



Rewarding Learning

**General Certificate of Secondary Education
2024**

Construction and the Built Environment

Unit 1

Introduction to the Built Environment

[GCN11]

WEDNESDAY 29 MAY, 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.

- 1 (a) The built environment is the man-made surroundings that provide the setting for human activity. Activities range from domestic, commercial & civil construction, utilities, landscaping, services or any other man-made structure which has affected the environment. [2]
- (b) Any of the following:
- Building** [1]
 Building involves many aspects of construction including commercial, residential, educational and health property types. A building is a structure with a roof and walls standing more or less permanently in one place, such as a house or factory. Buildings come in a variety of sizes, shapes, and functions, and have been adapted throughout history for a wide number of constraints. [2]
- Examples: City/Town Hall, leisure centre, hospital, cinema, school or any other appropriate response. [1]
- Civil Engineering** [1]
 Engineering concerned with the design, construction and maintenance of roads, bridges, dams, harbours, tunnels and similar structures. [2]
- Examples: Specific roads, bridges, dams, harbours, tunnels and similar structures or any other appropriate response. [1]
- Building Services** [1]
 Building Services make buildings meet the needs of the people who use them, providing a safe and healthy environment in which people can live, work, and achieve. Everything inside a building which makes it safe and comfortable to use. [2]
- Examples: Heating and ventilation, energy supply, lighting, water, drainage, plumbing, renewables, fire and security, refrigeration, air conditioning or any other appropriate response. [1]
- 2 (a) Portal Framed Construction [1]
- (b) • Steel
 • Concrete
 • Timber (Glued laminated, solid laminated)
- [1] per response up a maximum of [3] [3]
- (c) Any of the following or other appropriate response:
 • Factories
 • Shopping Centre
 • Agriculture sheds
 • Warehouses
- [1] per response up a maximum of [2] or any suitable answer [2]
- (d) Responsible for the design and physical integrity of the portal framed structure to ensure safety and durability. This could include pad foundation design and cladding/bracing. [2]

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

Advantages:

- Speed and ease of erection
- Large unobstructed floor space
- Buildings 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 erecting the framework
- Connected in factories by welding
- Site connections should be bolted
- Foundations can be constructed while frame is being fabricated off site
- Metal section easily obtainable in standard lengths
- Structure can be easily adapted for future use temporarily or permanently

Disadvantages:

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

Level 1 ([1]–[3])

Candidates compare advantages and disadvantages of using a portal framed construction when building a large new span building. Candidates will show an understanding of the advantages and disadvantages in relation to speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting steel members. Their level of accuracy for spelling, punctuation and grammar is limited. They discuss advantages and disadvantages 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 ([4]–[6])

Candidates compare advantages and disadvantages of using a portal framed construction when building a new large span building. Candidates will show an understanding of the advantages and disadvantages in relation to speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting steel members. Their level of accuracy for spelling, punctuation and grammar is satisfactory. They discuss advantages and disadvantages 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 ([7]–[10])

Candidates compare advantages and disadvantages of using a Portal framed construction when building a new large span building. Candidates will show an understanding of the advantages and disadvantages in relation to speed of erection, prefabrication, site works, weather difficulties, structural clear span, corrosion, combustibility, and connecting steel members. Their level of accuracy for spelling, punctuation and grammar is excellent. They discuss advantages and disadvantages 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]

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

[4] of the total marks awarded for quality of written communication

- 3
- Plant is an essential **resource** to help with all aspects of production work, i.e. to get project completed
 - Plant is used to save **time**
 - Plant is used to reduce the laborious **labour** content of many construction operations
 - The use of Plant should reduce the overall project cost
 - In many situations plant is used to satisfy Health and Safety aspects within a project
 - Regular Plant Maintenance to avoid break downs which causes delays, increasing costs
 - Plant Manager to coordinate maintenance and scheduling
 - Cost: hire or purchase analysis

[2] per evaluative discussion up a maximum of [6]

- 4 (a) The Health and Safety at Work Order (NI) 1978 [1]

(b) Any of the following:

- Employers
- Employees
- Self employed
- Designers
- Manufacturers
- Supplier

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

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

- Muscle strain
- Pulled ligaments
- Spinal disc injuries
- Trapped nerves
- Hernias

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

- (d)
- Keep back straight
 - Keep arms as close to the body as possible
 - Place hands under the load and pull the load close to body
 - Grip firmly using the whole hand and not just fingers
 - Use legs to lift the load and not back

[1] Per response up to a maximum of [5], all correct [6] [6]

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MARKS

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(e) Any of the following hazards or other appropriate response:

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| Risk Assessment | | | | | | Marks |
|-------------------|-------------------|---|---|---|--------------------------------|-------|
| Activity | Hazard | Persons Exposed | Severity 3–major 2–serious 1–minor | Likelihood 3–highly likely 2–likely 1–unlikely | Risk 9–Greatest 1–Lowest | |
| Working at height | Missing handrail | All persons on bay of scaffolding | 3 | 2 | 6 | [3] |
| Working at height | Missing kickboard | All persons on bay of scaffolding and those below | 3 | 3 | 9 | [3] |
| Working at height | Untied ladder | Persons on ladder | 3 | 1 | 3 | [3] |

[1] per hazard, [1] per persons exposed, [1] risk correctly calculated [9]

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5 Any of the following or other appropriate response:

(a) Softwood

- The term softwood refers to the botanical origin of wood and not to density or physical hardness
- Softwoods come from cone-bearing trees, often with evergreen needle-like leaves
- Softwood trees are usually much faster growing than hardwoods
- They grow in cold or cool temperate climates in countries such as Canada or Northern Russia

[1] per explanation up a maximum of [3]

[3]

(b) Hardwood

- The term hardwood refers to the botanical origin of wood and not to density or physical hardness
- Hardwoods come from broad-leaved trees. Most are deciduous but they can be evergreen
- Hardwood trees are usually much slower growing than softwoods

[1] per explanation up a maximum of [3]

[3]

(c) Mortar

- A mixture of lime with cement, sand, and water used in building to bond bricks, blocks or stones
- In designing mortar there should be adequate strength and ability to form a close bond with the bricks and blocks being used
- Sand: using a well graded clean sand will help produce a good workable mix of adequate strength
- Cement: Ordinary Portland cement is normally used for mortar
- Plasticiser: This is an additive which can be mixed with cement mortar to make it more workable
- Water: the water should be clean
- Proper batching of materials

[1] per explanation up a maximum of [3]

[3]

(d) Insulation

- Insulation is a material used to improve the thermal quality of your home
- The type used will depend on where you are insulating
- Surfaces can be insulated

[1] per explanation up a maximum of [3]

[3]

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- 6 (a) • Shops
 • Offices
 • Banks
 • Shopping centres
 • Restaurants
 • Hotels

[1] per response up a maximum of [2] [2]

- (b) Any of the following or other appropriate response:
- These are buildings that are mainly involved with retailing products to the public
 - They can also provide services to the community
 - They can vary widely in size and design
 - Dwellings could be converted into shops
 - Large multistorey office development

[1] per explanation up a maximum of [2] [2]

- (c) • Schools
 • Hospitals
 • Health Centres
 • Community Centres
 • Sport Centres
 • Concert Halls

[1] per response up a maximum of [2] [2]

- (d) Any of the following or other appropriate response:
- These buildings are used to accommodate the facilities that a community require
 - Type of frame: Rectangular or Portal frame
 - Location within a community/town/city
 - Could comprise of a large auditorium, sports facilities or meeting rooms

[1] per explanation up a maximum of [2] [2]

Total

8

80

**AVAILABLE
MARKS**