

SPECIMEN MARK SCHEME

UNIT 1 - DESIGN THE BUILT ENVIRONMENT: DESIGN FACTORS





Level 3 Diploma Principal Learning

**Construction and the Built Environment
CBE3U1**

Unit 1

Design the built environment: design factors

Specimen Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting, they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Centres should please note the following.

- The Advanced Diploma is a level 3 qualification, as are GCE 'A' levels
- The Advanced Diploma attracts 420 UCAS points, is equivalent to 3.5 GCE 'A' levels at Grade A, and is designed to provide entry to higher education
- The qualification has been designed to ensure that a minimum of half of the learning opportunities in each unit are **applied** learning opportunities.

It follows from the first two bullets that a high level of skill, knowledge and understanding are required to achieve the Advanced Diploma. The third bullet implies that at least half of any external assessment should have an applied context.

The questions in this paper have been designed to provide learners with opportunities to apply the skill, knowledge and understanding developed in the unit to realistic contexts in an applied fashion. A detailed knowledge of the contexts is not essential. The contexts and scenarios used are merely vehicles for assessing the learning that comprises the unit, by testing the learners' ability to apply what they have learned.

The intention is that tutors will use the sample external assessments to support their teaching and learning strategies.

The answers provided in the mark scheme are indicative and, as such, only examples of many possible 'correct' answers. Many other similar answers will attract marks, as long as they are correct, and address the appropriate learning outcomes and assessment criteria.

1

There are three geological categories of building stone:

Sedimentary, igneous and metamorphic.

Examples:

limestone & sandstone (both sedimentary types), granite (igneous) and slate (metamorphic).

2 marks

Stone is the traditional material for buildings in Britain. This is because of its durability and workability. The latter technical property means that stonemasons are able to create a variety of shapes and sizes, without the weathering performance being impaired.

2 marks

The historic use of certain types of stone in particular parts of Britain is due to local availability. Granite has been widely used for building in south-west England and north-east Scotland. Limestone is mainly used in southern England, while sandstone dominates the historic built environment in northern England and Scotland. Slate, Britain's most effective traditional roof material, is quarried in Cornwall, Cumbria, north west Scotland and north Wales.

2 marks (6 marks)

2

Historical references: Most famous in Britain is the Great Fire of London (1666) when 13,000 houses were destroyed.

1 mark

More recent incidents of importance were fires that led to changes in the requirements for fire safety design in buildings. For example: 11 deaths in a hotel fire Saffron Walden (1969) led to the Fire Precautions Act 1971, 56 deaths at Bradford City's football stadium (1985) led to changes to emergency exiting in sports venues.

2 marks

Technical improvements in fire safety in buildings examples:

compartmentation (preventing fire spread between properties), effective emergency exit doors and passageway lighting, non-flammable materials in building finishes, smoke and heat detectors, smoke extraction systems.

3 marks (6 marks)

3

From this invention, it became possible and practical for architects and engineers to design buildings with multiple storeys. Up until then, the heights of buildings were restricted to the number of steps that people would be able to climb in comfort.

2 marks

The highest buildings in Europe were bell towers associated with church buildings, e.g. the Campanile in Florence has 414 steps to the viewing gallery, St Paul's was completed in 1710 in London by the Royal Court Architect Christopher Wren and has a gallery at a height of 530 steps or 85 metres from ground level.

2 marks

Compare these buildings, to modern buildings that have elevators, such as the 180-m Swiss Re Tower (The Gherkin) which has 41 floors, the 452-m Petronas Towers in Kuala Lumpur or the 442-m Sears Tower in Chicago. The world's tallest structure is under construction in Dubai and is expected to be completed in September 2009. It will be over 900 metres high.

2 marks (6 marks)

4

(1 mark to be awarded for naming any of the features below and a further 1 mark for a clear and correct description)

Super-insulated buildings

Natural ventilation systems

Natural building cooling systems

Green technology methods of power supply (e.g. wind, photovoltaic)

Sustainable methods of heating and hot water supply (e.g. solar panel, heat pump)

Non-point (not piped) surface water drainage systems (e.g. porous block paving surfaces, local lake drain point)

State-of-the-art recycling

Sustainable transport options (public transport, cycle path of high quality and safety)

Adequate school provision, a medium scale retail centre, business and leisure facilities

Affordable housing

Rainwater collection points for car washing, garden watering or toilet flushing

Green roofs

4 x 2 marks (8 marks)

5

A recession in the economy is one which experiences industry / business activity at a growth level below that of the previous measurement.

2 marks

In a recession business growth is receding in time when compared to the long-term trend, which is likely to result in more caution in investment in major building projects.

2 marks

There will be a slump in house sales, which will reduce house building output by major building companies.

2 marks

There will be unemployment within the construction sector due to reduced activity on site.

2 marks (8 marks)

6 (a)

Hatching: this is the shading style used in a drawing to indicate a type of building material e.g. brickwork, blockwork, concrete, etc.

1 mark

Scale: this is the specific ratio of the drawing details to the actual size of the building work to be done.

1 mark

Title block: this gives important drawing information such as the project title, the drawing title, the scales used, who it was drawn by, the date and revision of the drawing, the address of the project.

1 mark

Vertical section: this is a projection of the cutaway view of the detail of a building component such as a wall, door or window.

1 mark (4 marks)

6 (b)

The insulation should be between the vapour barrier and the plywood sheeting.

2 marks

Thermal insulation is essential to minimise building heating costs and carbon emissions.

2 marks (4 marks)

7

Argument for:

A by-pass improves transport efficiency and reduces road dangers in towns and villages.

2 marks

Argument against:

There is a risk of reduced economic activity in the by-passed location.

2 marks (4 marks)

8

Ramp access points

Variously coloured / tactile paving slabs

Door thresholds without steps

Easy to reach automatic door opening switches and/or light switches

Mini elevators to gain access to landings

Stair lifts

4 x 1 mark (4 marks)

9

SUDS are built to manage surface water run-off. There are four general SUDS construction options:

- (a) filter strips and swales
- (b) porous surfaces
- (c) infiltration devices
- (d) basins and ponds

2 marks

The environmental benefit of SUDS is that they reduce peak flow loads to a drain and pipe and in that way reduce pressure on the traditional town sewer system. Contaminated run-off from vehicles is dealt with by being broken down naturally within the soil.

2 marks (4 marks)

10

Form is the look or aesthetic of a building, function is what it is to be used for. Architects and engineers share the responsibility.

2 marks

Aesthetic value: shape, scale, colour, materials in the building envelope.

2 marks

Functional performance: structural strength, lighting, heating.

2 marks (6 marks)

Question Paper total - 60 marks