Rewarding Learning

General Certificate of Secondary Education
January 2012

Construction and the Built Environment

Assessment Unit 1

assessing

The Construction Industry for the 21st Century

[GCB11]

WEDNESDAY 11 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

Use the pre-release material (house drawings and specifications) to assist with answering questions 1, 2, 3, 4 and 9.

1 **(a)** The following symbols have been used on the Front Elevation, Section and Ground Floor Plan contained within the pre-release material.

Identify what each of these BS1192 symbols or building elements represent.

1. Front Door or door [1]

2. Door in plan or door [1]

3. Eaves Detail [1]

4. Stair Case [1]

5. Shower Tray [1]

(b) Identify the material that is used to construct each of the following building elements.

1. Bangor blue or natural [1]

2. PVC plastic (Brown) [1]

3. Dry dash [1]

4. Reinforced concrete or concrete [1]

5. Concrete [1]

6. PVC or Plastic [1] 11

The following professionals and craft operatives are employed during the design and construction process of the house shown in the pre-release material.

AVAILABLE MARKS

2 **(a)** Identify **three** of the main roles that an Architect would have in relation to this project.

Architect

Any **three** from the following or other appropriate response:
- Initial meeting with client to develop design proposal
- Sketch proposals for the development
- Lead design team
- Design dwelling
- Design internal layout
- Prepare working drawings
- Making application for Planning and Building Control approval
- Supervise work on site

[1] per main role up to a maximum of [3] or any other appropriate response. [3]

(b) Identify **three** of the main roles that the following craft operatives would have for the project shown in the pre-release material.

Plumber

Any **three** from the following or other appropriate response:
- Design layout of plumbing installation within dwelling
- Provide water and waste supply to dwelling
- Install first fix plumbing pipes which are to be hidden within structure.
- Install second fix plumbing
- Connect newly installed sanitary and kitchen appliances to mains supply
- Test all plumbing work for both sanitary and waste system
- Provide test certificate and hand over building

[1] per main role up to a maximum of [3] or any other appropriate response. [3]

Plasterer

Any **three** from the following or other appropriate response:
- Plan plastering work including costs for builder
- Fix plasterboard to walls and ceilings
- Bond and or skim plasterboard
- Scratch solid block wall where necessary
- Floating coat to walls
- Skim walls and ceilings
- Trowel sand and cement floors where appropriate

[1] per main role up to a maximum of [3] or any other appropriate response. [3] 9

3 Using the attached pre-release material, give the following internal room dimensions in millimetres and the areas in square metres. Some dimensions may need to be sealed. 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 ±150 mm

(a) The length and width of the Study.

Length 4800 mm Width 3700 mm [4]

The length and width of the Kitchen.

Length 5100 mm Width 4500 mm [4]

(b) The overall length of the house from the outside of the walls at first floor level.

Length 13000 mm [2]

(c) The width and height of the Kitchen windows adjacent to the Granny flat.

Width 1000 mm Height 1050 mm [4]

(d) The total number of wash hand basins within the complete building.

Total number of hand basins 4 [2]

Tolerance ±1 for half marks

(e) The pitch of the roof for the main part of the house.

Roof pitch 37 degrees [2]

18

AVAILABLE MARKS

4 **(a)** Fig. 1 shows the construction of a block wall for the dwelling shown in the pre-release material. Name the type of bonding shown in Fig. 1.

AVAILABLE MARKS

Stretcher bond [1]

Give **two** reasons why you bond brick or block work.

1. Obtain maximum strength
2. Distributing the loads carried by the wall
3. Ensure lateral stability and resistance to side thrusts
4. Create an acceptable appearance

[1] per appropriate response up to a maximum of [2] or any other appropriate response. [2]

(b) Name the type of wall construction in Fig. 2.

(i) Cavity wall construction

[1] for wall construction
[2] for cavity wall or cavity wall construction [2]

(ii) Give two functions of the wall ties shown in Fig. 2.

1. Tying the outer and inner leaf of the cavity wall together
2. Preventing moisture passing from the outer to the inner skin of brickwork
3. Hold the insulation in place
4. Strength

[1] per appropriate response up to a maximum of [2] or any other appropriate response. [2]

(c) What is the correct horizontal spacing for wall ties shown in Fig. 2?

900 mm

Tolerance ±100 mm half marks [2]

What is the correct vertical spacing for wall ties shown in Fig. 2?

450 mm

Tolerance ±100 mm half marks [2] 11

5 **(a)** List **seven** different performance requirements of windows:

AVAILABLE MARKS

1. Weather Exclusion
2. Security
3. Provide resistance to air penetration in the form of drafts
4. Thermal Insulation
5. Sound Insulation
6. Privacy (bathroom)
7. Durability
8. Let in light
9. Ventilation
10. Appearance

[1] per performance requirement of a window shown above up to a maximum of [7] or any other appropriate response. [7]

(b) List **three** different materials windows can be made from.

1. Softwood
2. Hardwood
3. Wood
4. Aluminium
5. Steel
6. PVC
7. Plastic
8. Glass

[1] per material from which windows can be made up to a maximum of [3] or any other appropriate response. [3]

(c) Define the following wooden window frame terms.

1. Head

   The horizontal top member of a window.

2. Sill

   The horizontal base of a window.

3. Stile

   The vertical members of a window on the outer edges.

4. Transom

   The horizontal member in a window frame.

5. Mullion

   The vertical member in a window frame

[1] per correct definition [5] 15

			AVAILABLE MARKS
6	**(a)**	The building element shown in Fig. 3 is?	
		a stair or wooden stair case [1]	
		The **two** main reasons for having this element within a two storey dwelling are?	
		1. Access to first floor level 2. Provide safe and efficient means of moving between levels 3. Appearance	
		[1] per reason for having a stair case from the list above up to a maximum of [2] or any other appropriate response. [2]	
	(b)	The building elements shown in Fig. 4 is?	
		a door frame or door lining [1]	
		The **two** main reasons for having this element within a domestic house are?	
		1. Appearance. 2. Secure structure to hang a door on.	
		[1] per reason for having a door lining/frame from the list above up to a maximum of [2] or any other appropriate response. [2]	6
		Section A	**70**

Section B

AVAILABLE MARKS

Answer **all** questions

7 Discuss how you would identify the difference between a **Hardwood** and **Softwood** timber when walking through a forest. Suggest the type of construction work for which the **timber from each type of tree** could be used?
In your answer clearly show that you understand the difference between **Heartwood** and **Sapwood**.

The following points should be considered in relation Hardwood and Softwood trees.

The terms Softwood and Hardwood refer to the botanical origins of wood and not to its density or physical hardness.

Softwoods
Softwoods come from cone-bearing trees, often with evergreen needle-like leaves. Softwood trees are usually much faster growing than hardwoods. Softwood is generally used for roof timbers, dividing walls, garden decking or any other location where timber is used structurally but the appearance is not important.

Hardwood
Hardwood comes from broad-leaved trees, most are Deciduous but they can be evergreen. Native hardwoods include: Ash, Oak, Sycamore, Beech, Horse Chestnut, Elm, Lime. Hardwoods are generally used for decorative work such as kitchen cupboard doors, and internal doors. Tropical hardwoods are usually used for the manufacture of outside joinery elements such as windows and doors.

Sapwood and Heartwood
Both sapwood and heartwood are in use in the construction industry. Both have approximately equal strength but heartwood is naturally more durable than sapwood.

(Or any other suitable suggestion)

Level 1 ([1]–[4])
Candidates identify the difference between hardwood and softwood trees and what their resulting timber would be used for. Candidates will show an understanding of the difference between heartwood and sapwood. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss types of trees, timber, heartwood and sapwood in a limited form and style of writing. Their discussion is not fully coherent or organized and there is little use of specialist terms.

Level 2 ([5]–[7])
Candidates clearly identify the difference between hardwood and softwood trees and what their resulting timber would be used for. Candidates will clearly show an understanding of the difference between heartwood and sapwood. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss types of trees, timber, heartwood and sapwood in a satisfactory form and style of writing. Their discussion is coherent or organized in most cases and they use a range of specialist terms.

Level 3 ([8]–[10])
Candidates clearly identify the difference between hardwood and softwood trees and what their resulting timber would be used for. Candidates will clearly show an understanding of the difference between heartwood and sapwood. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss types of trees, timber, heartwood and sapwood 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 [0] should be awarded.
(AO1 [5], AO2 [5]) [10]

AVAILABLE MARKS
10

8 List **two** different ways in which you can create a ground floor for this proposed building.

AVAILABLE MARKS

(a) 1. Suspended concrete or timber floors
2. Solid concrete

[1] for one type of floor as shown above up to a maximum of [2] or any other appropriate response. [2]

List **five** functions of a ground floor.

Function of a ground floor:

1. To carry loads imposed on them
2. To prevent dampness rising from the ground into the building
3. To provide a degree of thermal insulation
4. To prevent growth of vegetable matter in the building
5. To provide a suitable wearing surface

[1] for one function of floor as shown above up to a maximum of [5] or any other appropriate response. [5]

(b) 1. Name the type of construction shown in Fig. 6.

Cellular construction [1]

2. State one material that is often used to construct the walls in this type of structure.

Concrete blocks or cast in situ concrete or any other appropriate answer. [1]

3. Describe how this type of structure achieves its strength.

The strength of cellular structures is achieved by the large number of short walls which are joined together at right angles.

[2] for a full answer or [1] for a part answer. [2]

4. How are the loads of floors and the roof, transferred to the ground in this type of structure

The total load of the roof and intermediate floors are transferred to the foundations by the external walls. The internal walls may also carry some of the load.

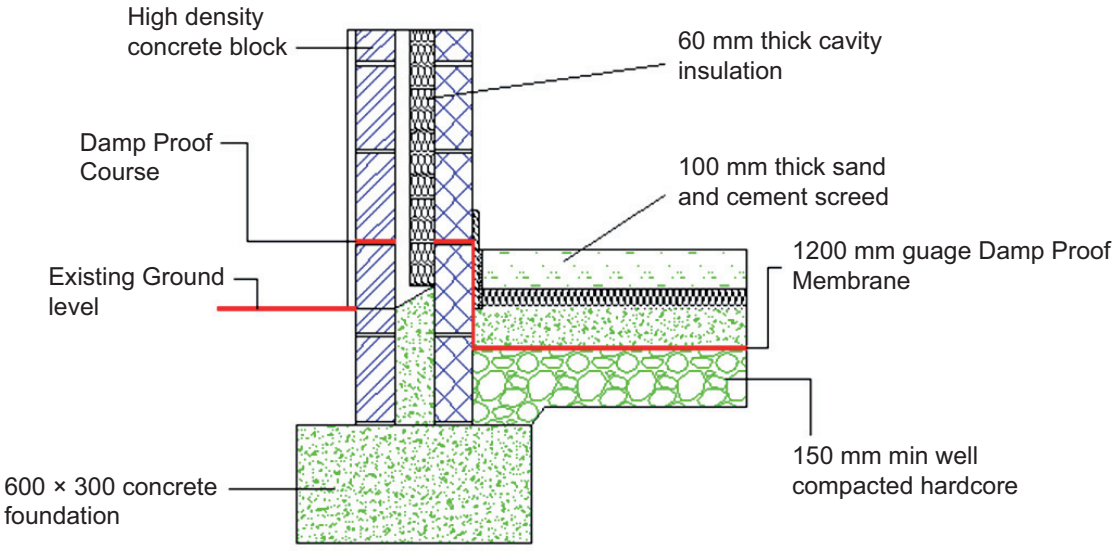
[2] for a full answer or [1] for a part answer. [2] 13

9 **(a)** Complete the drawing below by accurately completing the following elements. Drawing should be completed as shown adding in the following elements.

AVAILABLE MARKS

Foundation	Internal skin of cavity wall
Hardcore	Outer skin of cavity wall
Plaster	Wall insulation
Sand and cement screed	Floor insulation
Cavity fill concrete or solid block	

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



(b) Add the following labels to the drawing

High density concrete block

Existing Ground Level

Damp Proof Course

150 mm well compacted hardcore

1200 gauge Damp Proof Membrane

100 mm sand and cement screed

60 mm cavity wall insulation

600 mm × 300 mm concrete foundation

[1] Per label up to a maximum of [8] [8] 17

		AVAILABLE MARKS
10	The construction industry has a large impact on society and the generation of wealth. Discuss this impact under the following headings: • Direct and indirect employment • The creation of wealth • The impact of building on society **Direct employment** Direct employment in the design and construction process. **Indirect employment** Employment in the supply chain, estate management, banking, education and support services. **The creation of wealth** Wealth creation by contractors, developers and those directly or indirectly involved in the construction process. Regeneration of towns and cities. Secondary spending of those employed in construction. Examples would be weekly spending of families involved in construction, builders plant, tools, vans, etc. **The impact of building on society** Construction creates a stimulus for the economy, creates jobs, improves infrastructure and regenerates areas. (Or any other suitable suggestion) **Level 1 ([1]–[4])** Candidates will show an understanding of how to identify the impact on society and the generation of wealth under the above headings. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss the impact on society and the generation of wealth in a limited form and style of writing. Their discussion is not fully coherent or organized and there is little use of specialist terms. **Level 2 ([5]–[7])** Candidates will show a satisfactory understanding of how to identify the impact on society and the generation of wealth under the above headings. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss the impact on society and the generation of wealth in a satisfactory form and style of writing. Their discussion is coherent or organized and there is use of specialist terms. **Level 3 ([8]–[10])** Candidates will show a clear understanding of how to identify the impact on society and the generation of wealth under the above headings. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss the impact on society and the generation of wealth 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
	Section B	**50**
	Total	**120**