Rewarding Learning

General Certificate of Secondary Education
2013

Construction and the Built Environment

Assessment Unit 1: The Construction Industry for the 21st Century

[GCB11]

WEDNESDAY 15 MAY, 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' 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

AVAILABLE MARKS

1 **(a)** Cavity Wall Construction **or** Cavity wall **or** Cavity [1]

(b) 1. UPVC **or** UPVC (Oak grained windows) **or** PVC [1]

2 Cast Iron [1]

3. Painted render [1]

4. Solid Hardwood **or** Hardwood [1]

(c) 1. Stud walls or demountable partitions [1]

2 Timber **or** steel **or** wood (**or** the name of a suitable softwood) [1]

3. Plasterboard [1] 8

2 **(a)** [1] for function and [1] for location in each answer up to a maximum of [2].

AVAILABLE MARKS

1. These are inclined timbers fixed between **wall plate** and **ridge** which transmit live and dead **loads** to wall plate. [2]

2. This is a **horizontal roof member supporting the rafters** and usually at right angles to these. This enables small section timbers to be used for the rafters. The Purlins run from **gable to gable** or from purlin wall to purlin wall. [2]

3. First floor joist **support the upper floor** and the **plasterboard screwed** to the ceiling beneath it. They usually run in the same direction as the rafters, i.e. from **wall to wall**. They also help tie the rafters together at the base. [2]

4. The **ridge board is a horizontal** board set on edge to which the rafters are attached. The function is to provide something to secure the top of the rafters or top of roof or stability. [2]

5. Verge or gable board **found up the gable of a dwelling**. The function of this member is to **protect** the rafters and other roof members from the elements. [2]

6. A horizontal board fixed to the **underside of the rafter** outside the building. The function of this member is to **protect** the tails of the rafters. [2] 12

			AVAILABLE MARKS
3	**(a)** 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 or with an incorrect unit then only [1] will be given. Tolerance on scaled dimension only +/– 100 mm		
	(i) Length 4800 mm Width **4500 mm** (T)	[4]	
	(ii) Length 18300 mm	[2]	
	(iii) Width **1000 mm** (T) Height 1500 mm	[4]	
	(iv) Height 2500 mm	[2]	
	(b) 11	[2]	14

			AVAILABLE MARKS
4	**(a)**	Any **four** of the following, [1] mark for each up to a maximum of [4]. Falling from scaffolding Being hit by something falling Falling through fragile roofs Being hit by construction vehicles **or** misuse of machinery Electrocution [4]	
	(b)	Any **two** of the following, [1] mark for each up to a maximum of [2]. Muscle strain Pulled ligaments Spinal disc injuries Trapped nerves Hernias **or** sore back [2]	6

5 **(a)** Any **five** of the following, [1] mark for each up to a maximum of [5].

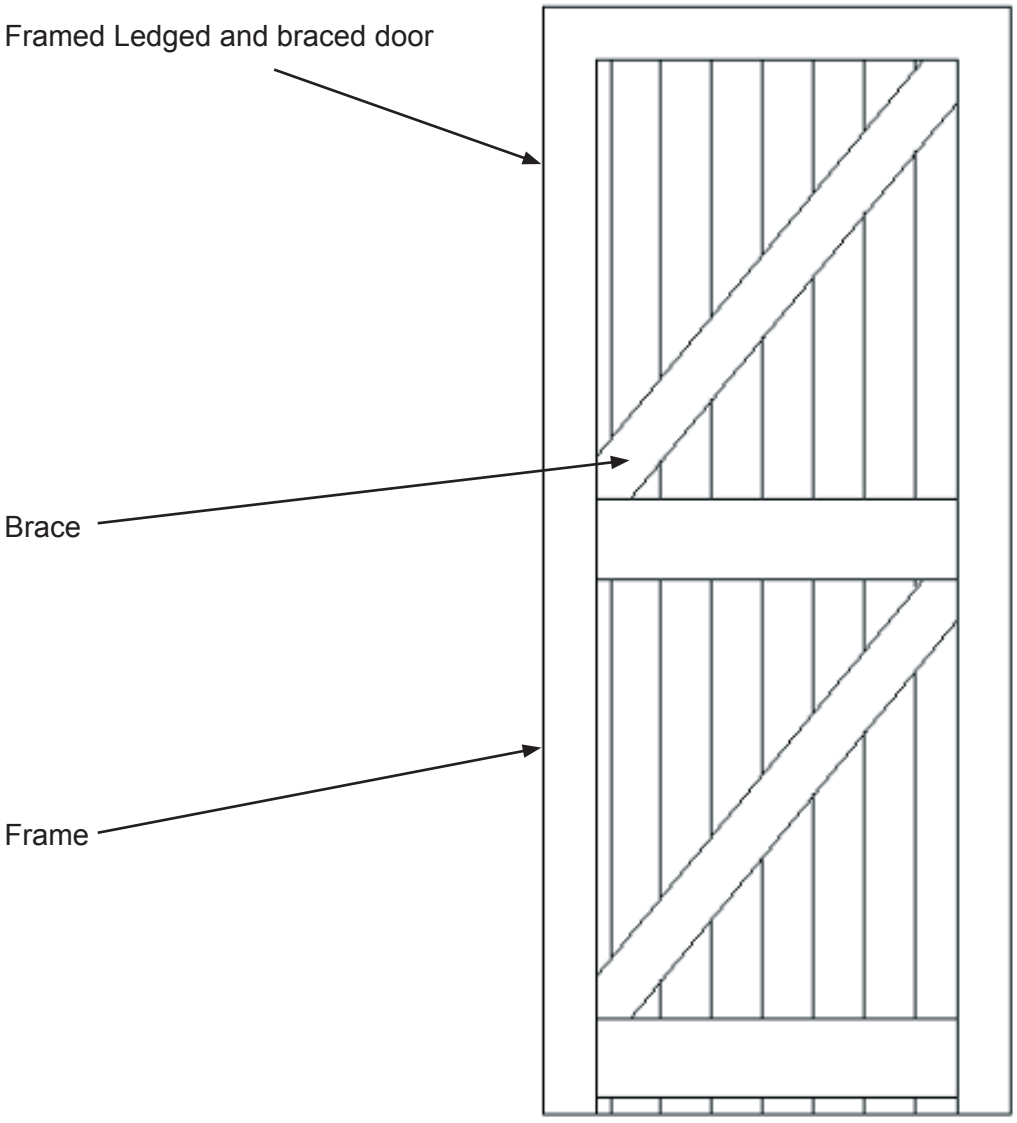
AVAILABLE MARKS

Access
Weather Exclusion
Security
Fire Resistance
Thermal Insulation
Privacy
Durability
Sound Insulation
Appearance

Or any other suitable answer [5]

(b)

Framed Ledged and braced door



Correct proportion of door	= [1]			
Three cross rails	= [2] or two cross rails	= [1]		
Two braces	= [2] or one brace	= [1]		
Sheeting	= [1]			
Quality of sketch high	= [3] medium =	= [2]	low	= [1]

Maximum marks awarded = [8] [8]

13

				AVAILABLE MARKS
6	**(a)**	Any **two** of the following [1] each up to a maximum of [2] The road network **or** cars **or** lorries The railway network **or** trains **or** railway station Waterways **or** boats **or** harbour Air traffic **or** aircraft **or** airports **Or** other suitable answer	[2]	
	(b)	1. Terraced houses	[1]	
		2. Detached houses	[1]	
		3. Multi storey apartments or commercial property	[1]	
		4. Commercial properties or multi storey apartments	[1]	
		5. Historic building of special interest	[1]	7

	AVAILABLE MARKS

7 (a)

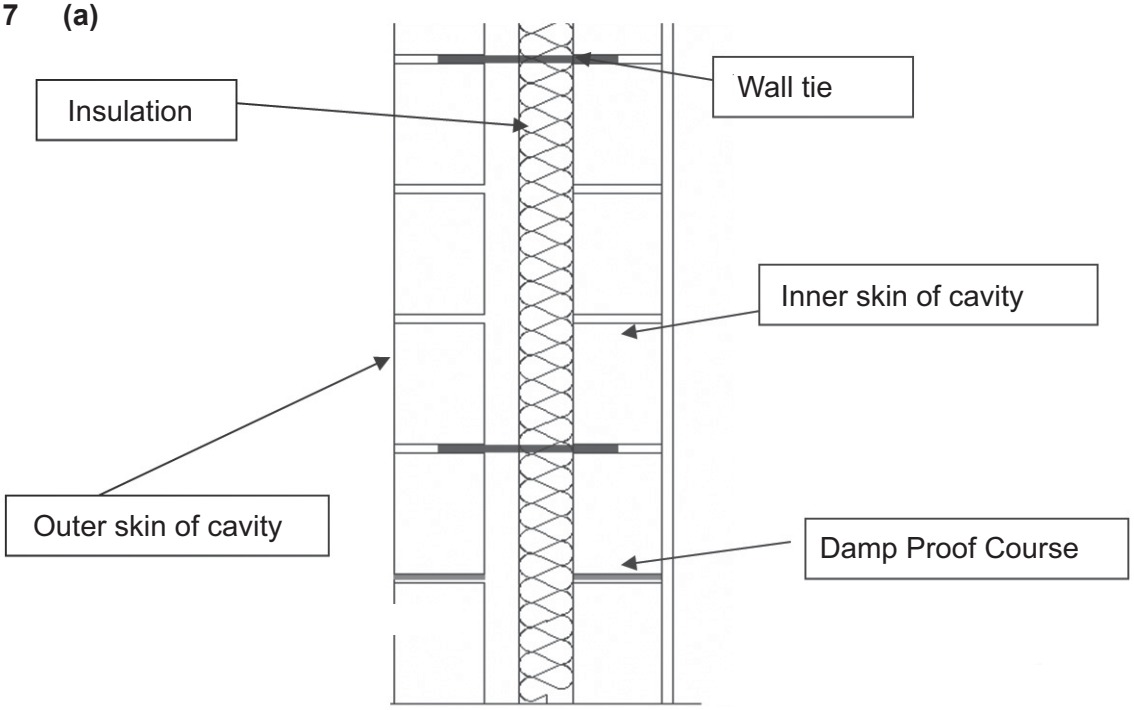


Fig. 1 [5]

(b) Any **five** of the following, [1] mark for each up to a maximum of [5]

- Cavity prevents the passage of moisture.
- DPC prevents moisture rising.
- Cavity wall tie holds the two skins of brickwork together.
- Cavity can be filled with insulation to reduce heat loss.
- Increase in width of cavity wall makes a more stable structure.
- Cavity wall is slightly more expensive to build as it uses more materials.

Or any other suitable answer [5] | 10

Section A | **70**

Section B

AVAILABLE MARKS

8 The following points should be considered in relation to timber framed construction.

Timber framed structures differ from those constructed of traditional solid stone construction work because the:

Structural frame panels are fabricated from wood.
They **transmit their loads** to the foundation through a common sole or base plate. **Must comply with the building regulations** in every aspect including resistance to fire.
The window and door openings in traditional stone walls will require a **large sections of timber over them**. Alternatively **concrete or steel** could be used. In a timber framed structure much **smaller sections of timber** are used.
A high degree of **thermal insulation** can easily be achieved in Timber framed structures using good quality insulation between the studs and also dry lining with insulation placed on the back of the sheeting.
The outside of the studs will be sheeted with plywood.
In the UK housing in timber framed structures is permitted up to three storeys including flats and Maisonettes. You can not place a solid stone wall at first floor level unless there is a stone wall underneath it to transmit the load to the foundations. You can **place a stud wall at any point on timber floor joists thus allowing increased flexibility** of design in a timber framed structure.

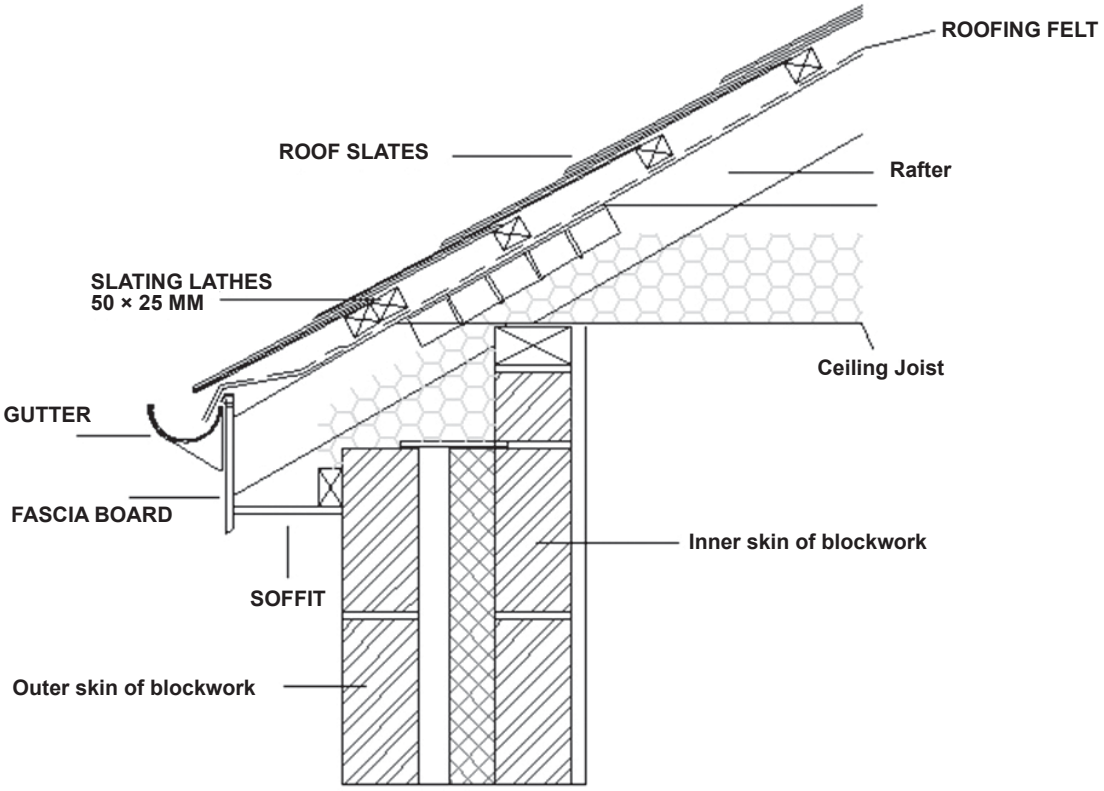
Level 1 ([1]–[4]) (1 technical or speed of erection point)
Candidates compare the difference between solid stone walls in traditional domestic construction and modern timber framed construction. Candidates will show an understanding of the difference between these wall types. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss types of walls 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]) (3 technical points)
Candidates compare the difference between solid stone walls in traditional domestic construction and modern timber framed construction. Candidates will show a satisfactory understanding of the difference between these wall types. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss types of walls 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]) (5 technical points)
Candidates compare the difference between solid stone walls in traditional domestic construction and modern timber framed construction. Candidates will clearly show a very good understanding of the difference between these wall types. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss types of walls 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. [10] 10

9 [1] per element up to a maximum of [10] [10]

AVAILABLE MARKS



Labelled correctly up to a maximum of [10] [10] 20

[1] per correctly drawn element up to a maximum of [10]

Rafter
Roofing membrane
Lathes completed
Slates completed
Soffit
Fascia
Insulation in roof
Insulation in wall
Wall plate
Ceiling joist

			AVAILABLE MARKS
10	**(a)**	Rectangular framed structures are used for multi-storey buildings such as educational buildings. The floor space will incorporate a large number of small columns with room for classrooms in between them. Because land is expensive you can place a car park under the building and create a multi-storey building which is cost efficient to build but takes up relatively little floor space. **Level 1 ([1]–[4]) (1 technical point)** Candidate will show an understanding of why the client has chosen a rectangular steel framed form of construction for this school project under the heading suggested. Their level of accuracy for spelling, punctuation and grammar is limited. They will evaluate in a limited form and style of writing. Their evaluation is not fully coherent or organised and there is little use of specialist terms. **Level 2 ([5]–[7]) (3 technical points)** Candidate will show an understanding of why the client has chosen a rectangular steel framed form of construction for this school project under the heading suggested. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They will evaluate in a satisfactory form and style of writing. Their evaluation is coherent or organised and there is use of specialist terms. **Level 3 ([8]–[10]) (5 technical points)** Candidate will show an understanding of why the client has chosen a rectangular steel framed form of construction for this school project under the heading suggested. Their level of accuracy for spelling, punctuation and grammar is excellent. They will evaluate in an excellent form and style of writing. Their evaluation is coherent and very well organised and there is use of specialist terms. When a response is not worthy of credit [0] should be awarded. [10]	
	(b)	A framed structure is a network of **beams and columns** joined up to form the skeleton framework of the building or steel frame. The structural frame carries the total load of the building and transfers it to the **foundation**. [2]	
	(c)	**Welding** Joints made in a controlled environment where the welding can be tested. Examples of welded joints would be base plate to columns. Flat plates on the end of beams. **Bolts** Joints made on site. The joining of beams and columns will be done on site. [4]	
	(d)	Increased structural stability is achieved by the addition of concrete lift shafts. Stair cases Diagonal bracing of the frame. Rigidity achieved by the external cladding. [4] (**Or** any other suitable suggestion) 1 = [2] 2 = [3] 3 = [4]	20
		Section B	**50**
		Total	**120**