

GCE 2004

June Series



Mark Scheme

Design and Technology: Product Design *(Subject Code PD3D)*

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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Design and Technology: Product Design

3D Design Unit 3 (PD3D)

Quality of Written Communication

The following marks are allocated to the quality of the candidate's written communication. Make a separate assessment of the candidate's overall ability as demonstrated across the paper using the criteria given below.

<i>Performance Criteria</i>	Marks
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The candidate will express complex ideas extremely clearly and fluently. Sentences and paragraphs will follow on from one another smoothly and logically. Arguments will be consistently relevant and well structured. There will be few, if any, errors of grammar, punctuation and spelling.	4
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The candidate will express moderately complex ideas clearly and reasonably fluently, through well-lined sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.	3
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The candidate will express straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.	2
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The candidate will express simple ideas clearly, but may be imprecise and awkward in dealing with complex or subtle concepts. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling may be noticeable and intrusive, suggesting weaknesses in these areas.	1
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NB This mark scheme is intended as a guide to the type of answer expected but is not intended to be exhaustive or prescriptive. If candidates offer other answers which are equally valid **they must be given full credit.**

Many responses at this level are assessed according to the **quality** of the work rather than the number of points included. The following level descriptors are intended to be a guide when assessing the quality of a candidate's response.

(low mark range)
The candidate has a basic but possibly confused grasp of the issues. Few correct examples are given to illustrate points made. Description may be unclear.
(mid mark range)
The candidate has some knowledge but there will be less clarity of understanding. Some correct examples given to illustrate points made. Description better but unclear or confused in parts.
(high mark range)
The candidate has a thorough understanding of the issues and has provided relevant examples to support the knowledge shown. This candidate's answer shows clear evidence of understanding.

Question 1

- (a) Suitable description/explanation of safety features incorporated into play area design. Maybe a bullet point list.

Features may include:

- Height restrictions/guidance to ensure user is big enough to use equipment safely.
- Rubber matting to prevent injury from falls.
- Tread/grip on steps to prevent slipping.
- Guard rails on the top to prevent falls.
- Gap between bars large enough to prevent entrapment in event of fall.
- Bolts, screws etc. countersunk into surface.
- No protruding threads.
- Metal edges are edge rolled to prevent cuts.
- Timber surfaces are well sanded and finished to prevent splinters and cuts.
- Features are well made from durable materials so that surfaces or components do not become faulty and dangerous.
- Secure fence / gate
- Non toxic materials
- Non rotating ladder rungs
- Tripping / head height hazards
- Ladder rungs / steps spaced appropriately
- Reference to BS /EN standards
- Etc.

1 – 2 marks per safety feature.

Explanation required for 2 marks.

(10 marks)

(b) Description of two tests. These may include:

- Load testing with static and dynamic loads to check for component failure. May refer to test rigs.
- ‘Catch’ tests-rubbing over the product with a soft cloth to check for snags, sharp points etc.
- Durability tests- components exposed to weather conditions, simulated wear and tear of use to check safety of components and finishes.
- Material testing to check all materials are as specified by the manufacturer.
(Cheaper, inferior materials can lead to premature failure).
- Toxicity testing of finishes.
- Testing for entrapment risks with ergonomic manikins/probes etc.
- BSI/EC tests.
- Computer simulation tests
- User trials with supervised group
- Use of go/no go gauges to test dimensions Etc.

Breakdown.

- Basic description of a suitable test.. (1 – 2 marks)
- Better description of a suitable test with reference to the hazards, materials and components (3 – 4 marks)
- Full description of an appropriate test. Candidate makes good references to materials, components, finishes, etc. and the hazards that maybe tested for. (5 marks)

(2 x 5 marks)

Total 20 marks

Question 2(a) **Quality of communication.**

- Drawing mainly 2D, untidy, limited annotation with little thought (1 – 3 marks)
- Drawings combination of 2D and 3D. Annotation showing some thought to the design requirements. Use of colour, texture, or tone to enhance the drawings. (4 – 7 marks)
- Drawings combination of 2D and 3D. Good use of colour and texture to enhance drawings. Thorough annotation showing consideration to the design criteria (points from the spec, details of materials and components etc). (8 – 10 marks)

Total 10 marks(b) **Range of ideas.**

Marks will be awarded as follows:

- Limited range of ideas which are very similar. Little annotation to indicate potential for development. Such ideas will generally be worthy of 1 mark per drawing. (1 – 5 marks)
- Range of appropriate ideas. May be small in number but have some variety, having alternative design features. Such ideas will generally be worthy of **up to** 3 marks per drawing. (6 – 10 marks)
- Wide range of good quality design ideas. Designs will be varied and show a number of different features. Such ideas will generally be worthy of 3-4 marks per drawing. **Candidates with fewer ideas but ones that are very good quality should be able to access marks in this band.** (11 – 15 marks)

N.B. Look for differences in overall shape, styling, but maybe developed around central way of gaining height. **Total 15 marks**

(c) **Originality/innovation of product**

Marks will be awarded as follows:

- Uninspiring initial ideas and final design which are stereotypical. Designs will probably be inappropriate for intended end-use, however, there will be an attempt to incorporate a design feature, an interesting use of a material or component. (1 – 3 marks)
 - Designs may be varied and the final design lacks flair but will probably be appropriate to end use. There will be **one to two** innovative features, innovative use of materials or components. (4 – 6 marks)
 - Candidate has attempted to produce imaginative designs but products lack interest and designs are not wholly relevant to the theme. There will be **several (2-3)** examples of innovative features, innovative use of materials or components. (7 – 9 marks)
 - Sound ideas and final design clearly appropriate to theme with a **wide range of** examples of innovative features, innovative use of materials or components. (10 – 12 marks)
 - Highly original ideas which exploit the use of the theme. There will be **numerous** occasions where the candidate has shown innovative design features, innovative use of materials or components. (13 – 15 marks)
- Total 15 marks**

Note: Some candidates may only produce a small number of designs but they may be extremely original and innovative. If this is the case, award marks in the higher mark range for innovation and originality.

(d) **Appropriateness of materials and components.**

Marks will be awarded as follows:

- Limited range of materials across designs with little clear detail. E.g. ‘steel’. May be repeated throughout the drawings. Some may be inappropriate. (1 – 3 marks)
- Range of appropriate materials and components. Some may be repeated. (**More than 2**) different specific materials described, and/or components sketched to gain top of this range). (4 – 7 marks)
- Wide range of appropriate materials and components, with some components sketched or developed into the final design. Materials and components are entirely appropriate to the theme. (8 – 10 marks)

Note: Some candidates may produce a small number of designs but will be able to access marks in the top band if they indicate the use of a *wide range* of materials and components.

Total 10 marks

(e) **Methods of construction.**

Marks will be awarded as follows:

- Limited information about how the product will be constructed. Probably **one or two** stated in simple labels. (1 – 3 marks)
- Variety (**two to three**) of appropriate construction methods stated and/or at least one construction/manufacturing method sketched and explained – awarding the higher mark for level of detail. (4 – 7 marks)
- Clear information about appropriate construction methods with use of exploded drawings to show assembly of **two** areas of the product or drawing(s) of industrial manufacture with accompanying notes explaining its use in the product.

Note: Where the construction method or manufacturing process is complex and the candidate answers in detail, only one drawing is needed to access the higher mark range.

(8 – 10 marks)

Total 10 marks

(f) Dimensions and dimensioning

Marks will be awarded as follows:

3 marks for overall length, width and depth.

Up to 5 marks if sub components dimensioned appropriately

Total 5 marks

(g) Specification criteria met.

Marks will be awarded for:

- | | | |
|---|-------------------|---------------|
| • Some points of the specification addressed. | (1–2 spec points) | (1 – 2 marks) |
| • Most of the specification points addressed. | (3–6 spec points) | (3 – 4 marks) |
| • All specification points addressed. | (7 spec points) | (5 marks) |

Total 5 marks

(h) Details of finish.

Marks will be awarded for:

- | | |
|--|---------------|
| • Specific finish named e.g. yacht varnish | (1 – 2 marks) |
| • Specific finish named with a basic description of its application, justification for its use or justification for no finish. | (3 – 4 marks) |
| • Specific finish named with a full description of application or justification for its use or justification for no finish. | (5 – 6 marks) |

Total 6 marks

Total 76 marks