

# Unit 5: Construction Technology and Design in Construction and Civil Engineering

<b>Unit code:</b>	<b>T/600/0283</b>
<b>QCF Level 3:</b>	<b>BTEC Nationals</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

The aim of this unit is to enable learners to gain knowledge of construction methods and factors that influence design, and develop skills in communicating ideas between team members and in translating construction details into written and graphical instructions.

## ● Unit introduction

In recent times we have built far bigger and far more complex buildings than before. For many years the UK has been among the market leaders in this field and UK construction workers are taking their knowledge and expertise all over the world.

Modern developments in construction technology and materials have enabled us to create more efficient and complex structures. The ability to design, plan and communicate ideas effectively is essential if a project is to be translated from an idea into reality. Poor communication will lead to poor construction.

This unit will encourage learners to develop their understanding of the design process and to recognise the contribution of other members of the design team.

Planning and organising design activities is related to the decision-making process and the likely outcomes of decisions taken by the team within a legal framework should be considered in the wider social context, rather than as simple subjective preferences.

This unit will enable learners to cope with the requirements of construction-related projects as they pass through various stages from design to construction, including the implications of changes and variations in the design. Learners will develop their ability to produce clear drawings of construction components, using both manual and CAD techniques, together with succinct and accurate explanations that specify for builders the exact characteristics of relevant construction details. Use of scale, proportion and appropriate description is expected of all successful learners.

Learners will be able to use appropriate design and planning procedures to specify for and communicate to other team members involved in a construction project requirements for the technical components of buildings.

## ● Learning outcomes

### On completion of this unit a learner should:

- 1 Know the factors that influence the design process
- 2 Be able to communicate ideas between various members of the design and production teams
- 3 Know about construction methods
- 4 Be able to translate construction details into written and graphical instructions.

# Unit content

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## 1 Know the factors that influence the design process

*Factors:* financial; social; client needs; legal and environmental constraints for the design team (building regulations, health, safety and welfare); Construction Design and Management (CDM) Regulations; planning acts

*Design process:* need for and benefits of a structured framework for design eg RIBA (Royal Institute of British Architects) Architect's Plan of Work/Job Book; characteristics of individual stages; factors that affect each stage; ways in which various stages interconnect

## 2 Be able to communicate ideas between various members of the design and production teams

*Design team:* client; architect; architectural technologist; landscape architect; structural engineer; services engineer; facilities manager; qualifications

*Production team:* project manager; site manager; quantity surveyor; site engineer

*Legal implications:* legal position of each member of a design team; rights of client; damages; negligence; health, safety and welfare; environment

*Written communications:* brief (initial brief; after consideration of client's requirements; to aid design); decision-making process; factors that contribute to making design decisions; influence of such decisions on final project outcomes

## 3 Know about construction methods

*Construction methods:* characteristics, applications and limitations of traditional and modern methods of construction; influence of these on design; identification of multiple construction options to satisfy requirements of a given design; variety of construction options available to satisfy the primary and secondary requirements of a design; sustainability

*Terminology:* construction and architectural terminology to describe traditional and modern building elements and methods; terminology associated with legislation; health and safety and environmental factors

## 4 Be able to translate construction details into written and graphical instructions

*Specifications:* to meet requirements of client, building control and production team

*Sketch designs:* multiple options in sketch form to satisfy given brief and comply with technical, financial, legal and environmental constraints; drawings and documentation needed to make a formal planning and building regulations application; working drawings and details to facilitate construction, to include variations and superseded drawings; compliance with current British Standards, eg BS1192, Drawing Office Practice

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<b>P1</b> describe the factors that influence the design process [IE1, IE2, SM2, SM3, TW1, TW3]	<b>M1</b> explain for a complex project the operation and effectiveness of the RIBA Architect's Plan of Work	<b>D1</b> evaluate the effectiveness of the RIBA Architect's Plan of Work in terms of teamwork and the introduction of design changes after construction has started
<b>P2</b> explain the roles and responsibilities of the design team [IE1, IE2, TW1, TW3]	<b>M2</b> compare the methods recommended for communicating design changes to other members of the design team	
<b>P3</b> explain the roles and responsibilities of the production team [IE1, IE2, TW1, TW3]		
<b>P4</b> describe the legal implications that could arise from miscommunication [IE1, IE2, SM2, SM3]		
<b>P5</b> produce written communications between members of the design and production teams [IE1, IE2, CT1, CT2, CT3, CT4, SM2, SM3, TW1, TW3]		
<b>P6</b> describe construction methods using relevant terminology [CT1, CT2, CT4, SM2, SM3]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<b>P7</b> create specifications for construction details, providing suitable instructions for the construction team [CT1, CT2, CT4, SM2, SM3]	<b>M3</b> interpret tutor-provided construction details, using recognised technical and architectural terminology.	<b>D2</b> appraise a set of instructions that represent design modifications to the original contract.
<b>P8</b> produce sketch designs, plans, elevations, sections and details using standard conventions and symbols. [CT1, CT2, CT4, SM2, SM3]		

**PLTS:** This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills which are embedded in the assessment of this unit. By achieving the criteria, learners will have demonstrated effective application of the referenced elements of the skills.

<b>Key</b>	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators
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# Essential guidance for tutors

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## Delivery

Tutors delivering this unit have opportunities to use a wide range of techniques. Lectures, discussions, seminar presentations, site visits, use of manual and CAD drawing, research using the internet and/or library resources and use of personal and/or industrial experience are all suitable. Delivery should stimulate, motivate, educate and enthuse learners. Visiting expert speakers could add to the relevance of the subject.

Study of this unit depends on a prior knowledge and understanding of construction technology. An overview of the role of the design process, and the wider context within which it fits needs to be addressed at an early stage in delivery. Learners must be made aware that a wide range of professionals are involved in the design process contributing varying amounts to the design and implementation of projects.

Learners should understand the role and importance of the RIBA Architect's Plan of Work/Job Book in facilitating a well-organised process for building design. An awareness and understanding of the procedures adopted, and of the implications of design change, are also essential. In addition, learners need to appreciate the importance of effective communication between the design and production teams. Job descriptions and training needs for the design team, along with examples of relevant documentation, can provide a good basis for case study material to enhance and contextualise the learning experience.

Learners should develop an awareness and understanding of the ways in which legislative requirements, such as planning acts, building regulations and health and safety provisions, together with relevant areas of contract law impact on the design process. The effects of more recent concerns and provisions relating to environmental issues should also be addressed.

A key element of delivery should include developing an ability to produce sketch designs, plans, drawings and/or sketches of construction details using standard conventions and symbols. Learners should be encouraged to develop their ability to draw plans and details for buildings that are functional, and also to express themselves within a design context. This should normally be restricted to the building types studied in *Unit 6: Building Technology in Construction* ie low-rise domestic and/or commercial buildings. Conversion projects would also be suitable for this purpose whereby floor layout and accommodation arrangements may provide suitably demanding projects for learners to develop their understanding of these issues.

Learners will need to grasp the need for accurate scale drawings showing salient and important information for construction teams. The ability to translate the information contained in drawings into meaningful, written technical terminology is essential.

Where possible, links should be formed with design practices and construction firms, with visits arranged to enable learning to be contextualised. The learning process could be enhanced further by seeking specialised input from current practitioners.

Overall delivery of the unit should be supported by case studies and visual media, where appropriate, including photographs, videos, DVDs and drawings to demonstrate the role of the design process in the construction of buildings.

Group activities are permissible, but tutors will need to ensure that individual learners have equal experiential and assessment opportunities.

**Health, safety and welfare issues are paramount and should be reinforced through close supervision of all workshops and activity areas, and risk assessments must be undertaken before practical activities are taken. Centres are advised to read the *Delivery approach* section in the specification, and *Annexe H: Provision and Use of Work Equipment Regulations 1998 (PUWER)*.**

## Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

### Topic and suggested assignments/activities and/assessment

Introduction to unit content

Introduction to the factors that influence the design process and the need to work with others to create a suitable design solution

Whole-class teaching – financial and regulatory factors: implications of financial, social and clients needs

Group work to investigate the legal and environmental constraints for design teams (Building Regulations, health, safety and welfare) and CDM (Construction Design and Management) Regulations, using knowledge gained from other units and research

Tutorial/class discussion on the legal and environmental constraints for design teams (building regulations, health, safety and welfare) CDM (Construction Design and Management) Regulations

Whole-class teaching – a brief outline of the stages of the design process: need for and benefits of a structured framework for design eg RIBA Architect's Plan of Work/Job Book

Group work to investigate various stages of RIBA Architect's Plan of Work/Job Book: characteristics of individual stages; factors that affect each stage; ways in which various stages interconnect

Tutorial/class discussion on various stages of the RIBA Architect's Plan of Work/job book: characteristics of individual stages; factors that affect each stage; ways in which various stages interconnect

Whole-class teaching – a brief outline of design team members (client, architect, architectural technologist, landscape architect, structural engineer, services engineer, facilities manager); qualifications, roles and responsibilities; interactions

Group work to investigate design team member qualifications, roles and responsibilities and interactions between team members, followed by class discussion

Group work to investigate production team: team members (project manager, site manager, quantity surveyor, site engineer)

Whole-class teaching – roles and responsibilities in design office and on site; communication between designer, client and production team

Introduction to the importance of good communication of ideas between members of the design and production teams, using graphical and written documents to determine design strategy

Whole-class teaching – client brief; initial brief, consideration of client requirements, final design

Whole-class teaching – decision-making process: factors that contribute to making design decisions; influence of decisions on final project outcomes

Whole-class teaching – legal aspects: legal position of each member of a design team; rights of client; damages; negligence; health, safety and welfare; environment; CDM

## Topic and suggested assignments/activities and/assessment

### Assignment 1: Design Processes, Procedures and Communications

Introduction to the use of relevant technical and architectural terminology to describe and specify aspects of construction technology and design

Whole-class teaching – construction methods: characteristics, applications and limitations of traditional and modern methods of construction; influence of these on design; identification of multiple construction options to satisfy requirements of a given design; variety of construction options available to satisfy the primary and secondary requirements of a design. Understanding of sustainable construction and the associated legislation

Whole-class teaching – construction and architectural terminology to describe traditional and modern building elements and methods

Whole-class teaching – sketch designs: multiple options in sketch form to satisfy given brief and comply with technical, financial, legal and environmental constraints

Whole-class teaching – terminology associated with legislation; health and safety and environmental factors

Visit to local authority building control department.

Visit to local authority planning department.

Whole-class teaching – drawings and documentation needed to make a formal Planning and Building Regulations application, processes and procedures required to obtain planning consent; working drawings and details to facilitate construction, to include variations and superseded drawings

Class exercise in scale drawing, using both CAD and manual techniques, to produce drawings needed to make a formal Building Regulations application

Class exercise in scale drawing, using both CAD and manual techniques, to produce drawings needed to show processes and procedures required to obtain planning consent; working drawings and details to facilitate construction, to include variations and superseded drawings

Introduction to construction details and how to translate them into written instructions to enable progress from design to production

Whole-class teaching – specifications: sample model specifications to meet client requirements, planning, building control and production team

Class exercises in specification writing: sample model specifications to meet requirements of client, building control and production team. Class split to cover different elements and types and then compare

### Assignment 2: Design and Production Drawings and Specifications

Review of unit and assignment feedback

## Assessment

Evidence for this unit may be gathered from a variety of sources, including well-planned investigative assignments, case studies or reports of practical assignments.

There are many suitable forms of assessment that could be used and some example assessment approaches are suggested below. However, these are not intended to be either prescriptive or restrictive, and are provided as an illustration of the alternative forms of assessment evidence that would be acceptable. Some criteria could be assessed directly by the tutor during practical activities. If this approach is used, suitable evidence would be observation records or witness statements. Guidance on the use of these is provided on the Edexcel website.

The structure of the unit suggests that the grading criteria could be addressed fully by using two assignments. The first of these would cover criteria P1, P2, P3, P4, P5, P6, M1, M2 and D1 and the second would cover criteria P7, P8, M3, D2. Case studies could provide a suitable vehicle for assessment. Staged submissions should be considered and regular, interim tutor feedback would be essential.



To achieve a pass grade learners must meet the eight pass criteria listed in the grading grid.

For P1, learners must describe the factors that influence the design process.

For P2, learners must explain the roles and responsibilities of the design team. Learners should describe the nature of the team, how they work and who would be deployed within design teams to create and effect a suitable design for construction works. Learners must be able to identify all members of the design team, along with their relevant backgrounds and their expected qualifications and explain their contribution to the design. Learners should also be able to express the effect of working together in teams and understand that the complexities of construction projects mean that one person is unlikely to possess all the technological skills needed to complete all the design themselves. Similarly, learners must be able to explain the roles and responsibilities of members of the production team to achieve P3.

For P4, learners must describe the legal implications that could arise from miscommunication. Learners do not need to know the details of relevant legislation, although the tutor should ensure that legal implications reflect current laws and regulations.

For P5, learners must produce written communications between members of the design and production teams. Learners must demonstrate the ability to request information in an appropriate manner. Learners must also be specific and focused in order to solicit the exact information needed to complete the work. Learners must understand that when an instruction for a design change or modification is issued, the instructions have to be clear, concise and succinct. The importance of correct procedures regarding architects instructions must also be considered. Technical terminology must be used appropriately.

For P6, learners must describe construction methods using relevant terminology. Evidence should make it clear why some methods and components are used in one project, or part of a project, but not in another. The detail will be covered in *Unit 6: Building Technology in Construction* and will be assessed there.

For P7, learners must create specifications for construction details to provide suitable instructions for the construction team. This requires learners to demonstrate the ability to write specifications, using appropriate terminology and formats relating to the details and components that are used. (For instance, this could be 'cavity construction' or 'foundations' etc.)

For P8, learners have to produce sketch designs, plans, elevations, sections and details using standard conventions and symbols. Learners are required to communicate construction information through carefully constructed drawings using both manual and CAD techniques. These should be accurate, using scale, proportion and appropriate symbols complying with current British Standards, for example BSI 192, Drawing Office Practice. Technical terminology is required at this level, with relevant references to British Standards or suitable legislative requirements.

To achieve a merit grade learners must meet all of the pass criteria and the three merit grade criteria.

For M1, learners should explain the use of the RIBA Architect's Plan of Work to integrate design factors such as purpose, function and location, and finance, and demonstrate what can happen if the Plan of Work is modified or not followed properly.

For M2, learners have to compare the methods recommended for communicating design changes to members of the design team. Changes and modifications to the original design should be addressed and the requirement of contractors to adopt these changes explained.

For M3, learners must interpret tutor-provided construction details using recognised technical and architectural terminology. Learners will need to be given suitable materials that can be used to complete drawings. Examples include construction detailed sketches and working drawings, photographs, and manufacturer's literature. Learners will be expected to demonstrate an ability to use technical expressions and terminology, effectively linking British Standards and legislative controls to the suitability of materials to the relevant application.

To achieve a distinction grade learners must meet all of the pass merit grade criteria and the two distinction grade criteria.

For D1, learners are required to evaluate the effectiveness of the RIBA Architect's Plan of Work in terms of teamwork and the introduction of design changes after construction has started. The Plan should be evaluated in terms of its flexibility and practical application in use. Examples of changes to design once construction work has begun should be used to consider how to accommodate these changes. Learners must demonstrate some understanding of the need for a degree of flexibility and the ability to respond swiftly to changes in different circumstances. Established methods of determining and quantifying changes in progress should be explained and learners should be able to provide good examples of the effectiveness of the plan and its use.

For D2, learners are required to appraise the implications of instructions produced by the design team that represent modifications to the original contract. They should note the importance of the client, design and production teams working to the same drawings and specifications.

### Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, P5, P6, M1, M2, D1	Design Processes, Procedures and Communications	A written activity based on the members of the production team, their roles and responsibilities. It should also contain details of how communications are carried out regarding instructions or requests for information with members of the design team.	A report containing written responses to the implications of financial factors, social factors, client needs and legal and environmental constraints for design. It should also include the roles of the team and highlight the various stages of the RIBA Plan of Works, and Job Book. The report should identify the members of the design and production team their roles, responsibilities and the importance of good communication between the teams.
P7, P8, M3, D2	Design and Production Drawings and Specifications	You have been asked to produce a portfolio of sketch designs, plans, drawings and/or sketches of construction details. This should use the appropriate symbols and drawing conventions and must be accompanied by supporting specifications.	Drawings showing sketch designs, and fully annotated plans showing construction details using manual and CAD techniques. These should include correct technical terminology and any modifications. A report containing sample specifications for construction details providing suitable instructions to the construction team and comparing a traditional specification to a sustainable specification.

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Construction and the Built Environment sector suite. This unit has particular links with the following unit titles in the Construction and the Built Environment suite:

Level 1	Level 2	Level 3
		Health, Safety and Welfare in Construction and the Built Environment
		Sustainable Construction
		Building Technology in Construction
		Project Management in Construction and the Built Environment
		Graphical Detailing in Construction and the Built Environment
		Building Regulations and Control for Construction
		Computer Aided Drafting and Design for Construction
		Project in Construction and the Built Environment
		Design Procedures in Construction
		Planning Procedures in Construction

This unit links to the Edexcel Level 3 Technical and Professional NVQs for Construction and the Built Environment. It also links to the following National Occupational Standards at Level 3:

- BE Design
- Construction Contracting Operations
- Construction Site Supervision
- Surveying, Property and Maintenance
- BE Development and Control.

### Essential resources

Learners should have access to authentic general and detailed working drawings and specifications to demonstrate their format, use and application, together with drawing equipment to facilitate the preparation of assessment material. This would include both manual and CAD facilities. Where possible, supervised visits to local authority planning and building control departments will be a valuable vehicle for contextualising the unit and demonstrating real examples of building technology. Appreciation of the characteristics of building materials and components would be enhanced by the availability of selected samples.

## Employer engagement and vocational contexts

The use of vocational contexts is essential in the delivery and assessment of this unit. Much of the work can be set in the context of learners' work placements, be based on case studies of local employers or on the unit *Project in Construction* and the *Built Environment*. Local authority planning and building control department visits will enhance this unit.

Support to enable centres to initiate and establish links to industry, and to networks arranging visits to industry and from property practitioners is given below:

- Learning and Skills Network – [www.vocationallearning.org.uk](http://www.vocationallearning.org.uk)
- National Education and Business Partnership Network – [www.nebpn.org](http://www.nebpn.org)
- The Royal Institution of Chartered Surveyors – [www.rics.org](http://www.rics.org)
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – [www.warwick.ac.uk/wie/cei/](http://www.warwick.ac.uk/wie/cei/)

## Indicative reading for learners

### Textbooks

Topliss S, Hurst M and Skarratt G – *BTEC Level 3 National Construction and the Built Environment Student Book* (Pearson, 2009) ISBN 9781846906565

Topliss S, Hurst M and Skarratt G – *BTEC Level 3 National Construction and the Built Environment Teaching Resource Pack* (Pearson, 2009) ISBN 9781846906558

*Metric Handbook Planning and Design Data* (Elsevier, 2007) ISBN 9780750652810

*Architects Job Book, 8th Edition* (RIBA Publishing, 2008) ISBN 9781859462522

Brett P – *An Illustrated Dictionary of Building* (Elsevier, 2007) ISBN 9780750636841

Chudley R & Greeno R – *Building Construction Handbook* (Butterworth-Heinemann, 2008) ISBN 0750686227

Emmitt S – *Design Management for Architects* (Blackwell, 2007) ISBN 9781405131476

Emmitt S and Gorse C – *Barry's Introduction to Construction of Buildings* (Blackwell, 2005) ISBN 1405110554

Emmitt S and Yeomans D – *Specifying Buildings: a Design Management Perspective, 2nd Edition* (Butterworth-Heinemann, 2008) ISBN 9780750684507

Foster J and Greeno R – *Structure and Fabric: Pt. 1 (Mitchells Building Series)* (Pearson Education Ltd, 2006) ISBN 9780131970946

Greeno R – *Introduction to Building (Mitchells Building Series)* (Pearson Education Ltd, 2007) ISBN 9780132325714

Phillips R – *Architect's Plan of Work* (RIBA Publishing, 2000) RIBA Order Code 21009

Riley M and Cotgrave C – *Construction Technology 1 House Construction* (Palgrave, 2008) ISBN 9780230624

Riley M and Cotgrave C – *Construction Technology 2 House Construction* (Palgrave, 2008) ISBN 9781403940957

Stephenson – *Spon's Building Regulations Explained* (Taylor and Francis, 2009) ISBN 9780415430678

### Journals

*The Architect's Journal* – Emap

*Construction News* – Emap

### Websites

[www.greenspec.co.uk](http://www.greenspec.co.uk)

Green Building

[www.thenbs.com](http://www.thenbs.com)

National Building Specification

[www.planningportal.gov.uk](http://www.planningportal.gov.uk)

The Complete Online Planning and Building Resource

## Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are ...
<b>Independent enquirers</b>	identifying the members of the design team and describing factors that influence the design process in terms of procedures identifying the members of the production team, their roles and responsibilities
<b>Creative thinkers</b>	producing written communications creating sample specifications for construction details to provide suitable instructions for the construction team producing sketch designs, plans, drawings and/or sketches of construction details using standard conventions and symbols
<b>Team workers</b>	researching factors that influence the design process
<b>Self-managers</b>	organising time and resources prioritising activities.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
<b>Independent enquirers</b>	investigating the legal and environmental constraints for design teams using knowledge gained from other units and research identifying questions to answer and problems to solve during whole-class teaching planning and carrying out research, appreciating the consequences of decisions exploring issues, events or problems from different perspectives when carrying out research and analysing and evaluating information, judging its relevance and value supporting conclusions, using reasoned arguments and evidence
<b>Creative thinkers</b>	generating ideas when writing specifications asking questions to extend their thinking during whole-class teaching asking questions to extend their thinking during assignment preparation connecting their own and others ideas when carrying out group work, and questioning their own and others assumptions, adapting ideas as circumstances change
<b>Reflective learners</b>	assessing themselves and others, identifying opportunities and achievements when carrying out research and group work inviting feedback and dealing positively with praise, setbacks and criticism during tutorial/class discussion communicating their learning in different ways for different audiences whilst on site visits
<b>Team workers</b>	collaborating with others to work towards common goals during group work and provide constructive support and feedback to others
<b>Self-managers</b>	working towards goals showing initiative, commitment and perseverance organising time and resources, prioritising actions
<b>Effective participators</b>	discussing issues of concern, seeking resolution where needed during tutorial/class discussions

## ● Functional Skills – Level 2

Skill	When learners are ...
<b>ICT – Use ICT systems</b>	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using the internet to research information for their projects
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning research, eg for construction methods and techniques
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
<b>ICT – Find and select information</b>	
Select and use a variety of sources of information independently for a complex task	researching, eg for construction methods and techniques
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching, eg for construction methods and techniques
<b>ICT – Develop, present and communicate information</b>	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> <li>• text and tables</li> <li>• images</li> <li>• numbers</li> <li>• records</li> </ul>	using ICT to produce their reports, including text, images, drawings, schedules and specifications as appropriate
Bring together information to suit content and purpose	producing presentations, eg about teams and communications
Present information in ways that are fit for purpose and audience	producing presentations, eg about teams and communications
Evaluate the selection and use of ICT tools and facilities used to present information	producing presentations, eg about teams and communications
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	exchanging information, communicating by email and attaching and opening attachments to emails

Skill	When learners are ...
<b>Mathematics</b>	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
<b>English</b>	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	delivering presentations, eg about teams and communications
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching and collating information for inclusion in their reports
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	producing communication documents producing reports for assessment purposes.