



Rewarding Learning

**General Certificate of Secondary Education
2019**

Construction and the Built Environment

Unit 2

Sustainable Construction

[GCN21]

MONDAY 10 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.

Assessment Objectives

Below are the assessment objectives for Construction.

Candidates must:

- AO1** recall, select and communicate their knowledge and understanding of concepts, issues and terminology;
- AO2** apply skills, knowledge and understanding in a variety of contexts and in planning and carrying out investigations and tasks; and
- AO3** analyse and evaluate evidence, make reasoned judgements and present conclusions.

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.

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.

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.

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:

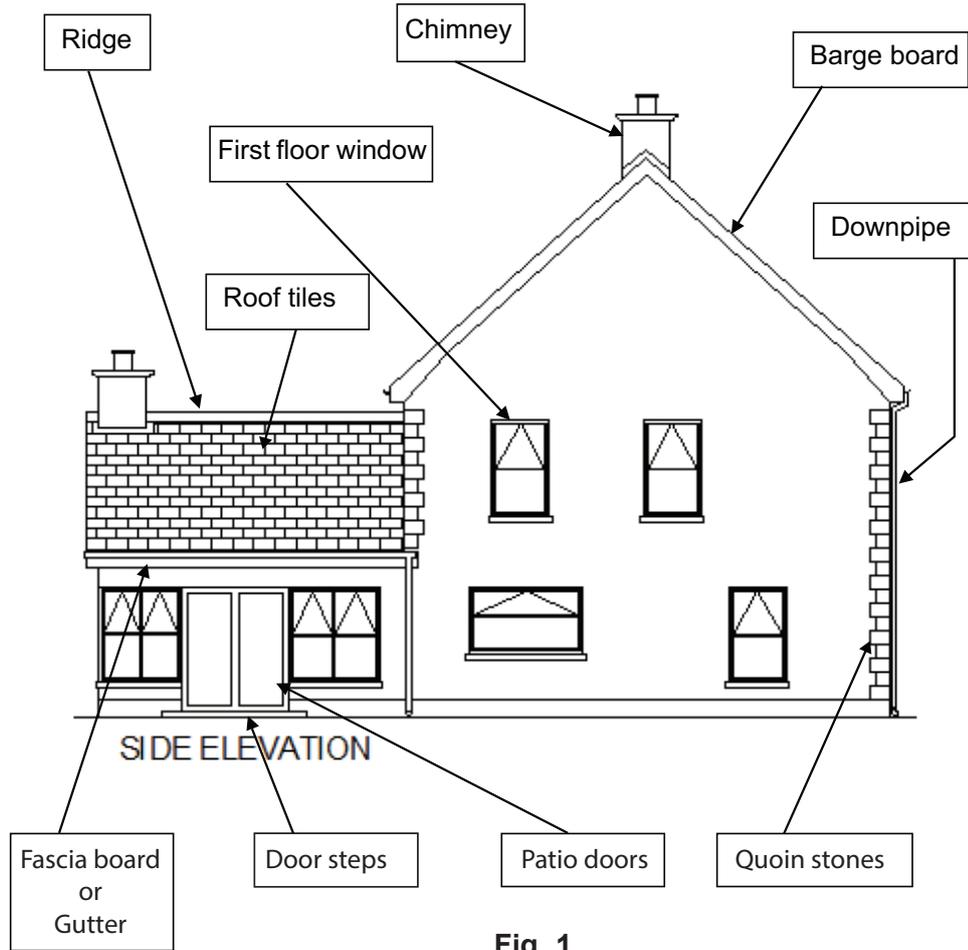
Level 1 (Basic): The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Candidates are expected to answer **all** questions.

1 [1] per correct label up a maximum of [10]



[10]

10

AVAILABLE MARKS

- 2 (a) Length 4000 mm [1]
Width 3900 mm [1] [2]
- (b) Length 5900 mm [1]
- (c) Length 7000 mm [2]
± 100 mm tolerance
Width 4000 mm [2]
± 100 mm tolerance [4]
- (d) Length 11300 mm
± 100 mm tolerance [2]
- (e) $4000 \times 2000 = 8000$ mm square [1]
 $-1100 \times 1100 = 1210$ mm square [1]
 $8000 - 1210 = 6790 = 6.79$ square metres [1]
or
 $4 \text{ m} \times 2 \text{ m} = 8$ square metres [1]
 $-1.1 \text{ m} \times 1.1 \text{ m} = 1.21$ square metres [1]
 $= 6.79$ square metres [1] [3]
- Deduct one mark when the response is incorrect but within ± 1 m square tolerance.
- (f) 6 windows [2]
Deduct one mark where the response is ±1 window, i.e. 5 or 7 windows

AVAILABLE
MARKS

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3 Any of the following or other appropriate response up to a maximum of [2].

[1] to demonstrate an understanding of terms and [1] to give an appropriate example.

(a) Green belt

- Policy for controlling urban growth
- An area surrounding a town or village where construction is kept to a minimum
- Limited development is allowed within greenbelt area for farms or other appropriate occupations associated with agriculture
- Prevents urban sprawl [1]

One example such as the green belt surrounding a city, town or village. [1]
Or any other appropriate answer.

(b) Conservation Area

- A designated area of architectural heritage which is to be retained (part of a town or city)
- A designated area of outstanding natural beauty which is to be preserved [1]

One example of a conservation area such as Gracehill. [1]
Or any other appropriate answer.

Full list of N.I. Conservation Areas are found on the website.

www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/conservation/conservation_az.htm

(c) Recycling

- Reusing existing construction materials in new or refurbished buildings
- Convert (waste) into reusable material
- Recycling metals for the manufacture of new products
- Use again [1]

One example such as reusing natural slate [1] or
 Recycling old copper to make new copper heating pipes [1]. [1]
Or any other appropriate answer.

(d) Retrofit

To install, fit, or adapt an existing building to provide an alternative use [1]

One example would be to insulate an existing property adding solar panels and thermostatic valves [1]

Change an existing terrace house into a coffee shop [1]
Or any other appropriate answer.

AVAILABLE
MARKS

(e) Damp Proof Membrane

- An impermeable layer placed in floors to prevent the passage of moisture from the ground to the upper part of the floor
- A water-proof layer placed in floors to prevent the ingress of moisture.

[1]

One example such as the DPM in a floor.

[1]

Or any other appropriate answer

AVAILABLE
MARKS

10

4 [1] for each shaded box completed correctly up to a maximum of 22

[2] for getting the total cost of table correct.

Item	Part	Quantity	Description of material required	Total Length in mm	Width in mm	Thickness in mm	Total length required	Total cost	
1	Legs	4	Tulip wood	450	50	50	1.800 m	£9.83	[1]
2	Long Top Rails	2	Tulip wood	610	120	18	1.220 m	£5.60	[5]
3	Short Top Rails	2	Tulip wood	420	120	18	0.840 m	£3.86	[5]
4	Short Bottom Rails	2	Tulip wood	420	50	18	0.840 m	£2.49	[5]
5	Table Top	1	Ash Faced MDF	810	520	18	6 table tops from one sheet	£7.00	[4]
Total cost of glue, connection blocks, varnish etc.								£4.00	
Total cost of table								£32.78	[2]

Fig. 3

Marks will be awarded for correct follow through calculations

AVAILABLE MARKS

22

5 (a) Functions of an external hardwood door

- Access
- Weather Exclusion
- Security
- Fire Resistance
- Thermal
- Noise reduction
- Privacy
- Durability
- Strength
- Appearance
- Let light in
- Sound insulation

[1] per function required up to a maximum of [6]

Or any other appropriate answer.

[6]

- (b)
- Fibreglass Quilt
 - Expanded Polystyrene
 - Styrofoam
 - Platinum Bead
 - Sheep's Wool

[1] per suitable insulation material from the above list up to a maximum of

Or any other appropriate answer.

[2]

- (c)
- Reduce heat loss
 - Conserves fuel
 - Reduce condensation
 - Provides better living conditions

For a reasoned discussion on any of the above points or any other appropriate discussion point.

[2]

10

AVAILABLE
MARKS

- 6 An answer should be constructed using the following points below or any other suitable answer:

	Cost	Performance	Reliability
Heat pumps (ground source and air source)	Higher installation and capital cost compared to non-renewable systems such as oil or gas boiler	Low maintenance	
Wind Turbines		Must be placed in suitable location	Only work when wind speed meets the turbine cut in speed
Solar PV	Free energy from sun	20year life span Requires very little maintenance	
Solar water heater			Requires daylight Most efficient in summer months
Biomass Wood chip & Wood pellet	Capital cost to install boiler and storage of chip/pellets as required Fuel cost - Need to purchase chips/pellets or produce your own	Boiler requires servicing Moisture content of fuel source will impact on boiler efficiency	Works constantly provided there is a fuel source

Level 1 ([1]–[4])

Candidates demonstrate a limited evaluation of the advantages and disadvantages of using renewable energies to heat the home shown in the pre-release material. They evaluate at least one of the following: cost, performance and reliability in a limited form and style of writing. Their evaluation is not fully coherent or organised and there is little use of specialist terms. The quality of written communication is basic.

Level 2 ([5]–[7])

Candidates demonstrate a satisfactory evaluation of the advantages and disadvantages of using renewable energies to heat the home shown in the pre-release material. They evaluate at least two of the following: cost, performance and reliability in a satisfactory form and style of writing. Their evaluation is coherent or organised in most cases and they use a range of specialist terms. The quality of written communication is good.

Level 3 ([8]–[10])

Candidates demonstrate an excellent evaluation of the advantages and disadvantages of using renewable energies to heat the home shown in the pre-release material. They evaluate all of the following: cost, performance and reliability in an excellent form and style of writing. Their evaluation is coherent and very well organised in all cases and they use a good range of specialist terms. The quality of written communication is excellent.

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

[10]

10

Up to 5 of the total available marks will be awarded for the quality of the written communication.

AVAILABLE
MARKS

- 7 An answer should be constructed using the following points below or any other suitable answer:

One brick wall would not be suitable under the current Building Regulations as it:

- is a solid brick wall constructed with no cavity.
- has no damp proof course in the wall.
- has no insulation in wall.
- has no barrier to prevent the passage of damp from through the wall.

[1] to comment on each of the above points up to a maximum of [4].

Or

[2] to fully explain in context of each of the above points up to a maximum of [8].

[1] for a basic explanation

[2] for a satisfactory explanation

[10]

AVAILABLE
MARKS

10

8 Quality of drawing [1] per accurate drawing/hatch pattern

(a) When completing your drawing add the following:

- The cavity
- Damp Proof Membrane
- Sand and cement screed

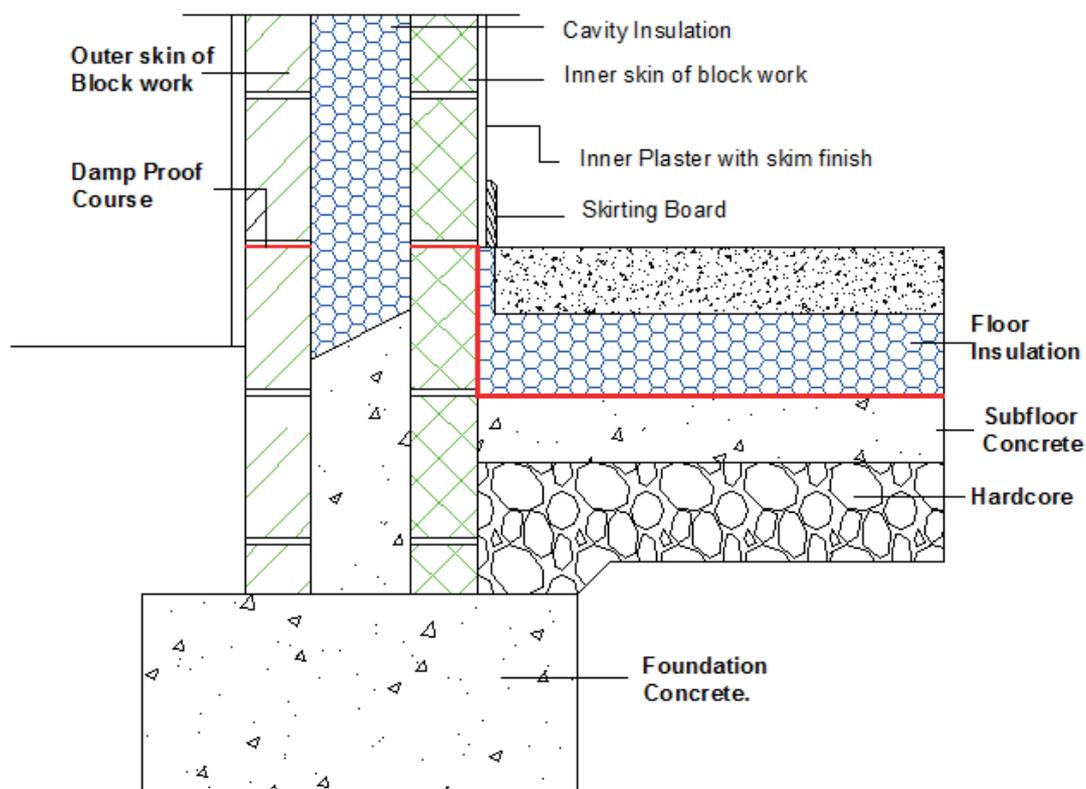
[3]

Draw in hatch pattern to represent the following:

- Hardcore
- Foundation Concrete
- Sand and cement screed
- Inner skin of block work
- Outer skin of block work
- Cavity Insulation
- Floor Insulation

[7]

(b) [1] per label up to a maximum of [10]



[10]

Fig. 5

(c) Answer must reflect the following:

- Floor insulation across the complete floor
- Cold Bridge insulation under skirting at the edge of the floor screed
- Cavity wall insulation
- DPC

Identification of each of the above [1] mark each up to a maximum of [2]

Comparison of the floor construction to a typical floor construction from 100 years ago up to a maximum of [2]

[4]

AVAILABLE MARKS

24

- 9 An answer should be constructed using the following points below or any other suitable answer.

Construction as a stimulus for the economy.

- Creates employment opportunities as direct labour on site.
- Creation of secondary wealth in local shops, restaurants and possibly accommodation if construction employees are staying away from home.
- Creation of wealth in the supply chain.

Providing a catalyst for training apprentices & unemployed and student placement.

- Providing training for apprentices.
- Provide opportunities for short term work placement from school or college.
- Provide University placement opportunities.
- Provide training and employment opportunities for long term unemployed.

Long term benefits of a new school to the community.

- Providing educational opportunities within the community.
- The school building is a community resource in terms of a sports facility, health and wellbeing.
- Employment opportunities for teachers, classroom assistants, cleaners, caretakers and ground staff.

Level 1 ([1]–[4])

Candidate demonstrates a basic evaluation of the impact which the construction industry has on society during and after the construction of a school costing £20 million pounds. They evaluate at least one of the following:

Construction as a stimulus for the economy.

Providing a catalyst for training apprentices, unemployed and student placements.

Long term benefits of a new school to the community.

Their evaluation is not fully coherent or organised and there is little use of specialist terms. The quality of written communication is basic.

Level 2 ([5]–[7])

Candidate demonstrates a satisfactory evaluation of the impact which the construction industry has on society during and after the construction of a school costing £20 million pounds. They evaluate at least two of the following:

Construction as a stimulus for the economy.

Providing a catalyst for training apprentices, unemployed and student placements.

Long term benefits of a new school to the community.

Their evaluation is coherent and organised in most cases and they use a range of specialist terms. The quality of written communication is good.

AVAILABLE
MARKS

Level 3 ([8]–[10])

Candidate demonstrates an excellent evaluation of the impact which the construction industry has on society during and after the construction of a school costing £20 million pounds. They evaluate at least three of the following:

Construction as a stimulus for the economy.

Providing a catalyst for training apprentices, unemployed and student placements.

Long term benefits of a new school to the community.

Their evaluation is coherent and organised in most cases and they use a range of specialist terms. The quality of written communication is excellent.

[10]

Up to 3 of the total available marks will be awarded for the quality of the written communication.

Total**AVAILABLE
MARKS**

10

120