



*Rewarding Learning*

**General Certificate of Secondary Education  
January 2019**

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## **Construction and the Built Environment**

### **Assessment Unit 1**

**The Construction Industry for the 21st Century**

**[GCB11]**

**FRIDAY 25 JANUARY, MORNING**

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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

AVAILABLE  
MARKS

- 1 (a) Cavity wall construction [1]
- (b) Non load bearing walls – supports no load, dividing space only.  
Load bearing walls – supporting loads, roofs, floors, etc.  
[1] per answer up to a maximum of [2] or any other relevant answer. [2]
- (c) Any **six** of the following functions:
- Strength
  - Stability
  - Weather exclusion
  - Thermal insulation
  - Sound insulation
  - Durability
  - Fire resistance
  - Appearance and privacy, security
- [1] per function up to a maximum of [6] or any other relevant answer. [6]
- (d) Any **two** of the following:
- they tie the inner and outer leaf of the cavity wall together.
  - they have a drip that will not allow moisture to travel from the outer leaf to the inner leaf of the wall.
  - they hold the insulation in place.
  - they will not rust.
- [1] per answer up to a maximum of [2] or any other relevant answer. [2]
- 2 (a) Architect
- Any **three** of the following:
- Plan the design of the house
  - Sketch proposals for the house
  - Design the internal layout
  - Prepare working drawings
  - Make application for Planning and Building Control approval
  - Supervise work on the site
  - Chair site meetings negotiating with contractors
  - Act as team leader.
  - Sign off completed work/architect's instructions.
- [1] per answer up to a maximum of [3] or any other relevant answer. [3]
- (b) Joiner
- Any **three** of the following:
- Prepare a quotation for the cost of joinery work
  - Assemble roof structure
  - Fit door frames
  - Fit window frames
  - Fit sheeting to floors
  - Fix plasterboard to walls and ceilings
  - Hang doors
  - Joinery related to specialist areas such as kitchen/hotpress.
- [1] per answer up to a maximum of [3] or any other relevant answer. [3]

11

(c) Plumber

Any **three** of the following:

- Prepare a quotation for the cost of plumbing work
- Fit the heating pipes first and second fix
- Fit the sanitary ware
- Fit the kitchen appliances
- Fit the hot water cylinder
- Fit the oil burner
- Plumb related specialist items such as unvented system.

[1] per answer up to a maximum of [3] or any other relevant answer. [3]

AVAILABLE  
MARKS

9

**3 Tolerance on scaled dimensions only +/- 100mm**

(a) Length 6900mm Width 6400mm [4]

**Tolerance +/- 100**

(b) Width 10400mm [2]

**Tolerance +/- 100**

(c) Width 1200mm Height 2000mm [4]

**Tolerance +/- 100**

(d) Length 10800mm [2]

**Tolerance +/- 100**

(e) 7 doors [2]

**Tolerance doors correct [2] +/- 1 door [1]**

(f) 44.16 sq m [2]

**Tolerance +/- 1 sq m**

16

			AVAILABLE MARKS
<b>4</b>	<p>Any <b>four</b> of the following:</p> <ul style="list-style-type: none"> <li>• Take care not to put themselves or other people at risk</li> <li>• Cooperate with employers</li> <li>• Wear PPE provided by the employer</li> <li>• Use any equipment and safeguards provided by their employer</li> <li>• Not misuse or interfere with anything that is provided for their Health and Safety</li> <li>• Only use machinery or equipment they have been trained to use</li> <li>• Report issues/attend site induction</li> </ul> <p>[1] per answer up to a maximum of [4] or any other relevant answer.</p>	[4]	4
<b>5</b>	<p>(a) Roof valley or valley</p> <p>(b) Rafter</p> <p>(c) Fascia board</p> <p>(d) Wall plate</p> <p>(e) Ridge board or ridge</p> <p>(f) Any <b>five</b> of the following:  Weather resistant  Privacy  Thermal insulation  Low maintenance  Sound insulation  Durability  Aesthetics  Carry dead and imposed loads.</p> <p>[1] per answer up to a maximum of [5] or any other relevant answer.</p>	[5]	10
<b>6</b>	<p>(a) Reduce heat loss [1]  Located in a roof, floor or wall. [1]</p> <p>(b) Prevent the passage of moisture [1]  Located in a cavity wall or around window or door openings. [1]</p> <p>(c) Reduce heat loss or the passage of sound [1]  Located in a window or door. [1]</p> <p>(d) Prevent the passage of moisture into the dwelling [1]  Located round a chimney opening, dormer window or at any location where a pipe or other object passes through a roof. [1]</p> <p>(e) The trim to prevent the joint showing between the frame and the wall [1]  Located round the outer edge of a door frame or window frame. [1]</p>	[2]	10

7 (a) The Area Plan is prepared by the Planning Department. It consists of:

- maps
- diagrams
- illustrations
- reports
- photographs

These show the expected development in that particular area for:

- industry
- housing
- schools
- hospitals
- new roads, etc.

The plan forms the basis from which all development will be approved or disapproved in the coming years.

The Planning Department must give adequate publicity to an area plan and allow opportunity for inspection and representation by any interested parties.

[1] per appropriate point up to a maximum of [5]  
or any other relevant answer.

[5]

(b) The Department of Environment (DOE) Planning service published advice on how it will apply the policy to protect Northern Ireland's countryside. This policy statement issued on 16th March 2006 is called "Sustainable Development in the Countryside".

Building will not be encouraged in the countryside unless it is a replacement dwelling, a farm worker's dwelling or a retirement dwelling for a farmer. All rural dwellings will have to integrate into the countryside and the design will also have to reflect the area in which the dwelling is situated. In many areas this will mean windows which have a vertical emphasis (about twice as tall as they are wide), no facing brickwork, rather rendered dash or stone. The policy will also enforce a scale and size which is considered appropriate for a rural setting.

[1] per appropriate point up to a maximum of [5]  
or any other relevant answer.

[5]

10

AVAILABLE  
MARKS

Section B

AVAILABLE  
MARKS

- 8 (a) Rectangular framed structure  
The structure is made from steel
- [1] per answer up to a maximum of [2] [2]
- (b) Any **five** of the following:
- School
  - Hospital
  - Office block
  - Apartments
  - Flats
  - Hotel
  - Museum
- [1] per answer up to a maximum of [5] or any other relevant answer. [5]
- (c) Any **three** of the following:
- A framed structure is a network of beams and columns joined up to form the skeleton framework of the building.
  - The skeleton framework makes many small rooms suitable for occupancy.
  - The structural frame carries the total load of the building and transfers it to the foundation.
  - Cladding is fixed over the framework, or infill panels are placed between its members, to totally enclose the space within the building.
- [1] per answer up to a maximum of [3] or any other relevant answer.  
[1] for a limited discussion [2] for well reasoned discussion. [5]
- (d) Any **four** of the following:
- Members can be pre-fabricated off-site.
  - Fast erection on-site.
  - Framed structures are easily erected from pre-made members.
  - Members are easily connected in the correct sequence to form the structural framework.
  - Cost competitive
  - Many floors.
  - Different types of cladding can be used.
- [1] per answer up to a maximum of [4] or any other relevant answer. [4]
- (e) Any **two** of the following:
- Diagonal bracing
  - Concrete core lift shaft
  - Stairs/stairwell
  - Floor slabs
- [2] per answer up to a maximum of [4] or any other relevant answer. [4]

20

- 9 The following points should be considered in relation to timber framed construction:

Timber framed structures differ from those constructed of traditional concrete brick and block work because the structural frame panels are fabricated from wood. They transmit their loads to the foundation through a common sole or base plate. They must comply with the building regulations in every aspect including resistance to fire. The window and door openings in traditional masonry walls will require concrete or galvanized steel lintels over them. 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 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 cannot place a solid block wall at first floor level unless there is a load bearing masonry 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]) (Up to 2 technical points)**

Candidate compares the difference between concrete brick and block work in traditional domestic construction and modern timber framed construction. Candidate shows 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]) (Up to 4 technical points)**

Candidate compares the difference between concrete brick and block work in traditional domestic construction and modern timber framed construction. Candidate shows 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 and organised in most cases and they use a range of specialist terms.

**Level 3 ([8]–[10]) (Up to 6 technical points)**

Candidate compares the difference between concrete brick and block work in traditional domestic construction and modern timber framed construction. Candidate clearly shows 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.

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

[10]

10

10 The following points should be considered in relation to the client giving their final approval for the houses to be constructed in the attached pre-release material:

- The building can be improved by increasing insulation within the structure including within the walls, floors, roof, etc.
- Use highly insulated windows and doors.
- Double or triple glazing
- Use methods of construction which reduce heat loss such as timber frame or carefully designed window and door openings which do not allow air to escape.
- Increase the thickness of the inner skin with insulation.
- Other uses of innovative technology such as heat exchangers, heat zoned areas within the dwelling.
- Use solar panels in the building/or wind energy.
- Use a heating system which is based on renewable energies such as biomass.
- Change to LED light fittings.

Or any other suitable suggestion

**Level 1 ([1]–[4])**

Candidate shows an understanding of how to reduce reliance on fossil fuels by identifying at least one of the above points. Their level of accuracy, spelling, punctuation and grammar is limited. They use 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])**

Candidate shows an understanding of how to reduce reliance on fossil fuels by identifying at least three of the above points. Their level of accuracy, spelling, punctuation and grammar is satisfactory. They use a satisfactory form and style of writing. Their discussion is coherent or organised and there is use of specialist terms.

**Level 3 ([8]–[10])**

Candidate shows an understanding of how to reduce reliance on fossil fuels by identifying at least four of the above points. Their level of accuracy, spelling, punctuation and grammar is excellent. They use an excellent form and style of writing. Their discussion is coherent and well organised and there is use of specialist terms.

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

[10]

10

- 11 (a) • Fixed light  
 • Top hung casement including hinges  
 • Side hung casement including hinges

[1] per window element/component drawn correctly up to maximum of [3]  
 [1] for a reasonably good quality drawing  
 [1] for a drawing in proportion. [5]

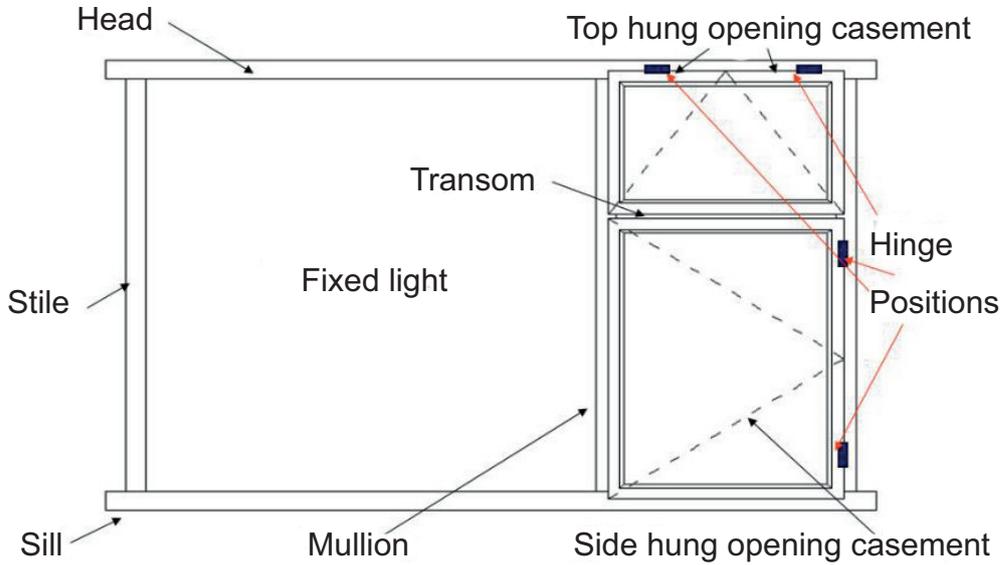


Fig. 1

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(b) [1] per appropriate label up to a maximum of [5] [5]

**Total**

**AVAILABLE MARKS**

10

**120**