

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

JUNE 2002

GCE Advanced Level

MARK SCHEME

MAXIMUM MARK : 60

SYLLABUS/COMPONENT : 9705 /3

**DESIGN AND TECHNOLOGY
(WRITTEN 2)**

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Section A

Part A – Product Design

1	(a)	appropriate material including:			
		- aluminium			
		- acrylic / PVC			
		- appropriate wood laminate		1	
		Reasons including:			
		- weather resistance			
		- easy to form		2	[3]
	(b)	description to include:			
		- appropriate method;			
		- forming;			
		- holding;			
		- securing to base.			
		quality of description:			
		- fully detailed	3 - 6		
		- some detail,	0 - 2		
		quality of sketches	up to 2		[8]
	(c)	explanation could include:			
		- change in process;			
		- change in materials;			
		- use of templates, jigs, formers;			
		- simplification of design.			
		quality of explanation:			
		- logical, structured	4 - 7		
		- limited detail,	0 - 3		
		quality of sketches	up to 2		[9]
					[Total: 20]

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2 (a) description to include:

- kits**
- easy to assemble;
 - re-use
 - quick;

mock – ups

- quick;
- fairly realistic;
- cheap materials

scale prototypes

- very realistic;
- functional;
- accurate test results.

Quality descriptions

4 x 2

[8]

(b) explanation could include:

- simple 2D representation;
- 3D viewing;
- simulation;
- realistic presentation;

quality of explanation:

- logical, detailed 7 - 9
- clear, structured 4 - 6
- limited detail, 0 - 3

use of examples

up to 3

[12]

[Total: 20]

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- 3 (a) description of process
- fully detailed 3 - 5
 - some detail, 0 - 2
- quality of sketches up to 2 7 x 2 [14]
- (b) injection moulding
- simple mould;
 - huge production runs
 - little waste.
- Turning
- speed;
 - accuracy;
 - high quality finish.
- Milling
- appropriate for material
 - accurate;
 - speed; 3 x 2 [6]

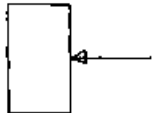
[Total: 20]

Part B – Practical Technology

- 4 (a) elastic limit - point at which elasticity begins to disappear 2
- yield point - extension increases by metal yielding 2
- limit of proportionality - load and extension cease to be proportional 2
- ultimate stress - maximum reached, sample 'necks' 2 [8]
- (b) description could include:
- pulling method; 2
 - gripping method; 2
 - standard samples; 2
 - comparative measurement method. 2
- quality of communication 4 [12]

[Total: 20]

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5	(a) (i)	reed switch - description of magnetically operated switch	3	[4]
		- alarm	1	
		(ii)	relay - description of device that can be used to separate two circuits	4
	- headlights	1		
	(iii)	Darlington pair - description of a method of using two transistors to give increased current gain and input impedance	4	[5]
			- light sensor circuit	
	(b)	$\frac{R_2}{R_1 + R_2} \times V = \frac{6.8 \times 9}{16.8}$	2	[4]
			3.64V	
	(c)	Potentiometer 	1	[2]
[Total: 20]				

6	(a)	$1000 \times 200 = E \times 1000 \therefore E = 200 \text{ N}$	[2]	
		20 N	[2]	
	(c)	velocity ratio = $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$	2	[6]
		relationship to mechanisms	1	
		efficiency = $\frac{\text{work out}}{\text{work in}} \times 100\%$	2	
	(d)	(i)	eg. brakes	2 x 2 [4]
			belt drives	
		(ii)	eg. lubricants	3 x 2 [6]
			bearings	
	[Total: 20]			

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Part C – Graphic Products

7	correct pictorial projection	1
	approx twice full size	1
	quality of linework	3
	overall shape / proportion	6
	rendering base (wood)	3
	stem (matt steel)	3
	shade (polished plastic)	3
		[Total: 20]

8	discussion could include;	
	design of products	
	- speed	
	- testing	
	- databank	
	manufacture of products	
	- stock availability / management	
	- accuracy / repetition	
	- automation	
	- quality control	
	business / communication	
	- marketing / advertising	
	- stock control	
	- overall speed up of lead time	
	overall comprehension and interpretation	2
	for each section up to 6 marks	
	examination of issues	1 mark
	quality of explanation	up to 4 marks
	supporting examples / evidence	1 mark
		6 x 3
		[Total: 20]

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- 9 (a) description of function of cams –transfer of motion
- | | | |
|---------------|---|-----|
| | 3 | |
| applications | 3 | |
| communication | 2 | [8] |
- (b) given data to include:
- | | | |
|-------------------------|---|------|
| - rotation | 1 | |
| - follower | 2 | |
| - minimum diameter | 1 | |
| - lift | 2 | |
| - angular displacement | 3 | |
| - - linear displacement | 3 | [12] |

[Total: 20]

discretion to be awarded concerning breakdown of marks,
 very good answer missing minor points should not be penalised.