



## General Certificate of Education

# Design and Technology: Product Design 5551

*Unit 3 (3D Design) PD3D*

## Mark Scheme

*2006 examination - June series*

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.

# 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
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
The candidate will express moderately complex ideas clearly and reasonably fluently, through well-linked sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.	3
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
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

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.

<b>(low mark range)</b>
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.
<b>(mid mark range)</b>
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.
<b>(high mark range)</b>
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.

**PD3D**

1 (a) (i) Expect candidates to give a brief description of ways that CAD could be used to design a point of sale display. Examples could include:

- To produce accurate 2D or 3D drawings.
- The use of a CAD package to design graphics, logos, lettering etc.
- The use of a CAD package to design the component parts of the point of sale display.
- The use of a CAD package to create a 3D artist impressions / rendering / CAD models of the display.
- To produce dimensioned drawings.
- To carry out stress analysis, load testing, stability on a virtual model.
- Etc.

(4 marks) (4 marks)

Breakdown

- Limited understanding of use of CAD. Basic, generic terms used to describe its use in the design of **point of sale display**.  
(1 – 2 marks)
- Better understanding of use of CAD. Some appropriate examples given to describe the use of CAD in the design of point of a sale display.  
(3 – 4 marks)
- Generic terms/reasons in no way related to P.O.S display.  
(0 marks)

(ii) Expect candidates to give a brief description of ways that CAM could be used to manufacture a point of sale display. Examples could include:

- The use of a CNC vinyl cutter (plotter cutter) to make self adhesive labels, logos, letter forms etc. (Accept Roland CAM1, CAM2, STIKA, etc).
- The use of a printer to produce graphics, etc.
- The use of CNC laser or router to machine flat pack component parts of the point of sale display.
- The use of CNC laser or router to engrave graphics.
- The use of Rapid Prototyping Technology (RPT) to make a solid 3D model prior to manufacture .

- The use of CAM to produce moulds/dies etc for volume production of P.O.S.

- Etc.

(4 marks) (4 marks)

Breakdown

- Limited understanding of use of CAM. Basic, generic terms used to describe its use in the manufacture of point of sale display.

(1 – 2 marks)

- Better understanding of use of CAM. Some appropriate examples given to describe the use of CAM in the manufacture of a point of sale display.

(3 – 4 marks) (4 marks)

- Generic terms/reasons in no way related to P.O.S. display.

(0 marks)

- (b) Explanation how designer may use nature to develop ideas.

Answer maybe varied but could include:

- The use of colours found in nature e.g. greens, brown, blues, etc to form the colours used in the graphics on the point of sale display.
- The use of textures found in nature e.g. stone, bark, sand etc to influence surface textures / surface treatment of materials used in the point of sale display.
- The use of patterns and structures found in nature e.g. honeycomb, spiders-web to design structures in the point of sale display e.g. wire-framework, etc.
- The use of shapes and forms found in nature e.g. water droplet, wave, leaf, etc to inspire the shape of the point of sale display.
- The use of natural materials.
- The use of eco-friendly materials.
- Etc.

(8 marks)

Breakdown

- Very basic answer. Reference to some aspects of nature used to inspire ideas but limited. Answer maybe unclear. (1 – 3 marks)
- Better answer with several references to nature influencing design but limited to the obvious – colour and shape. (4 – 5 marks)
- Clear answer showing good insight with appropriate examples given to link nature to the design of the point of sale display. (6 – 8 marks) (8 marks)

Point = 1 mark Justification = 1 mark

- (c) Safety factors that should be considered in the design of a point of sale display.

Answers will vary but expect:

- No sharp edges or snagging points where someone may injure themselves.
- Stability of the display to prevent it toppling over and landing on someone.
- Prevention of items falling from a height on the display such as on a high shelf.
- Fire retardant, so as not to create an additional fire hazard in a shop
- Non toxic materials.
- Conforms to electrical safety standards.
- No finger trapping.
- Method of assembly by shop assistant is safe.

Point = 1 mark Justification = 1 mark

(4 marks) (4 marks)

2 (a) **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 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) (15 marks)

N.B Look for difference in overall shape, styling, etc.

(b) (i) **Quality of communication.** (Across both sheets)

- 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 **or** texture, **or** tone to enhance the drawings.  
(4 – 7 marks)
- Drawings combination of 2D and 3D. Good use of colour or texture to enhance drawings. Thorough annotation showing consideration to the design criteria (points from the specification, details of materials and components etc).  
(8 – 10 marks) (10 marks)

Candidates only need to show evidence for this on one occasion.

(ii) **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 – 2 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.  
(3 – 4 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.  
(5 – 6 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.  
(7 – 8 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.  
(9 – 10 marks) (10 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.**

Look for – innovative shape/form to design or  
– innovative/original features, e.g.

- motion sensors and sound
- moving parts/automata
- automatic spray of fragrance
- use of water/sand, etc
- innovative use of fibre optics or LEDs/OLEDs
- etc



(iii) **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) (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.

(iv) **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. (8 – 10 marks) (10 marks)

**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.**

(v) **Dimensions and dimensioning.**

Marks will be awarded as follows:

3 marks for overall length, width and depth.

Up to 6 marks if sub-components dimensioned appropriately. **(6 marks)**

Note: diameter or radius dimensions may give both width and depth.

(vi) **Details of finish.**

Marks will be awarded for:

- Specific finish named e.g. acrylic paint. (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 marks) (5 marks)

e.g. “acrylic paint painted on with a brush” – 2 marks  
“wood is sanded and cleaned. Polyeurathane varnish is applied by brush or spray. It’s then allowed to dry. A second coat may be needed. 5 marks.

(vii) **Specification criteria met.**

Marks will be awarded for:

- Some points of the specification addressed. (1-2 spec points) (1-3 marks)  
But at a basic level. Possibly confused grasp of the issues.  
Major criteria ignored.
- Most of the specification points addressed. (3-4 spec points) (4-6 marks)  
Candidate shows some clarity of understanding. Some correct  
Examples given to show application of spec.
- All specification points addressed. (5 spec points) (7-10 marks)  
Thorough understanding of the issues in the specification. (10 marks)

**Total 76 marks**