



*Rewarding Learning*

**General Certificate of Secondary Education  
2014**

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## **Construction and the Built Environment**

Unit 1: The Construction  
Industry for the 21st Century

**[GCB11]**

**WEDNESDAY 4 JUNE, 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. The mark schemes should be read in conjunction with these general marking instructions.

### ***Assessment Objectives***

Below are the assessment objectives for Construction and the Built Environment.

Candidates must:

- recall, select and communicate their knowledge of construction and the built environment and understanding of a range of contexts (AO1);
- apply skills, knowledge and understanding in a variety of contexts and in planning and carrying out investigations and tasks (AO2); and
- analyse and evaluate evidence, make reasoned judgements and present conclusions (AO3).

### ***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.

### ***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.

### **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.

### **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 (Limited):** The level of accuracy of candidates’ presentation, spelling, punctuation and grammar is limited. The candidate makes 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.

**Level 2 (Satisfactory):** The level of accuracy of candidates’ presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

**Level 3 (Excellent):** The level of accuracy of candidates’ presentation, spelling, punctuation and grammar is excellent. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is excellent. There is excellent use of appropriate specialist vocabulary.

**Section A**

Answer **all** questions

**AVAILABLE  
MARKS**

**Use the pre-release material to assist with answering questions 1, 2, 3, 4 and 9.**

<b>1</b>	<b>(a)</b> Cavity wall (construction) or cavity	[1]	
	<b>(b)</b> Stainless steel/nylon plastic	[1]	
	<b>(c)</b> Wall ties	[1]	
	<b>(d)</b> Horizontal Spacing	900 mm or 750 mm	[2]
	Vertical Spacing	450 mm	[2]
	Vertical Spacing at window or door jambs	300 mm	[2]
			9
<b>2</b>	<b>(a) (i)</b> Terrace housing/town house	[1]	
	<b>(ii)</b> A row or street of houses occupied by different tenants. Separate doors/houses joined together	[2]	
	<b>(b) (i)</b> Semidetached housing	[1]	
	<b>(ii)</b> One large house divided in two by a part wall to form two houses.	[2]	
	<b>(c) (i)</b> High rise flats/flats/apartments/sky scrapers/multi-storey	[1]	
	<b>(ii)</b> Multi-storey "High Rise" erected where space is limited in built-up areas or where land is very expensive.	[2]	
	<b>(d) (i)</b> Bungalow/detached/cottage/storey and a half	[1]	
	<b>(ii)</b> Detached – This is a building which is not connected to any other buildings A bungalow is a single storey dwelling.	[2]	12
	Full answer award [2], short answer award [1]		
<b>3</b>	<b>Tolerance on scale dimensions areas only ± 100 mm</b>		
	<b>(a)</b> Length 6200 mm	Width 3300 mm	[4]
	<b>(b)</b> Length 5275 mm	Width 3350 mm or 3950 mm	[4]
	<b>(c)</b> Width 10 350 mm		[2]
	<b>Tolerance on scale dimensions areas only ± 1m</b>		
	<b>(d)</b> 92.64 square metres		[2]
	<b>(e)</b> The total number of 1000 mm wide windows in the front elevation is 29		[2]
			14

			AVAILABLE MARKS
4	<p><b>(a)</b> Solar Panels/sun</p>	[1]	6
	<p><b>(b)</b> Wind Energy Geothermal Biomass Tidal Water powered turbine [1] each up to a maximum of [3] or any other suitable alternative.</p>	[3]	
	<p><b>(c)</b> Any <b>two</b> of the following or other appropriate response:</p> <ul style="list-style-type: none"> <li>• Glass wool</li> <li>• Sheep's wool</li> <li>• Timber chips</li> <li>• Foam insulation</li> </ul>	[2]	
5	<p><b>(a) Estimator</b></p> <p>Any of the following or other appropriate response:</p> <ul style="list-style-type: none"> <li>• Measure the quantities of materials required for the houses</li> <li>• Attach a cost estimate to each material</li> <li>• Prepare tender documents</li> <li>• Submit final tender</li> <li>• Or any other appropriate answer</li> </ul> <p>[1] per activity up to a maximum of [3]</p>	[3]	
	<p><b>(b) Site Manager</b></p> <p>Any <b>three</b> of the following or other appropriate response:</p> <ul style="list-style-type: none"> <li>• Ensure that all aspects of site operations run smoothly</li> <li>• Ensure health and safety on site</li> <li>• Represent the construction company on site and at meetings.</li> <li>• Organise plant, labour, and resources on site</li> <li>• Ensure project is completed within the stipulated time frame.</li> <li>• Or any other appropriate answer</li> </ul> <p>[1] per activity up to a maximum of [3]</p>	[3]	
	<p><b>Plumber</b></p> <p>Any <b>three</b> of the following or other appropriate response:</p> <ul style="list-style-type: none"> <li>• Design pipe layout</li> <li>• Position heat emitters and secure to walls</li> <li>• Cut, bend and lay pipes</li> <li>• Plumb bathroom</li> <li>• Plumb Kitchen.</li> <li>• Test system</li> <li>• Or any other appropriate answer</li> </ul> <p>[1] per activity up to a maximum of [3]</p>	[3]	9

6 Any **five** responses [1] per response. up to [3] per section.

Material **Timber** [1]

Which is used for and found within the roof structure. [1]

The function of timber is to provide a strong cost efficient roof structure which is easy to construct. [1] [3]

Material **Concrete roof tiles** [1]

Which is found on the outside of a roof [1]

The function is to provide a water proof roof covering [1] [3]

Material **PVC/Plastic** [1]

Which is found on the outside of fascia boards or barge boards. Gutter can also be manufactured from this. [1]

The function is to protect the timber under the fascia board. [1] [3]

Material **Steel** [1]

Which is found in purlins to support the roof structure [1]

The function is to provide structural support across openings. [1] [3]

Material **(Sheet) lead** [1]

Which is found as flashing round chimneys [1]

Provided a waterproof joint [1] [3]

15

Other materials copper/felt/insulation  
slate cast iron plastic

7 Ash  
Oak  
Sycamore  
Beech  
Horse Chestnut  
Elm  
Lime  
[1] each up to a maximum of [5]

[5]

5

**Section A**

**70**

**AVAILABLE MARKS**

## Section B

Answer **all** questions

AVAILABLE  
MARKS

### 8 Advantages

- A cellular structure is a solid wall or cavity wall enclosing the total space within the building.
- It supports the total loading of the building and transmits it to the foundations along the entire length of the wall.
- No steel required within the structure.
- The external walls form the boundaries of the building (cavity wall) and the internal walls divide the building into cells (rooms) making the building cellular.
- Some of these internal walls are loadbearing walls. Consequently the external walls do not support the total load of the building. All load bearing walls must be carried down to a sound load bearing substrata called a foundation.
- Walls at right angles provide structural stability.

### Disadvantages

- If traditional methods are used it is slow to construct but precast alternatives are available.
- Requires skilled labour which increases cost.
- Can be weather dependent.

### Level 1 ([1]–[4])

Candidates discuss the advantages and/or disadvantages of using cellular constructions when building domestic houses which are two storeys high. Candidates will show an understanding of the advantages and/or disadvantages in relation to foundations, methods of construction, speed of erection and structural stability. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantage 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 ([5]–[7])

Candidates discuss the advantages and/or disadvantages of using cellular constructions when building domestic houses which are two storeys high. Candidates will show an understanding of the advantages and/or disadvantages in relation to foundations, methods of construction, speed of erection and structural stability. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss advantage 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 ([8]–[10])

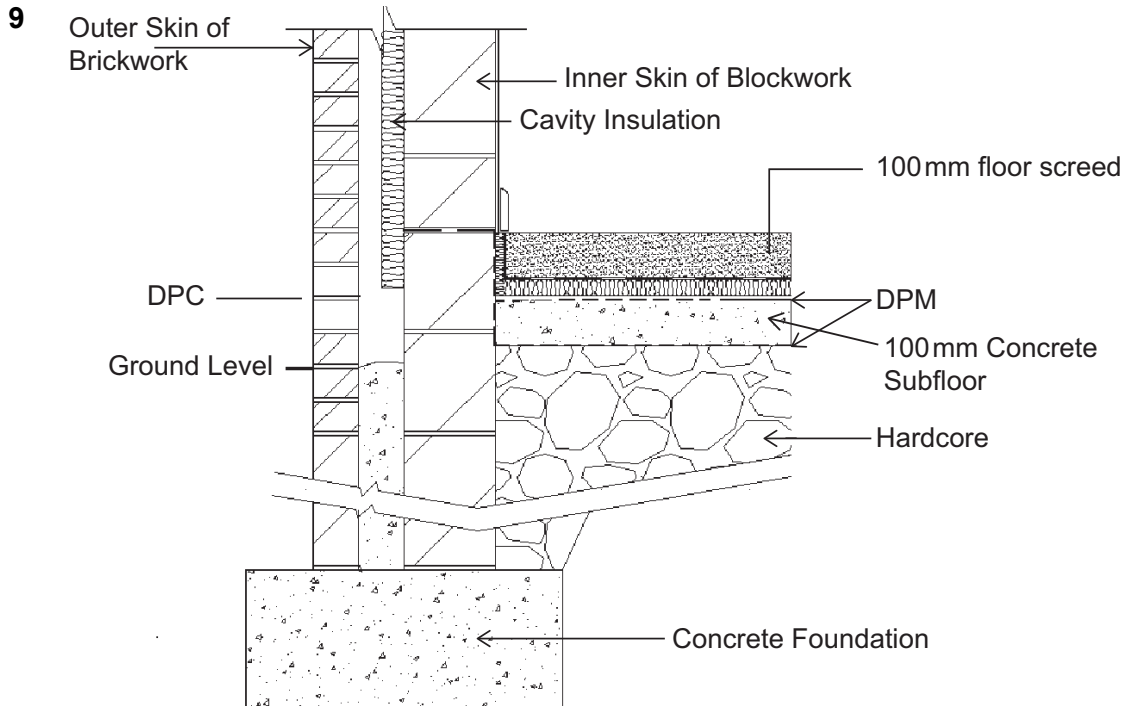
Candidates discuss the advantages and disadvantages of using cellular constructions when building domestic houses which are two storeys high. Candidates will show an understanding of the advantages and disadvantages in relation to foundations, methods of construction, speed of erection and structural stability. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantage and disadvantages in an excellent form and style of writing. Their discussion is coherent and very well organized and they use a wide range of specialist terms.

When a response is not worthy of credit [0] should be awarded.

(AO1 [5], AO2 [5])

[10]

10



**Fig. 6**

[10] for labels and [10] for drawings.

[20]

20

**10 Advantages**

- Timber can be hardwood or softwood.
- It should be sourced from renewable resources.
- Timber portal frames are particularly suitable for use in high visual impact applications such as this retail warehouse.
- Portal frames may be made from sawn timber or laminated beams.
- Difficult to get large sections of timber so laminated beams are the most common.
- Large sections of timber have a high fire resistance.

**Disadvantages**

- Difficult to get long lengths of timber which are free from defects.
- The connections carry significant moments and must have both strength and stiffness to be effective.
- Timber portal frames must have a metal base in the ground or they rot if in contact with moisture.

**Level 1 ([1]–[4])**

Candidates discuss the advantages and disadvantages of using timber for the construction of a portal frame as an alternative to steel when constructing a new retail warehouse. Candidates will show an understanding of the advantages in relation to the resourcing of materials and methods of jointing. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantage 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 ([5]–[7])**

Candidates discuss the advantages and disadvantages of using timber for the construction of a portal frame as an alternative to steel when constructing a new retail warehouse. Candidates will show an understanding of the advantages in relation to the resourcing of materials and methods of jointing. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss



advantage 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.

AVAILABLE  
MARKS

**Level 3 ([8]–[10])**

Candidates discuss the advantages and disadvantages of using timber for the construction of a portal frame as an alternative to steel when constructing a new retail warehouse. Candidates will show an understanding of the advantages in relation to the resourcing of materials and methods of jointing. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantage in an excellent form and style of writing. Their discussion is coherent and very well organized and they use a wide range of specialist terms.

When a response is not worthy of credit [0] should be awarded.  
(AO1 [5], AO2 [5])

[10]

10

- 11 [2] for a good answer and [1] for a satisfactory answer up to a maximum of 5 answers.

**Planning**

Carry out Studies to determine the feasibility of the Client's requirement  
Provide information for report on cost implications.  
Identification of Client's requirements and of possible constraints on development.  
Preparation of studies to enable the Client to decide whether to proceed and to select the probable procurement method.

**Design**

Preparation of Brief by or on behalf of the Client confirming key requirements and constraints including:

- Outline drawing
- Outline specifications
- Provide approximate costs for construction.
- Obtain Client approval of Outline Proposals
- Complete development of Project Brief

Prepare:

- Detailed drawings
- Detailed specifications
- Preparation of Cost Estimate
- Consult statutory authorities (Building Regulations)
- Obtain Client approval to the Detailed Proposals, showing spatial arrangements, materials and appearance, and a cost estimate.
- Prepare and submit application for full planning permission

**Tendering**

Prepare tender documents in sufficient detail to enable a Tender or Tenders to be obtained for the construction of the Project.

Quantity Surveyor provide Bill of Quantities.

Seek fixed price tender to see which contractor will be selected to construct the building. Quality of completed building is often an important part of this process.

Consider with the Client the appointment of a Contractor.

Consider the responsibilities of the parties, and the authority and duties of the Architect under the Building Contract.

## Construction process

Prepare the Building Contract and arrange for it to be signed, appointing the Contractor, issuing of Production Information to the Contractor, and arranging site handover to the Contractor.

- Prepare site including principal roads and drainage.
- Excavate foundation.
- Build substructure to ground floor level.
- Pour sub-floor concrete.
- Build wall construction to first floor level.
- Place floor joist or slabs
- Build substructure to ground floor level.
- Pour sub-floor concrete.
- Build wall construction to first floor level.
- Place floor joist or slabs
- Plastering all internal and external walls.
- Install second fix components, including doors, skirting, radiators, light switch covers etc.
- Install kitchen and bathroom.

## Handover

- Clean, test and handover building

## Evaluation

- Review design information from Contractors or specialists.
- Certify valuations of work prepared by others and present financial reports prepared by others.
- Provide Drawings and other information for the Health and Safety file.
- Give general advice on operation and maintenance of the building.
- Evaluate the complete process from initial design to completion. [10]

**Section B**

**50**

**Total**

**120**

**AVAILABLE  
MARKS**