



General Certificate of Education

Design and Technology: Product Design (5551/6551)

Unit 6 (3D Design) PD6D

Mark Scheme

2005 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.

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Design and Technology: Product Design

3D Design (PD6D)

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

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. This candidate does not have a clear idea of what s/he is writing about.
(mid mark range)
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.
(high mark range)
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

Question 1

- (a)
- Polypropylene being a thermoplastic has a low melting point but higher than boiling water!
 - Free flowing so suitable for injection moulding.
 - Ability to pigment for different colours.
 - Insulation properties so cool wall etc.
 - Lightweight.
 - Impact resistant – durable.
 - Water resistant – washable.
 - Mass-volume production.

2 marks each relevant point (includes explanation, reasons why this is appropriate) to a maximum of 12. (12 marks)

- (b) Note change of emphasis in question set – metal may not be suitable but is used due to style requirements.

- Stainless steel is malleable without fracture so can be press formed.
- Stainless used to give slim – simple style/colour is fashionable tech. appearance.
- Tough – durable – impact resistant but will deform.
- Rust – stain resistant.
- Waterproof – washable.
- Not an insulator – hot/cold touch.
- Does not taint food taste.

2 marks each relevant point to a maximum of 12. (12 marks)

NB Do not reward details of injection moulding, etc.
No marks for sketching injection moulding machine.

Total 24 marks

Question 2

- (a) Anticipate from the following: 1 mark for naming composite
1 mark for constituent parts

GRP (do not reward fully the term “glass fibre”) FRP, concrete, manufactured boards – MDF etc., accept alloys – brass, stainless steel.

- PVC etc not a composite
- Relevant properties should refer to different properties – physical and/or mechanical.
- Strengths – flexibility – weight – availability – costs.

Composites (being defined as – when two or more materials are combined by bonding) must be different to reward with 2 x 8 marks each. (2 x 8 marks)

- Accept man-made boards such as MDF.
- Material must be “different” GRP/fibreglass are too similar.

(b) 1 mark for named product
1 mark for composite

- Product and material must be accurate/appropriate e.g. GRP boat/ canoe construction.
- Link together appropriate properties to function – performance and manufacture needs 8 marks max. available for appropriate selection of a composite accurately matched to a product through relevant properties.

(8 marks)

NB Composite may be different in (b) from those given in (a)

Total 24 marks

SECTION B

Question 3

- Prototype – full size or scale model – usually working – to test specific features – form may be in an alternative material/production method. Accept rapid prototyping – stereo lithography.
- Application of “finish” to a presentation drawing of a design proposal. To represent material, texture etc.
- Accept CAD rendering.
- Communication of sequence of events – may be in planning – production etc. marks added for demonstration of knowledge of symbols used.
- Combination of plan and elevation drawing to show full details of size etc. in three dimensions – 1st / 3rd angle – working drawings.
- Formal or free hand sketching technique at 30 degrees to horizontal – good at representative of realistic view can be enhanced by rendering – thick thin line etc.
- To create image or mood relevant to a particular client/product style/ suggestion of colour, form style etc. Accept – image and mood board definitions – used prior to design idea generation.

May not include candidate’s own demonstration of each chosen communication method but answers must show that they understand appropriate use of each method for award of 6 marks each.

(4 x 6 marks)

Total 24 marks

Question 4

(a) Safety issues which may be included, selection from, following examples:

- No sharp edges – pointy bits.
- Flammability.
- Materials – non-toxic, close grained woods.
- Finishes – non-toxic paints or self-finished plastics.
- Size of components – nothing which can detach and be swallowed.
- Finger traps – sized holes.
- Chocking hazards, no solid parts – hollowed.
- Stability.
- Durability.
- Quality of manufacture.
- Mass – weight

(12 marks)

(b) Should make reference to own studies/design experience but do not penalise if this is omitted.

- Detailed description of what product should be/do – function.
- Specification checklist presented following initial analysis of brief and research.
- Prior to ideas generation – needed to focus upon specific needs.
- To reflect information gathered in research activity.
- To specify target market.
- May relate to manufacture specification.
- May be in bullet form.
- To assist in elevation of designs/final product.

(12 marks)

Total 24 marks

SECTION C

Question 5

- (a) Should refer to specific industry – anticipate volume/mass production such as car production.

NB No mark for naming industry.

- Standardised design – use of a common car chassis/cupboard carcass with use of variable components to supply specific individual needs – alternative style etc.
- Use of templates, jigs, moulds.
- Use of CAD/CAM technology, computer control/management systems (although question refers to methods of production, accept CAD but not exclusively).
- Application of JIT – flexible manufacturing systems – continuous production techniques.
- Manufacturing cells – sub assembly.
- Use of flow chart/Gantt chart. (12 marks)

- (b) Should refer to specific area – jewellery, textiles, building, but may include hand made cars – Morgan etc.

- Ability to supply bespoke, custom built products – commissioned to specific client needs/wants – individual specification.
- Originality – rarity value (USP – unique selling point).
- Use of high quality materials.
- Demonstration of traditional crafts skills.
- Nostalgia – warmth of feel.
- Economic issues. (12 marks)

Total 24 marks

Question 6

Free choice of product – anticipate a wide variety of products but observe development to last 25 years. No need to be pedantic but beware of descriptions of kettles and irons heated over open fires etc. Anticipate telephones – mobile phone – satellite technology.

Technologies referred to may include:

- Development of new materials.
- Application of new process of manufacture – polymer production methods.
- New technologies applied to function – use of electronics as opposed to mechanics.
- Digital – analogue technology.
- New forms of energy – portable hand-held tools/equipment.

Aesthetic changes due to materials/process possibilities.

- New materials – polymers produce new shape possibilities.
- Fashion/style taste – translucent materials/chrome – stainless steel/plated plastics.
- Influence of design movements – Memphis/retro style.

24 marks available, although no specific mark allowance for sketches, these will be necessary along with annotation to demonstrate specific product and relevant changes. Generalisations will inevitably limit award of marks.

Total 24 marks