



General Certificate of Secondary Education
January 2013

Construction and the Built Environment

Assessment Unit 1

The Construction Industry for the 21st Century

[GCB11]

WEDNESDAY 9 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’ 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

- 1 (a) Pitched roof construction or cut roof [1]
- (b) 1. Slates [1]
2. Brick [1]
3. Lead [1]
4. Fired Clay [1]
- (c) 1. Cavity Wall construction [1]
2. Sand
- Cement
- Aggregate or stone
- Water
- Clay
- Or any other suitable answer up to a maximum of [4] [4]

AVAILABLE
MARKS

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- 2
1. Roofing membrane or roofing felt
This is a breathable membrane nailed on top of the rafters. This membrane prevents moisture leaking through the roof and wetting the ceiling. It also allows water vapour to exit the building. [2]
 2. Fascia board
A board fixed horizontally to rafter ends, which provides an additional fixing for gutters and keeps the elements from penetrating the roof. And appearance. [2]
 3. Hangers
These are timbers hanging from the purlins to the ceiling joist giving additional support to binders. [2]
 4. Eaves
The lower part of the roof, which usually includes the end of the rafter, ceiling joist, soffit, fascia and gutter. This secures the base of the roof. [2]
 5. Valley
This is the name for the intersection between two sloping surfaces, forming an internal angle (the opposite to a hip). The function is to provide the intersection to two roofs. [2]
 6. Gutter
The gutter is an open section of plastic or metal screwed to the front of the fascia. This open section collects the water at the bottom of the roof and conveys it to a storm drain by way of a down pipe. [2]

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

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MARKS

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- 3 (a) Length 4800 mm Width 3800 mm (+/- 100) [4]
- (b) Width 10800 mm (+/- 100) [2]
- (c) Length 6300 mm (+/- 100) Width 3400 mm [4]
- (d) 7 doors or 9 doors [2]
- Tolerance on Calculation +/- 1
- (e) 40 degrees [2]

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MARKS

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4 (a) Control of Substances Hazardous to Health Regulations

[1] for one word right.

[2] for two words right.

[3] for a completely correct answer.

[3]

(b)



Corrosive



Toxic or Poison



Harmful

[1] for each correct answer up to a maximum of [3].

[3]

AVAILABLE
MARKS

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5 (a) Any **five** of the following:

- Weather Exclusion
 - Security/Safety
 - Provide resistance to air penetration in the form of draughts
 - Thermal and Sound Insulation
 - Privacy (bathroom)
 - Durability
 - Let light in
 - Ventilation
- [1] for each up to a maximum of [5].

[5]

Or any other suitable answer.

(b)



The sketch should reflect specification such as the window above **or** any other suitable combination.

- [1] for two correct casements.
- [2] for four correct casements.
- [3] for six correct casements.
- [4] for eight correct casements.
- [5] for ten correct casements.

[5]

10

- | | | |
|----------|---------------------------------------|-----|
| 6 | 1. Landscaped area | [1] |
| | 2. Steel framed rectangular structure | [1] |
| | 3. Modern terraced housing | [1] |
| | 4. Concrete bridge over a motorway | [1] |
| | 5. Farm building | [1] |
| | 6. Cellular Construction | [1] |
| | 7. Portal Framed Structure | [1] |
| | 8. Timber framed structure | [1] |

**AVAILABLE
MARKS**

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7 (a) Any **six** of the following:

- Strength
- Stability
- Weather exclusion
- Thermal Insulation
- Sound Insulation
- Durability
- Fire resistance
- Appearance
- Security

[1] for each up to a maximum of [6].

[6]

Or any other suitable answer.

(b) (i) 900 mm

[1]

(ii) 450 mm

[1]

(iii) 300 mm

[1]

} [1] for interchange of answers

(c) Stainless steel or Nylon

The above **or** other suitable answer.

[1]

AVAILABLE
MARKS

10

Section A

70

Section B

AVAILABLE
MARKS

- 8 Answer must reflect four of following sustainable methods of generating energy or other suitable alternative.

Wind
Biomass
Tidal
Solar Energy
Geothermal Ground Pumps

Level 1 ([1]–[4])

Candidates demonstrate knowledge of two different sustainable methods of generating usable energy. Candidates will show an understanding of the difference between each method. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss types of energy 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 demonstrate knowledge of three different sustainable methods of generating usable energy. Candidates will show a satisfactory understanding of the difference between each method. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss types of energy 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 demonstrate knowledge of four different sustainable methods of generating usable energy. Candidates will show an excellent understanding of the difference between each method. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss types of energy 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

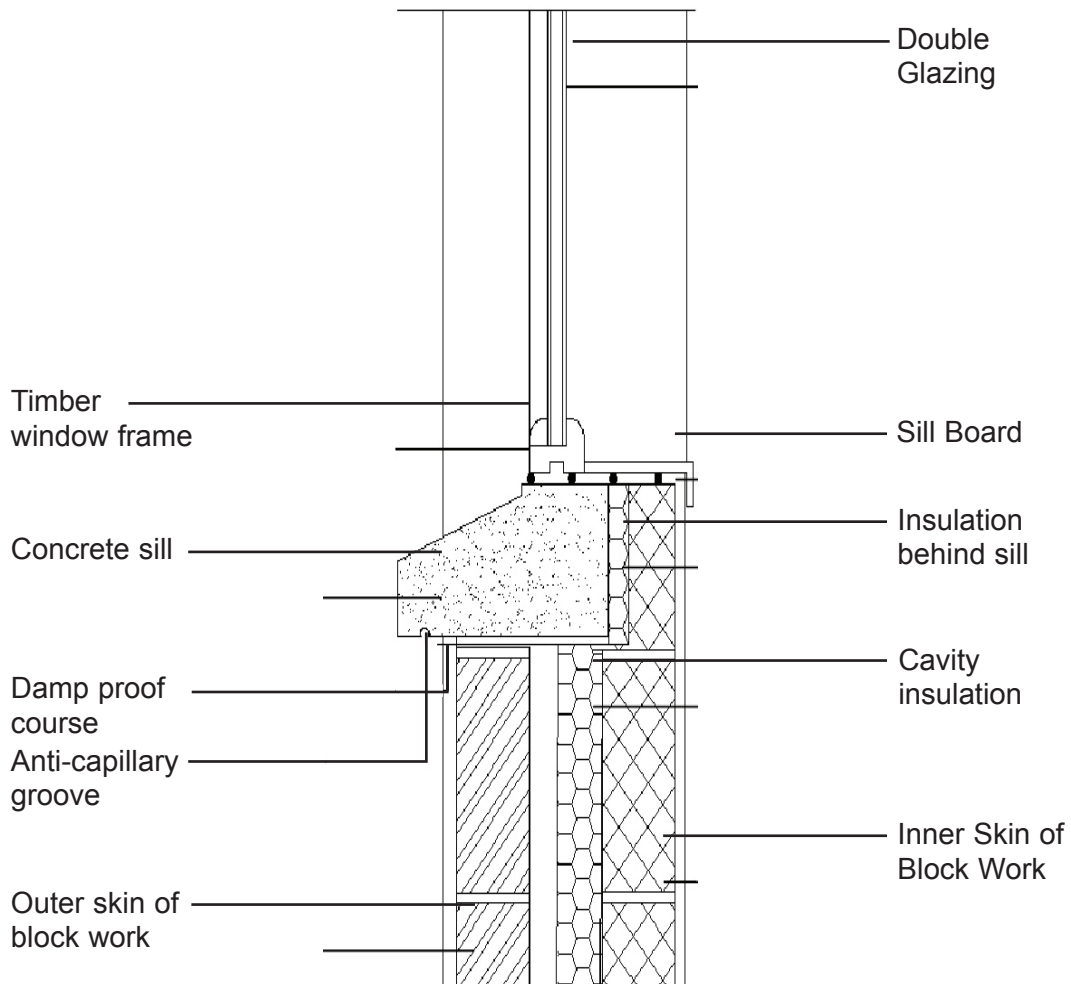


Fig. 2

- Cavity wall correctly drawn [2]
- Cavity insulation in the correct place [1]
- Insulation behind sill [1]
- Sill correctly drawn [2]
- Anti-capillary groove drawn [1]
- DPC in correct place [2]
- Window frame [1]
- Double glazing [1]
- Any of the above to a maximum of [10].

[10]

Labelled correctly max 10

[10]

20

AVAILABLE MARKS

- 10 (a) A portal structure is designed in such a way that it has no intermediate columns, as a result large open areas can easily be created within the structure.

Portal Frames are generally used for single storey construction which require a large unobstructed floor space, i.e.

Factories

Shopping Centres

Warehouses

With single storey buildings natural lighting is gained by placing clear sheets in roof layout.

Advantages

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 the erection of the framework.

Connected together in factories by welding. Site connections should be bolted.

Disadvantages

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

Subject to corrosion

Expensive to heat

Level 1 ([1]–[4])

Candidate will show an understanding of why the client has chosen a steel portal framed form of construction for this warehouse 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])

Candidate will show an understanding of why the client has chosen a steel portal framed form of construction for this warehouse 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])

Candidate will show an understanding of why the client has chosen a steel portal framed form of construction for this warehouse 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 portal framed structure is a network of rafters and columns joined up to form the skeleton framework of the building. The columns carry the total load of the building and transfer it to the foundation. [3]

(c) Answer must reflect three of following methods of increasing the structural stability of a portal framed structure.

- Infill walls or panels between columns
- Diagonal bracing in the walls
- Diagonal bracing in the roof
- Steel tension cables
- Large composite panels used in the roof and walls.

[2] for each method of increasing structural stability up to a maximum of [6], additional [1] for an answer which clearly advises the client well.

Or any other suitable answer. [7]

Section B

Total

AVAILABLE MARKS

20

50

120