Cambridge International A Level

Cambridge International Examinations
Cambridge International Advanced Level

DESIGN AND TECHNOLOGY **9705/31**

Paper 3 **October/November 2016**

MARK SCHEME

Maximum Mark: 120

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

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Section A

Part A – Product Design

1 **(a)** Suitable material:
- abs/polypropylene/acrylic/HIPS
- appropriate hardwood for laminating/bending
- aluminium alloy
- mild steel (with finish)
- stainless steel — 1

Reasons:
- can produce high quality finish
- can be bent to required shape
- will hold shape when hanging heavy clothing
- look attractive in desired environment — 2×1 **[3]**

(b) Description to include:
Quality of description:
- fully detailed — 3–7
- some detail — 0–2
- quality of sketches — up to 2 **[9]**

(c) Explanation could include:
- change in process
- change in materials
- use of jigs, formers, moulds
- simplification of design

Quality of explanation:
- logical, structured — 4–6
- limited detail — 0–3
- quality of sketches — up to 2 **[8]**
-

[Total:20]

2 Discussion should refer to:
- aesthetics – appeal/complexity against manufacturing possibilities
- unit costs – target market – demand
- processes – specific to product
- consumer need for product
- speed of response/lead time to sales
- quantity consideration/batch production
- competition/advertising

Examination of issues:
- wide range of relevant issues — 5–9
- limited range — 0–4

Quality of explanation:
- logical, structured — 4–7
- limited detail — 0–3 **[16]**

Supporting examples/evidence:
- specific products
- specific marketing/commercial awareness
- specific details of quantity production methods **[4]**

[Total: 20]

3 **(a)** Description of process:

– fully detailed	3–5		
– some detail	0–2		
– quality of sketches	up to 2	7×2	**[14]**

(b) Hardening and tempered:
- ensures hard/sharp blade
- reduces brittleness
- relatively low cost, no need for possibly costlier higher carbon/specialist steel blades

Edged and veneered:
- attractive
- dimensionally stable
- reduced weight/cost
- environmentally friendlier

Vacuum formed:

– range of colours		
– quick process		
– no finishing required	3×2	**[6]**

[Total: 20]

Part B – Practical Technology

4 **(a)** Application identified – e.g. modelling/construction/assembly with materials named **[3]**

(b) Explanation to include:
- possible preparation of materials/surfaces/work area
- stages of application
- possible health and safety issues

– clear, fully detailed	8–10	
– most features described	4–7	
– limited detail	0–3	
– structure/communication	0–2	**[12]**

(c) Explanation could include:
- strength
- speed
- cost

– clear, fully detailed	3–5	
– limited detail	0–2	**[5]**

[Total: 20]

5 (a) (i) Alloys named, e.g.:

Brass	copper (65–90%) zinc (10–35%)
Bronze	copper (78–95%) tin (5–22%)
Stainless steel	Iron (50%+), chromium (10–30%), plus smaller amounts of carbon, nickel, manganese, molybdenum
Duralumin	Aluminium (94%), copper (4.5–5%), magnesium (0.5–1.5%), manganese (0.5–1.5%)

One mark for alloy, two marks for materials 3×2 **[6]**

(ii) Product identified e.g. screw, sink 1×2 **[2]**

(iii) Explanation to include:
- extends material range
- specific qualities/properties produced **[4]**

(b) (i) Product [1] explanation up to 2 **[3]**

(ii) Hardness – resistance to indentation or abrasion
- appropriate test for indentation/abrasion up to 3
- quality of communication up to 2 **[5]**

[Total: 20]

6 Discussion should refer to:
- materials – weight, strength
- mechanisms – cranks, gearing, levers
- friction – tyres, brakes, seat

Examination of issues:
- wide range of relevant issues 5–9
- limited range 0–4

Quality of explanation:
- logical, structured 4–7
- limited detail 0–3 **[16]**

Supporting examples/evidence:
- specific materials
- specific cycle components
- specific reference to function – racing, multi-terrain etc. **[4]**

[Total: 20]

Part C – Graphic Products

7 (a) (i)

accuracy	2
construction	2
interpenetration	2
scale	1 **[7]**

(ii)

development construction	2
correct outline	3
accuracy	2 **[7]**

(b) Explanation should include:
- need for consistency/clarity
- easily understood

- clear, fully detailed 4–6
- limited detail 0–3 **[6]**

[Total: 20]

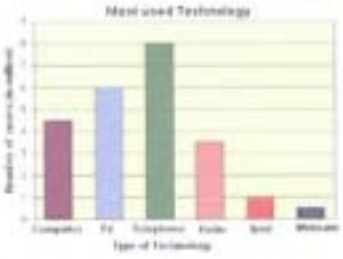
8 **(a)** Description could include:
- speed
- ease of manipulation
- store and send 2×2 **[4]**

(b) **(i)** Description of process:
- fully detailed 4–6
- some detail 0–3
- quality of sketches up to 2 **[8]**

(ii) Description of process:
- fully detailed 4–6
- some detail 0–3
- quality of sketches up to 2 **[8]**

[Total: 20]

9

Pictograms resemble what they signify
Bar charts are chart with rectangular bars with lengths proportional to the values that they represent
Pie charts circular chart showing proportion
Ideograms graphic symbol that reflects idea or concept, (also Chinese characters)

Quality of explanation:
- logical, structured 4–5
- limited detail 0–3 **[5×4]**

[Total: 20]

Section B

Analysis

Analysis of the given situation/problem. **[0–5]**

Specification

Detailed written specification of the design requirements.
At least five specification points other than those given in the question. **[0–5]**

Exploration

Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection.

- range of ideas **[0–5]**
- annotation related to specification **[0–5]**
- marketability, innovation **[0–5]**
- evaluation of ideas, selection leading to development **[0–5]**
- communication **[0–5]**

Development

Bold sketches and noted showing the development, reasoning and composition of ideas into a single design proposal. Details of materials, constructional and other relevant technical details.

- developments **[0–5]**
- reasoning **[0–5]**
- materials **[0–3]**
- constructional detail **[0–7]**
- communication **[0–5]**

Proposed solution

Produce drawing/s of an appropriate kind to show the complete solution.

- proposed solution **[0–10]**
- details/dimensions **[0–5]**

Evaluation

Written evaluation of the final design solution. **[0–5]**

[Total: 80]