Rewarding Learning

General Certificate of Secondary Education
2017

Construction and the Built Environment

Assessment Unit 1

The Construction Industry for the 21st Century

[GCB11]

TUESDAY 13 JUNE, 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)** Pitched roof construction/pitched [1]

(b) **(i)** Very good in a wet climate, like N.I. Good at keeping out the elements [1]

(ii) Durable [1]

(iii) Stability/strong

(iv) Appearance

(v) Room in the roof space/attic

Or any other appropriate answer up to a maximum of [2].

(c) **Four** of the following elements and **four** materials.

(i) Interlocking roof tiles made from concrete

(ii) Window sill made from concrete

(iii) Windows made from uPVC/glass

(iv) Chimney coping made from concrete

(v) Gutter/downpipe made from powder coated aluminium

(vi) Fascia board made from uPVC

(vii) Barge board made from uPVC

(viii) Door made from hardwood/timber/wood

(ix) Soffit (uPVC)

[1] per element and [1] per material up to a maximum of [8] or any other appropriate answer. [8] 11

AVAILABLE MARKS

2 (a) Site Manager

Any of the following or other appropriate response:

- Ensure that all aspects of site operations run smoothly
- Ensure compliance with Health and Safety regulations on site
- Represent the construction company on site and at meetings
- Organise plant, labour, materials, finance and resources on site
- Ensure project is completed within the stipulated time frame

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

(b) Wall and Floor Tiler

Any of the following or other appropriate response:

- Put on wall tiles
- Lay floor tiles
- Grout tiles/sealing
- Tile specialist areas such as a fireplace or swimming pool
- Tile splash back
- Level floors
- Order materials
- Measure area to be tiled
- Cut tiles
- Help client/advice

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

Building Control Officer

Any of the following or other appropriate response:

- Inspect foundations on site
- Inspect drawing prior to approval
- Give advice on interpretation of Building Regulations
- Inspect building at various stages during construction/approval
- Inspect heating installations prior to approval
- Health and safety

[1] per response up to a maximum of [3] [3] 9

		AVAILABLE MARKS
3 (a) **Tolerance on scaled dimensions only +/- 100 mm**		
(i) Length 6700 mm Width 4000 mm	[4]	
(ii) Length 20050 mm	[2]	
(iii) Length 2000 mm Width 3000 mm	[4]	
Tolerance +/- 100		
(b) 9.6 square metres Tolerance +/- 1 square metre	[2]	
(c) Width 2000 mm	[2]	14

AVAILABLE MARKS

4 **(a)** 110 volts [2]

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

Check body of power tool
Check that the body of the tool is clean from excessive dirt or grease. This dirt could make the tool more difficult to hold and control. It could also hide other defects.
Check H & S

Check for cracks in the body
Check for loose fittings and missing bits of the tool. Check to see if there is an up-to-date Portable Appliance Test (PAT) label on the tool. This will show if it has passed an electrical safety test, which has been carried out by a competent person.

Check cable on power tool
The cable often lies on the ground in dirt and water and can easily be damaged by treading or driving over it. Check the cable for cuts, abrasions, burns, bare wires and frayed ends.

Check plug of power tool
Check the plug to make sure it is not dirty, wet or covered in grease. Check the pins are in place and not loose or misshaped. Also check the casing of the socket to make sure the spring-loaded cover is not cracked.

Check voltage of power tool
If the plug and cable are coloured yellow the power tool will operate at 110 volts. There may also be labels on the power tool showing 110 volts. To work on building sites, all power tools should be at this reduced voltage, or battery operated tools used.
Check PPE
[1] per check up to a maximum of [5] [5]

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

Welfare facilities are things that your employer must provide to ensure a safe and healthy workplace for this housing development.

These include:

Toilets – the number of toilets needed will depend upon the amount of people who will use them. Toilets should be working and clean.

Washing facilities – employers must provide a basin with hot and cold running water as well as soap and something to dry your hands. It may also be necessary to supply showers.

Drinking water – there should be a supply of clean drinking water available which is clearly labelled.

Lunch area – every site must have facilities that can be used for taking break away from the work area. These must provide shelter from the wind and rain and be heated if necessary. There should be tables and chairs and a way to boil water and heat food.
First Aid facilities
Office facilities

				AVAILABLE MARKS
		[1] for listing appropriate facility up to a maximum of [3] [1] for describing appropriate facility up to a maximum of [3] [1] reflecting a site with 25 operatives up to a maximum of [3] (3 × [3])	[9]	16
5	**(a)**	Footings or Substructure **Or** other appropriate answer	[2]	
	(b)	150 mm	[2]	
	(c)	Any **four** of the following or other appropriate response [1] mark each Sand Cement Water Mortar mix/Plasticizer Lime [1] per material/liquid up to a maximum of [4]	[4]	
	(d)	Prevent: Damage to the facing brick Base of the wall getting splashed or dirtied Dampness [1] per appropriate response up to a maximum of [2]	[2]	10

		AVAILABLE MARKS
6 **(a)** Performance requirements of a front door **(i)** Access **(ii)** Weather Exclusion **(iii)** Security **(iv)** Fire Resistance **(v)** Thermal resistance **(vi)** Noise reduction **(vii)** Privacy **(viii)** Durability **(ix)** Strength/stability **(x)** Appearance [1] per performance requirement up to a maximum of [6] **Or** any other appropriate answer	[6]	
(b) Width × Height +/– 50 762 mm × 1981 mm 838 mm × 1981 mm 864 mm × 2083 mm 926 mm × 1981 mm [1] per width and [1] per height (as shown above) up to a maximum of [2] **Or** any other appropriate response	[2]	
(c) Architrave	[1]	
(d) Housing joint	[1]	10
Section A		**70**

Section B

Answer **all** questions

AVAILABLE MARKS

7 Four principal resources of the construction industry

Finance
Finance is required by the Client to pay for any construction project.

Finance may be in the form of a:
Mortgage,
Bank loan, (for hotel)
Finance by a government organisation like a housing association, education or health department.

Plant
Essential resource to help with all aspects of production work i.e. to get project completed.
The use of plant is to save time (tower crane for the hotel).
Plant reduces the labour content of many construction operations.
Should reduce overall project cost.
In many situations plant used to satisfy Health and Safety aspects of the project.
Plant to excavate two level basements.

Labour
Labour in the construction industry can broadly be divided into two categories:
Construction craft operative
Technical and Managerial

The two most common methods of employing labour are:
- Directly employed labour

versus
- Self-employed labour.

The contractor must also ensure a very high quality of work no matter which employment method is used. The type of work involved may also influence decisions i.e. new hotel self-employed labour.

Materials
No construction project can proceed without materials. In smaller companies accounts may be set up with some suppliers and foremen are given the responsibility for ordering materials. With medium or large companies the purchasing of materials is usually handled by an office buying department. However the site manager could be given this responsibility on smaller contracts.

Material management includes:
Quality control and scheduling/testing
Ordering
Handling and storage
Waste control

Level 1 ([1]–[4]) (1/2 principal resources of the construction industry)

Candidate discusses at least two principal resources of the construction industry. The discussions should reflect a seven storey hotel. Candidate will demonstrate why it is necessary to use different combinations of finance, plant, labour and materials for the hotel project. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss finance, plant, labour and materials in a

limited form and style of writing. The presentation of the discussion is not fully coherent or organised and there is little use of specialised terms.

Level 2 ([5]–[7]) (3 principal resources of the construction industry)

Candidate discusses at least three principal resources of the construction industry. The discussions should reflect a seven storey hotel. Candidate will demonstrate why it is necessary to use different combinations of finance, plant, labour and materials for the hotel project. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss finance, plant, labour and materials in a satisfactory style and form of writing. The presentation of the discussion is coherent or organised in most cases and they use a range of specialised terms.

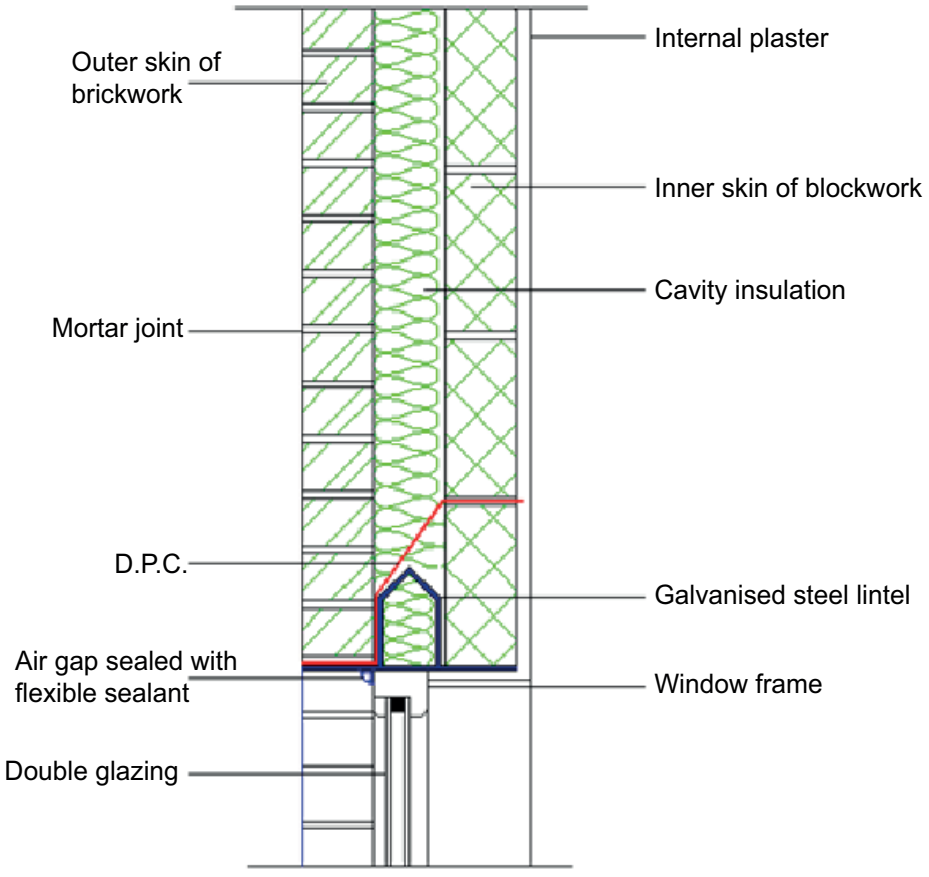
Level 3 ([8]–[10]) (4 principal resources of the construction industry)

Candidate discusses all four principal resources of the construction industry. The discussions should reflect a seven storey hotel. Candidate will demonstrate why it is necessary to use different combinations of finance, plant, labour and materials for the hotel project. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss finance, plant, labour and materials in an excellent style and form of writing. The presentation of the discussion is coherent and very well organised in most cases and they use a wide range of specialised terms. [10]

AVAILABLE MARKS

10

		AVAILABLE MARKS
8 **(a)**	[1] mark for each of the following up to a maximum of [10]	
	External skin Cavity Internal skin Steel Lintel Hatch brick Hatch block Hatch insulation D.P.C. Mortar joints Internal plaster	
	Or any other appropriate answer [10]	
(b)	Labels added in the correct locations:	
	Outer skin of brickwork — Cavity insulation Inner skin of blockwork — D.P.C. Internal plaster — Mortar joint Galvanized steel lintel — Window frame Double glazing — Air gap sealed with flexible sealant	
	[1] mark for each correct label up to a maximum of [10] [10]	20



9 Discuss the advantages and disadvantages of the following or other appropriate materials

AVAILABLE MARKS

Facing brickwork/good range available/difficult to build in wet weather
Grey interlocking concrete tiles/limited in style of tiles in this colour
White uPVC windows/shows the dirt
Hardwood front door/can be painted any colour
White powder coated aluminium gutter
Precast concrete widow sills
Precast concrete chimney coping
White uPVC fascia board/shows dirt easily
White uPVC barge board/shows dirt easily

Finishes fall into two categories:

Self-finish or applied finish

Self-finish – is a finish which is inherent in the material and does not have to be specially applied on site.

Applied finish – is a finish which is actually applied on site.

Materials specified for this dwelling are all self-finishes.
Low maintainence.
Limited reliance on the weather when under construction.
Durable.
Readily available.
Minimum use of skilled labour for trades like plastering.

Level 1 ([1]–[4]) (1/2 advantages or disadvantages in the use of materials used on the exterior of the house shown for the pre-release materials.)

Candidate will demonstrate through discussion the advantages and disadvantages of different types of materials used in this house. These discussions should reflect the range of materials as set out in the specification. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss the advantages or disadvantages of material used for exterior finishes in a limited form and style of writing. The presentation of the discussion is not fully coherent or organised and there is little use of specialised terms.

Level 2 ([5]–[7]) (3/4 advantages or disadvantages in the use of materials used on the exterior of the house shown for the pre-release materials.)

Candidate will demonstrate through discussion the advantages and disadvantages of different types of materials used in this house. These discussions should reflect the range of materials as set out in the specification. Candidate should demonstrate a clear understanding of either an applied finish or a self-finish. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss the advantages or disadvantages of material used for exterior finishes in a satisfactory style and form of writing. The presentation of the discussion is coherent or organised in most cases and they use a range of specialised terms.

		AVAILABLE MARKS
Level 3 ([8]–[10])	**(5/6 advantages or disadvantages in the use of materials used on the exterior of the house shown for the pre-release materials.)**	
Candidate will demonstrate through discussion the advantages and disadvantages of different types of materials used in this house. These discussions should reflect the range of materials as set out in the specification. Candidate should demonstrate a clear understanding of both an applied finish and a self-finish. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss the advantages or disadvantages of material used for exterior finishes in an excellent style and form of writing. The presentation of the discussion is coherent and very well organised in most cases and they use a wide range of specialised terms. [10]		10

		AVAILABLE MARKS
10	**One** valid method of improving fuel conservation [1] mark, two valid methods of improvement [2] marks up to a maximum of 2 marks for each element.	
	Element 1 External walls	
	Increase cavity fill insulation to full-fill.	
	Dry line inside external walls with timber or metal studs with increased insulation.	
	Or any other appropriate answer. [2]	
	Element 2 Solid ground floors	
	Increase floor insulation	
	Type of floor surface fitted, wood or carpet as opposed to marble.	
	Or any other appropriate answer. [2]	
	Element 3 Ceiling	
	Fix patent sheet insulation to underside of ceiling. Secured by screws through plasterboard sheeting.	
	Increased quilted insulation on top of ceiling. LED lights	
	Or any other appropriate answer. [2]	
	Element 4 Roof	
	Fix patent sheet insulation to underside of ceiling. Secured by screws through plasterboard sheeting.	
	Additional insulation could be placed on top of rafters before roof tiles are fitted. Solar panels	
	Or any other appropriate answer. [2]	
	Element 5 Glazing	
	Install double or triple glazing	
	Fit patent energy retain glass such as K glass	
	Or any other appropriate answer. [2]	10
	Section B	**50**
	Total	**120**