



*Rewarding Learning*

**General Certificate of Secondary Education  
2019**

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## **Construction and the Built Environment**

**Unit 1**

**Introduction to the Built Environment**

**[GCN11]**

**THURSDAY 30 MAY, AFTERNOON**

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**MARK  
SCHEME**

## General Marking Instructions

### **Introduction**

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

### **Assessment Objectives**

Below are the assessment objectives for Construction.

Candidates must:

- AO1** recall, select and communicate their knowledge and understanding of concepts, issues and terminology;
- AO2** apply skills, knowledge and understanding in a variety of contexts and in planning and carrying out investigations and tasks; and
- AO3** analyse and evaluate evidence, make reasoned judgements and present conclusions.

### **Quality of candidates' responses**

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

### **Flexibility in marking**

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

### **Positive marking**

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

### **Awarding zero marks**

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

### **Marking calculations**

In marking answers involving calculations, examiners should apply the "own figure rule" so that candidates are not penalised more than once for a computational error.

### **Types of mark schemes**

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

**Levels of response**

Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the “best fit” bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

**Quality of written communication**

Quality of written communication is taken into account in assessing candidates’ response to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is limited.

Level 2: Quality of written communication is satisfactory.

Level 3: Quality of written communication is excellent.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

**Level 1 (Basic):** The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

**Level 2 (Good):** The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

**Level 3 (Excellent):** The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Candidates are expected to answer **all** questions

**1** Candidates should relate the following responses to a construction site containing 48 houses and 12 apartments.

**(a) Site Manager**

Any **three** from the following:

- Plan operations to be carried out on site prior to work commencing on the housing site
- Secure site on Health and Safety grounds for a construction site containing 48 houses and 12 apartments
- Mark out and manage excavation of houses and apartments
- Supervise construction operations on site
- Order materials for the dwellings
- Chair site meetings
- Manage handing over the building to the client

Or any other appropriate response

[1] per main role up to a maximum of [3]

[3]

**(b) Bricklayer**

Any **three** from the following:

- Prepare a quotation for the cost of the work
- Build sub-structure
- Build superstructure
- Build in Lintels
- Build Brickwork
- Build red facing brick
- Mix Mortar
- Insert wall ties
- Insert insulation

Or any other appropriate response

[1] per main role up to a maximum of [3]

[3]

**(c) Plumber**

Any **three** from the following:

- Prepare a quotation for the cost of the work
- Carry out first fix plumbing work on the housing site like installing heating pipes
- Second fix plumbing like fitting radiators
- Install kitchen sink/utility room sink
- Install bathroom fittings
- Install heating boiler
- Test heating system
- Gas Installations
- Sewage Installations

Or any other appropriate response

[1] per main role up to a maximum of [3]

[3]

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MARKS

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			AVAILABLE MARKS		
<b>2</b>	<b>(a)</b>	1. Terrace housing/town house	[1]	12	
		2. A row or street of houses/occupied by different tenants Separate doors/houses joined together Two-storey	[2]		
	Or any other appropriate response [1] per distinguishing characteristic up to a maximum of [2]				
	<b>(b)</b>	1. Semi-detached housing	[1]		
		2. One large house divided in two by a part/wall divides to form two houses/one roof/symmetrical	[2]		
	Or any other appropriate response [1] per distinguishing characteristic up to a maximum of [2]				
	<b>(c)</b>	1. High rise flats/flats/apartments/sky scrapers/multi-storey	[1]		
		2. Multi-storey "High Rise"/erected where space is limited in built-up areas/where land is very expensive	[2]		
	Or any other appropriate response [1] per distinguishing characteristic up to a maximum of [2]				
	<b>(d)</b>	1. Detached house	[1]		
2. Detached – This is a building which is not connected to any other buildings/sits in its own site Two-storey		[2]			
Or any other appropriate response [1] per distinguishing characteristic up to a maximum of [2]					
<b>3</b>	<b>(a)</b> Control of Substances Hazardous to Health	[4]			
	[1] per key word up to a maximum of [4]				
	<b>(b)</b>	[3]			
	<ul style="list-style-type: none"> <li>• Being hit by something falling</li> <li>• Falling from scaffolding</li> <li>• Falling through fragile roofs</li> <li>• Being hit by construction vehicles</li> <li>• Electrocution</li> </ul>				
Or any other appropriate response Any [1] per risk up to a maximum of [3]					
<b>(c)</b>	[4]				
<ul style="list-style-type: none"> <li>• Take care, not put themselves or other people at risk</li> <li>• Co-operate with employers</li> <li>• Use any equipment and safeguards provided by their employer</li> <li>• Not misuse or interfere with anything that is provided for their Health and Safety</li> <li>• Reporting of Accidents</li> <li>• Training courses</li> </ul>					
Or any other appropriate response Any [1] per duty up to a maximum of [4]					

- (d) • Toilets  
 • Washing Facilities  
 • Drinking Water  
 • Fire assembly point  
 • Lunch Area  
 • Site office/accommodation/storage

[3]

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Or any other appropriate response

Any [1] per facility up to a maximum of [3]

- 4 (a) • Steel (Galvanised)  
 • Concrete  
 • Timber

[1] per material up to a maximum of [2]

[2]

- (b) Bolts  
 Welding

[2]

[1] per jointing method up to a maximum of [2]

- (c) Advantages

- Speed and ease of erection
- Large unobstructed floor space
- Buildings can be quickly closed in and made watertight
- Framework prefabricated in a workshop and not affected by weather
- Site works such as drainage, roads, etc. can be carried out until framework is ready for erection
- No weather delays during erecting the framework
- Connected together in factories by welding
- Site connections should be bolted
- Foundations can be constructed while frame is being fabricated off site
- Metal section easily obtainable in standard lengths
- Agriculture use

Disadvantages

- Although steel is incombustible it has a poor resistance to fire as it bends easily when hot
- Subject to corrosion.

#### Level 1 ([1]–[2])

Candidates discuss advantages and disadvantages of using a portal framed construction when building a new large span agriculture building. Candidates will show an understanding of the advantages and disadvantages in relation to two of the following: speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting steel members. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantages and disadvantages in a limited form and style of writing. Their discussion is not fully coherent or organised and there is little use of specialist terms.

#### Level 2 ([3]–[5])

Candidates discuss advantages and disadvantages of using a portal framed construction when building a new large span agriculture building. Candidates will show a good understanding of the advantages and disadvantages in relation to the following: speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting

steel members. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss advantages and disadvantages in a satisfactory form and style of writing. Their discussion is coherent or organised in most cases and they use a range of specialist terms.

### Level 3 ([6]–[8])

Candidates discuss advantages and disadvantages of using a Portal framed construction when building a new large span agriculture building. Candidates will show an excellent understanding of the advantages and disadvantages in relation to the following: speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting steel members. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantages and disadvantages in an excellent form and style of writing. Their discussion is coherent and very well organised and they use a wide range of specialist terms. [8]

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When a response is not worthy of credit [0] should be awarded.  
Up to [4] of the total marks available are for the quality of written communication

5 (a) 2013 [1]

(b) Eight or 0–7 stages [1]

(c) 1. Preparation and Brief

This will involve outlining in detail some of the following issues:

- Who is the client representative (Project Manager [in-house/consultant]/architect, etc.)
- Who is the Design Team Leader (usually the architect)
- What are the communication channels
- What will the communication media be
- Include contact details with email and postal addresses for all parties involved
- Regularity of meetings between Design Team members [3]

Or any other appropriate response

Any [1] per description up to a maximum of [3] for each stage

2. Concept Design (outline planning permission)

Once the project is declared feasible, the Architect will usually prepare some alternative proposals taking consideration of the Client's general considerations. These are then presented to the Client. The information should include:

- Outline drawings showing the design
- Explanation of the main decisions that have been made
- Expectation of costs and time scale
- Further consideration of the proposed procurement route
- After consideration of these proposals and perhaps some amendment the Client should instruct the design team to proceed [3]

Or any other appropriate response

Any [1] per description up to a maximum of [3] for each stage

3. Developed Design

The design is now developed to include:

- Investigation of individual room requirements
- Methods and materials to be used

- External requirements – colours/textures/style
- The Structural Engineer will require layout drawings identifying space requirements and some idea of services layout. From this information he/she can estimate the section sizes for all the main structural elements
- At this stage a detailed cost plan, report, outline specification and scheme drawings are produced for the Client's approval
- An application for full/detailed planning permission could be sought at this stage [3]

Or any other appropriate response

Any [1] per description up to a maximum of [3] for each stage

Note: The brief should not be changed after this stage

4. Technical Design (Building Control)

- The agreed scheme plans/elevations, etc. will be finalised and passed on to the Structural and Services Engineers
- Architectural and structural detailing work is done at this stage
- The Architect must co-ordinate the design process and ensure that all the interested parties receive the relevant information as and when required
- All drawings should be checked by the QS to ensure compliance with the cost targets
- All the drawings and structural calculations must be submitted to Building Control for approval
- Tender documentation [3]

Or any other appropriate response

Any [1] per description up to a maximum of [3] for each stage

6 1. Building [1]

Building includes many aspects of construction, including commercial, residential, educational and health properties. Projects can be large or small scale and vary in cost. [1]

Any named example (e.g. Royal Hospital, local school, shopping complex) [1]

Or any other appropriate response

2. Civil Engineering [1]

Civil Engineering relates to designing, constructing and maintaining infrastructure, including roads, bridges, tunnels, harbours, wind farms and airport runways. A large number of constraints must be considered including cost and weather conditions. [1]

Any named example (e.g. Belfast Harbour, Peace Bridge) [1]

Or any other appropriate response

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## 3. Building Services or Utilities [1]

Utility services make an important contribution to maintaining the operation of infrastructure and buildings – everything inside a building which makes it safe and comfortable to use.

Any named example (e.g. electricity, gas, water, communications) [1]

Or any other appropriate response [1]

**Please note that answers 6 (1), (2) and (3) can be in any order.**

7 (a) With the **platform frame** method each storey is framed up as a separate operation making use of each floor as an erection platform [2]

## (b) Advantages

- Timber frame houses are usually made in factories under controlled conditions into large wall sized units which makes economic use of the materials
- Timber framed construction allows for the use of semi-skilled labour for the manufacture in factory controlled conditions
- Manufacture is not affected by inclement weather
- Speed of erection on site as fewer wet trades involved
- Higher levels of insulation. The use of low thermal capacity linings absorbs less heat than masonry walls making it easier to reach the required comfort temperature more quickly.
- Flexible, easy to modify or add to
- Many types of cladding available
- Construction method simple to insulate
- Sustainable material
- Cost savings

## Disadvantages

- Greater fear of combustibility
- Relatively poor sound insulation in building timber framed semi-detached housing

**Level 1 ([1]–[2])**

Candidates discuss advantages and disadvantages of using a timber framed construction when building social semi-detached domestic housing. Candidates will show a limited understanding of the advantages and disadvantages as listed above. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantages and disadvantages in a limited form and style of writing. Their discussion is not fully coherent or organised and there is little use of specialist terms.

**Level 2 ([3]–[5])**

Candidates discuss advantages and disadvantages of using a timber framed construction when building social semi-detached domestic housing. Candidates will show a good understanding of the advantages and disadvantages as listed above. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss advantages and disadvantages in a satisfactory form and style of writing. Their discussion is coherent and organised in most cases and they use a range of specialist terms.

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**Level 3 ([6]–[8])**

Candidates discuss advantages and disadvantages of using a timber framed construction when building social semi-detached domestic housing. Candidates will show an excellent understanding of the advantages and disadvantages as listed above. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantages and disadvantages in an excellent form and style of writing. Their discussion is coherent and very well organised and they use a wide range of specialist terms.

When a response is not worthy of credit [0] should be awarded.  
Up to 4 of the total marks available are for the quality of written communication

**Total****AVAILABLE  
MARKS**

10

**80**