# Unit 301: Principles of planning, organising and pricing construction work

## Sample scheme of learning

This sample scheme of learning covers classroom based learning for Unit 301. It is based on 6 hours per session for 15 sessions, which includes hours for independent learning. Some suggestions of independent learning are made in the session plans.

**This is only an example of a possible scheme of learning. You can use it as it is, adjust it or extract content to suit your delivery needs, or the needs of individual learners. We have endeavoured to make the schemes of learning as flexible as possible: where sessions may be taught out of order, this has been signposted. You may find it useful to use our lesson plan template to translate and adapt the sessions.**

The schemes of learning are intended to be learner-focused, and they embrace current pedagogical methodology such as flipped and blended learning. They include the following types of learning tasks:

- **Pre-learning** – tasks for the learner to complete in advance of the session to allow for flipped learning
- **Active learning** – active, experiential and discovery learning approaches
- **Challenge focus** – stretching tasks to challenge more able learners
- **Independent learning** – tasks that learners can complete individually or collaboratively without tutor supervision. These tasks may be given as homework

Reference is made within the scheme of learning to learning materials and other resources required for each session. A version of this scheme of learning with **full supporting materials** is also available to purchase on **SmartScreen.co.uk**. Resources consist of physical equipment required, as well as any technologies needed. Where possible we have included blended learning activities that make good use of technology so as to help centres fulfil the minimum amount of digital teaching recommended by government.

The scheme of learning also signposts opportunities within the unit content to introduce the following wider skills and government initiatives:

- English, mathematics and ICT
- employability skills and behaviours
- British values (including the Prevent strategy)

Centres should also incorporate the following themes, where appropriate. Although they are not specifically referred to in the scheme of learning, City & Guilds regards these as essential in the teaching of the qualification:

- spiritual, moral, social and cultural issues.
- health and safety considerations, in particular the need to impress upon learners the fact that they must preserve the health and safety of others as well as themselves
- environmental education and related European issues

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# Unit 301: Principles of planning, organising and pricing construction work

## Sample scheme of learning

**Course/qualification**: Level 3 Advanced Technical Diploma in Architectural Joinery **Tutor's name**: _____

**Number of sessions**: 15 **Delivery hours**: 90 **Venue**: _____ **Group**: _____

| **Aims:** | **To enable learners to**: |
|---|---|
| • understand the way the construction industry is regulated<br>• understand energy efficiency and sustainable materials for construction<br>• understand how to estimate quantities and price work for construction<br>• understand how to plan work activities for construction<br>• understand how to communicate effectively in the workplace<br>• understand and use drawings and associated software. | • understand the regulations that regulate the construction industry and how they affect the way we work in construction<br>• understand materials that are used to insulate buildings and their application<br>• estimate construction work and calculate construction costs<br>• plan construction work activities<br>• communicate in the workplace<br>• understand the types of site documentation and how they are used. |

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**Session 1**: Health and safety regulations

**Suggested Teaching Time**: 6 hours

**Learning outcome 1:** Understand the way the construction industry is regulated

**Topics:** 1.1 – Health and safety regulations

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners will already be aware of the range of health and safety regulations that apply in the construction industry and will examine how these regulations are used to manage the risks that are involved in the construction process. Session to begin with a recap of the range of regulations.<br>**Active learning:**<br>• Learners to complete a tutor-provided worksheet in groups of three, identifying how each of the regulations they select are implemented within the construction process and outlining individual responsibilities in relation to them.<br>• Learners to split into small groups and brainstorm the individual responsibilities of the following members of the team under the regulations listed:<br>○ client<br>○ architect<br>○ employer<br>○ employee.<br>• In groups, learners to discuss which regulations are implemented at each of the following stages of the construction process:<br>○ pre-planning<br>○ construction phase<br>○ maintenance<br>○ demolition.<br>• In small groups access the following HSE webpage: www.hse.gov.uk/construction/resources/casestudies.htm. Select a case study to review as a group. Make notes of the strengths identified within the chosen case studies and share your findings with the rest of the group. | **Resources**<br>• Worksheet on health and safety regulations. Provide learners with a list of regulations and allow them to select two pieces of legislation and comment on the following: What is the main outline of the legislation and how will this affect you in the workplace?<br>• Worksheet to reinforce learning. Example content: Who is responsible for ensuring that the Health and Safety at Work Act is implemented in the workplace? Access the open learning HSE information.<br>www.hse.gov.uk/pubns/books/puwer.htm | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| • Plenary session to allow each group to present the strengths identified within the case studies selected.<br>• Arrange a visit to a local construction site for learners to view the safety precautions taken.<br>**Challenge focus:** Learners intending to extend their reading could review the following pages and summarise the key points:<br>• www.hse.gov.uk/construction/index.htm<br>• www.hse.gov.uk/construction/healthrisks/index.htm<br>• www.hse.gov.uk/construction/healthrisks/key-points.htm<br>**Independent learning:** Learners should complete a tutor-provided worksheet to check their understanding of how Building Regulations are implemented in construction. | Download the training booklet and read section 9 on training. Answer the three questions at the end of the script. Access the sites below and complete the calculator for HAV and WBV.<br>www.hse.gov.uk/vibration/wbv/calculator.htm<br>www.hse.gov.uk/vibration/hav/vibrationcalc.htm<br><br>**Materials**<br>• Interactive WB<br>• Computers | |

**Opportunities to develop maths, English, ICT and wider skills:**

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| **English:**<br>• Speaking and listening skills can be demonstrated in developing the discussion about regulations giving a point of view as well as allowing and responding to others' opinions.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information. | **Employability:**<br>• Learners should demonstrate self-analysis by identifying the skills needed in the tasks and using this to evaluate and prioritise their own strengths and skill gaps for development.<br>**British values:**<br>• Learners to develop their self-knowledge, self-esteem and self-confidence when taking part in the discussions.<br>• Talk about appropriate learner behaviour both at college and at work when in the classroom/workshop. |

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**Session 2**: Planning permission and building control

**Suggested Teaching Time**: 6 hours

**Learning outcome 1:** Understand the way the construction industry is regulated

**Topics:** 1.2 – Planning permission and building control

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners to research the details of the local authority in their area that is responsible for dealing with planning applications and building control and complete a tutor provided worksheet.<br>**Active learning:**<br>• Tutor-led discussion outlining the planning process, reasons for Planning Regulation, Local Plans, permitted developments, outline consent, reserved matters, detailed consent and Listed Building Consent. Learner should use their answers from the worksheet during the discussion.<br>• Learners to access the Planning Portal (www.planningportal.gov.uk/planning) and, in small groups, research the process required to make a planning application. Write a list of the mandatory documents required in a planning application. In their groups, learners should then create a flow chart showing the key stages in the planning application process.<br>• Groups to complete the following task: develop a chart indicating the actions to be taken in order to make a planning application for the development of a three-bedroomed house.<br>• Learners should outline the process for making an application for outline consent for the construction of a garage to an existing house.<br>• Read about listed buildings at the following link: https://historicengland.org.uk/listing/what-is-designation/listed-buildings and make a note of the main points. Learners should then outline the process for making an application to change the windows to a house in a Listed Building or in an Area of Outstanding Natural Beauty (AONB)<br>• Access the planning Portal (www.planningportal.gov.uk/permission) and look at the interactive guides. Note the requirements regarding fitting solar panels to the roof of an existing detached house and to a terraced house. Make notes on the process.<br>**Challenge focus:** Learners intending to extend their reading should review the following YouTube | **Resources**<br>• Worksheet on planning permission. Example content: What is the name of your local planning authority office? What is permitted development? What is outline permission?<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Knowledge multiple-choice questions | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| video explaining the Local Plan and its development.<br>• https://youtu.be/fiPau5w_J30<br>**Independent learning:** Some construction work can be carried out without the need to make a full application. Look at the Planning Portal and research the maximum size that an extension can be built to an existing property without full consent. This should be applied to an extension to a porch at the front of a building and a kitchen extension at the side of a building. Write a short report on what would happen if a building were constructed without planning permission. | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Speaking and listening skills can be demonstrated in developing the discussion about planning permission, giving a point of view as well as allowing and responding to others' opinions.<br>• Learners can demonstrate writing skills when producing their report on the importance of planning permission. Check that learners have used language appropriately. Ensure correct spelling, punctuation and grammar has been used.<br>**Maths:**<br>• Learners will need to understand how to measure length and width in a construction context, as part of the independent learning task. | **British values:**<br>• Maintaining the environment for the improvement of living conditions for everyone.<br>• An understanding of how citizens can influence decision-making through a democratic process.<br>**Employability:**<br>• Opportunity to accept feedback and identify areas for improvement, which employees do regularly in order to progress at work. |

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**Session 3**: Planning permission and building control

**Suggested Teaching Time**: 6 hours

**Learning outcome 1:** Understand the way the construction industry is regulated

**Topics:** 1.2 – Planning permission and building control

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners should research the building regulation Approved Documents online and write a summary of their purpose.<br>**Active learning:**<br>• Tutor-led discussion on the Building Regulations and reasons for their implementation.<br>• Group discussion about the scope and coverage of regulations and inspections.<br>• Learners to access the Building Regulations Website (www.gov.uk/government/collections/building-regulations) and access the approved documents. Complete a tutor-provided worksheet using the information online.<br>• In small groups, discuss the process of making an application for building regulations for the construction of a two-storey extension to an existing property. List the information that you will need to provide to make the planning application.<br>• Produce a chart showing the inspections that would need to be carried out by a Building Control Officer during the construction of a three-bedroomed house. Link these inspections to specific approved documents that show the regulations that are appropriate.<br>**Challenge focus:** Learners wishing to extend the scope of their learning may wish to access www.gov.uk/government/collections/building-regulations-research to research some of the documents relating to research of the scientific basis of Building regulation changes. Write a summary of your findings.<br>**Independent learning:** Access the planning portal, go to the section that covers applications then access the planning fee calculator. Complete the details online to calculate the cost of making an application for planning consent for an extension to a domestic dwelling. Make notes on the process and costs to feedback to the remainder of the group. | **Resources**<br>• Worksheet detailing all approved documents. Direct learners to select two regulations and write a short synopsis of the Approved Document content. (For detailed information see: www.gov.uk/government/collections/building-regulations)<br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners can demonstrate writing skills when producing a report about regulations. Check that learners have used formal language appropriately. Ensure correct spelling, punctuation and grammar has been used.<br>**Maths:**<br>• Learners to practise calculations involving money and time, as part of calculating the cost of making an application. Learners will need to use addition and multiplication in their calculations. Learners should be encouraged to use checking procedures to ensure their answer is correct.<br>**ICT:**<br>• Learners could use appropriate word-editing software to produce their charts. They should be encouraged to edit the document as well as use format and layout the content appropriately. | **British values:**<br>• Introduce and talk about the importance of identifying and combatting discrimination in the workplace and how it can be combatted through regulations.<br>**Employability:**<br>• Learners can experience working in a team as part of the case study exercise. Check that learners are working well together (letting one another have input, being positive, motivated etc) and all are contributing appropriately. |

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**Session 4**: Sustainable development

**Suggested Teaching Time**: 6 hours

**Learning outcome 2:** Understand energy efficiency and sustainable materials for construction

**Topics:** 2.1 – Sustainable development, 2.2 – Thermally insulated materials, 2.3 – Construction methods for insulation, 2.4 – Energy saving measures

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners should investigate the term 'sustainable development' and familiarise themselves with the meaning of the term, in order to complete a provided worksheet prior to the session. Learners should look up the Acronym BREEAM and find out what it stands for.<br>**Active learning:**<br>• In pairs or small groups, sustainable development should be discussed and the benefits of its use should be listed, in relation to social, economic and environmental benefits.<br>• In groups discuss the implementation of the BREEAM Code for sustainable homes and the impact on the design stage and the construction stage. Summarise the nine areas of focus highlighted in the code and their use in new development.<br>• Investigate Passive House requirements in pairs using www.passivhaus.org.uk. Look at the requirements for a building to be considered a Passive House and make notes.<br>  ○ The Space Heating Energy Demand<br>  ○ Space Cooling Energy Demand<br>  ○ The Primary Energy Demand<br>  ○ Airtightness<br>  ○ Thermal comfort<br>• In small groups discuss the construction processes that will meet the standards required for a property to be considered to meet the Passivhaus standards and make notes.<br>• In small groups look at the building Regulation Approved Document Part L Conservation of Fuel and Power. Link the regulations to SAP values and consider the TER (Target C02 Emission | **Resources**<br>• Worksheet on sustainability. Include the following: What does sustainability mean? Why do you think we need to maintain sustainability?<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| Rate) and the DFEE (Dwelling Fabric Energy Efficiency).<br>• Discuss the way in which the SAP rate of a structure is calculated related to initial design SAP and as Built SAP. Make notes and feedback on areas in groups.<br>• Discuss the implementation Energy Performance Certificates (EPCs) and their link to new buildings and SAP www.buildenergy.co.uk/sap_calculations/what-are-sap-calculations<br>• Make a list of the details that are considered to calculate SAP values for a building.<br>**Challenge focus:** Learners wishing to read further and gain a broader insight should read: Major challenges to sustainability (Hart 1997) Hart, S. (1997). "Beyond Greening." Harvard Business Review, January-February focusing on, developed economies, emerging economies, survival economies.<br>**Independent learning:** Watch the following videos and make notes on them:<br>www.youtube.com/watch?v=l6_cDwWq284<br>www.youtube.com/watch?v=Kve1QoAOJnk | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in the passive house task – identifying and summarising the main points about the requirements.<br>• Speaking and listening skills can be demonstrated in developing the discussion about the standards, giving a point of view as well as allowing and responding to others' opinions.<br>**Maths:**<br>• Learners will need to extract the relevant data from the information provided by the charts and graphs, when researching the EPCs. | **British values:**<br>• Remind learners about the importance of the laws of England and their purpose to protect citizens when looking at Building Regulations.<br>**Employability**<br>• Opportunity to listen and accept feedback and think about improving their performance.<br>• Talk about how learners might be able to contribute positively to wider society as part of the discussions about preserving the environment. |

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**Session 5**: Thermally insulated materials

**Suggested Teaching Time**: 6 hours

**Learning outcome 2:** Understand energy efficiency and sustainable materials for construction

**Topics:** 2.2 – Thermally insulated materials

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners should brainstorm and list a range of materials that they consider to have good insulation properties.<br>**Active learning:**<br>• Tutor led discussion on types of insulation used in construction processes and the way that insulation values are calculated.<br>• Brainstorming of areas of a dwelling that need to be insulated and why. Learners to complete provided worksheet.<br>• Brainstorming of types of materials that can be used to increase the thermal efficiency of a building. Learners should share their ideas from the pre-learning exercise, before completing provided worksheet.<br>• Group discussion on the way that insulation is manufactured and its impact on the environment.<br>• In groups, learners should access the internet to complete worksheet on thermal values. Answers should be discussed with the wider group.<br>• All learners to make a list of the areas within a structure that have insulation incorporated in to them.<br>• Learners to consider how insulation can be incorporated in:<br>  ○ floors<br>  ○ walls<br>  ○ windows<br>  ○ doors | **Resources**<br>• Worksheet on insulation. Ask the question: why do we insulate our homes? Provide an outline sketch of a dwelling to allow learners to indicate where heat loss takes place.<br>• Worksheet showing images of sustainable materials. Learners to name each material and state where it would be used in a structure. (For background information see: www.sustainablematerials.org.uk/resource)<br>• Worksheet on U-values and how they're calculated. Provide learner with an example cavity wall to practice | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| ○ roof areas.<br>• Draw pencil sketches of each of the above, showing the types of insulation used and how they are positioned to insulate a building.<br>• Learners to complete worksheet on construction methods.<br>**Challenge focus:** Learners should consider the term 'cold bridging' and discuss ways of overcoming it in construction.<br>**Independent learning:** Access the following site and make notes:<br>www.knaufinsulation.co.uk/media/1226749/kine2195bro-part-l1a-brochure.pdf | calculation of U-value. (For background information see: www.kingspaninsulation.co.uk/Services/U-Value-Calculator.aspx)<br>• Worksheet on construction methods to reduce heat loss. Example content to consider: position of doors, location of bathrooms, commencing work in the summer months, position of building, compliance with Building Regulations.<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | |

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**Session 6**: Energy saving measures

**Suggested Teaching Time**: 6 hours

**Learning outcome 2:** Understand energy efficiency and sustainable materials for construction

**Topics:** 2.4 – Energy saving measures

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners should investigate the term 'renewable energy' and write their own definition of it to bring to the session.<br>**Active learning:**<br>• In pairs or small groups make a list of renewable energy sources. Groups should then consider how these energy sources can be incorporated into a building.<br>• Discuss in pairs the ways in which air enters a building and how we can construct a building to ensure that we control the flow of air. As a group discuss the findings and share the information (tutor to list the various ways).<br>• Group discussion about conservation of power in buildings and saving electricity. List the ways in which power can be saved, considering the following areas:<br>  ○ Lighting<br>  ○ Water usage<br>  ○ Heating<br>• Discussion on carbon footprints and the ways that energy can be saved by its reduction. Brainstorm ways of reducing the carbon footprint by using locally sourced materials. Make a list of the materials that increase the carbon footprint and consider ways to mitigate this.<br>• Group to watch the following video clips:<br>  ○ www.youtube.com/watch?v=UtlP-GADL5U<br>  ○ www.youtube.com/watch?v=wbQ6Gh3sEsM<br>  ○ www.youtube.com/watch?v=1L54y6pVYCA | **Resources**<br>• Worksheet on EPCs. Learner to explain: What is an Energy Performance Certificate (EPC)? What is its purpose?<br>Worksheet providing a number of scenarios in which the learner must choose appropriate sustainable materials and construction methods and justify the choice. (For background information see: www.planningportal.gov.uk/buildingregulations/greenerbuildings/epc<br><br>**Materials**<br>• Interactive WB<br>• Computers | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| Group discussion to follow each clip to discuss the content.<br>• Learners to access the Planning portal through the following link: www.planningportal.gov.uk/buildingregulations/greenerbuildings/epc. Learners should also visit www.gov.uk/government/collections/energy-performance-certificates and look at the areas monitored by an Energy Performance Certificate. Using the information found, complete a provided worksheet on Energy Performance Certificates (EPC)<br>• Learners to consider the scenarios in a tutor-provided worksheet to review their understanding.<br>**Challenge focus:** Learners wishing to read further and gain a broader insight should read: Major challenges to sustainability (Hart 1997) Hart, S. (1997). "Beyond Greening." Harvard Business Review, January-February.<br>focussing on, Developed economies, Emerging economies, Survival economies.<br>**Independent learning:** Learners wishing to extend their reading could access:<br>1. www.youtube.com/watch?v=l6_cDwWq284<br>2. www.youtube.com/watch?v=Kve1QoAOJnk | • Cue cards | |

**Opportunities to develop maths, English, ICT and wider skills:**

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| **English:**<br>• Learners can practise using appropriate reading strategies to locate the key information within the planning portal. They should be encouraged to use organisational features (e.g. contents, headers, pictures) to find relevant parts.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information about renewable energy. | **British values:**<br>• Talk about how learners might be able to contribute positively to wider society as they research the importance of sustainable development.<br>• Talk about how learners may come into contact with wider public institutions such as the BREEAM, the need for learners to respect them, and why they are important in ensuring sustainable working practices are adopted.<br>**Employability:**<br>• Learners can demonstrate their ability to generate and select new ideas, and develop them more fully as part of the brainstorming task.<br>• Learners should have an understanding of the wider current issues in the |

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| | construction industry (e.g. recent legislation, reduction of green belts) from watching and making notes on the YouTube videos provided. |

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**Session 7**: Tendering process

**Suggested Teaching Time**: 6 hours

**Learning outcome 3:** Understand how to estimate quantities and price work for construction

**Topics:** 3.1 – Tendering process, 3.2 – Calculate quantities of building materials, 3.3 – Prepare a quote

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners to watch the following video prior to the session to introduce them to what tendering is www.youtube.com/watch?v=vhr388zPgC0<br>**Active learning:**<br>• Tutor-led discussion on how construction work is costed and tendered.<br>• As a class watch and discuss the following video: www.youtube.com/watch?v=TNCE0X2znUs<br>• Tutor to outline procurement methods and, as a class, discuss the different forms of tender, to include:<br>  ○ Open tendering<br>  ○ Closed tendering<br>  ○ Competitive tendering<br>  ○ Selective tendering<br>• Learners to research online to find definitions of the following terms:<br>  ○ Preliminaries<br>  ○ PC sums<br>  ○ Penalty clauses<br>  ○ Retentions<br>  ○ Valuations<br>• Learners to compare the following supplier types and make notes on their main differences:<br>  ○ Preferred | **Resources**<br>• Worksheet on tendering. Provide opportunity for learner to explain the following: explain what a quote is; explain what an estimate is; summarise the difference between an estimate and a quote.<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| ○ Nominated<br>○ Locally sourced<br>Learners should complete tutor-provided worksheet to check their understanding.<br>**Challenge focus:** Learners wishing to extend their learning should read *Estimating and Tendering for Construction Work* by Martin Brook.<br>**Independent learning:** Use a search engine to find two software tools that can be used for estimating – compare the features and cost of the two selected. | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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| **English:**<br>• Speaking and listening skills can be demonstrated in developing the discussion about tendering, giving a point of view as well as allowing and responding to others' opinions.<br>**Maths:**<br>• Learners will need to calculate volume and linear measurements in a construction context, as part of the costing task.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information about tendering terms. | **British values:**<br>• Enable learners to acquire a broad general knowledge of and respect for public institutions and services in England.<br>**Employability:**<br>• Learners should demonstrate they can actively listen during discussions, understand what has been said and respond accordingly by making notes. Learners should be encouraged to use techniques to ensure they understood the talk eg repeating back what was said, summarising or asking clarifying questions. |

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**Session 8**: Calculate quantities of building materials

**Suggested Teaching Time**: 6 hours

**Learning outcome 3:** Understand how to estimate quantities and price work for construction

**Topics:** 3.2 – Calculate quantities of building materials

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:**<br>Watch the short YouTube video on electronic estimating tools www.youtube.com/watch?v=kButmtldxRY and make some brief notes on the main points covered.<br>**Active learning:**<br>• Group discussion on methods used to calculate the cost of a small building project. Learners to share their observations on the pre-learning video.<br>• As a class, discuss the following documents used to cost building works:<br>○ drawings<br>○ specifications<br>○ schedules<br>○ bill of quantities<br>○ contracts.<br>Learners should then complete a tutor provided worksheet individually.<br>• With the aid of a set of drawings and basic specification from the tutor, learners to measure the quantities of materials needed to build a small domestic garage. Calculate the quantities of materials required, including waste and disposal of waste, to build the garage.<br>• Learners to complete a tutor-provided worksheet individually. Discuss answers as a class.<br>• Split the class into small groups. Each group should be provided with a set of plans for one of | **Resources**<br>• Worksheet on documents used to cost building work. Summarise how each of the following can be used when calculating the quantities of materials required for building work: specifications/drawings, schedule, bill of quantities.<br>• Worksheet giving the learner examples of basic room area to calculate sheet materials required. Include regular and irregular shapes and instruct the learner to allow for 15% wastage in the final calculation. | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| the below, which they should complete and then share with the rest of the class:<br>○ Prepare a window schedule from a set of plans.<br>○ Prepare an internal door schedule from a set of plans.<br>○ Prepare an ironmongery schedule from a set of plans.<br>**Challenge focus:** Compare the difference in cost of constructing the garage in brickwork or block and render.<br>**Independent learning:**<br>Look at the following videos on YouTube and make notes on the points raised:<br>www.youtube.com/watch?v=r6-uNcPwGt4<br>www.youtube.com/watch?v=wPR_KoSSofA<br>www.youtube.com/watch?v=Er1FsdNblrc<br>www.youtube.com/watch?v=vhr388zPgC0 | **Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **Maths:**<br>• Learners to practise calculations involving quantities in a construction context, as part of the group activities. Learners will need to use addition, subtraction and multiplication in their calculations. Learners should be encouraged to use checking procedures to ensure their answer is correct. | **British values:**<br>• Learners to develop their self-knowledge, self-esteem and self-confidence when taking part in discussions.<br>**Employability:**<br>• Learners can demonstrate they are financially aware by finding economical ways of doing things, suggesting possible cost-savings and ways of improving profits in the costing task. They should be encouraged to recognise the implications of waste (both time and resources) in their planning. |

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**Session 9**: Prepare a quotation

**Suggested Teaching Time**: 6 hours

**Learning outcome 3:** Understand how to estimate quantities and price work for construction

**Topics:** 3.3 – Prepare a quotation

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Using online research, learners to establish an hourly rate for labour for each of the following:<br>○ General Operative<br>○ Bricklayer<br>○ Carpenter.<br>**Active learning:**<br>• In small groups, complete provided worksheet**,** listing the information required for preparing a quote.<br>• Using the information gathered from the measuring process, prepare a quote to carry out the building work required.<br>• Detail the labour cost<br>• By research through local merchants, establish the materials cost for:<br>○ Cost of hiring plant and equipment.<br>○ Depreciation cost of own equipment<br>○ VAT cost at current rate<br>• Write a letter to the client providing an overview of the work to be carried out, stating the expected start and finish dates and the expected working hours. Outline the cost to complete the project showing costs for: | **Resources**<br>Worksheet on preparing a quote. Direct learners to list the information that is required within a quote for a building project. (For background information see: www.quotetemplate.org/ms-excel-templates/template25.html)<br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| ○ Material<br>○ Labour<br>○ Plant and equipment<br>○ Clearance of waste<br>○ Profit<br>○ VAT at current rate<br>**Challenge focus:** Discuss VAT and identify the type of projects that are subject to this charge.<br>**Independent learning:** look at the website below<br>www.google.co.uk/?gws_rd=ssl#q=vat+rules+on+building+projects<br>www.constructionbusinessowner.com/topics/strategy/construction-company-management/9-necessary-numbers-you-need-know-keep-your-company | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners can demonstrate writing skills when writing their letter. Check that learners have used formal language appropriately. Ensure correct spelling, punctuation and grammar has been used.<br>**Maths:**<br>• Learners to practise calculations involving time and money as part of working out the total costs. Learners will need to use addition, subtraction and multiplication in their calculations. Learners should be encouraged to use checking procedures to ensure their answer is correct. | **Employability:**<br>• Opportunity to accept feedback and identify areas for improvement, which employees do regularly in order to progress at work.<br>• Learners can demonstrate they are financially aware by finding economical ways of doing things, suggesting possible cost-savings and ways of improving profits in the project planning task. They should be encouraged to recognise the implications of waste (both time and resources) in their planning. |

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**Session 10**: Planning construction works

**Suggested Teaching Time**: 6 hours

**Learning outcome 4:** Understand how to plan work activities for construction

**Topics:** 4.1 – Planning construction works

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** All learners to watch the following YouTube videos on bar charts:<br>www.youtube.com/watch?v=TjxL_hQn5w0<br>www.youtube.com/watch?v=YndeX-U04HA<br>www.youtube.com/watch?v=YndeX-U04HA<br>Learners should make notes summarising the main points of each video.<br>**Active learning:**<br>• Tutor-led discussion on planning construction work. Learners to complete tutor-provided worksheets.<br>• In small teams list the order of works to be carried out to construct a two-storey house, from site clearance to completion. Teams to compare the lists created and discuss any differences in approach.<br>• Discuss the timescales required to complete each phase of the constructions work and identify where some works may be possible to complete simultaneously.<br>• Using a provided worksheet to create a bar chart (GANTT) to show the programme for the works to be completed. Teams to present their charts to the main group<br>• Group to watch the following YouTube clip on critical path analysis: www.youtube.com/watch?v=LsbnHNAkfVQ<br>• Invite a speaker from a local construction company to come and give a talk to learners about how they plan construction works on site.<br>**Challenge focus:** Some learners may wish to access: | **Resources**<br>• Worksheet on construction planning. Ask learners to research and list below the benefits of planning the sequence of material and labour requirements. Refer to: www.homebuilding.co.uk/advice/project-tips/project-management/self-build-project-planner or use an appropriate search engine.<br>• Worksheet on planning methods. Research and identify planning methods used in construction. Produce a mind map and an explanation of methods.<br>• Worksheet on bar charts. Provide a Gantt chart | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| www.cimt.plymouth.ac.uk/projects/mepres/alevel/discrete_ch12.pdf for further information on this subject.<br>**Independent learning:** Learners to access the following clips and write a report on their findings:<br>www.google.co.uk/?gws_rd=ssl#q=critical+path+analysis+for+construction+projects<br>www.smartsheet.com/critical-path-method | template and direct the learners to complete proposed construction operations and time duration of each. (For background information see: http://creately.com/blog/diagrams/use-gantt-chart-plan-project)<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in pre-learning task – identifying and summarising the main points about bar charts<br>• Learners can demonstrate writing skills when writing their report. Check that learners have used formal language appropriately. Ensure correct spelling, punctuation and grammar has been used.<br>**ICT:**<br>• Learners could use appropriate spreadsheet software to present their Gantt chart. | **British values:**<br>• Enable learners to develop their self-knowledge, self-esteem and self-confidence.<br>**Employability:**<br>• Learners to learn how to use feedback by listening openly, accepting both praise and criticism, as part of getting peer comments on their group work. They should be encouraged to clarify any feedback as needed and think of their own next steps for improvement.<br>• Learners should demonstrate they can actively listen during the guest speaker's talk, understand what has been said and respond accordingly |

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| | by making notes. Learners should be encouraged to use techniques to ensure they understood the talk eg repeating back what was said, summarising or asking clarifying questions. |

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**Session 11**: Statutory safety documentation

**Suggested Teaching Time**: 6 hours

**Learning outcome 4:** Understand how to plan work activities for construction

**Topics:** 4.2 – Statutory safety documentation

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners to access the HSE website and access one of the following:<br>www.hse.gov.uk/risk/casestudies/bricklayers.htm<br>www.hse.gov.uk/risk/casestudies/woodworking.htm<br>www.hse.gov.uk/risk/casestudies/plasterers.htm<br>Look at this to prepare for the session and download a copy. All learners to select a work activity to use for a risk assessment.<br>**Active learning:**<br>• Learners to complete worksheet.<br>• Learners to give their selected work activity to another member of the group to produce a risk assessment (access HSE site www.hse.gov.uk/risk/controlling-risks.htm and use the template provided for the RA). Each learner to run through the risk assessment with another member of the group.<br>• Learners to follow on and produce a Method Statement for the same piece of work.<br>• Access the HSE website www.hse.gov.uk/comah/sragtech/techmeaspermit.htm and locate the factors that could contribute towards a major incident or hazard that could be controlled by a permit to work.<br>**Challenge focus**. Learners may wish to extend their study by reading www.hse.gov.uk/pubns/books/hsg150.htm<br>**Independent learning:** Access the HSE website and summarise the requirements for carrying out work for domestic clients. www.hse.gov.uk/construction/areyou/domestic-client.htm | **Resources**<br>• Worksheet on safety documentation. Explain the purpose of each of the following: risk assessment, method statement, permit to work.<br>**Materials**<br>• Interactive WB<br>• Computers<br>• Risk assessment template<br>• Method statement template | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in the worksheet tasks as they identify the correct information to answer the comprehension questions about health and safety measures.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information about safety. | **Employability:**<br>• Learners should demonstrate they can actively listen during the tasks, understand what has been said and respond accordingly by considering their response. Learners should be encouraged to use techniques to ensure they understood the question eg repeating back what was said, summarising or asking clarifying questions.<br>• As part of the discussion learners should show support for their peers by showing respect, empathy and motivating them as needed. |

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**Session 12**: Written and oral communication

**Suggested Teaching Time**: 6 hours

**Learning outcome 5:** Understand how to communicate effectively in the workplace

**Topics:** 5.1 – Written and oral communication

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners to complete worksheet on communication methods prior to the session.<br>**Active learning:**<br>• Tutor-led discussion on the use of site documentation to include:<br>○ site diaries<br>○ toolbox talks<br>○ accident books<br>○ meeting agendas<br>○ minutes of meetings<br>• Group discussion regarding the strengths and weaknesses of the following communication methods:<br>○ telephone communication<br>○ oral communication<br>○ emails<br>○ memos<br>Learners to then complete tutor-provided worksheet individually**.**<br>• Individuals to list the strengths and weaknesses of each method of communication and discuss them with the group. Learners should complete provided worksheet as a group.<br>• Learners should prepare a toolbox talk. All learners to select a piece of equipment that is regularly used in construction and: | **Resources**<br>• Worksheet on communication methods. Provide learners with a blank table to populate with descriptions of communication methods used during construction activity. Include columns for categories and methods.<br>• Worksheet on good communication. Provide the learners with opportunity to express three reasons why good communication is vital during construction activity. Allow extension to five reasons for differentiation.<br>• Worksheet on how key personnel communicate on site. List professional and operative site staff and workers and list methods of | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| ○ list the dangers in using the piece of equipment<br>○ list the PPE required to use the equipment<br>○ list any accidents that have been recorded using this piece or type of equipment.<br>○ run through the regular maintenance for the equipment.<br>On completion, each learner will then deliver the talk to the rest of the group.<br>• Learners to coordinate a team lift. Initial discussions with the group (tutor led) regarding the considerations prior to lifting and the maximum recommended weight that can be lifted by one person. Groups to consider the following:<br>○ Consider alternatives ie machine lifting.<br>○ Coordinate a lift – prepare a checklist of the considerations prior to lifting.<br>○ Establish an item of material that is too heavy to be lifted by one person.<br>○ Identify exactly how heavy the item is in Kg.<br>○ Consider the distance that the item needs to be moved.<br>○ Consider the terrain, steps, doors, obstacles and final position of the item.<br>○ Will the lift be made in one continuous move or will there be a stage process?<br>○ Consider where the item is to be placed.<br>○ Instruct the team of the process.<br>○ Carry out the lift in groups of two.<br>• Learners should draft a letter that they could send out to prospective customers that have made an application for planning consent. The letter should serve to introduce themselves as a contractor to cost for and carry out the construction work that the applications are made for.<br>• Prepare an agenda for a site meeting in groups of two or three learners. Decide the items that will be included, make a list of the staff etc attending and decide a time for the meeting and a proposed time the meeting will take.<br>**Challenge focus:** Access the HSE website www.hse.gov.uk/construction/induction.pdf | communication typically used.<br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| Download the toolbox talk for small builders. Run through the talk and present it to the group.<br>**Independent learning:** Learners to access the HSE website. www.hse.gov.uk/construction/resources/toolboxtalks.htm<br>Look at the range of toolbox talks that are available and read the content. | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Speaking and listening skills in presenting can be developed during the toolbox talk task. Learners to use the correct format with an introduction, supporting evidence and statements, and conclusions. They should adapt the content to suit the audience and purpose.<br>• Learners can demonstrate writing skills when writing their letters and agendas. Check that learners have used formal language appropriately. Ensure correct spelling, punctuation and grammar has been used. | **British values:**<br>• Enable learners to develop their self-knowledge, self-esteem and self-confidence.<br>**Employability:**<br>• Learners can demonstrate how they change their communication style to suit their audience in the toolbox talk. Use of appropriate language, tone and body language should be analysed. Learner should have successfully identified the purpose of the presentation is to inform and acted accordingly. |

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**Session 13**: Manual drafting

**Suggested Teaching Time**: 6 hours

**Learning outcome:** Understand and use drawings and associated software

**Topic:** 6.1 – Manual drafting

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Active learning:**<br>• Tutor-led discussion on construction drawings.<br>• Learners should use provided worksheet to fill in a range of hatchings used on construction drawings.<br>• Learners to draw a plan view of the ground floor of a domestic dwelling to scale, given the sizes and layout by the tutor.<br>• Tutor to provide an example of a small domestic dwelling for the group to reproduce in plan and elevations.<br>Group members to select an item to produce a detailed drawing in isometric from the examples shown below:<br>○ brick<br>○ panelled door.<br>**Challenge focus:**<br>**Independent learning:** Learners to complete tutor-provided worksheet to check their learning. | **Resources**<br>• Worksheet on hatchings. Provide example illustrations of hatchings for a range of materials and direct learners to identify each example.<br>• Worksheet consisting of multi choice questions to check accuracy of learning from previous sessions.<br><br>**Materials**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in the worksheet tasks as they identify the correct information to answer the comprehension questions.<br>**Maths:**<br>• Learners will need to measure length/width/height/weight using the correct measurements in a construction context, as part of the drawing activities. | **British values:**<br>• Enable learners to develop their self-knowledge, self-esteem and self-confidence.<br>**Employability:**<br>• Team working, communication. |

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**Session 14**: Computer Aided Design (CAD)

**Suggested Teaching Time**: 6 hours

**Learning Outcome:** Understand and use drawings and associated software

**Topic:** 6.2– Computer Aided Design (CAD)

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| Learners should be aware of the range of computer drawing software packages available and the hardware required to run them. They do not need an in-depth working knowledge of each system but they do need to know that there is a range of options and that these vary considerable in complexity and cost. Learners will be able to compare advantages and disadvantages of Computer Aided Design (CAD) programs to traditional drawing methods.<br>It would be an advantage for learners to develop CAD software skills, however, this will not be assessed.<br>**Pre-learning:** Learners to access the internet and research three types of CAD software that are available to purchase online.<br>**Active learning:**<br>• Learners will look at a range of CAD software and compare the features to select the one that is best suited to produce Architectural drawings for construction. Features should include:<br>○ 2D, 3D<br>○ Suited to architecture<br>○ Available for pre-purchase trial<br>○ Building design capability<br>Split the class into groups. Each group to research one of the following CAD software providers and secure a trial of the software, eg:<br>www.autodesk.com/free-trials | **Resources**<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| www.hongkiat.com/blog/free-cad-software<br>http://download.cnet.com/windows/cad-software<br>www.techsupportalert.com/best-free-cad-computer-aided-design-programs.htm<br>http://sourceforge.net/projects/free-cad<br>www.cadsoftwaredirect.com<br>www.deltacad.com<br>http://cad.softwareinsider.com<br>www.solidworks.com<br>Access the trial software and look at the features provided by the providers. Present your findings to the rest of the class. As a class, you should then decide which one best suits your needs.<br><br>**Challenge focus:** Some learners may wish to produce a basic drawing by using a CAD programme.<br>**Independent learning:** Find a software supplier that offers a free trial of the product for 30 days and access the software. | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in the worksheet tasks as they identify the correct information to answer the comprehension questions.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information about CAD software. | **Employability:**<br>• Learners can demonstrate they are financially aware by finding economical ways of doing things, suggesting possible cost-savings and ways of improving profits in the software comparison. They should be encouraged to recognise the implications of waste (both time and resources) in their planning.<br>• Learners are able to prove their decision-making skills during the class discussion and decision on CAD software. Ensure that the learners demonstrate they have reviewed and weighed up all the available options |

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| | before making an appropriate decision based on the evidence and justifying it. |

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**Session 15**: Building Information Modelling (BIM)

**Suggested Teaching Time**: 6 hours

**Learning outcome:** Understand and use drawings and associated software

**Topic:** 6.3 – Building Information Modelling (BIM)

| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Pre-learning:** Learners to research the term 'BIM' and establish the meaning.<br>**Active learning:**<br>• Group to watch the video clip 'What is BIM': www.thenbs.com/knowledge/what-is-building-information-modelling-bim.<br>• Group discussion regarding BIM and its use in construction.<br>• Group to look at the following video clip: www.autodesk.com/solutions/bim/overview<br>• Group to access RICS site and read the description of BIM.<br>• Make a list of the key points about the implementation of BIM in the UK.<br>• Access the site below and research the schedule for introduction of BIM to all Government-led projects by 2016: www.building.co.uk/the-route-to-bim-in-10-steps/5049305.article<br>• Using worksheet make some notes on how the following processes are utilised by the use of BIM:<br>  ○ 3D modelling<br>  ○ building simulation<br>  ○ data management<br>  ○ building operation<br>  ○ change management.<br>Use the points to discuss the advantages of using this system.<br>**Independent learning:**<br>Access the BRE site to establish the requirements of level 2 BIM: www.bre.co.uk/academy/page.jsp?id=3516 | **Resources**<br>• Worksheet providing opportunity to state how featured processes are enhanced and integrated by the use of BIM.<br>• Interactive WB<br>• Computers<br>• Cue cards | • Completed worksheets<br>• Directed questions and assess knowledge understanding<br>• Group exercises |

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| Key learning activity/approach | Suggested materials and resources | Skills check |
|---|---|---|
| **Challenge focus:**<br>Further reading:<br>• www.amazon.co.uk/Building-Information-Modeling-For-Dummies/dp/1119060052/ref=pd_sim_14_7?ie=UTF8&dpID=51aY5UvedRL&dpSrc=sims&preST=_AC_UL160_SR127%2C160_&refRID=0MV8FQHABW0YQAGNW3AN | | |

**Opportunities to develop maths, English, ICT and wider skills:**

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|---|---|
| **English:**<br>• Learners demonstrate reading skills in the worksheet tasks as they identify the correct information to answer the comprehension questions.<br>**ICT:**<br>• Learners have the opportunity to use advanced search techniques to locate, select and evaluate relevant online sources that provide suitable information about BIM. | **Employability**<br>• Learners can experience working in a team as part of the group activity. Check that learners are working well together (letting one another have input, being positive, motivated etc.) and all are contributing appropriately. |

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