

**MARK SCHEME for the November 2005 question paper**

**9705 DESIGN AND TECHNOLOGY**

**9705/03**

**Paper 3**

**maximum raw mark 120**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the *Report on the Examination* for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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## Section A

### Part A – Product Design

1	(a)	appropriate material including:		
		<ul style="list-style-type: none"> <li>- aluminium</li> <li>- acrylic</li> </ul>	1	
		Reasons including:		
		<ul style="list-style-type: none"> <li>- takes a good finish</li> <li>- easy to form</li> </ul>	1 x 2	[3]
1	(b)	description to include:		
		<ul style="list-style-type: none"> <li>- appropriate method;</li> <li>- shaping, drilling</li> <li>- bending</li> </ul>		
		quality of description:		
		<ul style="list-style-type: none"> <li>- fully detailed</li> <li>- some detail,</li> </ul>	3 - 6	
		quality of sketches	0 - 2	
			to 2	[8]
1	(c)	explanation could include:		
		<ul style="list-style-type: none"> <li>- change in process;</li> <li>- change in materials;</li> <li>- use of templates, jigs, formers;</li> <li>- simplification of design.</li> </ul>		
		quality of explanation:		
		<ul style="list-style-type: none"> <li>- logical, structured</li> <li>- limited detail,</li> </ul>	4 – 7	
		quality of sketches	0 – 3	
			up to 2	[9]
				[Total: 20]
2	(a)	examples could include:		
		<ul style="list-style-type: none"> <li>- seat height;</li> <li>- seat to pedal</li> <li>- handle diameter;</li> <li>- seat to handle</li> </ul>		
		for <b>four</b> examples	3 x 4	[12]
2	(b)	explanations could include:		
		<ul style="list-style-type: none"> <li>- <u>physiological</u></li> <li>- back angle/seat comfort</li> <li>- force required to turn pedals;</li> <li>- <u>psychological</u></li> <li>- shape:</li> <li>- colour</li> </ul>		
		For <b>two</b> explanations	4 x 2	[8]

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3	(a)	description of process			
		<ul style="list-style-type: none"> <li>- fully detailed</li> <li>- some detail,</li> <li>quality of sketches</li> </ul>	3 - 5 0 - 2 up to 2	7 x 2	[14]
	(b)	vacuum forming			
		<ul style="list-style-type: none"> <li>- complex shape formed quickly</li> <li>- variety of colours</li> </ul>			
		laminating			
		<ul style="list-style-type: none"> <li>- Little wastage</li> <li>- Very strong</li> </ul>			
		die casting			
		<ul style="list-style-type: none"> <li>- quantity production</li> <li>- quality/consistent finish</li> </ul>	3 x 2		[6]
					<b>[Total: 20]</b>

**Part B – Practical Design**

4	(a)	(i)	e.g. linear expansion/contraction ( accurate info over a period of time) bridge spans/cracks in buildings explanation 2 example 1		[3]
		(ii)	plastic profiles tested to identify stress concentration e.g. clips/frames explanation 2 example 1		[3]
	(b)	(i)	e.g. Steel/screwdriver graphite/golf club shaft example 1 application 1		
		(ii)	e.g. Nylon/fishing line steel/guitar string example 1 application 1		[4]
	(c)	discussion could include:			
		<ul style="list-style-type: none"> <li>- large/expensive products</li> <li>- no wastage</li> <li>- useful performance data</li> </ul>			
		issues raised	4		
		quality of discussion	4		
		examples introduced	2		[10]
					<b>[Total: 20]</b>

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5	(a)	clockwise moments	$(5 \times 2) + (7 \times 5) + (4 \times 7)$	1		
			73 kNm	2		
			sum of anti clockwise moments	$R_2 \times 10 = 10 R_2$		
			for equilibrium	$73 = 10 R_2$		
			$R_2 = 7.3 \text{ kN}$		2	
		$R_1 + R_2 = 5 + 7 + 4$				
		$R_1 + 7.3 = 16$		1		
		$R_1 = 8.7 \text{ kN}$		2	[8]	

(b)	(i)	issues include:			
			- no contact with food		
			- range of speeds, reduce noise		
		(ii)	issues include:		
				- chain can contact rider higher viscosity/wheel bearings lv	
		- free moving handlebar, brakes without touching wheel rim			
(iii)	issues include:				
		- high speed/heavy loads			
		- needs changing/disposal			
		issues raised	2		
		quality of explanation	2	4 x 3	[12]

[Total: 20]

6	(a)	(i)	detailed explanation	3	
		(ii)	detailed explanation	3	
	(b)	for each appropriate application stated 1 mark, described 2 marks		2 x 2	
(c)	complete/appropriate/accurate circuit diagram		5 5 x 2		[10]

[Total: 20]

### Part C – Graphic Products

7	Correct planometric/quality/scale/proportion		[5]
	detail	- doors	[2]
		- counters	[2]
		- cabinets	[4]
		- platform	[2]
	- table	[5]	

[Total: 20]

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8 Discussion could include:

- (a) Designing
- speed
  - storage / retrieval
  - quality of output
  - communication/research
- issues up to 3 marks  
 explanation up to 3 marks  
 evidence up to 2 marks **[8]**
- (b) Managing/manufacturing
- control CNC
  - stock control
  - costing
- examination of issues up to 5 marks
- broad range 3 – 5
  - limited 0 – 2
- quality of explanation up to 5 marks
- detailed, logical 3 – 5
  - limited, 0 – 2
- supporting examples/evidence up to 2 marks **[12]**

**[Total: 20]**

- 9 (a) (i) explanation up to 2 marks  
 example 1 mark
- (ii) explanation up to 2 marks  
 example 1 mark
- (iii) explanation up to 2 marks  
 example 1 mark
- (iv) explanation up to 2 marks  
 example 1 mark **[12]**
- (b) pictorial view 2  
 proportion 2  
 line quality 2  
 rendering 2 **[8]**

**[Total: 20]**