



**General Certificate of Education**

**A2 Design and Technology  
Product Design 6551**

**PD6D    Written Paper**

**Mark Scheme**

*2008 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.

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## 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. This candidate does not have a clear idea of what s/he is writing about.
<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. This candidate knows what s/he is writing about but is confused in part.
<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 knows what s/he is writing about and provides clear evidence of understanding.

**SECTION A: Materials and Components**

- 1 (a) (i) Lamination – description of layered wood – either plywood with alternate layers and grain at 90 degrees or lamination for wood forming/bending with all layers parallel grain.  
Use of adhesive/resin to join layers. Heated press to set uniformly etc  
May include waterproof glues/WBPplywood /stoutheart /multiply. etc
- Composite – accept description of MDF, Chipboard, fibreboard, hardboard, stiring boards ...  
Resin adhesives – formaldehyde – use of press to ensure uniform/density.
- Scale of marks:
- Correctly annotated, accurate sketches reward (3 – 4 marks)
  - Simplistic description (0 – 2 marks) (4 marks)

- 1 (a) (ii) Accept reference made to any of the following:
- ability to produce large size and uniform thickness material
  - remove inherent weakness due to grain direction
  - remove problems due to shrinkage/moisture content/grain faults
  - achieve strength in all directions
  - remove need to fabricate with joints
  - create weather resistant material
  - press-form/mould produce details such as replicate surface decoration / panelling etc
  - cost benefits to manufacturer – use of raw material and labour
- Answers should demonstrate understanding of benefits which apply to both manufacture and function and relate to problems associated with solid timbers.
- Scale of marks:
- good choice of product is accurate/appropriate answer covers all relevant points (6 – 8 marks)
  - majority of points covered relating to suitable product (3 – 5 marks)
  - a small number of points which are often unrelated to a product. (0 – 2 marks) (8 marks)

*Examples:* Alvar Alto style laminated wood seat, Veneered MDF cabinet furniture

NB. There may be some reference to a “lamine surface” – melamine/formica attached to MDF/chipboard ground/base layer.  
Give some credit.

- 1 (b) Ensure that there is reference to two *different* materials and an accurate application to a specific product/s.

Give credit if more than one product is referred to and additional point made.

1 mark each for naming a specific material which is correctly linked to a product (2 × 1 mark) (2 marks)

Anticipate examples:

- of timber( pine/softwood) dry and wet rot / fungal attack
- inhibit and/or treat with tanalise – wood preserver, paint/varnish etc
- ferrous metal corrosion//rust – plating (eg zinc galvanise), paint, plastic coat.

Scale of marks

- Some accuracy in example but lacks clarity, no reference to selection for application (0 – 2 marks)
- Appropriate example with accurate explanation, includes reference to selection of material for application. (3 – 5 marks)

(2 × 5 marks)

2 (a) (i) Select from common list of thermoplastics- polyethylene, acrylic etc  
Accept PP, HDPE, etc (1 mark)

2 (a) (ii) Select from common list of thermo-setting plastics urea formaldehyde  
epoxy/polyester resins etc (1 mark)

2 (b) Answers must relate to a specific, named product.

Example: Although a composite, accept GRP. Use of polyester resin with catalyst hardener and pigment and glass fibres - Boat hull/canoe.

Light weight, flexible, pigment coloured, impact resistant.

Can be moulded to complex shape, requires mould

Mark allocation:

Reference to both manufacture and function but do not expect/require equal no. of points.

Properties both physical and mechanical to suit manufacture:

- easy /economic production by appropriate forming/moulding process
- create properties to suit function-weight/strength, colour, resist surroundings/environment

Scale of marks:

- good choice of product is accurate / appropriate  
answer covers all relevant points (5 – 8 marks)
- majority of points covered relating to suitable product (3 – 4 marks)
- incorrect but a small number of points which are often unrelated to a product. (0 – 2 marks)

(2 × 8 marks)

2 (c) Benefits could be aesthetic appearance of traditional material – wood grain.  
Texture of paper/card against hard plastic in packaging.  
Nostalgic effect of traditional craft material – hand built marine ply canoe,  
clinker built boat hull.

Scale of marks:

- Explanation is detailed, names specific materials etc and is accurate (5 – 6 marks)
- Explanation has some relevant points linked to appropriate material choices (3 – 4 marks)
- Explanation is weak but may contain reference to relevant materials (0 – 2 marks)

(6 marks)

**SECTION B: Design and Market Influences**

- 3 (a) (i) Definition and explanation linked to candidate's own project work shows understanding of specification to support design generation. Not manufacture specification.
- Scale of marks
- Specification explained precisely as list of constraints which require research to define (4 – 6 marks)
  - Some accuracy in explanation but lacks clarity (0 – 3 marks)
- (6 marks)
- 
- 3 (a) (ii) Description should refer to analysis of brief leading to relevant primary and secondary research investigations, market research to identify and clarify target market, testing etc.
- Scale of marks
- Comprehensive and detailed description (6 – 8 marks)
  - Most points included and explained (3 – 5 marks)
  - Some points made but weak in explanation (0 – 2 marks)
- (8 marks)
- 
- 3 (b) A reference to patent / copyright legislation in order to protect the design. (Note these may treated as separate measures as there is a difference between the two.)  
Intellectual copyright/ perceived ownership of an "idea" /design
- Scale of marks:
- A number of methods explained (3 – 4 marks)
  - Probable reference to one method with little explanation (0 – 2 marks)
- (4 marks)
- 
- 3 (c) Initial research into need for the product, gap in the market  
Establishing client/niche market  
Initial and continuing research / development  
Marketing, advertising  
Regular review/re-designupdate in order to keep ahead of competition.
- Scale of marks:
- Number of elements are covered in detail and explained accurately. (4 – 6 marks)
  - Some methods referred to simplistically or one in detail. (2 – 3 marks)
  - One method covered in basic terms only. (0 – 1 mark)
- (6 marks)



- 4 Answer must include two *different* examples or restricted to 12 marks.  
Designer may be inspired by the pattern, shape, colour found in nature as a source or stimulus for decoration / aesthetics etc and/or relate to physical principles – Fibonacci series, golden mean proportion, camouflage

Scale of marks:

- Very good choice of product which is used to demonstrate a wide range of points which are fully explained and relevant to product. (9 – 12 marks)
- Acceptable product with reasonable explanation covering a number of points (5 – 8 marks)
- Somewhat tenuous link between product and only one or two points stated with limited explanation. (0 – 4 marks)

(2 × 12 marks)

## SECTION C: Processes and Manufacture

- 5 (a) Anticipate answers which relate to a wide and free choice of possible products.  
eg. motor vehicles, domestic heating, cooking, washing, food prep.etc

Questions specifies issues of design, manufacture and function and so look for and accept either / and /or product manufacture as well as product in use. e.g. Smart car factory designed for “green” production / low energy costs **and** product in use – reduced MPG running costs to individual from efficient engine design, use of lightweight plastics in small 2 seat body and conservation re-global issues.

Scale of marks:

- Very good choice of product which is used to demonstrate a wide range of energy issues which are fully explained and relevant to product  
(9 – 12 marks)
- Acceptable product with reasonable explanation covering a number of points  
(5 – 8 marks)
- Somewhat tenuous link between product energy issues, only one or two points stated with limited explanation.  
(0 – 4 marks)

(2 × 12 marks)

- 5 (b) Clear explanation of the advantages of application of ICT to a specific product(s). Referring to stock control, ordering of raw materials /components, as well as consumer orders demand/requirements.

Use of software, system control input/process/output, robotics, quality control monitoring etc

Scale of marks:

- Very good choice of product / manufacture process which is used to demonstrate a wide range of issues which are fully explained and relevant.  
(9 – 12 marks)
- Acceptable product / manufacture with reasonable explanation covering a number of points  
(5 – 8 marks)
- Limited response with poor/no examples, only one or two points stated with limited explanation.  
(0 – 4 marks)

(2 × 12 marks)

- 6 (a) Anticipate numerous references to IKEA etc.  
 Factory mass-production as opposed to craft style / one-off, custom made.  
 International trade, low cost, uni-style responding to and setting design trends.  
 Use of man-made materials veneered MDF, KD fittings, self build.

Scale of marks:

- Very good understanding of issues of flat-pack product and manufacture.  
 Refers a wide range of issues of both materials and production which are fully explained and relevant (6 – 8 marks)
- Some understanding of product / manufacture with reasonable explanation covering a number of points (3 – 5 marks)
- Limited understanding with poor examples, only one or two points stated with limited explanation (0 – 2 marks)

(8 marks)

- 6 (b) (i) Manufacturer / supplier –  
*Advantages* of costs relating to raw materials, labour, scale of production, international trade / transport / storage.  
 Ability to respond to and set customer demands.  
*Disadvantages*, unable to meet supply needs, at mercy of global/trade issues.

- 6 (b) (ii) Customer –  
*Advantages* of cost, availability, personal satisfaction of manufacture.  
 Design style – complementary / complementary, able to disassemble  
*Disadvantages*, lack of personal taste, poor quality, need to travel to collect and difficulties with manufacture.

Scale of marks: Applies to both (i) and (ii) equally

- Very good understanding of issues of flat-pack products.  
 Refers to a wide range of issues of both materials and production which are fully explained and relevant. (6 – 8 marks)
- Some understanding of product/manufacture with reasonable explanation covering a small number of points (3 – 5 marks)
- Limited understanding with poor examples, single point stated with limited explanation. (0 – 2 marks)

(2 × 8 marks)