

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

GCE Advanced Level

**MARK SCHEME for the October/November 2012 series**

**9705 DESIGN AND TECHNOLOGY**

**9705/31**

Paper 3, maximum raw mark 120

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.

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Section A

Part A – Product Design

1 (a) description of process  
 – fully detailed 3 – 5  
 – some detail, 0 – 2  
 quality of sketches up to 2  
 [7 × 2]

(b) extrusion  
 – long lengths produced  
 – regular section  
 – no wastage

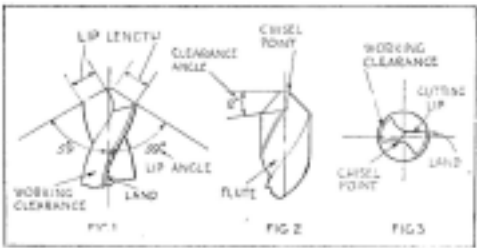
blow moulding  
 – large hollow shape  
 – very fast production rate  
 – excellent finish  
 – minimal wastage

turning  
 – regular cylindrical shape  
 – high quality finish  
 – shape easily repeated [3 × 2]

2 (a) cutting action clearly described up to 3  
 quality of sketch up to 2  
 [5 × 2]



eg.



(b) detailed description up to 3  
 quality of sketches up to 2  
 [5 × 2]

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- 3 (a) appropriate material including:
- Laminated specific hardwood
  - Acrylic/HIPS
  - Aluminium/copper
- 1
- Reasons including:
- Bend to shape easily;
  - Takes good finish
  - Easy to cut shapes out
- 2 × 1 [3]
- (b) description to include:  
quality of description:
- fully detailed
  - some detail,
- quality of sketches
- 3 – 7  
0 – 2  
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
  - limited detail,
- quality of sketches
- 4 – 6  
0 – 3  
up to 2 [8]

### Part B – Practical Design

- 4 (a) (i)  $R = \frac{V}{I}$       $\frac{12}{3} = (1 \text{ mark})$   $4\Omega$  (1 mark)     1 [2]
- (ii)  $I = \frac{V}{R}$       $\frac{9}{40} = (1 \text{ mark})$  225 mA (2 marks)     1 [3]
- (iii)  $V = IR$       $150\mu\text{A} \times 30000$  (2 marks) 4.5 v (1 mark)     1 [3]
- (b) issues could be:
- more products, consumer choice, new potential;
  - marketing implications;
  - cost;
- examination of issues
- wide range of relevant issues
  - limited range
- quality of explanation
- logical, structured
  - limited detail
- 4 – 5  
0 – 3  
3 – 5  
0 – 2

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supporting examples / evidence:

- mobile phones,
- computing,
- media

2 [1]

<b>5</b>	<b>(a)</b> crank fully described Product	4 1	
	<b>(b)</b> linkage fully described Product	4 1	
	<b>(c)</b> cam fully described Product	4 1	
	<b>(d)</b> worm and worm wheel fully described Product	4 1	
<b>6</b>	<b>(a)</b> materials, reasons and applications could be:		
	<ul style="list-style-type: none"> <li>- teak application – garden furniture</li> <li>- aluminium application – buildings</li> <li>- cedar application – garden fences, sheds</li> <li>- copper (brasses and bronzes) application – sculpture, door furniture</li> <li>- lead application – roof protection</li> <li>- PVC (uPVC) application - conservatories, garden furniture</li> <li>- Acrylic (PMMA) Application – shop signs</li> </ul>	<ul style="list-style-type: none"> <li>oils reduce degradation</li> <li>oxide layer forms and protects aluminium</li> <li>oils reduce degradation</li> <li>does not oxidise quickly</li> <li>does oxidise quickly</li> <li>polymer resistant to ultra violet light, does not react to water</li> <li>polymer fairly resistant to ultra violet light, does not react to water</li> </ul>	
	<ul style="list-style-type: none"> <li>Material        1 mark</li> <li>reason         1 mark</li> <li>application    1 mark</li> </ul>	<ul style="list-style-type: none"> <li>3 × 2</li> </ul>	[6]
	<b>(b)</b> quality of description		
	<ul style="list-style-type: none"> <li>- fully detailed, well communicated</li> <li>- some detail, one method described for one specific wood and one specific metal</li> </ul>	<ul style="list-style-type: none"> <li>3 – 4</li> <li>0 – 2</li> <li>4 × 2</li> </ul>	[8]
	<b>(c)</b> quality of explanation:		
	<ul style="list-style-type: none"> <li>- logical, structured</li> <li>- limited detail</li> </ul>	<ul style="list-style-type: none"> <li>4 – 6</li> <li>0 – 3</li> </ul>	[6]

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## Part C – Graphic Products

7	Correct isometric scale	2	
	detail – positioning	2	
	– base	3	
	– upright	2	
	– ellipse	4	
	– recess	2	
	Quality of line/construction	3	[20]
8	Discussion could include:		
	Quality control		
	– no errors		
	– QC throughout operation		
	Manufacturing		
	– reduce components		
	– update		
	CAD/CAM		
	– speed up process; drawing to machine capability; research component availability		
	– 24/7 production potential		
	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	
	supporting examples/evidence		
	– modifying/upgrading rather than creating new (cars, mp3, 4, phones)		
	– rapid prototyping,		
	– Dyson (injection moulding, shared components)		
	– other specific products	4	[20]
9	(a) (i) 3 <sup>rd</sup> angle (1 mark) sectional, orthographic projection (1 mark for sectional or orthographic)		[2]
	(ii) accurate / scaled fully dimensioned agreed standard	2 × 2	[4]
	(b) grip / length / width thumb / finger operation of buttons / size		
	description of example	2	
	sketch	1	
		3 × 2	[6]

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(c) discussion could include:

- research target group – advertising
- cost
- placement of product

examination of issues	3	
quality of explanation	3	
supporting examples/ evidence	2	[8]

**Section B**

**Analysis**

Analysis of the given situation/problem. [5]

**Specification**

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

**Exploration**

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

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

**Development**

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

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

**Proposed solution**

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

- proposed solution [10]
- details/dimensions [5]

**Evaluation**

Written evaluation of the final design solution. [5]

**[Total 80]**