CAMBRIDGE
INTERNATIONAL EXAMINATIONS

June 2003

GCE A AND AS LEVEL

MARK SCHEME

MAXIMUM MARK: 120

SYLLABUS/COMPONENT: 9705/01

DESIGN AND TECHNOLOGY

Written 1

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Section A

1	**(a)**	Two pieces of appropriate data identified e.g. hand size, finger size	2 x 1	2	
	(b)	Two appropriate features identified e.g. button sizes, width of control designed to fit hand	2 x 1	2	(4)
2	**(a)**	Appropriate advantage Quality of explanation	1 up to 2	3	
	(b)	Appropriate limitation Quality of explanation	1 up to 2	3	(6)
3	**(a)**	Burning fingers, risk to eyes, fumes Wear protective gloves, use tongs, goggles	2 x 1 2 x 1	4	
	(b)	Fumes, toxicity, eyes Fume cupboard, goggles, mask	1 1	2	(6)
4	**(a)**	Rotary. Linear OR Reciprocating	2 x 1	2	
	(b)	Cam. Follower	2 x 1	2	
	(c)	Correct mechanism shown, eg. Crank and slider, Accurate sketch showing detail of parts, Labels	2 1 1	4	(8)
5	**(a)**	Any suitable materials, eg. Timbers, metals, plastics	2 x 1	2	
	(b)	Suitable solution presented: Feasibility Construction Sketch or explanatory notes	 2 2 2	6	(8)

6	Collection	– Materials need to be collected often mixed in with other rubbish Sorted items can be expensive to collect Can be placed in collecting points	3 x 1	3	
	Sorting	– Can be expensive to do Can be dirty if done manually Expensive equipment if automated	3 x 1	3	
	Re-use	– Typically plastics quality degrades with recycled material Often cheaper to use virgin material Storage of material requires large space	2 x 1	2	(8)

Section B

7	**(a)**	Suitable timber named	1		
		Two suitable reasons for selection	2	3	
	(b)	Excellent sketching techniques shown. All stages covered and in order. Tools and machines identified	7-9		
		Sketching of a good standard. Most stages identified and in reasonable order. Majority of tools and machines named	3-6		
		Basic sketching techniques used. Only a few stages considered with limited knowledge of tools and equipment	0-2	9	
	(c)	Excellent sketching techniques shown. All details of the jig described and would clearly work to provide accurate holes in correct place. Suitable method of being safely used on the pillar drill shown.	6-8		
		Sketching of a good standard. Suitable details of the jig shown and it would most probably provide reasonably accurate holes. Some sort of method shown by which it could be safely used on the pillar drill	3-5		
		Basic sketching techniques used. Limited details of jig with only possible chance of success. Little chance of safe use	0-2	8	(20)
8	**(a)**	Development:			
		Accurate outline	1		
		Four folds shown in correct place	2		
		Slot and holes on correct surface	1		
		Slot correct sizes (L x W)	1		
		Holes in line (V & H)	2		
		Holes of correct diameter	1	8	
	(b)	All stages considered in detail and presented in correct order	8-12		
		Most aspects considered in some detail and ordered	4-7		
		Basic outline described	0-3	12	(20)
9	**(a)**	Suitable hardwood named, e.g. Teak, Iroko	1		
		Two good reasons, e.g. Oily surface requires no treatment Relatively easy to shape	2 x 1	3	
	(b)	Any two suitable reasons: Lightweight Easy to machine Requires no surface treatment	2 x 1	2	

(c)	Use of Vee blocks	1			
	Use of clamps to hold tubes	1			
	Accurate marking of line across ends using surface gauge	1			
	Correct speed of drill	1			
	Sketches	1	5		
	Other suitable method would also gain marks				
(d)	Sketches and notes to cover the following stages:				
	Place and secure in chuck	1			
	Face off one end	1			
	Turn to diameter	1			
	Centre drill	1			
	Drill hole to suitable length	1			
	Turn boss on end	1			
	Use parting off tool to cut groove	1			
	Part off component leaving allowance for second boss	1			
	Replace in chuck	1			
	Turn boss	1	10		(20)

Section C

10	**(a)**	**(i)**	Injection moulding	1		
			ABS, Polypropylene	1	2	
		(ii)	Magnesium alloy	1		
			Die casting	1	2	
	(b)	**(i)**	Appropriate reasons	2 x 1		
			Quality of explanation up to	2 x 2	6	
		(ii)	Appropriate reasons	2 x 1		
			Quality of explanation up to	2 x 2	6	
	(c)		Appropriate standards/features given up to 2 marks			
			Critical examination of issues up to 2 marks		4	(20)
11	**(a)**	**(i)**	Some understanding shown 1 mark			
			Clear understanding 2 marks		2	
		(ii)-(iv)	As for **(i)**		2	
					2	
					2	
	(b)	**(i)**	Advantages/disadvantages identified up to 3 marks			
			Critical discussion of issues up to 3 marks		6	
		(ii)	As for **(i)**		6	(20)

12	**(a)**	Two properties identified Quality of explanation	2 x 1 up to 2	4	
	(b)	Quality of explanation	up to 2	2	
	(c)	Two disadvantages identified Quality of explanation	2 x 1 up to 2	4	
	(d)	Disadvantage Advantage	1 1	2	
	(e)	Ergonomic factors identified Critical discussion of issues	up to 4 up to 4	8	(20)

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Written 2

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Section A

Part A - Product Design

1 For each method:

Quality of description:
- clear, logical, detailed 4-6
- limited detail 0-3

Quality of sketches up to 2

Specific material 1
Method used to ensure accuracy 1

2 x 10 [20]

2 **(a)** Description of process
- fully detailed 3-5
- some detail 0-2

Quality of sketches up to 2

7 x 2 [14]

(b) Hardening and tempering
- hard enough to turn screw
- Tough enough to resist breaking

Compression moulding
- speed
- uses thermosets
- little waste

Moulding (machine or tool)
- consistent profile
- quality finish

3 x 2 [6]

[Total: 20]

3 Discussion could include:
- gender
- symbols/icons
- colours
- materials
- range/ceremonial

Overall comprehension and interpretation	2
Examination of issues	up to 6 marks
- broad range	4-6
- limited	0-3
Quality of explanation	up to 8 marks
- detailed, logical	6-8
- some detail	3-5
- limited	0-2
Supporting examples/evidence	up to 4 marks

[Total: 20]

Part B - Practical Design

4 **(a)**

Clear understanding of difference between types of structure	3
Examples	2

[5]

(b) Explanation could include:
- <u>monocoque</u>
- shell structure 1
- <u>frame</u>
- consists of joined members 1
- quality of explanation
- use of appropriate examples 3

[5]

(c) Explanation could include:
- <u>natural</u>
- skull, egg, deflects/transmits loads
- properties of materials e.g. bone
- <u>manufactured</u>
- building, pylon, correct joining methods, flexibility,
- triangulation

Quality of description	
- clear, logical, detailed	5-8
- limited detail	0-4
Examples	2

[10]

[Total: 20]

5 **(a)** Efficiency = useful work output x100%
work input 2

[2]

(b) **(i)** Example 1 x 1
Description 1 x 1

[4]

(ii) Explanation could include:
- selection of materials
- quality of design
- special wash cycles on washing machines
- insulation quality on refrigerators/kettles

Comprehension and interpretation 2

Quality of explanation
- detailed, logical 9-12
- some detail, structured 5-8
- limited 0-4

[14]

[Total: 20]

6 **(a)** Differences include:
- temperature
- materials used
- strength of joint

Quality of description
- clear, logical, detailed 4-6
- limited detail 0-3

Examples 2

[8]

(b) Details could include:
Epoxy resin
- clean, grease free surface
- correct mix hardener/resin
- metals 3

PVA
- planed or sanded
- surfaces well covered
- appropriate clamping whilst curing
- wood 3

Contact Adhesive
- both surfaces coated, left until tacky
- immediate careful application, no clamps required
- laminates to wood 3

For each:
Description 3

Materials 1

4 x 3 [12]

[Total: 20]

Part C - Graphic Products

7 **(a)**

Correct perspective	3
Approx. twice full size	2
Quality of linework	3
Overall shape/proportion	6

[14]

(b) Rendering

- roof	2
- walls	2
- door	2

[6]

[Total: 20]

8 Discussion could include:

Research
- internet
- questionnaires
- up to date info
- Databases

Stock control
- Accurate statistics
- Speed of ordering
- Storage reduced

Drawings
- accuracy
- speed/ease of correction
- storage of data/transfer

Machinery
- 24/7 production
- guaranteed reliability
- quality checks

For each section, up to 5 marks:

Examination of issues	1 mark
Quality of explanation	up to 3 marks
Supporting examples/evidence	1 mark

5 x 4 [20]

[Total: 20]

9 **(a)** Pictograms
- images in chart form

Flow charts
- structured procedures

Quality of explanation 2 x 2

Examples 2 x 1

[6]

(b) **(i)** Correct orthographic 6

(ii) Fully dimensioned 6

(iii) Angle of projection 2

[14]

[Total: 20]