, and internal/external views, highlighting the use of line thickness, shading, and rendering techniques. Students practise sketching simple plans and elevations based on a provided brief, focusing on accuracy and clarity. [SP-C&I] Students share their sketches with the class for constructive feedback, with emphasis on improving technical skills and communication. 	<p>ArchDaily</p> <p>Features exercises aimed at improving freehand drawing skills for architects, focusing on proportion, perspective, and spatial understanding to effectively represent architectural forms.</p> <p>10 Essential Freehand Drawing Exercises for Architects</p>
B3 Initial design production - Advanced Sketching Techniques:	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> The teacher demonstrates single-point and two-point perspective sketches, planometric views, and isometric views, focusing on shading, light direction, and rendering depth. [SP-C&I] Students apply advanced techniques to produce perspective and isometric sketches of a simple building design, refining their visual communication skills. Students present their sketches to the class, discussing challenges and receiving feedback to improve their technique. 	<p>Sketchpad.net</p> <p>Provides a tutorial on freehand perspective drawing techniques, including the use of guide lines to create two-point perspective</p> <p>https://www.sketchpad.net/fhpersp.htm?utm_source=chatgpt.com</p> <p>YouTube - Architecture Sketching Technique</p> <p>Provides a video tutorial demonstrating how to quickly draw an</p>

		<p>urban scene in two-point perspective freehand, focusing on a corner building.</p> <p>https://www.youtube.com/results?search_query=architecture+sketching+technique+two-point+perspective</p>
B3 Initial design production - draft models made by hand	<p>Small Group Activity</p> <ul style="list-style-type: none"> • In small groups, students create simple draft models of a building design using readily available materials, exploring spatial arrangements and construction methods. [SP-C&I] • Each group presents their model to the class, receiving feedback on how effectively it communicates the design and addresses the project brief. • Get the groups to identify and discuss key features of their models, such as external fabric, roof type, service access, circulation space, windows, and doors, ensuring clarity and accuracy in representation. 	<p>YouTube - 30X40 Design Workshop</p> <p>Hosts a series of video tutorials demonstrating architectural model making techniques, including material selection, construction methods, and tips for creating both quick study models and detailed presentation pieces.</p> <p>https://www.youtube.com/watch?v=Kfj2-A5rJlQ</p>
B3 Initial design production - Technical Annotation	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • The teacher demonstrates how to add clear technical annotations to sketches and models, focusing on effective communication of design details such as dimensions, materials, and key features. [SP-C&I] • Students annotate their existing sketches, ensuring their designs are technically clear and suitable for presentation to a client. 	

<p>B4 Computer-aided design - Setting up CAD projects</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> • The teacher introduces the class to CAD: Importance in construction with real-world examples. • The teacher is to give a live demonstration of setting up a CAD project to include: <ul style="list-style-type: none"> ○ Number of floors and floor levels. ○ Linking elements (top and bottom anchors). ○ Building footprint and saving the project. <p>Individual activity:</p> <ul style="list-style-type: none"> • Students replicate the steps demonstrated: [SP-C&I] <ul style="list-style-type: none"> ○ Create a new CAD project. ○ Set up a simple rectangular building footprint, to include levels, linking walls to levels. ○ Save the project in an appropriate format. 	<p>CADTutor A resource hub offering free tutorials, guides, and videos for AutoCAD, SketchUp, and other CAD tools. Ideal for revision or self-paced learning https://www.cadtutor.net/</p> <p>YouTube – Balkan Architect Balkan Architect’s YouTube channel is one of the most comprehensive sources of free CAD software video tutorials. It covers everything from basic modelling to advanced design techniques and tips. https://www.youtube.com/@balkanarchitect</p> <p>Autodesk Learning – Free CAD software Tutorials from Autodesk https://www.autodesk.com/learn/catalog/CADsoftware?msockid=1b99ad8e07536d1c23f9b97206556c9e</p>
<p>B4 Computer-aided design - Detail levels, to include appropriate level for drawing use and audience:</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ This introduces the concept of detail levels (fine, medium, coarse) and the use of hidden element features through teacher-led explanations and demonstrations. <p>Small Group Activity or Individual Activity:</p>	<p>YouTube, CAD software Architecture Detail Views: Coarse, Medium, Fine This tutorial provides an overview of setting detail levels in CAD software and explains how different levels affect the visibility of elements in your</p>

	<ul style="list-style-type: none"> ○ This engages students in practical application where they collaboratively or independently produce drawings reflecting varying levels of detail and hidden elements, tailored for specific audiences. [SP-C&I] 	<p>model.</p> <p>https://www.youtube.com/watch?v=obuv605nnA</p>
B4 Computer-aided design Use and Manipulating 3D Models	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> ○ Teacher demonstration on creating 3D views and manipulating them in CAD software, including orientation, rotation, zooming, and adjusting the detail level. <p>Individual activity:</p> <ul style="list-style-type: none"> ○ Students practise creating 3D views of their model, experimenting with rotation, zoom, and setting appropriate detail levels for different project stages. [SP-C&I] 	
B4 Computer-aided design – Using Component Libraries	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> ○ A teacher demonstration on how to set up and draw composite elements such as walls, floors, and roofs using CAD software tools. <p>Individual activity:</p> <ul style="list-style-type: none"> ○ Students create a basic building model by adding walls, floors, and a roof, ensuring accuracy in dimensions and alignment. [SP-C&I] 	<p>YouTube – Balkan Architect Balkan Architect’s YouTube channel is one of the most comprehensive sources of free CAD software video tutorials. It covers everything from basic modelling to advanced design techniques and tips.</p> <p>https://www.autodesk.com/learn/ondemand/tutorial/create-a-roof-in-CAD-software</p>

<p>B4 Computer-aided design – Adding Standard Opening Components</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on how to place and position doors (external, internal, garage) and windows in a CAD software model. <p>Individual activity:</p> <ul style="list-style-type: none"> Students add doors and windows to their existing model, ensuring correct placement, alignment, and dimensions. [SP-C&I] 	<p>YouTube Revit Tutorial - How to Place Doors and Windows in Revit This tutorial provides a step-by-step guide on inserting and modifying doors and windows within Revit, making it suitable for beginners and those looking to enhance their skills.</p> <p>https://www.youtube.com/watch?v=87IHmgI6K1k</p>
<p>B4 Computer-aided design – Adding Fixtures and Fittings</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on how to add fixtures like stairs, plumbing and sanitary fixtures, and fitted furniture in CAD software, focusing on proper placement and alignment. <p>Individual activity:</p> <ul style="list-style-type: none"> Students enhance their model by adding stairs, kitchen or bathroom fixtures, and fitted furniture, ensuring realistic placement and scaling. [SP-C&I] 	<p>Balkan Architect YouTube Channel <i>Revit Stairs - Beginner to PRO Tutorial</i> This comprehensive tutorial walks you through the process of creating stairs in Revit, covering both basic and advanced techniques to enhance your architectural designs.</p> <p>https://www.youtube.com/watch?v=ahacKNz4yKI</p>
<p>B4 Computer-aided design -Designing External Site Areas</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on how to design external site areas in CAD software, including adding car parking, roads, drives, landscaping, and street furniture. <p>Individual activity:</p> <ul style="list-style-type: none"> Students create an external site for their model by adding driveways, parking spaces, and basic landscaping features like trees or shrubs. [SP-C&I] 	<p>Balkan Architect YouTube Channel Landscape tutorial</p> <p>https://www.youtube.com/watch?v=QyzBsr3XY5U&list=PL1n-0H6b0FkXZuouI37WNgCFcozqZUv1x</p>

<p>B4 Computer-aided design - Rendering Techniques</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on rendering in CAD software, including setting up camera views, applying lighting effects (internal and external), and using shadow and seasonal effects. <p>Individual activity:</p> <ul style="list-style-type: none"> Students render a selected view of their model, experimenting with camera angles, lighting, and effects to create a realistic output.[SP-C&I] 	<p>Balkan Architect How to Setup a Rendering in Revit This tutorial walks you through the process of setting up a rendering in Revit, covering camera placement, lighting adjustments, and rendering settings to achieve realistic results. https://www.youtube.com/watch?v=LFjNW76UpuA</p>
<p>B4 Computer-aided design -Drawing output</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on setting up borders, title blocks, and adhering to orthographic drawing conventions (e.g., third angle). Demonstrate proper scaling and placement of images for printing and screen outputs. <p>Individual activity:</p> <ul style="list-style-type: none"> Students prepare their drawings by adding title blocks, applying scales, and arranging plans, elevations, and sections for final output.[SP-C&I] 	<p>Balkan Architect 5 Tips For Sheets in Revit Tutorial https://www.youtube.com/watch?v=-klnkGDuy30&t=66s</p>
<p>B4 Computer-aided design - Extracting 2D and 3D Drawings</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher demonstration on how to extract 2D drawings (plans, elevations, and cross-sections) and export 3D 	<p>Balkan Architect Placing Views on Sheets in Revit Tutorial</p>

	<p>models from CAD software, ensuring appropriate scale and detail levels.</p> <p>Individual activity:</p> <ul style="list-style-type: none"> Students practise extracting 2D plans, elevations, and sections from their model and exporting a 3D view for presentation or printing. [SP-C&I] 	<p>https://www.youtube.com/watch?v=0UsBsdjf5QY</p>
<p>B4 Computer-aided design -Reviewing and Refining Final CAD Outputs</p>	<p>Whole class teaching and learning:</p> <ul style="list-style-type: none"> Teacher-led demonstration on reviewing CAD models and drawings for accuracy, checking for errors in scaling, alignment, and detail levels, and ensuring drawings meet professional standards. <p>Individual activity:</p> <ul style="list-style-type: none"> Students review and refine their CAD models and drawings, incorporating feedback to produce final outputs ready for presentation or printing 	<p>Mashyo How to Scale ANYTHING in Revit https://mashyo.com/scale-in-revit/?utm_source=chatgpt.com</p>
<p>C1 Production, construction, handover and use phases</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> Introduce the phases of building lifecycle (production, construction, handover, and use) and their interdependencies, using real-world examples. <p>Small Group Activity:</p> <ul style="list-style-type: none"> Assign groups one phase to research (e.g., construction) and present its key considerations and challenges to the class. Groups present findings, and the teacher highlights how design decisions impact all phases. 	<ul style="list-style-type: none">

<p>C1 Production, construction, Building Systems</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Introduce different building technologies (e.g., offsite manufacturing, timber frame, Passivhaus) and their relevance to various project briefs. <p>Individual Activity:</p> <ul style="list-style-type: none"> ○ Students evaluate a case study and recommend suitable building systems, justifying their choices. ○ Students share recommendations, and the teacher provides additional insights. 	<p>Passive House Institute – Passive House Institute web site https://passivehouse.com/index.html</p> <p>Streif UK Explores different methods of offsite manufacturing for sustainable building systems, with a focus on advanced closed timber panel building systems suitable for Passivhaus standards. https://streif.co.uk/the-different-types-of-off-site-manufacturing-methods-for-sustainable-building-systems/</p>
<p>C1 Production, construction, Building Handover and Maintenance</p>	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Discuss the handover phase, including aftercare, defect rectification, and ongoing maintenance requirements (e.g., accessibility, budget, ease of use). <p>Small Group Activity:</p> <ul style="list-style-type: none"> ○ Groups create checklists for aftercare and maintenance based on a given building type. <p>Peer Teaching:</p> <ul style="list-style-type: none"> ○ Groups present their checklists, and the teacher highlights common challenges and strategies. 	<ul style="list-style-type: none"> ○ Designing Buildings Wiki Covers the handover process, including defect rectification, aftercare, and client occupancy. Link: https://www.designingbuildings.co.uk/wiki/Handover_and_close_out ○ Sitemate - Provides an in-depth look at construction project handover procedures, emphasizing testing, commissioning, defect management, and ensuring ongoing maintenance post-

		<p>handover.</p> <p>https://sitemate.com/uk/resources/articles/construction/construction-project-handover-procedure/</p>
<p>C1 Production, construction - ongoing maintenance requirements</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Begin with a teacher-led overview explaining how design choices influence implementation and long-term maintenance. Use examples like HVAC systems, lift installations, or building materials. ○ Highlight the three key considerations: ease of use, budget, and accessibility. Use a real-world case study of a poorly designed building or system for discussion. ○ Provide handouts with definitions and examples of the three considerations. 	<ul style="list-style-type: none"> ○ Housing LIN – Accessibility and Adaptability Brief Description: Provides resources and case studies on accessible design in housing, illustrating the importance of considering accessibility, budget, and usability in design. Link: https://www.housinglin.org.uk/Topics/browse/Design-building/AccessibleDesign/accessibility-adaptability/
<p>C1 Production, construction - ongoing maintenance requirements with reference to:</p>	<p>Small group activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 4-6 and provide a design brief, e.g., designing a community centre. ○ Include challenges related to ease of use (complex HVAC controls), budget (limited funding), and accessibility (wheelchair ramps and visual aids). ○ Ask each group to analyse how the design affects implementation and maintenance. They should identify at least one potential issue and propose a solution. 	<ul style="list-style-type: none"> ○

C2 Review of design	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Introduce the importance of evaluating designs against key criteria (budget, purpose, and functionality) and explain how these factors impact project success. <p>Individual Activity:</p> <ul style="list-style-type: none"> ○ Students analyse a sample design using a provided checklist to assess how well it meets the client/end user's objectives, annotating strengths and weaknesses. [SP-C&I] <p>Peer Teaching:</p> <ul style="list-style-type: none"> ○ Students share their findings, discussing the design's success and areas for improvement. 	<ul style="list-style-type: none"> ○ The Design Council - Design Review: Principles and Practice This resource from the Design Council offers practical advice on conducting design reviews, focusing on improving the quality of architecture, urban design, landscape, and highway design. It outlines ten fundamental principles required for a successful design review process. https://www.designcouncil.org.uk/our-resources/archive/reports-resources/design-review-principles-and-practice/
C2 Review of design	<p>Whole Class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Explain advanced evaluation criteria (innovation, authenticity, maintenance, aesthetics, and sustainability), emphasising their role in creating effective designs. <p>Small Group Activity:</p>	

	<ul style="list-style-type: none"> ○ Students evaluate a design proposal in groups, using the advanced criteria to assess strengths and areas for improvement, and prepare a short presentation. [SP-C&I] <p>Peer Teaching:</p> <ul style="list-style-type: none"> ○ Groups present their findings, and the teacher provides feedback on their evaluations, highlighting key insights. 	
C2 Review of design – Review Approaches	<p>Small Group Activity: Iterative Design Review Simulation</p> <ul style="list-style-type: none"> ○ Students work in groups of 4-6 to create a quick design for a small community building. After the initial design, groups exchange their work with peers who provide feedback, focusing on strengths, weaknesses, and suggestions for incremental improvement. ○ Each group then refines their design based on the feedback, incorporating social, ethical, moral, and environmental impacts into the revisions. At the end of the session, groups present their final designs and explain how feedback shaped their outcomes. <p>Whole Class Teaching and Individual Activity</p> <ul style="list-style-type: none"> ○ The teacher introduces the role of peer and client/end user feedback in the design process and discusses its value in addressing wider issues like sustainability and inclusivity. ○ Students then individually analyse a real-world case study of a building project (provided by the teacher) to identify how feedback contributed to iterative improvements and addressed social, ethical, and environmental challenges. Students write a short reflective summary on what they learned. 	

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
IS - WC	<p>Technical Report Writing:</p> <ul style="list-style-type: none"> • Ask students to write a formal report evaluating factors that influence a building design (e.g., client requirements, sustainability). Include headings, subheadings, and proper citations to mimic professional standards. <p>Annotated CAD Drawings:</p> <ul style="list-style-type: none"> • Require students to annotate their CAD or sketch designs with clear, formal explanations of key features (e.g., materials, spatial layouts, and sustainability). This practice ensures clarity and precision. <p>Client Design Statement:</p> <ul style="list-style-type: none"> • Have students draft a formal design statement explaining how their building design meets the specific client/end user brief, using appropriate tone and technical language. <p>Peer-Reviewed Feedback Summary:</p> <ul style="list-style-type: none"> • Students can summarise peer feedback on their design and write a professional review outlining how they incorporated suggestions, demonstrating their ability to communicate clearly and reflect formally. <p>Handover Documentation:</p> <ul style="list-style-type: none"> • Assign students to prepare a "building manual" section, outlining the construction, operation, and maintenance details in a formal, client-friendly manner.

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

Architecture for London Explores the RIBA Plan of Work stages with practical examples. <https://www.architectureforlondon.com/riba-plan-of-work>

ARCO₂ Sustainable Architecture Case study highlighting sustainable architectural practices and projects. <https://www.arco2.co.uk>

Austin Fletcher Provides key elements of the RIBA Plan of Work, specifically Stage 1: Preparation and Brief. <https://www.austinfletcher.com>

Balkan Architect (YouTube Channel) One of the most comprehensive sources for free CAD software video tutorials, covering everything from basic modeling to advanced design techniques. <https://www.youtube.com/@balkanarchitect>

Balkan Architect Tutorial on how to place doors and windows in Revit. <https://www.youtube.com/watch?v=87IHmgI6K1k>

Balkan Architect A tutorial on creating stairs in Revit, covering both basic and advanced techniques. <https://www.youtube.com/watch?v=ahacKNz4yKI>

Balkan Architect Explains how to set up a rendering in Revit, covering camera placement, lighting adjustments, and rendering settings. <https://www.youtube.com/watch?v=LFjNW76UpuA>

Balkan Architect A tutorial on placing views on sheets in Revit. <https://www.youtube.com/watch?v=0UsBsdjf5QY>

Bioregional The UK's first major zero-carbon community, the BedZED project. <https://www.bioregional.com>

Brownfield Site: Salford Astley Road Regeneration, UK Focuses on constraints associated with brownfield sites. <https://www.salfordbrownfields.co.uk>

CADTutor A resource hub offering free tutorials, guides, and videos for AutoCAD, SketchUp, and other CAD tools. <https://www.cadtutor.net>

Designing Buildings Wiki Discusses how budget constraints influence design decisions in construction projects.
https://www.designingbuildings.co.uk/wiki/Cost_control_in_building_design_and_construction

Designing Buildings Wiki Covers the handover process, including defect rectification, aftercare, and client occupancy.
https://www.designingbuildings.co.uk/wiki/Handover_and_close_out

Go Construct Website A case study of the Eden Project, discussing the challenges and legacy of its construction. <https://www.goconstruct.org>

Historic England Provides guidance on design in the historic environment, offering principles and case studies. <https://historicengland.org.uk>

Housing LIN Offers resources and case studies on accessible design in housing, illustrating the importance of considering accessibility, budget, and usability in design.
<https://www.housinglin.org.uk/Topics/browse/Design-building/AccessibleDesign/accessibility-adaptability/>

Library Design Guide – First In Architecture Offers insights into different types of libraries and their design considerations. <https://www.firstinarchitecture.co.uk>

Passive House Institute Focuses on sustainable architecture with a focus on passive house standards. <https://passivehouse.com/index.html>

Planning Portal Provides information on the planning process in England.
<https://www.planningportal.co.uk>

RIBA Website Offers guidance on managing the delivery of buildings through each RIBA Plan of Work stage. <https://www.architecture.com>

Textbooks

[BTEC National in Construction 2017](#) – Pearson

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

Unit 4: Construction Commercial Management

Unit overview

Unit 4: Construction Commercial Management	
Assessment type: Internal	
Learning Aim	Topics
A Examine what constitutes a legal contract for a construction project	A1 Types of contract A2 What constitutes a legal contract A3 Resolving contract disputes
B Understand methods of procurement for a construction project	B1 Risk analysis B2 Procurement routes
C Apply methods for controlling cost during the completion of a construction project	C1 Types of estimate C2 Compiling an estimate C3 Dealing with cost changes
Assessment overview This unit is Internal assessed through a Pearson-Set Assignment Brief (PASB). Pearson sets the assignment for the assessment of this unit. The PSAB will take approximately 15 hours to complete. The PSAB will be marked by centres and verified by Pearson. The PSAB will be valid for the lifetime of this qualification.	

Common student misconceptions

Below are some common misconceptions related to the content of this unit by students and ideas for how you can help your students to avoid and overcome these.

What is the misconception?	How to help students overcome it
<p>Confusion between what procurement is and what a contract is.</p>	<p>Contracts and procurement are two important terms in the business world, but they have different meanings. A contract is a legal agreement between two or more parties that outlines the terms and conditions of their relationship. It specifies what each party is responsible for, what rights they have, and how disputes will be resolved. Contracts can cover everything from employment agreements to sales contracts.</p> <p>Procurement, on the other hand, refers to the process of acquiring goods or services from an external source. It involves identifying suppliers who can provide products or services at a competitive price while meeting quality standards. Procurement includes activities such as supplier selection, negotiation, contracting, purchasing, payment processing and inventory management.</p>

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., [IS-WC].

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
<p>A1 Types of Contract</p> <p>Types of construction contract</p>	<p>Whole class teaching and learning - Introduction</p> <ul style="list-style-type: none"> o Introduce commercial management in construction. o Involves overseeing and managing the activities of a construction project. o Projects are complex, requiring materials, plant and labour to complete structures like buildings, roads or bridges. o What constitutes a legal contract in construction. o Benefits prompting the use of standard forms of contract. o Introduce Types of contract o Discuss each type of contract. <p>Individual activity</p> <ul style="list-style-type: none"> o Each student produce a short explanation of the types of construction contract. o Each student create a "Key Terms" section of notes and identify Key terms for Types of Contract. o Review the students' work to check for accuracy. 	<p>Alysed Construction - Understanding Commercial Management in Construction</p> <p>Article setting out the key components of Commercial Management</p> <p>Understanding Commercial Management in Construction: A Comprehensive Overview - AlSyed Construction Company Pakistan</p> <p>Travis Perkins - Construction Contracts: Main Types & Use Cases</p>

		<p>This website outlines eight standard types of construction contract used in the UK</p> <p>Construction Contracts: Main Types & Use Cases Travis Perkins</p>
<p>A1 Types of Contract</p> <p>Benefits of using standard forms of contract</p> <p>Principal standard contracts used in construction</p>	<p>Whole class teaching and learning – Types of Contract – Benefits of using standard forms of contract and principal standard contracts.</p> <ul style="list-style-type: none"> o Recap the types of contract. o Discuss the importance of contracts in construction. o Discuss the benefits of using standard forms of contract. o Introduce Joint Contract Tribunal – JCT. o Introduce New Engineering Contract – NEC. o Compare JCT and NEC. <p>Individual activity</p> <ul style="list-style-type: none"> o Each student produce an explanation of the JCT and NEC. o Each student produce a table to compare the JCT and NEC. o Add to the “Key Terms” section of notes and identify Key terms for JCT and NEC. o Review the students’ work to check for accuracy. 	<p>Up counsel - Advantages of Standard Form Contracts</p> <p>This website outlines the advantages of standard forms of contract</p> <p>Advantages of Standard Form Contracts: Everything You Need to Know</p> <p>Palmer's Law - Why are standard form contracts used in construction?</p> <p>Website introducing JCT and NEC</p> <p>Why are standard form contracts used in construction? Palmer's Solicitors</p> <p>DesigningBuildings The Construction Wiki</p>

		<p>Article on JCT JCT - Designing Buildings</p> <p>DesigningBuildings The Construction Wiki Article on NEC New Engineering Contract - Designing Buildings</p> <p>Metroun Quantity Surveying YouTube channel - JCT Contracts Explained Short video to explain JCT https://youtu.be/AzQSkb2wzsg</p> <p>Metroun Quantity Surveying YouTube channel - Advantages of JCT Short video explaining the advantages of JCT https://youtu.be/hqTSs34bpDs</p> <p>Metroun Quantity Surveying YouTube channel - NEC4 Contracts Explained Short video explaining NEC4 https://youtu.be/M8tHF7rtvTA</p>
--	--	---

		<p>Metroun Quantity Surveying YouTube channel - Advantages of NEC Short video explaining advantages of NEC https://youtu.be/k9Fq4PSCk</p> <p>Metroun Quantity Surveying YouTube channel - JCT vs NEC Similarities and Differences Short video comparing the two types of contract https://youtu.be/n16xNEjpJHk</p>
<p>A1 Types of contract</p> <p>Analysing data qualitative and quantitative</p>	<p>Whole class teaching and learning – Analysing data including qualitative and quantitative analysis techniques.</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Outline qualitative and quantitative analysis techniques <p>Small group activity</p> <ul style="list-style-type: none"> o In small groups produce an explanation of qualitative data analysis and identify techniques. o In small groups produce an explanation of Quantitative data analysis and identify techniques. o Produce a table to compare them. 	<p>Question Pro - Qualitative Data Analysis: What is it, Methods + Examples Website explaining qualitative data analysis Qualitative Data Analysis: What is it, Methods + Examples</p> <p>Pixel Plex - 12 Most Prominent Use Cases of Construction Data Analytics Website on explaining quantitative data analysis</p>

	<ul style="list-style-type: none"> o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	<p>12 Examples of Using Data Analytics in Construction</p> <p>Geeks for Geeks - Difference Between Qualitative and Quantitative Data Website explaining the difference between qualitative and quantitative data Difference Between Qualitative & Quantitative Data</p>
<p>A2 What constitutes a legal contract</p>	<p>Whole class teaching and learning - What constitutes a legal contract</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Recap Qualitative and Quantitative data analysis o Introduce the four different parts required for a legal contract <p>Small group activity</p> <ul style="list-style-type: none"> o Give each group one of the part of a legal contract and ask them to produce a short presentation. o Each group present their findings to the rest of the students. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	<p>Legal Vision - What are the elements of a legally Binding Agreement in the UK? Website explaining the different elements of a contract. Elements of a Legally Binding Contract LegalVision</p> <p>Harvard Online YouTube Channel - What is a contract? Video explaining contracts https://youtu.be/JQNeRik2KpE</p>

<p>A2 What constitutes a legal contract</p> <p>Provision of types clauses found in construction contracts</p>	<p>Whole class teaching and learning – What constitutes a legal contract – types of clauses</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Recap Qualitative and Quantitative data analysis o Recap the four different parts required for a legal contract o Introduce what a clause is in a contract. o Introduce types of clauses found in construction contracts. <p>Small group activity</p> <ul style="list-style-type: none"> o Give each group one of the typical clauses identified in the specification: boilerplate clauses, scope of work, payment terms, variation clauses, liquidated damages, dispute resolution. o Each group research the clause and create presentation to explain the clause and provide examples of how it is used in construction projects. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	<p>Contractscounsel</p> <p>What is a Contract Clause?</p> <p>Website explaining what a contract clause is.</p> <p>Contract Clause: What Is It? Examples</p> <p>Lawbite - What is a boilerplate clause in a contract?</p> <p>Website explaining a boilerplate clause</p> <p>What is a boilerplate clause in a contract? LawBite</p> <p>What is a Boilerplate Contract YouTube Channel – Lawyer Hub Video explaining boilerplate contract</p> <p>https://youtu.be/4-B1NVWuD60</p>
<p>A2 What constitutes a legal contract</p> <p>Reasoning to justify choice of solutions</p>	<p>Whole class teaching and learning – What constitutes a legal contract – justify choice of solutions</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Recap Qualitative and Quantitative data analysis o Recap the four different parts required for a legal contract 	<p>Diffen - Deductive vs Inductive</p> <p>Website comparing deductive and inductive reasoning</p>

<p>Assessing the benefits and limitations of options and solutions</p>	<ul style="list-style-type: none"> o Recap types of clauses found in construction contracts. o Introduce reasoning (inductive and deductive) to justify choice of solutions. o Introduce assessing the benefits and limitation of options and solutions. <p>Individual activity:</p> <ul style="list-style-type: none"> o Each student research and produce a summary of inductive and deductive reasoning and explain how this applies in construction contracts o Assessing the benefits and limitations of options and solutions, as well as making judgments on their quality, is a critical part of decision-making and problem-solving. This process typically involves several key steps. Each student creates a list of possible key steps to follow. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	<p>Deductive vs Inductive - Difference and Comparison Diffen</p> <p>Principles of Management – The Decision-Making Process</p> <p>Website with example of key steps in decision making process The Decision-Making Process</p>
<p>A3 Resolving contract disputes</p>	<p>Whole class teaching and learning – Resolving contract disputes</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Recap Qualitative and Quantitative data analysis o Recap the four different parts required for a legal contract o Recap types of clauses found in construction contracts. o Recap inductive and deductive reasoning and benefits and limitations of options and solutions o Introduce the concept of disputes in construction projects o Introduce common causes of disputes in construction projects 	<p>DesigningBuildings The Construction Wiki</p> <p>Article on construction disputes</p> <p>Construction disputes - Designing Buildings</p>

	<ul style="list-style-type: none"> o Describe importance and methods of dispute resolution in construction projects. <p>Small group activity:</p> <ul style="list-style-type: none"> o Give each group one of the methods of contract dispute resolution o Each group research the method and create presentation to explain the method and provide examples of how it is used in construction projects. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. <p>Whole Group activity: Classroom Dispute Resolution Activity</p> <p>Scenario: The late Assignment Submission Dispute</p> <p>Background</p> <p>Two students, Marty and Hayley, were assigned as partners for a group project due last Friday. Marty claims that Hayley did not contribute equally, causing a delay in submission. Hayley argues that Marty did not communicate properly about deadlines. As a result, the teacher deducted points for the late submission, and both students are frustrated.</p> <p>Activity Instructions:</p> <ol style="list-style-type: none"> 1. Divide students into Groups <ul style="list-style-type: none"> o One group plays Marty’s side o One group plays Hayley’s side o One group acts as mediators. 2. Present each sides Argument (as a group) 	<p>Harper James -Construction Dispute Resolution – How to resolve a construction dispute</p> <p>Website explain the different methods used to resolve disputes</p> <p>Construction dispute resolution A step by step guide</p> <p>Dispute Resolution Methods – Construction YouTube channel -Metroun Quantity Surveying</p> <p>Short video on dispute resolution methods</p> <p>https://youtu.be/aTc8m9Bh_FM</p> <p>Tenarys Law solicitors - Understanding Common Construction Disputes - Causes and Solutions</p> <p>Common Construction Disputes – Causes and Solutions</p>
--	--	---

	<ul style="list-style-type: none"> o Marty o Hayley <p>3. Mediation process</p> <ul style="list-style-type: none"> o Mediator ask questions to clarify misunderstanding o Both sides discuss their perspectives o The class suggests possible fair resolutions <p>4. Resolution</p> <ul style="list-style-type: none"> o Mediator group proposes a fair compromise (e.g. extra credit work, clearer communication next time, apology etc) 	
<p>A3 Resolving contract disputes</p> <p>Use of language</p> <p>Different writing tone</p> <p>Acceptable writing formats</p>	<p>Whole class teaching and learning - Resolving contract disputes - use of language</p> <ul style="list-style-type: none"> o Recap the types of contract. o Recap JCT and NEC and their differences. o Recap Qualitative and Quantitative data analysis o Recap the four different parts required for a legal contract o Recap types of clauses found in construction contracts. o Recap inductive and deductive reasoning and benefits and limitations of options and solutions o Recap disputes in construction projects o Discuss the importance of use of language including correct grammar, spelling and punctuation o Discuss different writing tones formal, informal, humour, respectful, enthusiastic. o Discuss acceptable formats for formal letter, emails, reports and presentations. 	<p>DesigningBuildings The Construction Wiki</p> <p>Writing technique in the construction industry</p> <p>Article on good writing</p> <p>Writing technique in the construction industry - Designing Buildings</p>

	<p>Individual activity:</p> <ul style="list-style-type: none"> o Each student research how language, writing tone and format of communication can cause ambiguity and misinterpretation. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	
<p>Learning aim B: Understand methods of procurement for a construction project</p> <p>B1 Risk analysis</p>	<p>Whole class teaching and learning – Risk Analysis</p> <ul style="list-style-type: none"> o Outline the types of commercial risks that can impact a construction project in terms of time and cost. o For each commercial risk explain it and discuss the impact in terms of time and cost. o Design data inaccuracy, inflation, unexpected ground conditions, contractor performance and availability issues, problems with novel or bespoke design solutions, risk associated with the design, availability of utility services, changes to a project’s scope or specification, delay or default by suppliers of materials and components, subcontractor insolvency, weather, health and safety, cash flow restrictions, credit risk, difficulties acquiring land, social and environmental risk, unforeseen events (force majeure) <p>Small group activity:</p> <ul style="list-style-type: none"> o Divide the class into small groups and assign each group different types of commercial risk. o Each group research and prepare a presentation which explains the commercial risk, explains its impact in terms of cost and time and give an example. o Add to the “Key Terms” section of notes 	<p>The Construction Link Incorporated - 25 key risks in construction projects Website explaining the potential risks for construction projects 25 key risks in construction projects TCLL</p> <p>DesigningBuildings The Construction Wiki Inflation in the construction industry Inflation in the construction industry - Designing Buildings</p> <p>Linked in - The Impact of Weather on Construction Project and How to Prepare Your Team Website on impact of weather The Impact of Weather on Construction Projects and How to Prepare Your Team</p>

	<p>Review the students' work to check for accuracy.</p>	<p>Managing occupational health and safety YouTube channel - APCHQ Video on managing health and safety https://youtu.be/LiPNy_WyCTU</p> <p>DesigningBuildings The Construction Wiki Force majeure in construction Force majeure in construction - Designing Buildings</p>
<p>B1 Risk Analysis</p> <p>Techniques deployed to reduce the impact of commercial risk</p>	<p>Whole class teaching and learning - Techniques deployed to reduce the impact of commercial risks</p> <ul style="list-style-type: none"> o Recap the many sources of risks previously discussed o Now outline the possible techniques deployed to reduce the impact of these risks o Discuss each technique - Risk identification, risk assessment, risk mitigation, risk monitoring and control, risk reporting. <p>Group Activity - Management The Impact of Commercial Risk - Student Activity</p> <p>Example Scenario</p> <p>Imagine you are part of a project team managing the construction of a new shopping mall. Your team has identified several commercial risks</p>	<p>Indeed - What are common construction management risks (and how to avoid them) Website on how to avoid risks What are common construction management risks (and how to avoid them) Indeed.com UK</p>

that could impact the project. Your goal is to apply different risk management techniques to minimise their effects.

Step 1 Identifying Risk

Below are three common commercial risks faced during the project:

1. Material Price Inflation – The cost of steel and concrete is rising, increasing project expenses.
2. Payment Delays from Client – The client is slow to make payments, causing cash flow issues.
3. Delays in Project Completion – Poor weather conditions and labour shortages are slowing down construction

Step 2: Applying Risk Management Techniques

For each risk, the students will discuss and apply one or more of the following risk management strategies:

Risk Avoidance (taking steps to eliminate the risk)

Risk Reduction (Mitigation) ((reducing the likelihood or impact of the risk)

Risk Transfer (passing the risk to another party)

risk sharing

Risk retention

Step 3: Group Activity

1. Divide into Small Groups – Each group selects one of the risks to manage.
2. Develop a Risk Management Plan – Discuss and choose the best strategy to handle the risk.
3. Present Solutions – Each group presents their risk management approach and justifies their choice.
4. Class Discussion – Compare different strategies and determine the most effective solutions.

<p>B2 Procurement Routes</p>	<p>Whole class teaching and learning – Procurement Routes</p> <ul style="list-style-type: none"> o Recap the many sources of risks previously discussed o Recap the techniques deployed to reduce the impact of these risks o Explain the concept of procurement o Discuss the characteristics of each of the procurement routes used in construction o Traditional, design and build, partnering/alliancing, construction management, private finance initiative (PFI), public private partnership (PPP). <p>Individual activity:</p> <ul style="list-style-type: none"> o Each student research the different types of procurement route and create a table to outline the advantages and disadvantages of each. o Add to the “Key Terms” section of notes o Review the students’ work to check for accuracy. 	<p>DesigningBuildings The Construction Wiki Procurement routes Procurement route - Designing Buildings</p> <p>Access - What is Procurement in Construction ? (and what are the best methods?) Website explaining procurement in construction What is Procurement In Construction? The Access Group</p> <p>Top 4 Construction Procurement Routes Compared – YouTube Channel Metroun Quantity Surveying Video explaining the different types of procurement https://youtu.be/qFaetmy5aUo</p> <p>ScienceDirect</p>
------------------------------	---	--

		<p>The allocation of risk in PPP/PFI construction projects in the UK</p> <p>Article on PFI and PPP and risk allocation The allocation of risk in PPP/PFI construction projects in the UK - ScienceDirect</p> <p>ICE Guidance note – Procurement, commercial and contracting key principles. Guidance notes to help understand the key principles that support successful procurement. ice-procurement-guidance-notes.pdf</p>
<p>Learning aim C: Apply methods for controlling cost during the completion of a construction project</p>	<p>Whole class teaching and learning – Types of Estimate</p> <ul style="list-style-type: none"> o Introduce the importance of estimates during the completion of a construction project o Discuss each types of estimate – <ul style="list-style-type: none"> o Bill of Quantities o Schedule of rates o Provisional sums. <p>Small group activity:</p>	<p>DesigningBuildings The Construction Wiki Cost control in building design and construction Cost control in building design and construction - Designing Buildings</p>

<p>C1 Types of estimate</p>	<ul style="list-style-type: none"> o Divide the three methods of cost control between the different groups. o Each group research and prepare a presentation which explains the method of estimates. o Each group present their findings to the whole group. o Add to the “Key Terms” section of notes <p>Review the students’ work to check for accuracy.</p> <p>Individual activity:</p> <ul style="list-style-type: none"> o Each student prepare a table to compare the advantages and disadvantages of each method and give examples of where each would be used. o Example of possible table headings: Definition, purpose, usage, certainty in costing, flexibility, examples of use 	<p>DesigningBuildings The Construction Wiki Bill of quantities BOQ Bill of quantities BOQ - Designing Buildings</p> <p>Bill of Quantities Explained YouTube Channel – Metroun Quantity Surveying Video to explain BOQ https://youtu.be/ouhkzuULHnA</p> <p>DesigningBuildings The Construction Wiki Schedule of rates for construction Schedule of rates for construction - Designing Buildings</p> <p>Schedule of rates (SoR) Explained YouTube Channel - Metroun Quantity Surveying Video to explain SoR https://youtu.be/GH9fAykWfLU</p>
-----------------------------	--	--

		<p>DesigningBuildings The Construction Wiki Provisional sum Provisional sum - Designing Buildings</p> <p>Provisional sums explained YouTube Channel -Metroun Quantity Surveying Video to explain Provisional sums https://youtu.be/PXfi9HvzjOo</p> <p>Duotax Website comparing BoQ and SoR Bill Of Quantities Vs Schedule Of Rates Duo Tax Quantity Surveyors</p> <p>Quantity Surveying Hub Article explaining the role of provisional sums. The Role of Provisional Sums in Construction Contracts: An Overview</p>
--	--	--

<p>C1 Types of Estimates</p>	<p>Whole class teaching and learning - Types of Estimate</p> <ul style="list-style-type: none"> o Introduce the purpose and benefits of using Civil Engineering Standard Method of Measurement to compile estimates. o Outline its compatibility with different types of construction contract o Outline standard methods of pricing items of work o Outline common classification and description used for work undertaken as part of a construction project. o Outline how it can be used to compare between contractor's estimates. <p>Individual activity:</p> <ul style="list-style-type: none"> o Each student create a presentation explaining the benefits of CESMM o Each student prepare a table to compare the advantages and disadvantages of CESMM with Bill of Quantities and give examples of where each would be used. o Example of possible table headings: Definition, purpose, application measurement approach, flexibility, accuracy and consistency, examples of use and highlight the key differences. 	<p>DesigningBuildings The Construction Wiki Civil Engineering Standard Method of Measurement CESMM4 CESMM4 - Designing Buildings</p> <p>ICE CESMM Civil engineering standard method of measurement Institution of Civil Engineers (ICE)</p> <p>ICE 10 Things you need to know about CESMM4 10 Things you need to know about CESMM4</p> <p>Civil Engineering Standard Methods of Measurement Video explaining CESMM4 https://youtu.be/ql0A6nqvlBs</p> <p>Metroun Quantity Surveyors Civil Engineering Standard Methods of Measurement</p>
------------------------------	---	--

		Civil Engineering Standard Method of Measurement - CESMM - Metroun
<p>C2 Compiling an estimate</p>	<p>Whole class teaching and learning – Compiling an estimate</p> <ul style="list-style-type: none"> o Introduce the concept of how to compile an estimate of a basic construction activity. o Discuss unit rates. o Discuss pricing materials, plant and labour. o Discuss allowing for appropriate wastage percentage. o Discuss including overheads and profits. o Discuss dayworks. o Discuss preliminaries. <p>Group Activity - Student Exercise: Preparing a Construction Estimate</p> <p>Scenario: You are a site engineer tasked with estimating the cost of constructing a 10m x 2m brick wall (20m²) for a commercial project. Your estimate must include labour, plant (equipment), and material costs to determine the total project cost.</p> <p>Step 1: Identifying the Cost Components</p> <p>1. Materials:</p> <ul style="list-style-type: none"> a. Bricks b. Cement c. Sand d. Water <p>2. Labour:</p> <ul style="list-style-type: none"> a. Bricklayers b. Labourer 	<p>Procore Website explaining construction cost estimating Construction Cost Estimating: A Step-By-Step Guide Procore CA</p> <p>Construction Estimating and Budgeting Basics YouTube Channel – Pan & Spec Video on estimating and Budgeting basics https://youtu.be/cLBn8876T5s</p> <p>Construction Cost YouTube Channel – ConstructIQ - Estimating- The Basics Video on cost estimating https://youtu.be/utVkwubVz6g</p>

3. Plant & Equipment:

- a. Cement mixer
- b. Water hose

Step 2: Quantity Takeoff & Cost Breakdown

Item	Unit	Quantity	Rate per Unit (\$)
Materials			
Bricks (standard size)	Each	1,000	0.50
Cement (50kg bags)	Bag	10	8.00
Sand	m ³	2	30.00
Water	L	100	0.05
Labor			
Bricklayer	Day	2	80.00
Helper	Day	2	50.00
Plant & Equipment			
Cement Mixer	Day	1	40.00
Water Hose	Lump Sum	1	10.00
Total Cost			

	<p>Step 3: Adding Overheads & Profit</p> <ul style="list-style-type: none"> o Overheads (10%) $955 \times 10\% = \text{£}95.50$ o Profit Margin (15%) $(955 + 95.50) \times 15\% = \text{£}157.73$ o Final Estimated Cost = $955 + 95.50 + 157.73 = \text{£} 1208.23$ <p>Step 4 Group Activity</p> <ol style="list-style-type: none"> 1. Break into small teams – Each team prepares an estimate for a different construction activity (e.g., plastering, concrete slab, tiling). 2. Perform a quantity takeoff – Identify materials, labour, and plant requirements. 3. Calculate the costs – Using given rates, compute total costs. 4. Present findings – Each group presents their estimate and explains their calculations. 	
<p>C3 Dealing with cost changes</p>	<p>Whole class teaching and learning – Dealing with cost changes</p> <ul style="list-style-type: none"> o Introduce the concept of how to compile an estimate of a basic construction activity. o Discuss unit rates. o Discuss pricing materials, plant and labour. o Discuss allowing for appropriate wastage percentage. <p>Individual Activity</p> <ul style="list-style-type: none"> o Research examples of major construction projects which have run over budget o Agree with your tutor one project to investigate. 	<p>The Constructor Building Ideas</p> <p>Factors affecting construction cost of a Project</p> <p>Factors Affecting Construction Cost of a Project – theconstructor.org</p> <p>Bridgit</p> <p>Reason for cost overruns in construction projects</p>

	<ul style="list-style-type: none"> o Research the project and identify the factors that caused the project to run over budget. o Create a presentation on the project explaining the factors which contributed to it going over budget. o Each student present to the class on their researched project o Finally compile a list of common factors that contribute to projects overrunning their budget. 	<p>10 Reasons for cost overruns in construction projects - Bridgit</p> <p>Builder Space Website on reasons construction projects go over budget 8 Reasons Why Construction Projects Go Over Budget</p> <p>Construction Industry News UK's most over budget construction projects The UK's most over budget construction projects - Construction Industry News</p> <p>Construction Briefing Website on 7 construction megaprojects that overran their budget 7 construction megaprojects that severely overran their budget - Construction Briefing</p>
--	--	---

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
<p>MY-TPR</p> <p>Taking Personal Responsibility</p>	<ol style="list-style-type: none"> 1. "Own Your Decisions: Personal Responsibility in Commercial Risk Management" To help students understand how personal responsibility plays a crucial role in managing risks in a commercial environment. 2. Approach: <ul style="list-style-type: none"> Case Study – Present students with a real-world business scenario where a company faces a financial or reputational risk due to poor decision-making. Role-Playing Activity – Assign students different roles (e.g., risk manager, business owner, employee) to analyse and take responsibility for mitigating the risk. Decision-Making Challenge – Have students propose risk management strategies while considering ethical responsibility, financial impact, and regulatory compliance. Reflection & Discussion – Encourage students to reflect on how personal accountability in their decisions can prevent business losses and ensure long-term success. 3. Key learning: Every business decision carries risk, and taking personal responsibility ensures better judgment, ethical decision-making, and a proactive approach to commercial risk management.
<p>SP-PS</p> <p>Problem Solving</p>	<ol style="list-style-type: none"> 1. "Cost Control in Construction: Solving Budget Challenges" To help students develop problem-solving skills for managing and controlling costs during a construction project. 2. Approach:

	<p>Real-World Scenario – Present a case study where a construction project is exceeding its budget due to unforeseen expenses (e.g., material price hikes, labour shortages, design changes).</p> <p>Problem Identification – Have students analyse cost overruns</p> <p>Solution Brainstorming – In teams, students propose cost-saving strategies</p> <p>Decision-Making & Justification – Teams present their solutions, explaining how they balance cost reduction with quality and project deadlines.</p> <p>Reflection & Best Practices – Conclude with a discussion on key cost control techniques, including proactive budgeting, risk forecasting, and efficient resource management.</p> <p>3. Key Learning</p> <p>Smart cost control in construction requires proactive planning, continuous monitoring, and strategic problem-solving to keep projects within budget while maintaining quality and efficiency.</p>
--	--

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

Access

Website explaining procurement in construction.

What is Procurement In Construction? | The Access Group

AlSyed Construction Company Pakistan

Article outlining the key components of Commercial Management in construction.

[Understanding Commercial Management in Construction: A Comprehensive Overview - AlSyed Construction](#)

Builder Space

Website discussing reasons construction projects go over budget.

[8 Reasons Why Construction Projects Go Over Budget](#)

Bridgit

Website detailing reasons for cost overruns in construction projects.

[10 Reasons for cost overruns in construction projects - Bridgit](#)

Construction Briefing

Website discussing 7 construction megaprojects that overran their budget.

[7 construction megaprojects that severely overran their budget - Construction Briefing](#)

Construction Industry News

Website featuring UK's most over-budget construction projects.

[The UK's most over budget construction projects - Construction Industry News](#)

Construction Estimating and Budgeting Basics YouTube Channel – Pan & Spec

Video on estimating and budgeting basics in construction.

[Estimating and Budgeting Basics – Pan & Spec](#)

Construction Cost YouTube Channel – ConstructIQ

Video on the basics of construction cost estimating.

[Estimating – The Basics – ConstructIQ](#)

Contract Clause: What Is It? Examples | Contractscounsel

Website explaining what a contract clause is.

[Contract Clause: What Is It? Examples](#)

DesigningBuildings The Construction Wiki

Resource with articles on various topics in construction, such as JCT, NEC, procurement, construction disputes, cost control, and more.

[Designing Buildings Wiki](#)

Diffen

Website comparing deductive and inductive reasoning.

[Deductive vs Inductive - Difference and Comparison](#)

Duotax

Website comparing Bill of Quantities (BoQ) and Schedule of Rates (SoR) in construction.

[Bill Of Quantities Vs Schedule Of Rates | Duo Tax Quantity Surveyors](#)

Geeks for Geeks

Website explaining the difference between qualitative and quantitative data.

[Difference Between Qualitative & Quantitative Data](#)

Harper James

Website explaining the different methods used to resolve construction disputes.

[Construction dispute resolution | A step-by-step guide](#)

ICE (Institution of Civil Engineers)

Website offering guidance notes for understanding key procurement, commercial, and contracting principles.

[ICE Procurement Guidance Notes](#)

Website on Civil Engineering Standard Method of Measurement (CESMM).

[CESMM4 - Designing Buildings](#)

Indeed

Website explaining how to avoid common construction management risks.

[What are common construction management risks \(and how to avoid them\) | Indeed.com UK](#)

Lawbite

Website explaining boilerplate clauses in construction contracts.

[What is a boilerplate clause in a contract? | LawBite](#)

LinkedIn

Website discussing the impact of weather on construction projects and how to prepare for it.

[The Impact of Weather on Construction Projects and How to Prepare Your Team](#)

Legal Vision

Website explaining the elements of a legally binding agreement in the UK.

[Elements of a Legally Binding Contract | LegalVision](#)

Metroun Quantity Surveying YouTube Channel

Short videos explaining various aspects of construction contracts, including JCT, NEC4, advantages of JCT, and comparisons of JCT vs. NEC.

[JCT Contracts Explained](#)

[Advantages of JCT](#)

[NEC4 Contracts Explained](#)

[Advantages of NEC](#)

[JCT vs NEC Similarities and Differences](#)

Palmers Solicitors

Website introducing JCT and NEC standard form contracts.

[Why are standard form contracts used in construction? | Palmers Solicitors](#)

Pixel Plex

Website explaining 12 prominent use cases of construction data analytics.

[12 Examples of Using Data Analytics in Construction](#)

Procore

Website explaining construction cost estimating processes.

[Construction Cost Estimating: A Step-By-Step Guide | Procore CA](#)

Question Pro

Website explaining qualitative data analysis methods and examples.

[Qualitative Data Analysis: What is it, Methods + Examples](#)

Royal Institution of Chartered Surveyors

Industry tools, standards and guidance on topics such as the new rules of measurement, quantity surveying, valuation, dispute resolution

[Welcome to RICS](#)

ScienceDirect

Article on risk allocation in PPP/PFI construction projects in the UK.

[The allocation of risk in PPP/PFI construction projects in the UK - ScienceDirect](#)

Tenarys Law Solicitors

Website discussing common construction disputes, their causes, and solutions.

[Common Construction Disputes – Causes and Solutions](#)

The Constructor Building Ideas

Website discussing factors affecting the construction cost of a project.

[Factors Affecting Construction Cost of a Project – theconstructor.org](#)

The Construction Link Incorporated (TCLI)

Website explaining the potential risks in construction projects.

[25 key risks in construction projects | TCLI](#)

Top 4 Construction Procurement Routes Compared – YouTube Channel Metroun Quantity Surveying

Video explaining the different types of construction procurement routes.

[Top 4 Construction Procurement Routes Compared – YouTube Channel](#)

Travis Perkins

Website outlining eight standard types of construction contracts used in the UK.

[Construction Contracts: Main Types & Use Cases | Travis Perkins](#)

What is a Boilerplate Contract YouTube Channel – Lawyer Hub

Video explaining boilerplate contracts in construction.

[What is a Boilerplate Contract? – Lawyer Hub](#)

What is a Contract Clause? - Up Counsel

Website explaining what a contract clause is and its significance.

[Contract Clause: What Is It? Examples](#)

What is Procurement in Construction? – The Access Group

Website explaining procurement methods in the construction industry.

[What is Procurement In Construction? | The Access Group](#)

Writing Technique in the Construction Industry - Designing Buildings

Article on good writing techniques for the construction industry.

[Writing Technique in the Construction Industry - Designing Buildings](#)

YouTube Channel – Metroun Quantity Surveying

- [Provisional sums explained](#)
- [Bill of Quantities Explained](#)
- [Schedule of Rates \(SoR\) Explained](#)
- [Civil Engineering Standard Method of Measurement](#)

Textbooks

An official textbook has been created by Pearson to support this new qualification. However teachers who have copies of the previous version may use this to support teaching of this unit, due to the similarities of content to the 2017 BTEC National [BTEC Nationals Construction Student Book + Activebook](#)

Pearson paid resources also available

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

Unit 5: Retrofit in Construction and the Built Environment

Unit overview

Unit 5: Retrofit in Construction and the Built Environment	
Assessment type: Internal	
Learning Aim	Topics
A Examine retrofit solutions applied to buildings	A1 Assessment of the building and situation A2 Retrofit solutions A3 Potential issues of retrofit solutions A4 Suitability of retrofit solutions
B Propose retrofit solutions to an existing building to meet end user needs	B1 Planning and managing retrofit solutions B2 Legislation and safety
C Review retrofit solutions to meet end user needs	C1 Methods of communicating proposals and designs C2 Prioritising potential solutions C3 Methods of measuring actual benefits of proposed solution
Assessment overview This unit is Internal assessed through a Pearson-Set Assignment Brief (PASB). Pearson sets the assignment for the assessment of this unit. The PSAB will take approximately 9.5 hours to complete. The PSAB will be marked by centres and verified by Pearson. The PSAB will be valid for the lifetime of this qualification.	

Common student misconceptions

There are no common misconceptions for this unit

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., [IS-WC].

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
<p>A1 Assessment of the building and situation - Introduction</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Begin with a brief introduction to the RICS Level 1 Survey, highlighting its purpose, scope, and non-intrusive nature. Use visuals of survey tools and sample reports to spark interest. <p>Small group activity</p> <ul style="list-style-type: none"> ○ Have students work in groups of 3-8 to role-play as surveyors, using checklists to perform a mock visual inspection of a classroom or school building. Each group identifies potential “defects” (like a missing ceiling tile or cracked paint) and reports back. <p>Peer teaching</p> <ul style="list-style-type: none"> ○ Each group presents their findings to the class, discussing the types of issues noted and how a professional might record these in a Condition Report. Groups then exchange tips on effective surveying techniques and reporting. 	<p>RICS Home Survey Level 1 Sample Report Offers a sample Level 1 survey report, which can be used to illustrate the structure and content of such reports to students.</p> <p>https://www.rics.org/content/dam/rics/global/documents/standards/rhs_level_one_final.pdf</p>

<p>A1 Assessment of the building and situation – Location Information</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Introduce the importance of gathering location information when assessing a site for construction or development. ○ Explain key factors such as roof orientation, weather patterns, surroundings, conservation areas, and accessibility, using real-life examples (e.g., why south-facing roofs are ideal for solar panels). <p>Paired activity</p> <ul style="list-style-type: none"> ○ Provide students with maps or Google Earth images of a local area. ○ Ask them to assess the location's features, including roof orientations, nearby listed buildings, access points, and possible environmental impacts (e.g., wind or rainfall patterns). <p>Small group activity</p> <ul style="list-style-type: none"> ○ Have groups of 3-8 collaborate to create a summary report of their findings, explaining how each location feature might influence a construction or renovation project. Groups can present their analysis to the class for discussion. 	<p>GreenSpec – Passive Solar Design: Siting and Orientation This resource discusses optimal building orientation to maximise passive solar gain in the UK, recommending that the main orientation of a building should be within 30° of south to benefit from solar energy. https://www.greenspec.co.uk/building-design/solar-siting-orientation/</p> <p>Essex Design Guide – Solar Orientation This guide discusses the importance of building orientation for energy efficiency, advising on glazing-to-wall ratios and the placement of windows to optimise solar gain and minimise heat loss. https://www.essexdesignguide.co.uk/climate-change/solar-orientation/</p>
<p>A1 Assessment of the building and situation - building structure</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Start with an overview of construction types, explaining the differences between traditional and non-traditional construction, roof types (flat vs sloped), wall construction (solid vs cavity), floor types (solid vs suspended), and 	

	<p>structural elements like steel frames or timber trusses. Use visuals or diagrams of different constructions to illustrate.</p> <p>Small group activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-8 and assign each group a construction type (e.g., flat roof, cavity wall, suspended floor, steel frame, etc.). ○ Provide them with sample case studies or diagrams, and ask them to identify key features, advantages, disadvantages, and typical applications. <p>Project-based learning</p> <ul style="list-style-type: none"> ○ Each group creates a presentation or visual summary of their assigned construction type, including when and why it might be chosen in real-world projects (e.g., flat roofs for modern buildings, steel frames for high-rise structures). ○ Groups present their findings to the class, followed by a collaborative discussion comparing the suitability of each type for different scenarios. 	
<p>A1 Assessment of the building and situation - general description</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Begin by introducing the importance of a general property description in RICS Level 1 surveys. ○ Cover key aspects like observing the property's overall condition, identifying damage, signs of damp/rot, and structural issues. 	<p>Property Inspect - What is a Condition Report? Everything You Need to Know This article explains the purpose and content of a condition report, detailing how surveyors assess and document the general condition of a property, including the identification of defects and necessary repairs</p>

	<ul style="list-style-type: none"> ○ Use visual examples (photos of properties) to demonstrate these aspects, explaining how surveyors assess and record findings. <p>Small group activity</p> <ul style="list-style-type: none"> ○ Split students into groups of 3-8. Provide them with printed images or descriptions of hypothetical properties (e.g., one with damp patches, another with cracked walls). Ask each group to prepare a short general condition report for the property, identifying visible issues (e.g., water damage, structural cracks) and suggesting potential concerns. <p>Project-based learning</p> <ul style="list-style-type: none"> ○ Each group presents their condition report to the class, explaining their observations and reasoning. Facilitate a discussion about the possible causes of the identified issues (e.g., poor drainage causing damp) and how these would be documented in a Level 1 survey. 	<p>.https://propertyinspect.com/eu/blog/what-is-a-condition-report-everything-you-need-to-know/</p> <p>Select Building Inspections – Structural Damage Warning Signs This article outlines common warning signs of structural damage, such as cracks in walls and moisture-related issues, with accompanying images to aid identification. https://selectbuildinginspections.com.au/8-structural-damage-warning-signs-you-should-never-ignore/</p>
<p>A1 Assessment of the building and situation - existing services:</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Start with an introduction to the different types of heating systems commonly found in buildings (radiators, open fires, wood/coal burners, underfloor heating, storage heaters, boilers, and immersion heaters). Discuss how each system works, its typical applications, and the importance of assessing the condition and size of pipework. Use diagrams or images to illustrate each system. 	<p>BPEC – Understand and Apply Domestic Central Heating System Installation and Maintenance Techniques This comprehensive guide offers detailed information on the installation, maintenance, and decommissioning of various wet central heating systems in domestic settings. It covers system components, pipework considerations, and</p>

	<p>Small group activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-8 and provide each group with a case study or images of a property showing one type of heating system. ○ Ask the groups to identify the key features of the system, assess its condition (e.g., signs of wear or damage), and suggest potential issues or upgrades (e.g., pipework size or efficiency). <p>Project-based learning</p> <ul style="list-style-type: none"> ○ Groups create a visual poster or presentation summarising their findings. This should include an explanation of their assigned heating system, common issues (e.g., corrosion in radiators or outdated boilers), and recommendations for improvements. ○ Each group presents their work to the class, followed by a discussion on the pros and cons of each system in different contexts. 	<p>maintenance practices. https://bpec.org.uk/wp-content/uploads/2018/10/Section-8-%E2%80%93-Y6022888.pdf</p> <p>GLP HVAC Services – Types of Central Heating Systems in the UK This article provides an overview of different central heating systems commonly used in the UK, including wet systems, warm air systems, and storage heaters. It discusses the components and operation of each system, which can aid in understanding existing installations. https://www.gfps.co.uk/types-of-central-heating-systems-in-the-uk/</p>
<p>A1 Assessment of the building and situation - energy supply:</p>	<p>Individual activity</p> <ul style="list-style-type: none"> ○ Assign each student a type of energy supply (e.g., mains gas, off-grid, stored fuel, oil/gas/solid fuel). Provide a short introductory sheet or link to resources. Ask them to research how it works, typical applications, environmental impact, and potential advantages/disadvantages. 	

<p>A1 Assessment of the building and situation - taps and water outlets</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Introduce students to the key types of taps and water outlets commonly found in properties. Cover pillar taps, mixer taps, monobloc taps, lever taps, sensor taps, outdoor taps, and any specialised outlets (e.g., water softeners or filtration systems). Discuss their typical uses, materials, and common issues to look for (e.g., leaks, corrosion, poor water flow, or wear and tear). <p>Small group activity</p> <ul style="list-style-type: none"> ○ Provide each group with a diagram or photo set of different taps and water outlets. Ask them to identify the types and describe potential issues that could arise (e.g., rust on outdoor taps, leaking seals on mixer taps). Groups can annotate their images with their observations. 	<p>Water Regs UK – Top Ten Plumbing Problems Revealed This resource lists common plumbing issues in UK households, such as dripping taps and leaking pipes. It offers statistics and insights that can be useful for understanding the prevalence of certain problems during surveys. https://www.waterregsuk.co.uk/news/page/press-release/top_ten_plumbing_problems_revealed/</p> <p>WaterSafe – Common Plumbing Problems WaterSafe provides insights into common plumbing issues, including problems related to taps, such as dripping or leaking taps, and their potential causes. Understanding these common problems is crucial for identifying issues during a conditional survey. https://www.watersafe.org.uk/advice/common_plumbing_questions1/</p>
<p>A1 Assessment of the building and</p>	<p>Whole class teaching and learning:</p>	

situation - other information.	<ul style="list-style-type: none"> ○ Begin by explaining: ○ Assumptions: Discuss what assumptions are typically made in condition reports (e.g., inaccessible areas being in a similar condition to visible areas, services functioning as intended unless stated otherwise). Highlight their importance in framing the scope of the report. ○ EPC: Introduce the role of the Energy Performance Certificate in condition reporting, covering its purpose, what it evaluates (energy efficiency, environmental impact), and how it complements a surveyor’s findings. 	
A1 Assessment of the building and situation - research skills	<p>Group Activity – Evaluating Sources</p> <ul style="list-style-type: none"> ○ Provide a mix of sample sources (e.g., RICS report, blog, Wikipedia article) for students to assess based on authority, accuracy, relevance, and timeliness, then rank them from most to least reliable. <p>Individual Research Plan:</p> <ul style="list-style-type: none"> ○ Students create a plan for a chosen research question, outlining valid primary methods (e.g., interviews) and reliable secondary sources (e.g., textbooks, official publications), followed by a class discussion of their choices. 	
A1 Assessment of the building and	Introduction to Problem Analysis (Whole Class Teaching)	

<p>situation – Problem analysis</p>	<ul style="list-style-type: none"> ○ Introduce the concept of problem analysis in the context of construction (e.g., diagnosing structural issues, delays in projects, or cost overruns). ○ Provide an example, such as "A building has water ingress on the upper floor," and demonstrate how to: Gather facts (e.g., weather patterns, roof condition). Ask relevant questions (e.g., "Where is the ingress happening?"). Break the problem into components (e.g., roof design, drainage system). Reframe the problem as a question (e.g., "What improvements can prevent water ingress?"). <p>Student Project Setup</p> <ul style="list-style-type: none"> ○ Divide students into small groups (3–5 members) and assign each group a real-world construction-related problem to analyse. Example problems include Persistent damp in a ground-floor property or Cracks in a residential building's walls or high energy costs for a commercial building. ○ Each group must: ○ Fact-Find: Use available data (e.g., diagrams, case studies, or sample reports) to gather as much relevant information as possible about the problem. ○ Informed Questioning: Develop a list of specific, informed questions to understand the problem's scope and impact (e.g., "Is the damp caused by rising groundwater or leaking pipes?"). ○ Break Down the Problem: Identify and outline the problem's components (e.g., materials, processes, environmental factors). 	
-------------------------------------	---	--

	<ul style="list-style-type: none"> ○ Reframe as Questions: Convert each component into actionable questions (e.g., "How can we improve drainage to address rising groundwater?"). ○ Each group creates a presentation or report with: ○ A description of the problem. ○ Key facts gathered during their research. ○ A list of informed questions they asked. ○ A breakdown of the problem into components. ○ Reframed problem questions and possible next steps. <p>Presentations and Class Discussion</p> <ul style="list-style-type: none"> ○ Groups present their analysis to the class. ○ Facilitate a discussion, encouraging peers to critique and refine the reframed questions or suggest additional components to consider. 	
<p>A2 Retrofit solutions – Fabric solutions - Floors</p>	<p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Students work in groups to explore retrofit techniques for solid floor insulation, suspended floor insulation, and floor coverings. Each group identifies suitable materials, installation steps, and common challenges. ○ Groups present their findings to the class, highlighting best practices and discussing the impact on meeting UK standards. <p>Individual Design Plan</p> <ul style="list-style-type: none"> ○ Students select one floor type and develop a short strategy for retrofitting it in an older building, focusing on 	<p>Hertfordshire Climate Change and Sustainability Partnership – Retrofitting Your House Guide This guide offers practical advice tailored to residents, covering a range of retrofitting options from low-cost solutions to comprehensive retrofits. It includes sections on floor insulation and can serve as a useful resource for students.</p> <p>https://www.hccsp.org.uk/media/documents/hccsp-retrofitting-your-house-guide.pdf</p>

	<p>materials, compliance with UK standards, and cost considerations.</p> <ul style="list-style-type: none"> ○ Submit plans for peer review or class discussion. 	<p>Designs in Detail – Insulating Suspended Timber Floors: An Architect's Comprehensive Retrofit Guide</p> <p>This comprehensive guide explores best practices for insulating existing suspended timber floors. It covers benefits, construction details, insulation materials, and methods, providing a thorough understanding of the retrofit process.</p> <p>https://www.designsindetail.com/articles/insulating-suspended-timber-floors-an-architects-comprehensive-retrofit-guide</p>
<p>A2 Retrofit solutions – Fabric solutions - Walls</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Start by introducing the different types of wall insulation for retrofitting buildings. Discuss cavity walls and their insulation techniques (blown fibres, polystyrene beads, injected foam), solid walls with external and internal insulation solutions, and cladding materials and their properties. Use diagrams or sample materials to demonstrate how each insulation type works and highlight key considerations, such as moisture control and energy efficiency improvements. <p>Small group activity</p>	<p>GreenSpec – Housing Retrofit: Solid Wall Insulation: Internal Lining</p> <p>GreenSpec provides detailed illustrations and guidance on internal wall insulation methods for solid walls. It emphasises the importance of material selection and proper installation to ensure thermal efficiency and moisture control.</p> <p>https://www.greenspec.co.uk/building-design/internal-insulation/</p>

	<ul style="list-style-type: none"> ○ Divide students into groups of 3-4 and provide each group with case studies or images showing a wall type and possible insulation methods. Groups identify the wall type, assess potential insulation solutions, and discuss issues or considerations, such as thermal bridging, cost-effectiveness, moisture control or material compatibility. ○ Groups create a visual presentation or poster summarising their wall type and chosen insulation method, detailing benefits, challenges, and recommendations for retrofitting. Presentations should include examples of practical applications and a discussion of how insulation affects energy performance. Groups present to the class, followed by a discussion comparing different solutions and when they are most appropriate. 	
<p>A2 Retrofit solutions – Fabric solutions - Roofs</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to the key types of roofs commonly found in properties: pitched roofs and flat roofs. Use diagrams or images to illustrate each roof type and the associated retrofitting solutions. ○ For pitched roofs, discuss common retrofitting solutions such as: <ul style="list-style-type: none"> ○ Insulation Enhancements: Improving thermal performance by adding insulation between rafters or in the loft space. 	<p>Retrofit Room in Roof Insulation: Guide to Best Practice</p> <p>This guide provides best practices for designers, surveyors, project managers, and installers considering internal thermal upgrades for roofs. It covers assessing the viability of insulation systems, selecting appropriate materials, and safe installation methods.</p> <p>https://www.gov.uk/government/publi</p>

	<ul style="list-style-type: none"> ○ Ventilation Improvements: Installing or upgrading ventilation systems to prevent moisture buildup and condensation. ○ Roof Covering Upgrades: Replacing or overlaying existing materials with more durable or energy-efficient options. ○ For flat roofs, cover retrofitting solutions, including: <ul style="list-style-type: none"> ○ Warm Roof Construction: Adding insulation above the roof deck and beneath the waterproof membrane to create a 'warm' roof. ○ Cold Roof Construction: Placing insulation below the roof deck, ensuring adequate ventilation to prevent condensation. ○ Green Roof Implementation: Installing vegetative layers to improve insulation and manage stormwater. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide the class into groups of 3 - 4 and provide each group with a set of diagrams or photographs depicting different roof types and conditions. ○ Ask them to identify the roof type (pitched or flat) and assess potential issues that could arise (e.g., inadequate insulation, poor drainage, material degradation). ○ Get the groups to produce an annotated poster to suggest appropriate retrofitting solutions to address the identified issues for their assigned roof. 	<p>cations/room-in-roof-insulation-rii-best-practice</p>
--	---	--

<p>A2 Retrofit solutions – Fabric solutions - Windows/doors</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to common frame materials used in windows and doors, including wood, uPVC (Unplasticised polyvinyl chloride), aluminium, and composite materials. Discuss each material's typical uses, benefits, and drawbacks, such as thermal efficiency, durability, maintenance requirements, and cost. ○ Introduce students to key retrofitting techniques for windows and doors, including upgrading frame materials, enhancing glazing options, implementing draught-proofing methods, and considering the use of automatic and revolving doors to improve energy efficiency and functionality. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-4, providing each group with diagrams or photographs of various existing window and door installations. ○ Instruct them to identify potential retrofitting opportunities, annotate their images with observations and suggested measures, and prepare to present their findings and recommendations to the class. 	<p>GreenSpec – Energy Efficient Windows</p> <p>GreenSpec provides an overview of energy-efficient window options suitable for retrofitting projects. The resource covers aspects such as window materials, glazing types, and performance criteria, offering guidance on selecting windows that enhance thermal performance and sustainability in buildings.</p> <p>https://www.greenspec.co.uk/building-design/energy-efficient-windows/</p> <p>Energy Saving Trust – Windows and Doors</p> <p>The Energy Saving Trust offers comprehensive advice on energy-efficient glazing, including double and triple glazing options. The resource discusses the benefits of upgrading windows and doors, such as reduced energy bills, decreased carbon footprint, and improved home comfort. It also provides guidance on choosing the right products and installation practices.</p> <p>https://energysavingtrust.org.uk/advice/windows-and-doors/</p>
---	--	--

<p>A2 Retrofit solutions - Renewable and low carbon energy production.</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to various renewable energy sources, such as solar, wind, hydro, geothermal, and biomass, as well as low-carbon energy options like nuclear power. Discuss the basic principles of how each energy source generates power and their roles in reducing greenhouse gas emissions. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-4. Assign each group a specific energy source to research. Provide them with diagrams or case studies related to their assigned energy source. Ask groups to identify the advantages and challenges associated with their energy source, including factors like efficiency, environmental impact, and feasibility. Groups should prepare a brief presentation summarising their findings. 	<p>Royal Academy of Engineering - Renewable Energy Resources</p> <p>This resource reviews the need for renewable energy as an alternative to fossil fuels. It helps students consider the advantages and disadvantages of each form of renewable energy and how they might contribute to powering the UK.</p> <p>https://raeng.org.uk/education-and-skills/further-education/further-education-resources/fe-resources/renewable-energy/practitioner-and-learner-resources</p>
<p>A2 Retrofit solutions - Heating - heat pumps</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to the concept of heat pumps as energy-efficient heating systems that transfer heat from external sources into buildings. Discuss the three main types, air source, ground source, and water source heat pumps, and explain their basic operating principles, applications, and restrictions on their use. <p>Small Group Activity.</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-4 and assign each group one type of heat pump (air source, ground source, or 	<p>Heat Pump Association - Case Studies</p> <p>The Heat Pump Association provides case studies highlighting various heat pump retrofit projects across the UK. These examples illustrate the practical considerations and benefits of implementing heat pump technology in existing buildings.</p> <p>https://www.heatpumps.org.uk/category/case-study/</p>

	<p>water source). Provide diagrams or case studies related to their assigned type. Ask groups to identify the advantages and challenges associated with their heat pump type, including factors like efficiency, environmental impact, installation considerations, and suitability for different climates. Groups should prepare a brief presentation summarising their findings.</p>	
<p>A2 Retrofit solutions - Heating - solar</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to the two primary solar energy technologies: photovoltaic (PV) systems, which convert sunlight directly into electricity, and solar thermal systems, which capture solar energy to produce heat. ○ Discuss the basic principles, typical applications, and the role of each technology in renewable energy production. <p>Project-Based Learning</p> <ul style="list-style-type: none"> ○ In small groups, students will develop proposals for implementing an assigned solar technology in a specific building or community setting. ○ Each proposal should assess the energy needs of the chosen setting, provide a detailed integration plan considering local climate, available space, and orientation, analyse potential benefits such as energy savings, cost implications, and environmental impact, and address potential challenges with proposed solutions. Groups will present their proposals to the class, followed by a discussion on the feasibility and sustainability of each plan. 	<p>Solar Photovoltaic vs. Solar Thermal: Understanding the Differences</p> <p>This article explains the core differences between photovoltaic and solar thermal systems, including their working principles and typical applications.</p> <p>https://blog.ecoflow.com/us/solar-photovoltaic-vs-solar-thermal/</p>

<p>A2 Retrofit solutions – Heating</p>	<p>Project-Based Learning</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and present the groups with different scenarios. ○ Ask the students to explore advanced heating solutions by developing proposals for integrating electric boilers, hybrid systems, or district and community heat networks into specific building or community settings. ○ Each group will assess the energy requirements of their given setting, design a detailed integration plan considering factors such as local climate, infrastructure, and energy sources, analyse the potential benefits, including energy efficiency, cost savings, and environmental impact, and identify potential challenges along with strategies to overcome them. ○ The groups will then present their proposals to the class, followed by a discussion evaluating the feasibility and sustainability of each plan. 	<p>Boiler Guide – District Heating Networks Explained This article explains the concept of district heating systems, detailing how centrally generated heat is distributed to residential and commercial buildings in the UK. It covers the benefits and considerations of such networks. https://www.boilerguide.co.uk/heating/district</p> <p>Guidehouse – Hybrid Heating in Great Britain This paper outlines the role of hybrid heating systems in decarbonising buildings across Great Britain. It offers data and insights into the benefits of these systems for consumers, the energy network, and the environment. https://guidehouse.com/-/media/www/site/insights/energy/2021/hybrid-heating-great-britain_november-2021.pdf</p>
<p>A2 Retrofit solutions - Control and monitoring:</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to various advanced control systems used in building retrofits, including smart thermostats, zoned heating systems, PIR sensors, and smart meters. Discuss how these technologies contribute to energy 	<p>Barriers and Benefits of Home Energy Controller Integration -This report discusses the advantages and challenges associated with integrating home energy controllers, including the use of PIR sensors and zoned heating</p>

	<p>efficiency by optimising heating, lighting, and overall energy consumption.</p> <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide students into small groups and assign each group a case study focusing on the implementation of one of the control systems in an existing building. ○ Provide resources such as diagrams, articles, or project summaries. ○ Each group should analyse their case study to identify the specific technology implemented and its role in the building's energy management, the challenges faced during the retrofit process and how they were addressed and the outcomes in terms of energy savings, cost implications, and occupant comfort. ○ The groups will present their findings to the class, highlighting key takeaways and lessons learned. 	<p>controls.</p> <p>https://assets.publishing.service.gov.uk/media/5a801c90ed915d74e622c88c/D/ECC_Barriers_and_Benefits_of_Home_Energy_Controllers_-_Final_report_1.pdf</p>
<p>A2 Retrofit solutions - Energy production and storage.</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce students to the concept of retrofitting existing structures with renewable energy technologies such as solar panels and wind turbines, as well as energy storage solutions like batteries, power converters, and thermal energy stores. ○ Discuss the benefits of these retrofits, including reduced energy costs and environmental impact, as well as potential challenges such as structural limitations and initial investment costs. <p>Project Based Learning</p>	<p>Battery Storage and Solar Photovoltaics Guide</p> <p>This guide addresses common misconceptions in domestic retrofitting concerning battery storage and solar PV systems. It provides practical advice for integrating these technologies into existing homes.</p> <p>https://riseretrofit.org.uk/resources/toolkits/battery-storage-and-solar-photovoltaics-</p>

	<ul style="list-style-type: none"> ○ Instruct students to evaluate their own homes or a selected building, focusing on current energy consumption and identifying opportunities for integrating renewable energy production and storage solutions. ○ Direct students to consider factors such as the feasibility of installing solar panels or small wind turbines, the potential for battery storage systems, the need for power converters, and the applicability of thermal energy storage. ○ They should assess local climate, building orientation, available space, and existing energy infrastructure. ○ Require students to compile a report detailing their findings, proposed retrofitting measures, anticipated benefits in terms of energy efficiency and cost savings, and any challenges or limitations identified during the evaluation. 	<p>Electrical Energy Storage Systems in Historic Buildings</p> <p>Historic England offers guidance on the types of electrical energy storage systems suitable for historic buildings, covering design considerations and maintenance requirements.</p> <p>https://historicengland.org.uk/advice/technical-advice/building-services-engineering/electrical-energy-storage-systems/</p>
<p>A2 Retrofit solutions - Ventilation</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Begin by discussing the importance of ventilation in maintaining indoor air quality and energy efficiency. Explain how retrofitting existing buildings can address issues like condensation, dampness, and heat loss. ○ Introduce the concept of airtightness and its role in preventing uncontrolled airflow, which can lead to energy loss and moisture problems. Discuss common methods to improve airtightness, such as sealing gaps around windows and doors, and ensuring proper insulation. ○ Explain passive ventilation techniques that utilise natural airflows to ventilate spaces without mechanical 	<p>Partel – How to Retrofit a Ventilation System: Best Practices for Healthier, Energy-Efficient Homes - This article discusses best practices for retrofitting ventilation systems, covering both basic upgrades and comprehensive mechanical heat recovery installations.</p> <p>https://www.partel.ie/blog/how-to-retrofit-a-ventilation-system-best-practices-for-healthier-energy-efficient-homes/</p>

	<p>assistance. Discuss design strategies like strategically placed vents and windows to facilitate cross-ventilation.</p> <ul style="list-style-type: none"> ○ Describe Positive Input Ventilation (PIV) systems, which introduce fresh air into the building, creating positive pressure that pushes out stale air through vents and gaps. Highlight the benefits of PIV, including reduced condensation and improved air quality. ○ Discuss heat recovery ventilation (HRV) systems that extract heat from outgoing stale air to warm incoming fresh air, thereby conserving energy. Explain the components and operation of HRV systems. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide students into small groups and provide each group with relevant resources such as diagrams, articles, or project summaries. ○ Each group should identify the specific ventilation improvements implemented, challenges encountered during the retrofit process and their solutions, and the outcomes in terms of improved air quality, energy efficiency, and occupant comfort. ○ After their analysis, groups will present their findings to the class, highlighting key takeaways and lessons learned. 	<p>Homebuilding & Renovating - Positive Input Ventilation Explained</p> <p>- This article offers an in-depth explanation of Positive Input Ventilation systems, discussing their benefits, potential drawbacks, and considerations for installation.</p> <p>https://www.homebuilding.co.uk/advice/positive-input-ventilation</p>
<p>A2 Retrofit solutions - Reducing consumption -Water</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Begin by discussing the importance of water conservation, highlighting its environmental and economic benefits. Emphasise the role of efficient water usage in sustainable building practices. 	<p>Waterwise – Save Water - This resource offers practical advice on various water-saving devices and practices, including dual flush toilets and aerating outlets.</p>

	<ul style="list-style-type: none"> ○ Explain how dual flush toilets operate, offering two flushing options—low volume for liquid waste and higher volume for solid waste. Note that traditional single-flush toilets can use up to 13 litres per flush, whereas dual flush systems typically use between 4 to 6 litres, significantly reducing water consumption ○ Describe aerating outlets, such as faucet aerators, which mix air with water to maintain adequate water flow while reducing overall usage. ○ Discuss using electronic sensors in taps and urinals that activate water flow only when needed, thereby minimising waste. Highlight their application in public and commercial settings to enhance hygiene and efficiency. ○ Introduce the concept of collecting and storing rainwater for non-potable uses, such as toilet flushing and garden irrigation. Emphasize that rainwater harvesting can significantly reduce the demand on mains water supply. ○ Explain how greywater—wastewater from baths, showers, and sinks—can be treated and reused for purposes like toilet flushing and irrigation. This practice can further decrease potable water consumption in buildings. <p>Student group activity</p> <ul style="list-style-type: none"> ○ Divide students into small groups and assign each group a case study of a building that has implemented one or more water-saving technologies. Provide resources such as diagrams, articles, or project summaries. Each group should analyse their case study to identify the specific 	<p>https://www.waterwise.org.uk/save-water</p> <p>Rainwater and Greywater in Buildings: Project Report and Case Studies</p> <p>This comprehensive report by Waterwise presents detailed case studies on the implementation of rainwater and greywater systems in UK buildings, highlighting the water conservation measures adopted, challenges faced during implementation, and the outcomes achieved.</p> <p>https://www.waterwise.org.uk/wp-content/uploads/2018/02/Brewer-et-al.-2001_Rainwater-and-Greywater-in-Buildings_Project-and-Case-Studies.pdf</p>
--	--	---

	<p>water conservation measures implemented, challenges encountered during implementation and how they were addressed, and outcomes in terms of water savings, cost implications, and user satisfaction.</p> <ul style="list-style-type: none"> ○ After completing their analysis, groups will present their findings to the class, highlighting key takeaways and lessons learned. This activity will enhance students' understanding of practical applications of water-saving technologies and the considerations involved in their implementation. 	
<p>A2 Retrofit solutions - Reducing consumption - Reduce rainwater run-off</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain that rainwater runoff in cities can cause problems like flooding and pollution because hard surfaces prevent water from soaking into the ground. Introduce solutions such as permeable materials, which let water pass through, and rain gardens—planted areas that capture and filter rainwater. ○ Discuss how these methods help reduce runoff and improve water quality. Encourage students to think about how they can apply these ideas in their own communities to manage rainwater more effectively. <p>Small Group Activity</p> <ul style="list-style-type: none"> ○ Divide students into small groups and assign each group a case study of a building that has implemented water-saving technologies. ○ Provide resources such as diagrams, articles, or project summaries. 	<p>Susdrain – Case Studies - Susdrain offers a range of case studies showcasing successful implementations of sustainable drainage systems (SuDS), including permeable surfaces and green roofs, across the UK. https://www.susdrain.org/case-studies</p> <p>Royal Horticultural Society (RHS) – Rain Gardens. The RHS provides guidance on creating rain gardens, including design considerations, plant selection, and maintenance tips. https://www.rhs.org.uk/garden-features/rain-gardens</p> <p>Green Roof Organisation (GRO): The GRO offers resources on the design, implementation, and benefits of green roofs in the UK, including</p>

	<ul style="list-style-type: none"> ○ Each group should analyse their case study to identify the specific water conservation measures implemented, challenges encountered during implementation and how they were addressed, and outcomes in terms of water savings, cost implications, and user satisfaction. Groups will then present their findings to the class, highlighting key takeaways and lessons learned. 	<p>technical guidance and case studies. https://greenrooforganisation.org/</p>
<p>A2 Retrofit solutions - Reducing consumption - Lighting</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Introduce the concept of energy-efficient lighting, covering LED bulbs, smart lighting systems, and the benefits of natural lighting methods. Use diagrams and videos to show how roof lights and solar tunnels work. <p>Project-based learning</p> <ul style="list-style-type: none"> ○ Students work on a project where they create a lighting design plan for a small building. ○ They will consider energy-efficient technologies, natural light sources, and cost-benefit analysis. ○ At the end of the project, they will present their designs and recommendations. 	<p>Energy Saving Trust – Energy-efficient lighting This guide provides comprehensive information on the benefits of energy-efficient lighting, including the use of LED bulbs and smart lighting systems. It offers practical advice on selecting and installing these technologies to reduce energy consumption. https://energysavingtrust.org.uk/advice/lighting</p> <p>Thorlux Lighting – Retrofit Solutions Thorlux Lighting provides comprehensive retrofitting services to upgrade existing lighting systems to energy-efficient LED technology. Their solutions aim to balance environmental benefits with aesthetic and economic considerations. https://www.thorlux.com/sustainability/retrofit-solutions</p>

<p>A3 Potential issues of retrofit solutions - Damp and mould issues due to installation of insulation</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain what interstitial condensation is and how the placement of insulation can cause this. ○ Explain the impact of the problem to the structure of the fabric and the impact on the insulation ○ Cover preventive measures, emphasising the role of breathable materials and the importance of ongoing monitoring post-installation. 	<p>Grant Insulation - This page provides a detailed overview of the risks of condensation associated with internal wall insulation, focusing on how interstitial condensation can occur if moisture becomes trapped within the wall structure. https://grantinsulation.co.uk/wall-insulation/internal/condensation-risks-and-solutions-with-internal-insulation/</p> <p>Essex Design Guide This guide outlines key risks associated with retrofitting, emphasizing the importance of considering factors like thermal bridging, moisture control, and the integrity of existing structures. It provides insights into best practices to mitigate these risks. https://www.essexdesignguide.co.uk/climate-change/climate-change-and-the-historic-environment/key-risks-of-retrofitting</p>
<p>A3 Potential issues of retrofit solutions - Proposed improvements</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Begin with an overview of common retrofit upgrades like heat pumps, improved insulation, or upgraded plumbing. 	<p>Integrity Energy This piece outlines the top five challenges in retrofitting older government buildings, such as</p>

<p>compatible with existing services</p>	<p>Explain how these upgrades interact with existing services such as hot water cylinders, radiators, and ventilation systems.</p> <ul style="list-style-type: none"> ○ Use real-world examples to highlight compatibility issues (e.g., undersized radiators in a heat pump retrofit leading to insufficient heating). <p>Small group activity</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and provide each group with a case study of a retrofitted building and information about its existing services. ○ Ask them to identify potential compatibility challenges and suggest solutions, such as resizing radiators, upgrading pipework, or adding buffer tanks. 	<p>structural and architectural constraints, outdated building systems, and compliance with regulations. It provides insights into overcoming these hurdles through strategic planning and modernization efforts.</p> <p>https://www.integrityenergy.com/blog/top-5-challenges-and-solutions-for-retrofitting-older-government-buildings/</p>
<p>A3 Potential issues of retrofit solutions - Installing new components without fixing existing issues</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Discuss the risks of installing new components without addressing existing issues, such as weathering damage, rot, leaks, and thermal bridging. ○ Highlight specific problems like blocked cavity walls, incorrectly sized or poorly maintained heating systems, and the long-term effects on energy efficiency and building performance. Use visuals showing examples of damage and incorrect installations. <p>Project-based learning</p> <ul style="list-style-type: none"> ○ Provide students with a hypothetical building and ask them to develop a retrofit plan for a building with several existing issues. Their plan should outline how they would address the problems (e.g., repairing damaged materials, unblocking cavities, fixing leaks) before proceeding with new installations. 	

	<ul style="list-style-type: none"> ○ Groups will present their solutions and justify their approach. 	
<p>A3 Potential issues of retrofit solutions - Removal of existing components that have become obsolete</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Introduce students to the concept of obsolete components, such as unused flues, outdated service supplies, and redundant pipework. ○ Explain how these elements, if not properly removed, can lead to space inefficiencies, safety hazards, or interference with new systems. ○ Use examples where failure to remove such components caused issues during or after a retrofit. <p>Small group activity</p> <ul style="list-style-type: none"> ○ Provide each group with a building layout highlighting obsolete components (e.g., old flues, disconnected pipework). ○ Have them identify potential risks if these components are left in place and suggest proper removal methods or alternatives to repurpose the space safely. 	
<p>A3 Potential issues of retrofit solutions - Structural considerations</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> ○ Discuss key structural aspects to check before retrofitting, such as ensuring the roof structure is strong enough to support solar panels, identifying suitable locations for storage or buffer tanks, and verifying the integrity of lintels above windows and doors. ○ Use diagrams and examples of retrofits where structural issues were either successfully addressed or caused problems. 	

	<p>Small group activity</p> <ul style="list-style-type: none"> ○ Provide groups with floor plans or cross-sections of a building. ○ Assign each group one aspect to investigate (roof structure, buffer tank location, or lintels). ○ Have them assess potential risks or challenges and suggest solutions (e.g., reinforcing the roof, relocating heavy tanks). 	
<p>A4 Suitability of retrofit solutions - Consideration of whole building and deep retrofitting</p>	<p>Small-group Activity - Whole Building and Deep Retrofitting</p> <ul style="list-style-type: none"> ○ Ask the students to conduct a simulated evaluation of a building's retrofit potential by considering spatial and orientation constraints and survey outcomes. ○ The evaluation should include survey data on structural conditions, thermal performance, moisture risks, and air leakage points. ○ Get the groups to analyse the survey findings then and identify appropriate deep retrofit techniques, such as insulation upgrades, renewable energy systems, and ventilation improvements. ○ They will discuss how spatial constraints (e.g., room sizes, narrow pathways) and building orientation (e.g., sunlight exposure) influence their decisions. ○ Groups will create a presentation detailing their selected deep retrofit techniques, explaining how they fit the spatial and orientation constraints while addressing issues identified in the survey. 	

<p>A4 Suitability of retrofit solutions - End user requirements</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce, through a short presentation, using real-world examples of how different end users require different retrofit solutions. Cover the following key end-user categories, i.e. Housing, Office space, Healthcare, Education, Leisure, Retail and Manufacturing.[SP-PS] ○ Ensure that the key differences in retrofit requirements for each type of end-user are explained, focusing on factors such as comfort and functionality, energy efficiency and sustainability, health and safety, etc. <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and assign each group a specific building type. ○ Get the groups to analyse and identify appropriate retrofit techniques tailored to their building type, considering key user needs such as comfort, accessibility, energy efficiency, air quality, and functionality. ○ The group will present a poster highlighting how their chosen techniques address the specific needs of their assigned end user. 	
<p>A4 Suitability of retrofit solutions - Costs</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce the key cost components of retrofitting through a short presentation covering purchase, installation, operating, return on investment, budgetary, and maintenance requirements. ○ Use examples (e.g., insulating a home vs installing a solar panel system) to show how different retrofit techniques can vary in costs and return on investment. Provide a 	<p>Birmingham City Council Guidance Toolkit on Building Retrofit - Published by Birmingham City Council, this toolkit serves as a useful reference for understanding potential expenses associated with various retrofit measures, including insulation</p>

	<p>simple comparison table highlighting how purchase and installation costs influence long-term benefits.</p> <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Ask each group to analyse a retrofit case study (e.g., a residential or commercial building). Provide them with key details on different retrofit options (e.g., insulation, HVAC upgrades, or renewable systems) and their associated costs. ○ The groups will calculate and discuss Initial purchase and installation costs, Estimated operating savings and maintenance costs, Return on investment and potential payback periods and budgetary constraints and recommendations. ○ Get the groups to create a brief presentation summarising their cost analysis and recommendations for which retrofit techniques best balance initial investment and long-term benefits. 	<p>upgrades, heating systems, and renewable energy options.</p> <p>https://www.birmingham.gov.uk/download/downloads/id/29130/guidance_to_olkit_on_building_retrofit.pdf</p> <p>Harvard Business School Online •</p> <p>This resource explains how to calculate Return on Investment (ROI) with practical examples. It guides readers through determining net profit, calculating ROI, and interpreting the results to make informed investment decisions.</p> <p>https://online.hbs.edu/blog/post/how-to-calculate-roi-for-a-project</p>
<p>A4 Suitability of retrofit solutions - Other requirements</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Introduce key retrofit considerations by explaining how complexity of use influences the design and selection of techniques based on the building's purpose, human comfort ensures optimal thermal, air, and noise conditions, social need addresses issues like fuel poverty and accessibility, and aesthetics preserves or enhances the building's appearance, especially in heritage or public spaces. 	<p>Retrofit West – Case Studies</p> <p>A collection of diverse retrofit case studies showcasing various building types and retrofit approaches in the UK. These case studies provide insights into project challenges, solutions, and outcomes, highlighting considerations such as complexity of use, human comfort, social needs, and aesthetics.</p> <p>https://www.retrofitwest.co.uk/case-studies/</p>

	<ul style="list-style-type: none"> ○ Provide examples such as retrofitting a heritage building while maintaining its character or upgrading housing to lower energy costs and improve air quality. ○ Engage students by presenting different building scenarios, such as schools, hospitals, or retail spaces, and encourage them to discuss how these requirements would influence retrofit decisions, highlighting potential challenges and solutions. <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Split the class into small groups, give a retrofit scenario and get each group to evaluate a retrofit project scenario, such as retrofitting a public library, hospital ward, or community housing block. Provide key details on the building's function, user needs, and constraints for their analysis. ○ Get the groups to assess how to address the complexity of use (multi-purpose spaces), human comfort (thermal, visual, and acoustic needs), social need (fuel poverty or community well-being), and aesthetics (maintaining or enhancing appearance). They will create a brief presentation summarising their recommendations and how these requirements influence retrofit choices, promoting critical thinking and collaboration. 	
<p>B1 Planning and managing retrofit solutions - Program of work. • Use of Gantt charts, bar</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Provide an overview of Gantt charts as a key project scheduling tool in construction. ○ Explain the purpose of bar charts to represent tasks and durations, how linked bar charts show task 	<p>TeamGantt: What Is a Gantt Chart? A Practical Guide for Project Managers - This comprehensive guide explains the structure of Gantt charts, detailing elements like task lists,</p>

<p>charts, linked bar charts.</p>	<p>dependencies, and the role of the critical path in identifying the minimum project completion time. Emphasise why managing dependencies is essential to prevent delays.</p> <ul style="list-style-type: none"> ○ Walk through the creation of a simple Gantt chart using a basic construction project, such as building a garden shed. Include key tasks like laying the foundation, building the frame, and installing the roof. ○ Show how to link tasks that depend on each other and highlight the critical path by identifying tasks with no flexibility (float/slack). This demonstration will lay the foundation for students to create their own Gantt charts in the small-group activity. <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Split the students small groups to discuss examples of project schedules they have encountered, such as school projects or home tasks. ○ Guide them to identify how tasks often depend on one another and what happens when delays occur. ○ Provide a simple project example (e.g., building a garden shed) and list key tasks such as laying the foundation, building the frame, and installing the roof. Instruct students to identify the order of tasks and any dependencies. Guide them to collaboratively suggest which tasks might be on the critical path and explain why, setting the stage for creating a full Gantt chart in the next activity. 	<p>timelines, bars, milestones, dependencies, and progress indicators. It also discusses how to use Gantt charts for scheduling, tracking, and communicating project plans.</p> <p>https://www.teamgantt.com/what-is-a-gantt-chart</p> <p>YouTube: How to Make a Basic Gantt Chart in Microsoft Excel - This video tutorial demonstrates the process of creating a basic Gantt chart in Excel, making it easier for visual learners to follow along and implement the steps.</p> <p>https://www.youtube.com/watch?v=oD50HSBBBI</p>
-----------------------------------	---	--

<p>B1 Planning and managing retrofit solutions - Safe systems of work – method statements</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain the purpose of method statements in ensuring safe systems of work and preventing accidents on construction sites. ○ Discuss how they complement risk assessments by outlining safe work procedures. <p>Individual Activity</p> <ul style="list-style-type: none"> ○ Assign an individual task where students create their own method statement for a specific construction activity (e.g., installing scaffolding or trench excavation). Provide a template or guide if needed. ○ Ask students to include project details, hazards, control measures, and emergency procedures. 	<p>Health and Safety Executive (HSE): Administration - The HSE provides guidance on method statements, explaining their role in controlling specific health and safety risks in construction. It discusses how method statements complement risk assessments by detailing safe systems of work for higher-risk activities. https://www.hse.gov.uk/construction/safetytopics/admin.htm</p>
<p>B1 Planning and managing retrofit solutions - Sequencing of tasks</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Provide an overview of key construction methods used in retrofitting projects, discussing the importance of logical sequencing. ○ Discuss how construction delays can result from incorrect task sequencing. ○ Give examples of typical task dependencies in retrofitting (e.g., ensuring wall insulation is complete before installing windows or panels). <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Divide students into groups of 3-5. Provide each group with a set of task cards listing key activities for the retrofit project (e.g., scaffold installation, insulation installation, window replacement, solar panel mounting). Ask them to 	<p>Travis Perkins: A Guide to Construction Planning and Scheduling -This guide provides an overview of construction project planning and scheduling, emphasizing the importance of logical sequencing. It discusses how improper task sequencing can lead to delays and increased costs, and offers examples of typical task dependencies in construction projects. https://www.travisperkins.co.uk/content/construction-planning-and-scheduling</p>

	<p>arrange the cards in the correct order of precedence based on construction dependencies.</p> <ul style="list-style-type: none"> ○ Each group presents their task sequence to the class, explaining the logic behind their choices. The teacher reviews their choices and provides feedback, highlighting any errors or improvements. <p>[SP-PS]</p>	
<p>C1 Methods of communicating proposals and designs - Communicating information:</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Provide an overview of how effective communication is essential to construction projects, particularly in proposals used to convey project details, schedules, budgets, and safety considerations. ○ Explain the importance of correct grammar, spelling, punctuation, and precise technical language. Use examples of common errors and corrections to demonstrate how small mistakes can alter meaning or reduce professionalism. ○ Discuss the role of tone, highlighting that proposals should be formal and factual, avoiding informal language, slang, or excessive jargon. Provide examples of sentences with informal or overly technical language and their formal alternatives. ○ Discuss audience adaptation: Explain how to tailor communication depending on the recipient (e.g., clients, contractors, suppliers). <p>Whole-class and Individual Activity</p>	<p>OpenAsset: How to Write a Construction Proposal - OpenAsset provides a guide on crafting compelling construction proposals, including essential elements to include and a free construction bid template. This resource can help students understand the acceptable formats and structures for proposals. - https://openasset.com/blog/constructi-on-proposal/</p> <p>University of York: Academic Language – Formal Language - This guide from the University of York discusses the characteristics of formal language in academic writing. It provides examples of informal expressions and their formal equivalents, helping students understand how to transform informal language into a formal academic style.</p>

	<ul style="list-style-type: none"> ○ Provide students with a sample proposal containing sections that demonstrate poor communication practices (e.g., incorrect grammar, overly technical language, or an inappropriate tone). ○ As a class, identify the issues within the text and discuss possible corrections. ○ Individually, ask students to rewrite specific sections, improving grammar, punctuation, and tone while adapting the content to a given audience (e.g., a project manager, a supplier, or a non-technical client). <p>[SP-PS]</p>	<p>https://subjectguides.york.ac.uk/academic-language/formal</p>
<p>C1 Methods of communicating proposals and designs - use of visual aids</p>	<p>Whole-class and Individual Activity</p> <ul style="list-style-type: none"> ○ Provide an overview of visual aids (slides, artefacts, leaflets, and charts) and demonstrate how to use them effectively in construction communication through a sample presentation. ○ Students will then create their own short visual presentation for a given construction scenario, incorporating at least one slide, one artefact or leaflet, and one chart or graph.[SP-PS] 	
<p>C1 Methods of communicating proposals and designs - Types of information</p>	<p>Whole-class and Individual Activity:</p> <ul style="list-style-type: none"> ○ Provide an overview of different types of information (reports, specifications, instructions, signage, drawings, charts, and technical data) and their purpose in construction projects. ○ Show examples of each and explain how they guide construction processes, safety, and project communication. 	<p>NBS: Construction Specifications – Everything You Need to Know This resource explains what construction specifications are, their importance, and how to write them. It covers the different types of specifications, including performance and prescriptive specifications, and provides guidance on what to include</p>

	<p>Small-group Activity:</p> <ul style="list-style-type: none"> ○ Give groups a construction scenario and a set of example documents. ○ Ask them to identify each type of information and explain how it applies to the project. Groups present their findings to the class, followed by feedback and discussion. <p>[SP-PS]</p>	<p>in a specification document.</p> <p>https://www.thenbs.com/knowledge/construction-specifications-everything-you-need-to-know</p>
<p>C2 Prioritising potential solutions - Analysis of potential solutions:</p>	<p>Whole-class and Individual Activity:</p> <ul style="list-style-type: none"> ○ Explain key criteria for evaluating retrofit solutions, including cost-benefit analysis, ease of installation, disruption, payback period, and potential savings (emissions, energy consumption, and costs). ○ Provide a brief example (e.g., wall insulation) and show how it can be assessed using these criteria. <p>Small-group Activity:</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and assign each group a retrofit solution (e.g., solar panels or double-glazed windows) and provide a simple data sheet with information on cost, installation difficulty, disruption, payback, and savings. Groups will analyse their solution and prepare a summary recommending its suitability. ○ Get the groups to present their findings, followed by a discussion comparing different solutions. Summarise key takeaways about how criteria such as savings, costs, and disruption affect decision-making. <p>[SP-PS]</p>	<p>Retrofit for the Future: Analysis of Cost Data - This report presents findings from the "Retrofit for the Future" program, which aimed to reduce energy consumption and carbon emissions in UK homes. It offers detailed cost data and discusses the effectiveness of various retrofit measures, providing insights into cost-benefit analysis and payback periods.</p> <p>https://assets.publishing.service.gov.uk/media/5a7599eb40f0b67b3d5c7c49/Retrofit_for_the_Future_-_analysis_of_cost_data_report_2014.pdf</p> <p>Energy Efficiency, Retrofitting, and Sustainable Construction SPD - Description: This supplementary planning document offers practical guidance on retrofit and sustainable construction practices. It addresses</p>

		<p>considerations such as cost, disruption, and potential savings, aiding in comprehensive analysis of retrofit solutions.</p> <p>https://democracy.bathnes.gov.uk/documents/s70213/E3336%20Appendix%201%20Retrofitting%20and%20Sustainable%20Construction%20SPD.pdf</p>
<p>C2 Prioritising potential solutions - Advantages and disadvantages of different retrofit solutions</p>	<p>Whole-class and Individual Activity:</p> <ul style="list-style-type: none"> ○ Explain the key factors for evaluating retrofit solutions, including maintenance requirements, improved comfort, expected lifespan, ease of use, and smart control features. ○ Provide examples (e.g., wall insulation, smart thermostats) and discuss trade-offs between these factors. <p>Small-group Activity:</p> <ul style="list-style-type: none"> ○ Assign each group a retrofit solution and provide data sheets covering its key advantages and disadvantages. Groups will evaluate the solution and create a simple table listing pros and cons for each factor (e.g., maintenance, comfort, ease of use). ○ Get the groups to present their findings, followed by a discussion on trade-offs and scenarios where different solutions may be more suitable. 	<p>Retrofit for the Future: Analysis of Cost Data - This report presents findings from the "Retrofit for the Future" program, which aimed to reduce energy consumption and carbon emissions in UK homes. It offers detailed cost data and discusses the effectiveness of various retrofit measures, providing insights into cost-benefit analysis and payback periods.</p> <p>https://assets.publishing.service.gov.uk/media/5a7599eb40f0b67b3d5c7c49/Retrofit_for_the_Future_-_analysis_of_cost_data_report_2014.pdf</p>

	<ul style="list-style-type: none"> ○ Summarise key takeaways, including the balance between short-term and long-term benefits. 	
<p>C3 Methods of measuring actual benefits of proposed solution - Difference between theoretical and actual improvements:</p>	<p>Whole-class and Individual Activity:</p> <ul style="list-style-type: none"> ○ Explain the key differences between EPC and EUI: ○ Provide a comparison table and examples of both metrics for different buildings <p>Small-group Activity:</p> <ul style="list-style-type: none"> ○ Provide two case studies: a building with a high EPC rating but poor EUI, and one with a lower EPC but good EUI. Get the groups to analyse the reasons for differences and discuss which metric is more effective for identifying energy-saving opportunities. <p>[SP-PS]</p>	<p>Energy Performance Certificates (EPC) - Energy Saving Trust – Guide to Energy Performance Certificates (EPCs): This guide explains what EPCs are, how they are calculated, and their importance. It details the assessment process, including factors like insulation, heating systems, and building dimensions. https://energysavingtrust.org.uk/advice/guide-to-energy-performance-certificates-epcs/</p> <p>Energy Use Intensity (EUI) RIBA Journal – How to Calculate a Building's Operational Energy: This article provides a detailed explanation of EUI, including the formula for calculation and considerations for accurate measurement. It discusses the importance of EUI in assessing a building's energy performance. Website: https://www.ribaj.com/intelligence/how-to-calculate-operational-energy-of-a-building</p>

<p>C3 Methods of measuring actual benefits of proposed solution - R and U values</p>	<p>Whole-class and Individual Activity</p> <ul style="list-style-type: none"> ○ Explain R-values and U-values: R-value measures thermal resistance (higher R-values mean better insulation), while U-value measures thermal transmittance (lower U-values mean less heat loss). Explain that U-value is the reciprocal of R-value ($U = 1/R$). Demonstrate how to calculate the U value of building elements ○ Show a diagram of a building element with material layers, highlighting how R-values combine and how U-values represent overall heat transfer. Include an example (e.g., a well-insulated wall with U-value 0.2 W/m²K and R-value 5 m²K/W). ○ Give the students a worksheet of different building elements and get them to calculate the U value. <p>[SP-PS]</p>	<p>First In Architecture – "A Quick and Easy Guide to U-Values" - This guide provides a straightforward explanation of U-values, including their importance, how they are calculated, and their role in building design. It offers practical examples and is tailored for those seeking an accessible introduction to the topic.</p> <p>https://www.firstinarchitecture.co.uk/a-quick-and-easy-guide-to-u-values/</p> <p>ROCKWOOL – U-Value Calculator Tool - ROCKWOOL offers a free, online U-value calculator designed to help users calculate U-values for their specific projects using ROCKWOOL stone wool insulation. This tool can be useful for practical applications and understanding how different materials affect thermal performance.</p> <p>https://www.rockwool.com/uk/resources-and-tools/tools/u-value-calculator/</p>
<p>C3 Methods of measuring actual benefits of proposed solution - CO2 saving, Kilowatt</p>	<p>Whole-class Teaching and Learning</p> <ul style="list-style-type: none"> ○ Explain what the key terms CO₂ Savings, Kilowatt Hours (kWh) , and reduced consumption of natural resources. Discuss how efficiency improvements and renewables 	<p>Renewable Energy Practitioner and Learner Resources – Royal Academy of Engineering - This Level 2 resource reviews the need for renewable energy as an alternative to fossil fuels and</p>

<p>hours used, reduced consumption of natural resources.</p>	<p>(e.g., improved insulation, solar panels) help reduce dependence on gas, coal, and oil.</p> <ul style="list-style-type: none"> ○ Provide a practical example: Explain how installing solar panels reduces grid electricity consumption by 2,000 kWh, saves 1.5 tonnes of CO₂, and lowers natural gas usage. <p>Small-group Activity</p> <ul style="list-style-type: none"> ○ Divide the class into small groups and provide the groups with a scenario (e.g., retrofitting a building or installing solar panels) and data sheets with estimated kWh savings and CO₂ reductions. ○ Have groups calculate kWh savings, CO₂ savings, and natural resource savings. Instruct them to summarise their findings in a simple table comparing energy use before and after the retrofit. <p>[SP-PS]</p>	<p>helps students consider the advantages and disadvantages of each form, and how they might help to power the UK.</p> <p>https://raeng.org.uk/education-and-skills/further-education/further-education-resources/fe-resources/renewable-energy/practitioner-and-learner-resources</p>
<p>C3 Methods of measuring actual benefits of proposed solution - Reasons for differences between designed improvements and in use</p>	<p>Whole-class Teaching and Learning:</p> <ul style="list-style-type: none"> ○ Explain key reasons for performance gaps between designed and actual, including quality of work, incorrect materials, user error, erroneous design calculations, and assumptions at the design stage. ○ Provide examples such as insulation issues or user mismanagement of heating systems, showing how these can cause discrepancies between designed and actual performance. <p>Small-group Activity:</p> <ul style="list-style-type: none"> ○ Assign a performance gap scenario and provide expected vs. actual performance data. 	<p>"What is the Performance Gap?" - Kingspan GB - This article explores the causes of the performance gap, including product substitution during construction and assumptions made at the design stage. It discusses how deviations from specified materials and design assumptions can lead to discrepancies between anticipated and actual building performance.</p> <p>https://www.kingspan.com/gb/en/knowledge-articles/what-is-the-performance-gap/</p>

	<ul style="list-style-type: none">○ Groups identify causes (e.g., poor workmanship, user error, or unrealistic design assumptions) and suggest solutions such as better quality control, improved materials, or occupant training.○ Groups present their findings to the class for discussion. <p>[SP-PS]</p>	
--	---	--

○

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
Taking personal responsibility MY – TPR	<ul style="list-style-type: none"> • Divide students into small groups and assign each group a retrofit project with a clear deadline and project constraints. • Each group assigns roles, with each member responsible for the design of a specific project element (e.g., insulation, ventilation, or windows). • The members need collaborate to develop their retrofit designs while ensuring compliance with the project constraints and relevant codes. • Each student develops and contributes their portion of the design to the group’s overall project. • Groups present their final retrofit solutions, explaining how they meet design requirements and compliance standards with each member presenting their specific design contribution and how it integrates into the overall project..
Written communication IS-WC Verbal and non-verbal communications IS-V&NC	<ul style="list-style-type: none"> • Assign each student the task of carrying out a conditional survey of their home, inspecting key areas such as insulation, windows, ventilation, and heating systems. • Explain that the goal is to identify areas needing improvement to meet modern energy efficiency and building standards. • Ask Students produce a report communicating their survey findings, highlighting existing conditions and any issues found. • The report should include recommendations for retrofitting the building to meet current standards, covering improvements like insulation upgrades, window replacements, and ventilation systems. • Ask the students to prepare a PowerPoint presentation of their findings and recommendations and present it to a selected audience

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

Local Partnerships

Domestic Retrofit Handbook – Practical guide commissioned by the Department for Business, Energy and Industrial Strategy (BEIS).

[Local Partnerships](https://localpartnerships.gov.uk/resources/domestic-retrofit-handbook/) – <https://localpartnerships.gov.uk/resources/domestic-retrofit-handbook/>

UK Green Building Council (UKGBC)

Overview: Charity and industry network aiming to radically improve the sustainability of the built environment.

[UK Green Building Council \(UKGBC\)](https://ukgbc.org) – <https://ukgbc.org>

Textbooks

James Traynor, EnerPHit: A Step by Step Guide to Low Energy Retrofit, 2019, ISBN: 9781859468197

Marion Baeli Residential Retrofit: Twenty Case Studies: 20 Case Studies RIBA Publishing. ISBN 978-1859465011

Nigel Griffiths, The Green Building Bible, Volume 1: Essential Information to Help You Make Your Home and Buildings Less Harmful to the Environment, Society and Yourself, 2008, ISBN: 978-0954052036.

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

Unit 6: Modelling in Construction

Unit overview

Unit 6: Modelling in Construction	
Assessment type: Internal	
Learning Aim	Topics
A Understand how models and digital data contribute to a collaborative design process in the built environment	A1 Types of models A2 Work sharing and collaboration A3 Security of data A4 Modelling and modern methods of construction
B Carry out modelling techniques to design a structure in the built environment for a given client brief	B1 Use of software to prepare project information models B2 Creating a project information model for a given client brief
C Communicate a design proposal using digital technology	C1 Communicating designs C2 Communicating documents
<p>Assessment overview</p> <p>This unit is Internal assessed through a Pearson-Set Assignment Brief (PASB). Pearson sets the assignment for the assessment of this unit. The PASB will take approximately 12 hours to complete. The PASB will be marked by centres and verified by Pearson. The PASB will be valid for the lifetime of this qualification.</p>	

Common student misconceptions

What is the misconception?	How to help students overcome it
That BIM refers to a software package	Before students are introduced to any software, present BIM as a concept, using various introductory resources such as videos and case studies, as linked above
That BIM is merely an activity used to model and design building process	Using case studies suggested above, explain the use of BIM as a tool for collaboration that can be used throughout the building lifecycle
That 'Modern Methods of Construction' are not commonly used, or that they are not the default method in many building projects	Explain that the term 'modern methods of construction' refers to non-traditional methods and this term was conceived at a time when these methods were novel/ atypical. Nowadays these methods are no longer considered 'modern' or 'new' but are integrated into many projects from the start and lend themselves well to modern modelling processes. This can be illustrated via the many examples and case studies as suggested above

Learning Activities and Resources

This section offers a starting point for delivering the unit by outlining a logical sequence through the unit topics and suggesting practical activities and teacher guidance for covering the main areas of content during guided learning time. Transferable skills are integrated into various activities, with those embedded in a unit indicated by an acronym in square brackets. The acronym combines the letters from the broad skill area and the specific transferable skill, e.g., **[IS-WC]**.

Please note that the activities provided below are suggestions and not mandatory.

Learning Topic	Activities and guidance for unit content delivery	Resources
A1 Types of models (CDE)	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Begin with an overview of what a Common Data Environment (CDE) is: a digital platform used in construction projects to store, share, and manage all project data in one place. • Explain its importance: it ensures all project team members can access the latest information, reducing mistakes and improving collaboration. • Use a visual example of a CDE interface (e.g., Autodesk BIM 360) to engage students and provide context. <p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> • Teacher-Led Overview: Discuss key features of a CDE, such as document management, version control, and its role in enabling the Building Information Modelling (BIM) process. 	<p>Designing Buildings Wiki - An article that explains the concept of a Common Data Environment (CDE) as defined in industry standards, detailing its purpose in collecting, managing, and disseminating project information. Common data environment CDE - Designing Buildings</p> <p>Trimble Constructible: Understanding CDEs An article discussing the definition of a Common Data Environment, its application in construction, and the benefits of using a CDE for project efficiency. What Is a Common Data Environment and How Is It Used In Construction? Constructible</p>

	<ul style="list-style-type: none"> Individual Activity: Students identify real-world examples of software used as CDEs (e.g., Aconex, Trimble Connect, BIM 360) and write a brief explanation of their key functions. 	
<p>A1 Types of models (CDE) - Types of models, including:</p>	<p>Whole Class and Individual Activity</p> <ul style="list-style-type: none"> Teacher-Led Overview: Discuss when and why each model is used during the BIM process: <ul style="list-style-type: none"> Project Information Model (PIM): Used for planning, clash detection, and ensuring stakeholder alignment during the design stage. Guides on-site implementation by organising construction schedules, materials, and tasks. Asset Information Model (AIM): Used post-construction for managing building operations, maintenance, and lifecycle planning. Individual Activity: Provide students with a set of scenarios (e.g., coordinating design, solving construction delays, and planning maintenance). Students match the scenarios to the correct model and justify their choice. <p>Small Group Activity</p> <ul style="list-style-type: none"> Group Task: Students work in small groups to create a simple BIM timeline, identifying the stages of a project and placing each model—Project Information Model (PIM), and Asset Information Model (AIM)—in its appropriate phase. 	<p>The CAD Room: Project Information Model - An article that explains the concept of the Project Information Model (PIM), its development during the design and construction phases, and its role in the BIM process. What is the Project Information Model? CAD Services</p> <p>NBS: What is the Asset Information Model (AIM)? A comprehensive guide detailing the purpose and components of the Asset Information Model (AIM), its importance in the operational phase, and how it integrates with the BIM process. What is the Asset Information Model (AIM)? NBS</p>

	<ul style="list-style-type: none"> • Each group presents their timeline and explains how the models are used, focusing on their purpose and importance in the construction process. 	
<p>A1 Types of models (CDE) - Types of data, Graphical and non graphical</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Begin with an overview of what a Common Data Environment (CDE) is: a digital platform used to store, share, and manage project data. • Explain its importance in reducing errors and improving collaboration across construction projects. • Use a visual example (e.g., Autodesk BIM 360 or a similar interface) to provide context. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Provide groups with examples of 2D graphical data (plans, elevations) and 3D graphical data (BIM models). • Ask each group to list the uses of 2D and 3D data in construction projects. • Have groups present one key advantage of 2D data and one key advantage of 3D data to the class. <p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Introduce non-graphical data such as schedules, cost estimates, and material specifications. • Provide a short example of non-graphical data (e.g., a project material list). <p>Small Group Activity</p>	<p>Designing Buildings Wiki</p> <p>This page offers an overview of the Common Data Environment (CDE) in construction, detailing its purpose and the types of data it manages, including both graphical models and non-graphical information.</p> <p>Common data environment CDE</p> <p>Technostruct Academy Blog - This blog post provides insights into the Common Data Environment (CDE) in Building Information Modelling (BIM), outlining its tasks and the ease of viewing and extracting data from BIM models, highlighting the integration of graphical and non-graphical data.</p> <p>Common Data Environment</p> <p>GOV.UK - Cost Estimating Guidance Outlines best practices for cost estimating in infrastructure projects, highlighting the importance of transparent and accurate</p>

	<ul style="list-style-type: none"> • Divide the students into small groups and assign a non-graphical piece of data that is used in CDE. • Ask student groups to produce a poster of the non graphical data they have been assigned, describing what it is, it's function and how it is used to manage the construction process. <p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Summarise the integration of graphical and non-graphical data in a CDE, highlighting how this improves decision-making and collaboration. • Use an example (e.g., clash detection combining 3D models and schedules) to illustrate the practical application. 	<p>documentation. Cost Estimating Guidance RICS - Cost Analysis and Benchmarking 2nd Edition Summarizes the purpose and process of cost analysis and construction project benchmarking, emphasizing the need for clear documentation in cost estimation. https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/black-book/cost-analysis-and-benchmarking-2nd-edition</p>
<p>A1 Types of models (CDE): Types of data</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Explain the importance of client information requirements (CIR) in ensuring that all stakeholders have the necessary data to meet project needs. • Provide an overview of the key categories of CIR, including sources of manufacturer and supplier information, material specifications, facilities management data, costings, and other documents (e.g., legal, environmental reports). <p>Small Group Activity</p> <ul style="list-style-type: none"> • Assign each group one category of client information (e.g., material specifications or costings) and ask them to discuss 	

	<p>and list real-world examples of the data included in that category.</p> <ul style="list-style-type: none"> • Groups present their findings to the class, sharing how their category contributes to successful project delivery. <p>Individual Activity</p> <ul style="list-style-type: none"> • Provide students with a sample project scenario and ask them to identify what client information requirements would be necessary for the project (e.g., supplier warranties, detailed costings). • Students write a brief explanation of how this information supports project planning and execution. <p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Summarise how client information requirements integrate into construction projects and their role in ensuring compliance, cost control, and efficient facilities management. • Highlight the use of Common Data Environments (CDEs) to store and manage this information effectively. 	
<p>A2 Work sharing and collaboration</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Start with an explanation of what a Common Data Environment is and its importance in BIM-led projects. • Use a diagram or visual example of a CDE interface to illustrate its core components (digital platform, access, storage, etc.). 	

	<ul style="list-style-type: none">• Explain the key functions of a CDE<ul style="list-style-type: none">• Digital information platform: Centralised space for project data.• Data access: Controlled permissions to ensure the right people access the right data.• Data storage: Secure and efficient storage of project files and designs.• Real-time design collaboration: Allowing multiple stakeholders to work on a design simultaneously.• Requests for information (RFIs): Streamlining queries and responses between teams.• Change order processes: Managing and tracking changes to project designs. <p>Small Group Activity</p> <ul style="list-style-type: none">• Divide students into groups and assign each group one function of a CDE (e.g., data storage, RFIs).• Each group discusses examples of how their assigned function supports collaboration in construction projects.• Groups present their findings to the class, providing one real-world example.	
--	---	--

<p>A2 Work sharing and collaboration</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Introduce the importance of maintaining an up-to-date and accurate CDE in construction projects, highlighting the risks of errors or delays caused by outdated information. • Explain key measures for maintaining CDE accuracy i.e. regular audits, access permissions, restricting editing rights, data validation. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Divide students into groups and assign each group one measure (e.g., version control, regular audits). • Each group discusses how their assigned measure helps maintain the CDE's accuracy and shares an example of how it would work in a real-world construction project. • Groups present their findings to the class, explaining why their measure is critical. <p>Individual Activity</p> <ul style="list-style-type: none"> • Provide students with a scenario where a project team has uploaded inaccurate or outdated content to the CDE (e.g., incorrect material specifications). • Ask students to identify what measures could have prevented the error and write a brief explanation. 	<p>Kyro.ai Blog</p> <p>This article discusses the high cost of poor document management in construction, emphasising the importance of digital platforms and cloud-based systems for centralized access to documents, real-time collaboration, and version control.</p> <p>Construction Document Management Issues</p>
<p>A3 Security of data</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Start with a discussion on why protecting data and intellectual property is critical in construction projects, particularly in a Common Data Environment (CDE). 	

	<ul style="list-style-type: none"> • Highlight risks of data breaches, unauthorised access, and errors caused by uncontrolled changes. • Explain protocols for setting and controlling access permissions i.e. assigning user roles (e.g., viewer, editor, admin), restricting access to sensitive files based on user roles, using secure authentication methods (e.g., passwords, two-factor authentication). • Introduce version control as a key process for tracking changes to files i.e. ensures that the latest version of a document or model is clearly marked, prevent overwriting or loss of critical information. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Divide students into groups and assign each group a scenario: e.g. setting up access permissions for a sensitive project, managing changes to a 3D model using version control. • Each group identifies the steps they would take to secure the data and ensures only authorised personnel can access or modify the information. • Groups present their solutions to the class, explaining why their approach is effective. 	
<p>A4 Modelling and modern methods of construction</p> <p>Time and waste reduction & 3D</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Introduce the concept of BIM 3D virtual environment and its benefits for construction projects, such as improved planning, design coordination, and collaboration. 	<p>Pearson PLC – Slide deck introducing modern methods and digital construction Modern Methods and Digital Tools in Construction (requires Edexcel Online sign in)</p>

<p>printing and off-site component manufacture</p>	<ul style="list-style-type: none"> • Explain how BIM helps in reducing construction time through detailed scheduling and clash detection. • Discuss how BIM minimises waste by enabling precise material quantities and optimised workflows. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Provide a scenario where a project used off-site component manufacturing supported by BIM. • Groups discuss how 3D models facilitate accurate off-site production and faster on-site assembly. 	<p>McAvoy Construction – Modular construction case studies Case Studies Modular Construction Projects McAvoy Group</p> <p>Construction 3D Printing - an Introduction 3D printing in construction - Designing Buildings</p> <p>Homebuilding & renovation – Article 3D printed houses to be constructed in the UK for the first time 3D-printed houses to be constructed in the UK for first time Homebuilding</p>
<p>Sustainable Materials and BIM</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Discuss how BIM facilitates the selection of sustainable materials by providing material libraries with environmental data (e.g., embodied carbon, recyclability). • Explain the role of BIM in ensuring service specifications are optimised for renewable sources, such as solar panels and heat pumps. <p>Small Group Activity</p> <ul style="list-style-type: none"> • Provide groups with a BIM model and a material specification list. 	

	<ul style="list-style-type: none"> • Ask them to identify sustainable materials in the model and suggest improvements based on environmental impact. 	
<p>Energy Use and Life Cycle Analysis in BIM</p>	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Introduce the concept of life cycle analysis (LCA) and its importance in sustainable construction. • Discuss how BIM 3D models provide data for energy simulations and performance evaluations, helping to optimise energy use. <p>Paired Activity</p> <ul style="list-style-type: none"> • Provide students with a simplified BIM model showing a building's energy usage. • In pairs, ask them to analyse the model and suggest energy-saving strategies (e.g., improved insulation, renewable energy systems). <p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Show how LCA data, combined with BIM, allows stakeholders to make informed decisions about materials and systems to reduce environmental impact over the building's life cycle. <p>Individual Activity</p>	<p>BBC Bitesize - Life Cycle Assessment: This educational resource provides an overview of LCA, including its purpose and how it's conducted. It's tailored for students and includes examples relevant to material selection and environmental impact.</p> <p>BBC</p> <p>Life Cycle Assessment Training Kit Material: Provided by the Life Cycle Initiative, this training kit presents LCA in four comprehensive packages, ranging from introductory topics to specialized modules. It's a valuable resource for educators looking to develop a structured LCA curriculum.</p> <p>Lifecycle Initiative</p>

	<ul style="list-style-type: none"> • Ask students to review a project scenario where BIM was used for energy analysis and LCA. • Students write a brief reflection on the importance of these tools for sustainability. 	
B1 Use of software to prepare project information models	<p>Whole Class Teaching and Learning</p> <ul style="list-style-type: none"> • Define what a project information model (PIM) is and its role in construction projects. • Discuss how PIM differs from CAD, highlighting how PIM integrates data for collaboration, clash detection, and project lifecycle management. <p>Individual Activity</p> <ul style="list-style-type: none"> • Students review a CAD model and a PIM and identify key differences in functionality and purpose. 	
B1 Use of software to prepare project information models	<p>Whole Class Teaching</p> <ul style="list-style-type: none"> • Introduce types of input data that are used in PIM i.e. Topographical data (e.g., survey benchmarks, elevation data, and point clouds). • Underground utilities (e.g., electrical networks, water systems, wastewater systems, underground construction). <p>Individual Activity</p> <ul style="list-style-type: none"> • Use free online tools or software (e.g., QGIS or Revit) to visualise topographical data. 	<p>Ordnance Survey. 5m DTM sample OS Terrain 5 Data Products OS</p> <p>Gov.UK The National Underground Asset Register (NUAR) This is a UK digital map of underground utilities, improving safety, efficiency, and construction planning.</p> <p>National Underground Asset Register (NUAR) - GOV.UK</p>

	<ul style="list-style-type: none"> • Students practice importing a point cloud file into a model. <p>Paired Activity</p> <ul style="list-style-type: none"> • Teams research and present how underground utility data is integrated into PIMs. 	
<p>B1 Use of software to prepare project information models - the purpose of different software</p>	<p>Whole Class Teaching</p> <ul style="list-style-type: none"> • Demonstrate basic functions of Revit and SketchUp for creating, editing and viewing 2D sketches and 3D models. <p>Small group Activity</p> <ul style="list-style-type: none"> • Divide the class into small groups. Half the groups are to use SketchUp and the other half of the groups use REVIT to create a basic conceptual layout. • Each group is to produce a presentation on the capabilities of the software and present it the whole class. 	<p>www. Autodesk.com Autodesk Educator Resources: Autodesk offers a range of free teaching materials, including lesson plans and tutorials for Revit. These resources can help you demonstrate the basic functions of Revit for creating, editing, and viewing 2D sketches and 3D models.</p> <p>Autodesk</p> <p>WWW.Tes.com Getting Started with SketchUp Free: This step-by-step guide is designed for beginners and can be used by students to learn the basics of SketchUp. It includes exercises that can be incorporated into group activities.</p> <p>Tes</p> <p>SketchUP Community SketchUp Lesson Plans: SketchUp's educational resources include lesson plans that guide students through creating 3D models. These can</p>

		<p>be used in group settings to explore the software's features and prepare presentations.</p> <p>SketchUp Forums</p>
<p>B1 Use of software to prepare project information models - the purpose of different software</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Explain the purpose of Navisworks, Solibri, and Revit's built-in coordination tools for clash detection and issue monitoring. <p>Individual activity</p> <ul style="list-style-type: none"> Students use Navisworks to run a clash detection simulation with a Revit model and produce a presentation on how the tools improve efficiency. 	<p>Autodesk Learning Hub A comprehensive resource offering tutorials and guides on using Revit and Navisworks for clash detection and issue monitoring. Includes practical workflows and best practices. Clash Detection with Data Exchanges</p> <p>YouTube (Autodesk Navisworks Tutorials) (BIMLO Channel) Video tutorials explaining the use of Navisworks for clash detection, issue tracking, and integrating Revit models for project coordination. Navisworks Clash Detection</p>
<p>B1 Use of software to prepare project information models - the purpose of different software</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Explore rendering tools (e.g., Enscape) and progress tracking tools (e.g., Autodesk Construction Cloud, Primavera P6). 	<p>Enscape Video Tutorials Enscape offers a series of training videos that demonstrate how to integrate their real-time rendering plugin with Revit. These tutorials cover the basics of</p>

	<p>Individual activity</p> <ul style="list-style-type: none"> Students use Enscape to add realistic materials and textures to their Revit model and create a rendered walkthrough. <p>Small group activity</p> <ul style="list-style-type: none"> Groups compare rendered outputs and discuss how rendering aids client communication. 	<p>adding realistic materials, lighting, and creating walkthroughs.</p> <p>Enscape 3D</p>
<p>B1 Use of software to prepare project information models - Reasoning to justify choice of solutions</p>	<p>Whole Class Teaching</p> <ul style="list-style-type: none"> Explain reasoning techniques i.e. inductive reasoning, starting from specific observations (e.g., model clash detected) to general conclusions and deductive reasoning, starting from general principles (e.g., project constraints) to specific choices. <p>Small Group Activity</p> <ul style="list-style-type: none"> Provide students with a scenario (e.g., resolving a clash between utilities and structural elements) and have them propose solutions using reasoning. [SP-PS] 	<p>Leap Online by Bolton University - Inductive vs. Deductive Thinking</p> <p>This resource from the University of Bolton provides a clear explanation of inductive and deductive reasoning, including practical examples relevant to various fields.</p> <p>Leap Online - Inductive vs. Deductive Thinking</p>
<p>B2 Creating a project information model for a given client brief - Understanding Client Brief Requirements</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Introduce the concept of a client brief and explain how it informs project design decisions. Use examples of residential and commercial projects to illustrate the importance of understanding room sizes, dimensions, and budgets. <p>Individual activity</p>	<p>Designing Buildings Wiki - Client Briefs</p> <p>Explains the purpose of a client brief and its role in guiding design decisions. Includes examples of how room sizes, dimensions, and budgets are outlined in a client brief.</p> <p>Client requirements</p>

	<ul style="list-style-type: none"> Students analyse a sample client brief, identifying key requirements such as room sizes, dimensions, and budget constraints.[SP-PS] 	
<p>B2 Creating a project information model for a given client brief Exploring Materials, Finishes, and Architectural Styles</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Discuss how materials and finishes are selected based on architectural styles (e.g., Modern, Tudor, Victorian, Art Deco). Use visual aids such as images, mood boards, or material samples to demonstrate the alignment of finishes with style. <p>Small group activity</p> <ul style="list-style-type: none"> Groups select an architectural style and propose materials and finishes that reflect the style. Groups present their choices and justify their alignment with the style's characteristics. 	<p>First in Architecture - British Architectural House Styles This article provides an overview of key architectural styles, including examples of materials, finishes, and features characteristic of each style. It's an excellent resource for visual aids and contextual examples. British Architectural House Styles</p> <p>Architecture through the Ages - National Trust This resource delves into various architectural eras in the UK, discussing how trade and the introduction of new building materials influenced architectural styles and construction methods. National Trust</p> <p>Material District - Design and Materials Offers a wide range of materials and</p>

		finishes, with examples and case studies to inspire style-aligned selections. https://materialdistrict.com/
B2 Creating a project information model for a given client brief Integrating Sustainability Measures	<p>Whole-class teaching and learning</p> <ul style="list-style-type: none"> Explain the role of sustainability in modern design, focusing on energy-efficient glazing, insulation, solar panels, rainwater collection, and recycling systems. Highlight the benefits of these measures for both the environment and cost-efficiency. <p>Small group activity</p> <ul style="list-style-type: none"> Groups create a sustainability plan for a sample client brief, proposing specific measures to meet environmental and budgetary goals. Groups discuss their plans with the class. 	<p>Energy Saving Trust - Home Insulation Advice</p> <p>Offers detailed information on the benefits of insulation, including cost-saving measures and environmental advantages for buildings in the UK.</p> <p>Measures to help reduce home heat loss - Energy Saving Trust</p> <p>Solar Energy UK - Solar Panels Guide</p> <p>Provides comprehensive guidance on incorporating solar panels in building design, including cost benefits and environmental impact.</p> <p>https://solarenergyuk.org/</p>
B2 Creating a project information model for a given client brief Natural Lighting	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Discuss the importance of natural lighting in design and how fixtures for kitchens and bathrooms can enhance functionality and aesthetics. Use examples of layouts that optimise natural lighting and fixture placement. <p>Paired activity</p> <ul style="list-style-type: none"> Students work in pairs to sketch a room design (e.g., a kitchen or bathroom) that integrates natural lighting and 	<p>IQ Glass UK - A Guide to Natural Light in Architectural Design</p> <p>Offers insights into maximizing natural light in architectural designs, with a focus on UK building regulations and aesthetics.</p> <p>https://www.iqglassuk.com/news/a-guide-to-natural-light-in-architectural-design/bp353/</p>

	<p>appropriate fixtures. They present their sketches and explain their design decisions.</p>	<p>Detail Lighting - Sustainable Lighting Design Principles Provides principles and practices for sustainable lighting design, including the selection of fixtures that enhance natural light within UK buildings. https://detaillighting.co.uk/sustainable-lighting-design-principles/</p>
<p>B2 Creating a project information model for a given client brief Creating 2D Geometry and Dimensions</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Demonstrate how to create 2D geometry and dimensions in the x and y plane using Revit or AutoCAD. Show the process of importing a map, diagram, or sketch and using it as a base for design. • Explain the push, pull, and extrusion tools in SketchUp. Demonstrate how to convert 2D geometry into 3D elements such as walls and columns. • Or alternative demonstrate the tools used in REVIT or other software used to create 3D shapes. <p>Individual activity</p> <ul style="list-style-type: none"> • Students practice creating a 2D floor plan in Revit, AutoCAD, or SketchUp including dimensions and alignment. • Students practice creating 3D extrusions from the 2D floor plans. 	<p>SketchUp Help Center - Offers a comprehensive guide to using the tools in SketchUp, with examples of creating 3D elements from 2D geometry. Help With SketchUp Help</p> <p>YouTube channel Balkan Architect- Comprehensive videos on the use of REVIT Balkan Architect - YouTube</p> <p>YouTube channel MasterSketchUp - Comprehensive videos on the use of SketchUp MasterSketchUp - YouTube</p>

<p>B2 Creating a project information model for a given client brief Components and BIM Families</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Show how to use BIM families and elements in Revit to add doors, windows, ceilings, floors, and other components. Discuss the importance of using predefined families to maintain consistency. <p>Individual activity</p> <ul style="list-style-type: none"> • Students insert BIM elements such as doors, windows, and stairs into their 3D model, ensuring proper placement and alignment. 	<p>YouTube channel Balkan Architect- Comprehensive videos on the use of REVIT Balkan Architect - YouTube</p>
<p>B2 Creating a project information model for a given client brief - Adding Material, Dimensions, and Cost Properties</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Discuss the importance of adding material and cost properties to a model for accurate budgeting. Demonstrate how to assign materials and annotate their properties in Revit. <p>Small group activity</p> <ul style="list-style-type: none"> • Groups assign materials to their 3D models and calculate approximate costs for a specific component or area. 	<p>YouTube channel Balkan Architect- Comprehensive videos on the use of REVIT Balkan Architect - YouTube</p>
<p>B2 Creating a project information model for a given client brief - Adding Annotations</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Explain the role of annotations in construction drawings. Show how to add annotations, including labels, dimensions, and notes, to enhance the clarity of a model. <p>Individual activity</p> <ul style="list-style-type: none"> • Students add annotations to their 3D model, ensuring all key elements are labelled and dimensioned. 	<p>YouTube channel Balkan Architect- Comprehensive videos on the use of REVIT Balkan Architect - YouTube</p>

<p>B2 Creating a project information model for a given client brief - Adding Realistic Textures and Rendering in Digital Models</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Demonstrate how to add realistic materials and textures (e.g., brick, concrete, metal, and wood) to digital models using Revit and rendering tools like Enscape. Show how to use material libraries and customise textures for more accurate representations. • Explain the basics of rendering, including lighting, shadows, and reflection settings, to create photorealistic visuals. <p>Individual activity</p> <ul style="list-style-type: none"> • Students apply materials to a simple 3D model, using Revit's material library or importing custom textures. They then render their model using Enscape, experimenting with lighting and other settings to create realistic representations. <p>Paired activity</p> <ul style="list-style-type: none"> • In pairs, students critique each other's rendered outputs, focusing on the accuracy of materials, lighting effects, and overall realism. 	
<p>B2 Creating a project information model for a given client brief - Using Creative Tools in Problem Solving</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Introduce creative tools for problem-solving, such as mind mapping, brainstorming, and exploring alternate sectors for inspiration. Use examples to illustrate how these methods can lead to innovative solutions. • Discuss the importance of risk-taking and learning from failures in the creative process. Highlight how overcoming 	

	<p>fear of failure can lead to breakthroughs in design and decision-making.</p> <p>Small group activity</p> <ul style="list-style-type: none"> • Groups are presented with a design challenge, such as resolving a clash between structural elements and utilities in a building model. Using mind mapping, they brainstorm possible solutions, considering alternate approaches or sectors (e.g., engineering, architecture, or environmental design).[SP-PS] • Each group presents their solutions, explaining their creative process and the methods they used to address the problem. [SP-PS] <p>Individual activity</p> <ul style="list-style-type: none"> • Students reflect on a past challenge or failure and write a brief summary of how they overcame it. They then create a mind map to outline how they would approach a similar problem differently using creative tools. 	
C1 Communicating designs	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Explain how to use a project information model (PIM) to generate 2D views, including plans, elevations, and sections. Demonstrate these processes in Revit, highlighting how 3D models are converted into 2D views for detailed documentation. • Show how to export the model to a real-time rendering tool like Enscape. Demonstrate creating flythroughs, 360° 	<p>Autodesk Knowledge Network - Create Views Provides instructions on creating different views of a building model in Revit 2025, including plans, sections, elevations, and 3D views. Creating Views in REVIT 2025</p> <p>Autodesk Knowledge Network - View the Model</p>

	<p>panoramas, and generating QR codes for immersive model exploration.</p> <p>Small group activity</p> <ul style="list-style-type: none"> • Groups work on a sample model to create 2D views (plans, elevations, and sections) using Revit. They then export their model into Enscape to produce a flythrough and a 360° panorama. • Each group generates a QR code for their model and shares it with the class for interactive viewing. <p>Individual activity</p> <ul style="list-style-type: none"> • Students refine their exported models by customising camera angles and lighting in the rendering tool to create an engaging visual presentation. 	<p>Explains how to navigate and view your Revit 2025 model, including setting up different view types and orientations. Model Views in REVIT 2025</p> <p>Autodesk Knowledge Network - About Plan Views</p> <p>Details the process of creating and managing plan views in Revit 2025, essential for generating accurate floor plans. Views in REVIT 2015</p>
C1 Communicating designs	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Introduce the concept of construction phasing and sequencing, explaining its importance in aligning with a programme and timeline. Demonstrate how to use Revit's phasing tools or similar BIM software to simulate construction sequences. Show how these phases can be visualised as an animated timeline. • Discuss how 3D printed models can be used to represent different construction phases, improving understanding and communication among stakeholders. <p>Small group activity</p> <ul style="list-style-type: none"> • Groups use a sample Revit model to define construction phases (e.g., foundation, structure, and finishing stages). 	<p>Phasing in Revit: Step-by-Step Tutorial builditlikeap Channel</p> <p>This video tutorial provides a comprehensive guide on using phasing in Revit, demonstrating how to manage project phases to create detailed and accurate architectural designs. Phasing in REVIT</p> <p>Phasing in Revit - 8020 BIM Chanel Tutorial with Example Files</p> <p>This tutorial offers an in-depth look at phasing in Revit, complete with example files to practice defining and managing</p>

	<p>They simulate the sequence using timeline tools and create an animated phasing visualisation.</p> <ul style="list-style-type: none"> Groups prepare files for 3D printing, focusing on specific construction phases, and discuss how the printed model can enhance project communication. <p>Individual activity</p> <ul style="list-style-type: none"> Students refine the animated phasing sequence by adding detailed timelines and annotations. If 3D printers are available, they print a model representing a specific phase of construction. 	<p>construction phases within a project. Phasing in REVIT Construction STL Files for 3D Printing - Cults 3D Cults 3D offers a collection of 3D models related to construction, which can be used to print components representing various construction phases. 3D Printing models</p>
<p>C2 Communicating documents - Estimating Costs Using a Project Information Model</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> Demonstrate how to use a Project Information Model (PIM) to extract material quantities and assign cost properties. Explain the role of BIM tools like Revit and Navisworks in creating cost estimates. <p>Individual activity</p> <ul style="list-style-type: none"> Students use a sample PIM to estimate the costs of selected components, such as walls or floors, and generate a cost report using Revit's scheduling tools. 	<p>eLogicTech - Estimation and Costing Using Revit BIM Model This article discusses how Revit is used for cost estimation by refining quantities and assigning values for accurate material cost analysis. It also includes case studies demonstrating practical applications. Estimation and Costing Using REVIT Autodesk Knowledge Network - Data Extraction from a BIM Model This resource explains how to extract BIM data from a Revit model, crosslink properties from model objects, and export the results to an Excel spreadsheet using Dynamo as a</p>

		computational design tool. Data Extraction in Revit
C2 Communicating documents - Analysing Performance Using a Project Information Model	<p>Whole-class teaching and learning</p> <ul style="list-style-type: none"> Explain how PIMs are used to analyse building performance, focusing on sunlight analysis, orientation, energy consumption, and embodied carbon. Demonstrate these processes using software like Revit or Insight 360. <p>Small group activity</p> <ul style="list-style-type: none"> Groups conduct a sunlight or energy consumption analysis on a sample model and present their findings, including suggestions for improving building performance. [IS-WC] 	<p>Autodesk Knowledge Network - Sun Settings and Solar Study Animation in Revit Tutorial Balkan Architect Channel Provides a tutorial on setting up sun settings in Revit to accurately depict shadows and exporting solar study animations, essential for understanding the impact of sunlight and orientation on building performance. Sun Setting</p>
C2 Communicating documents - Preparing a COBie Document	<p>Whole-class teaching and learning</p> <ul style="list-style-type: none"> Introduce the Construction-Operations Building Information Exchange (COBie) framework and explain its importance in transferring information between design, construction, and operations teams. Demonstrate how to extract and format a COBie document from Revit. <p>Small group activity</p> <ul style="list-style-type: none"> Groups use a sample PIM to prepare a COBie spreadsheet, ensuring accurate and clear documentation of key information, such as equipment data and maintenance schedules. 	<p>NBS - What is COBie? Provides a concise explanation of the Construction-Operations Building Information Exchange (COBie), its purpose, and its role in facilitating data exchange in construction projects. What is COBie</p> <p>COBie Extension for Revit - Setup Project This video tutorial walks you through configuring your Revit model for use with the COBie Extension, detailing the setup process to ensure accurate data capture. COBie in REVIT</p>

<p>C2 Communicating documents - Communicating with Technical Language</p>	<p>Whole class teaching and learning</p> <ul style="list-style-type: none"> • Discuss the importance of using appropriate technical language in construction documentation. Provide examples of clear and professional communication in cost estimation, performance analysis, and COBie documents. <p>Individual activity</p> <ul style="list-style-type: none"> • Students write a summary of their cost estimation or performance analysis findings, focusing on using precise and professional technical language.[IS-WC] 	
---	---	--

Delivering signposted transferable skills

Signposted transferable skills are not mandatory for the delivery of the unit, and it is therefore your decision to deliver these skills as a part of the qualification. Below we have provided some ideas of teaching and learning activities that you could use to deliver these skills if you chose to.

Transferable skills	Ideas for delivery
SP-CT	<p>Whole-Class Teaching and Learning:</p> <ul style="list-style-type: none"> • Present a real-world construction case study where a critical decision must be made (e.g., material selection or addressing a design clash in a PIM). Guide the class in questioning the credibility, relevance, and reliability of the provided data (e.g., source accuracy, timeliness). <p>Small Group Activity:</p> <ul style="list-style-type: none"> • Divide students into groups to analyse the case study. Each group identifies potential solutions, evaluates the strengths and weaknesses of their arguments, and discusses how biases (e.g., anchoring or overconfidence) could impact their decisions. Groups present their structured reasoning and conclusions.
SP- PS	<p>Whole-Class Teaching and Learning:</p> <ul style="list-style-type: none"> • Demonstrate a flawed or incomplete PIM output (e.g., a design with missing cost data or inaccurate energy analysis). Facilitate a discussion on identifying errors, assessing the reliability of information, and suggesting improvement strategies. <p>Individual Activity:</p> <ul style="list-style-type: none"> • Students individually critique the PIM output, breaking the problem into parts and synthesising information to suggest improvements. They write a short report explaining their reasoning, including the importance of the information to the issue and their conclusions.

IS-WC

Individual Activity:

- Students are asked to research the range of software currently used in Construction modelling, with a report on what each may be used for in a building project. They could suggest the use of a particular software package for a given project, justifying why it would be appropriate for that type of build (real case study or a theoretical one).

Resources

This section has been created to provide a range of links and resources that are publicly available that you might find helpful in supporting your teaching and delivery of this unit in the qualification. We leave it to you, as a professional educator, to decide if any of these resources are right for you and your students, and how best to use them.

Pearson is not responsible for the content of any external internet sites. It is essential that you preview each website before using it to ensure the URL is still accurate, relevant, and appropriate. We'd also suggest that you bookmark useful websites and consider enabling students to access them through the school/college intranet.

Websites

Balkan Architect YouTube Channel – Balkan Architect

Offers video tutorials on using Revit for BIM tasks, including creating 2D and 3D models and advanced functionalities.

[Balkan Architect YouTube Channel](#)

Cults 3D – Cults 3D

Provides 3D printable models related to construction, including components for various construction phases.

[Cults 3D](#)

Designing Buildings Wiki – Designing Buildings

Provides detailed explanations of construction concepts such as Common Data Environment (CDE) and client briefs. Includes practical examples and guidance.

[Designing Buildings Wiki](#)

Energy Saving Trust – Energy Saving Trust

Provides information on insulation and other energy-saving measures for buildings, focusing on cost efficiency and environmental impact.

[Energy Saving Trust](#)

Homebuilding & Renovation – Homebuilding & Renovation

Features articles on construction trends, including 3D-printed houses and sustainable design practices.

[Homebuilding & Renovation](#)

IQ Glass UK – IQ Glass

Explains how to optimise natural light in architectural designs, adhering to UK building regulations and enhancing aesthetics.

[IQ Glass UK](#)

Kyro.ai – Kyro.ai

Discusses document management in construction, focusing on digital platforms for collaboration and efficient version control.

[Kyro.ai](#)

MasterSketchUp YouTube Channel – MasterSketchUp

Provides tutorials on using SketchUp, focusing on tools for creating 3D elements from 2D geometry.

[MasterSketchUp YouTube Channel](#)

McAvoy Construction – McAvoy Group

Features case studies on modular construction projects, showcasing the use of off-site manufacturing supported by BIM.

[McAvoy Construction](#)

NBS

Offers a comprehensive guide to the Asset Information Model (AIM), detailing its purpose and integration within the BIM process.

[NBS](#)

RICS – Royal Institution of Chartered Surveyors

Highlights cost analysis and benchmarking processes in construction, emphasizing clear documentation and accurate estimates.

[RICS](#)

Solar Energy UK – Solar Energy UK

Guides the incorporation of solar panels into building designs, detailing environmental and cost benefits.

[Solar Energy UK](#)

Technostruct Academy – Technostruct

Explains the integration of graphical and non-graphical data in Common Data Environments and their application in BIM.

[Technostruct Academy](#)

The CAD Room – The CAD Room

Explains the concept of the Project Information Model (PIM), its role in the BIM process, and its application during design and construction.

[The CAD Room](#)

Textbooks

Eastman, C. M., Teicholz, P., Sacks, R., & Liston, K. BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers (3rd Edition), Wiley, 2018 (ISBN 978-1119287537)

Hardin, B., & McCool, D BIM and Construction Management: Proven Tools, Methods, and Workflows (2nd Edition), Wiley, 2015 (ISBN 978-1118942765)

Mordue, S., Swaddle, P., & Philp, D. Building Information Modeling For Dummies, Wiley, 2015 (ISBN 978-1119060055)

Pearson paid resources also available

- [Pearson Student book](#)
- [ActiveBook \(a digital version of the Student Book, via ActiveLearn Digital Service\)](#)
- [Digital Teacher Pack \(via ActiveLearn Digital Service\)](#)

5. Pearson Qualification Support and Resources

This section provides information on support and resources that are available on the Pearson website for this qualification.

[Exam Wizard](#)

A free online resource containing a huge bank of past paper questions and support materials to help you create your own mock exams and tests

[Pearson Set Assignment Briefs \(PSABs\)](#)

These assignments are set by Pearson and marked internally by the centre. They should be used for all internal assessments on the course. There are specific PSABs for each internally assessed unit on the course.

[Purpose Statement](#)

This provides an overview of the qualification's key details. It outlines what students will study, the knowledge and skills they will develop, and any related subjects that complement the qualification. It also highlights potential progression routes for further learning and lists the Higher Education Institutes that have formally expressed their support and recognition for the qualification.

[Results plus](#)

A free online results analysis tool for teachers giving a detailed breakdown of students' performance in BTEC external assessments.

[Sample Assessment Material \(SAMs\)](#)

These resources illustrate the format and style of questions for the external assessment for this qualification. A mark scheme is also provided which shows how credit is awarded for these questions. The resources can be used to help prepare students for their external assessment.

[Specification](#)

This document contains an overview of the qualification, qualification purpose and structure, units including content and assessment, planning and implementing the qualification, qualification grade, glossary of terms used for internally assessed units, Transferable skills framework, digital skills framework, sustainability framework.

[Subject Adviser](#)

A dedicated subject adviser available throughout the year so please do get in touch if you would like any support or guidance with:

- Planning your courses
- Overview of BTEC quality assurance processes
- Suggested resources
- Teaching and Assessment of internal units and components
- Teaching external units and components
- The training and support materials we have available.

[Training](#)

Available training sessions can be booked here. On the left-hand side of the screen, select the qualification 'BTEC National' and subject. Where current training is available a list of titles, an overview of the training and dates will be provided giving teachers the option to select and book onto relevant sessions.

[Transferable Skills Guide for Teachers](#)

This guide provides an overview of the BTEC Transferable Skills Framework and how it has been used to integrate the delivery of these skills in the new suite of BTEC Level 3 and Level 2 qualifications starting in 2025.

[Transition Guide](#)

This guide provides an overview of what's new in the qualification, a comparison of the previous qualification to this new qualification, an overview of the assessment approach, a mapping guide to show where content is the same, updated or new.

Annexe

Curriculum Planning

The models in this section are intended to support your delivery planning and provide suggestions for the types and subjects of qualifications that might be delivered with this qualification.

Suggested combinations with other qualifications

This qualification can be combined in the following ways depending on the destination of students.

For students intending to progress to higher education to study Civil Engineering

Option 1	Option 2	Option 3
Maths Physics	AAQ Engineering Maths	Maths Design & Technology

For students intending to progress to higher education to study Architecture

Option 1	Option 2	Option 3
Design & Technology Art & Design	BTEC Art & Design Maths	Physics Art & Design

BTEC Key Terms

GLH – Guided Learning Hours, time the students have supervised teaching and learning

IV – Internal Verification, for internal quality assurance

Lead IV – the person responsible for the internal quality assurance across a qualification or programme subject area.

PSAB – Pearson Set Assignment Brief, used for summative internal assessments

SV – Standards Verification, for external quality assurance

Transferable Skills

Managing Yourself

Acronym	
MY-TPR	Taking Personal Responsibility
MY-PS&R	Personal Strengths and Resilience
MY-COP	Career Orientation Planning
MY-PGS	Personal Goal Setting

Effective Learning

Acronym	
EL-MOL	Managing Own Learning
EL-CL	Continuous Learning
EL-SRS	Secondary Research Skills
EL-PRS	Primary Research Skills

Interpersonal Skills

Acronym	
IS-WC	Written Communications
IS-V&NC	Verbal and Non-verbal Communications
IS-T	Teamwork
IS-C&SI	Cultural and Social Intelligence

Solving Problems

Acronym	
SP-CT	Critical Thinking
SP-PS	Problem Solving
SP-C&I	Creativity and Innovation

March 2025

For information about Pearson Qualifications, including Pearson Edexcel and BTEC qualifications visit [qualifications.pearson.com](https://www.pearson.com/qualifications)

Edexcel and BTEC are registered trademarks of Pearson Education Limited

**Pearson Education Limited. Registered in England and Wales No. 872828
Registered Office: 80 Strand, London WC2R 0RL.**

VAT Reg No GB 278 537121

