

General Certificate of Secondary Education
January 2014

Construction and the Built Environment

Unit 1:
assessing

The Construction Industry for the 21st Century

[GCB11]

WEDNESDAY 8 JANUARY, AFTERNOON

**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' responses 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

			AVAILABLE MARKS	
1	(a)	Pitched Roof (Construction) or trussed rafters	[1]	9
	(b)	Trussed Rafter/Walls/Foundations or truss	[1]	
	(c)	Thirty-two degrees	[1]	
	(d)	400 mm	[2]	
	(e)	200 mm ± 50 mm	[2]	
	(f)	100 mm wide and 50 mm thick or 50 mm × 100 mm	[2]	
2	(a)	(i) Factory or Warehouse or Industrial (unit) or commercial or agricultural or portal frame	[1]	12
		(ii) The distinguishing characteristics of this type of building are: Large unobstructed floor space	[2]	
	(b)	(i) Community building/concert hall/commercial	[1]	
		(ii) The distinguishing characteristics of this type of building are: Building with easy access for all residents	[2]	
	(c)	(i) Terrace housing or domestic house	[1]	
		(ii) The distinguishing characteristics of this type of building are: A row or street of houses occupied by different tenants Houses are joined together each with a separate door	[2]	
	(d)	(i) Bridge	[1]	
		(ii) The distinguishing characteristics of this type of structure are: A structural element which spans over river or road or other	[2]	

3 For each of the following answers the dimensions must be accurate and given in millimetres only to receive [2]

If a dimension is provided within tolerance but with an incorrect unit then only [1] will be given

Tolerance on scaled dimensions only ± 100 mm

- | | | | | |
|-----|---|--|-----|----|
| (a) | Length 6000 mm | Width 4000 mm or 3400 | [4] | |
| (b) | Length 9700 mm | Width 3300 mm | [4] | |
| (c) | Length 10 200 mm | | [2] | |
| (d) | Total number of chimneys is 6 | | [2] | |
| (e) | The total number of 400 mm wide windows in the front elevation is 5 | | [2] | 14 |
| | | | | |
| 4 | (a) | Cracks in the brick arch | [1] | |
| | | Bricks are broken or spalling or frost or erosion | [1] | |
| | (b) | Galvanized steel lintel or beam | [1] | |
| | | Precast concrete head | [1] | |
| | (c) | Prevent the passage of damp penetrating a building through the walls | [1] | |
| | (d) | Prevent the passage of damp penetrating a building through the floor | [1] | 6 |
| | | | | |
| 5 | (a) | Any three of the following or other appropriate response: | | |
| | | <ul style="list-style-type: none">• Measure the quantities of materials required for the houses• Prepare the Bill of Quantities• Prepare tender documents• Advise on selection of contractor• Measure up work on site• Prepare interim valuations• Prepare final accounts• Cost control• Or any other appropriate answer | | |
| | | [1] per activity up to a maximum of [3] | [3] | |

AVAILABLE
MARKS

(b) Any **three** of the following or other appropriate response:

AVAILABLE
MARKS

Electrician

- Advise on electrical layout of houses
- Mark out position of services
- Track walls
- Fix plastic ducting for cables
- Fix socket boxes
- Fit cables
- Install face plates
- Test system
- Connect to supply
- Or any other appropriate answer

[1] per activity up to a maximum of [3]

[3]

Bricklayer

- Mark out position of building
- Build substructure
- Build walls to first floor level
- Build walls to roof level
- Build brick round windows
- Build in window sills
- Or any other appropriate answer

[1] per activity up to a maximum of [3]

[3]

9

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

[1] per section

Material **Sand**

[1]

Which is used for and found within the mortar and the concrete.

[1]

The function of sand is to fill the void between the aggregates within concrete and form the base ingredient for mortar

[1]

Material **Cement**

[1]

Which is used for and found within the mortar and the concrete.

[1]

The function of cement is to act as the adhesive within concrete

[1]

Material **Water**

[1]

Water is found within the mortar or concrete.
Or activate the hardening process

[1]

Activates the hardening process of cement and allows mortar or cement to become liquid. The base liquid used to make mortar or concrete liquid.

[1]

		AVAILABLE MARKS
Material Stones	[1]	
Found within the concrete blocks.	[1]	
Stones make a strong non compressible agent for the manufacture of concrete blocks.	[1]	
Material Stainless steel	[1]	
Found in wall ties.	[1]	
Tie the two skins of the cavity wall together.	[1]	
Material Steel	[1]	
Found in reinforcing within concrete heads or steel lintels.	[1]	
Provide structural support to the concrete.	[1]	
Material Clay	[1]	
Manufacture of bricks for the outside of some houses.	[1]	
Provides a cheap material to manufacture bricks Building components will also be considered as materials given appropriate location and function within walls	[1]	15
7 (a) Sheet lead	[1]	
(b) Any four responses. [1] per response.		
Timber		
Glass		
Slate		
Plastic		
Clay		
Cast iron		
Brick		
Block		
Insulation		
Or any other appropriate answer	[4]	5
Section A		70

Section B

AVAILABLE
MARKS

Answer **all** questions

8 Advantages

- Foundations can be constructed while frame is being fabricated off site
- Metal section easily obtainable in standard lengths.
- Speed and ease of erection.
- Building 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 hold-up during erecting the framework.
- Connected together in factories by welding.
- Site connections are bolted.
- Structural stability easily provided through bracing, infill panels of structural staircase/lift shaft.

Disadvantages

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

Level 1 ([1]–[4])

Candidates compare advantages and disadvantages of using rectangular framed construction when building a new three storey school building. Candidates will show an understanding of the advantages and disadvantages in relation to foundations, materials, jointing methods, speed of erection and structural stability. 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 ([5]–[7])

Candidates compare advantages and disadvantages of using rectangular framed construction when building a new three storey school building. Candidates will show an understanding of the advantages and disadvantages in relation to foundations, materials, jointing methods, speed of erection and structural stability. 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.

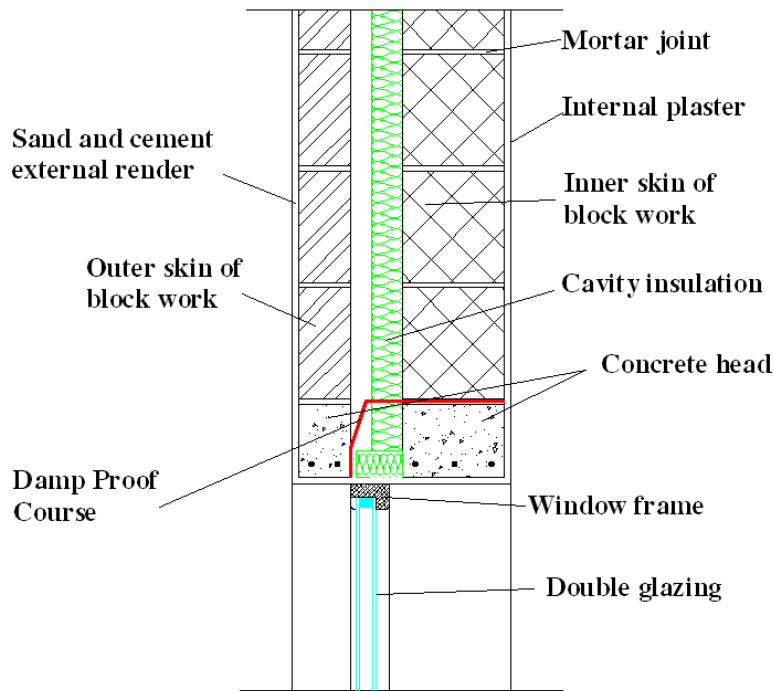
Level 3 ([8]–[10])

Candidates compare advantages and disadvantages of using rectangular framed construction when building a new three storey school building. Candidates will show an understanding of the advantages and disadvantages in relation to foundations, materials, jointing methods, speed of erection and structural stability. 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 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



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

[20]

20

10 Advantages

- Concrete has excellent non corrosive qualities.
- Concrete has good compressive qualities.
- Can be used to form foundation for bridge.
- Concrete can form a case round steel to protect it from the water in the river or sea.
- Steel section easily fabricated off site.
- Steel has excellent strength relative to section.
- Connected together in factories by welding. Site connections should be bolted.

Disadvantages

- Steel is subject to corrosion.
- Required to be galvanised or protected when exposed on a bridge.
- Concrete is very poor in tension.
- Needs to be reinforced.

Level 1 ([1]–[4])

Candidates discuss the advantages and any possible disadvantages of using steel and concrete for the construction of this bridge over an alternative material like timber. Candidates will show an understanding of the properties of steel and concrete in comparison to other materials. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantages and any possible 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 any possible disadvantages of using steel and concrete for the construction of this bridge over an alternative material like timber. Candidates will show an understanding of the properties of steel and concrete in comparison to other materials. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss advantages and any possible 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 any possible disadvantages of using steel and concrete for the construction of this bridge over an alternative material like timber. Candidates will show an understanding of the properties of steel and concrete in comparison to other materials. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantages and any possible 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])

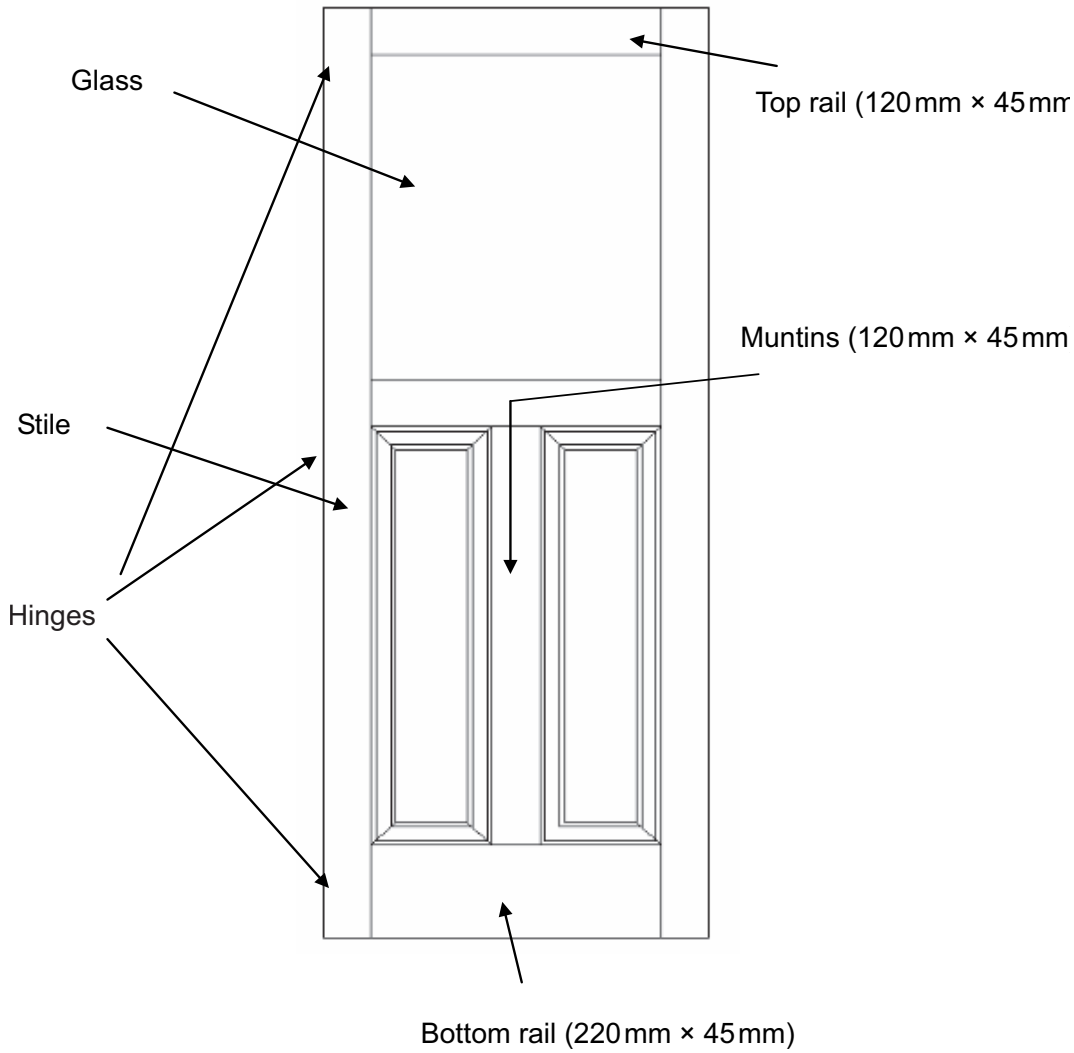
[10]

10

AVAILABLE
MARKS

- 11 (a)
- The top half of the door is glazed.
 - Two solid timber panels in the bottom half.
 - Show the position of three hinges.
 - Quality of drawing.
 - Drawing in proportion.

[5]



(b) Labels [1] each.

[5]

Section B

Total

AVAILABLE MARKS

10

50

120