

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Advanced Level

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**9705 DESIGN AND TECHNOLOGY**

**9705/33**

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.

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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 [14]
- (b) riveting
- permanent fixing
  - quick process
  - minimal interference when cooking/hygienic
- Compression moulding
- use with thermosetting plastic
  - good final finish
  - minimal wastage
- Mortice and tenon joint
- structurally strong
  - good gluing area
  - visually OK – no gaps 3 × 2 [6]
- [Total: 20]
- 2 (a) suitable material including:
- Acrylic
  - HIPS (other suitable thermoplastics)
  - appropriate hardwoods
  - Aluminium/copper 1
- reasons including:
- quality of finish – colour/attractive grain/texture
  - easy to bend
  - strong in small section 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]

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- (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]

[Total: 20]

3 (a) natural seasoning

- off floor
- protective cover
- spacers / stickers to allow air circulation
- ends of timber protected/painted
- change stack after period of time/ measure MC
- can be attacked bugs/fungus
- 25mm – 1 year

kiln seasoning

- enclosed
- on trolley
- same stacking system as natural
- precise MC control
- kills off bugs/fungus
- very quick 2-3 weeks or less

quality of description/including communication:

- fully detailed
- some detail,

3-5  
0-2  
5 x 2 [10]

(b) Discussion could include:

- cost
- dimensional stability
- quality control/visual appearance
- size limits

examples / evidence could be

- Specific boards/properties
- Specific design issues – table top size etc

examination of issues

quality of explanation

supporting examples / evidence

4  
4  
2 [10]

[Total: 20]

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### Part B – Practical Design

- 4 (a) reinforcement – definition should include reference to the strengthening of material/component by additional material/features

e.g.

- glass reinforced plastic (or carbon/graphite)
- steel reinforced concrete

quality of definition:

- fully explained/detailed 3–4
- some correct detail, 0–2

quality of sketches up to 2 [6]

- (b) alloying – must have reference to the processing of mixing two or more metals together to get better characteristics than sole metal e.g.

Steel – engineering products, tools – Iron and Carbon (0.1 – 2.1 %) specialist steels may also contain manganese, chromium, vanadium, and tungsten

Duralumin – aircraft – 4.4% copper, 1.5% magnesium, 0.6% manganese and 93.5% aluminium by weight.

Brass – musical instruments, bearings – copper and zinc (varying ratios for different uses)

Bronze – bearings, cast sculptures – copper and tin (phosphorus, manganese, aluminium, or silicon may also be added).

Electrical solder – joining circuits – tin (60 – 70%) and lead (30 – 40%)

importance to designer:

- Expands range of available materials
- Specific alloys can be generated for specific requirements
- Expands range of properties of materials e.g. Toughness, lightness etc

quality of explanation

- logical, structured/detailed 4–8
- limited detail, 0–3

supporting examples

product 1 × 2

materials 2 × 2 [14]

[Total: 20]

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5 (a)

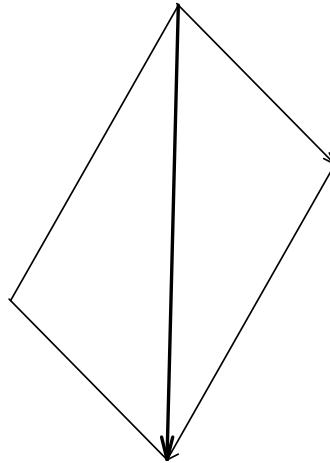


diagram	1	
direction	1	
Magnitude (80N)	1	[3]

(b) (i)  $R_2 \times 8 = 2 \times 10 + 6 \times 16$   
 $= \frac{116}{8}$

2

$R_2 = 14.5 \text{ kN}$   
 $R_1 = 11.5 \text{ kN}$

1 [3]

(ii) accurate truss/notation  
 accurate force diagram  
 magnitude of members (.5 tolerance)  
 strut / ties (all correct up to 3)

2

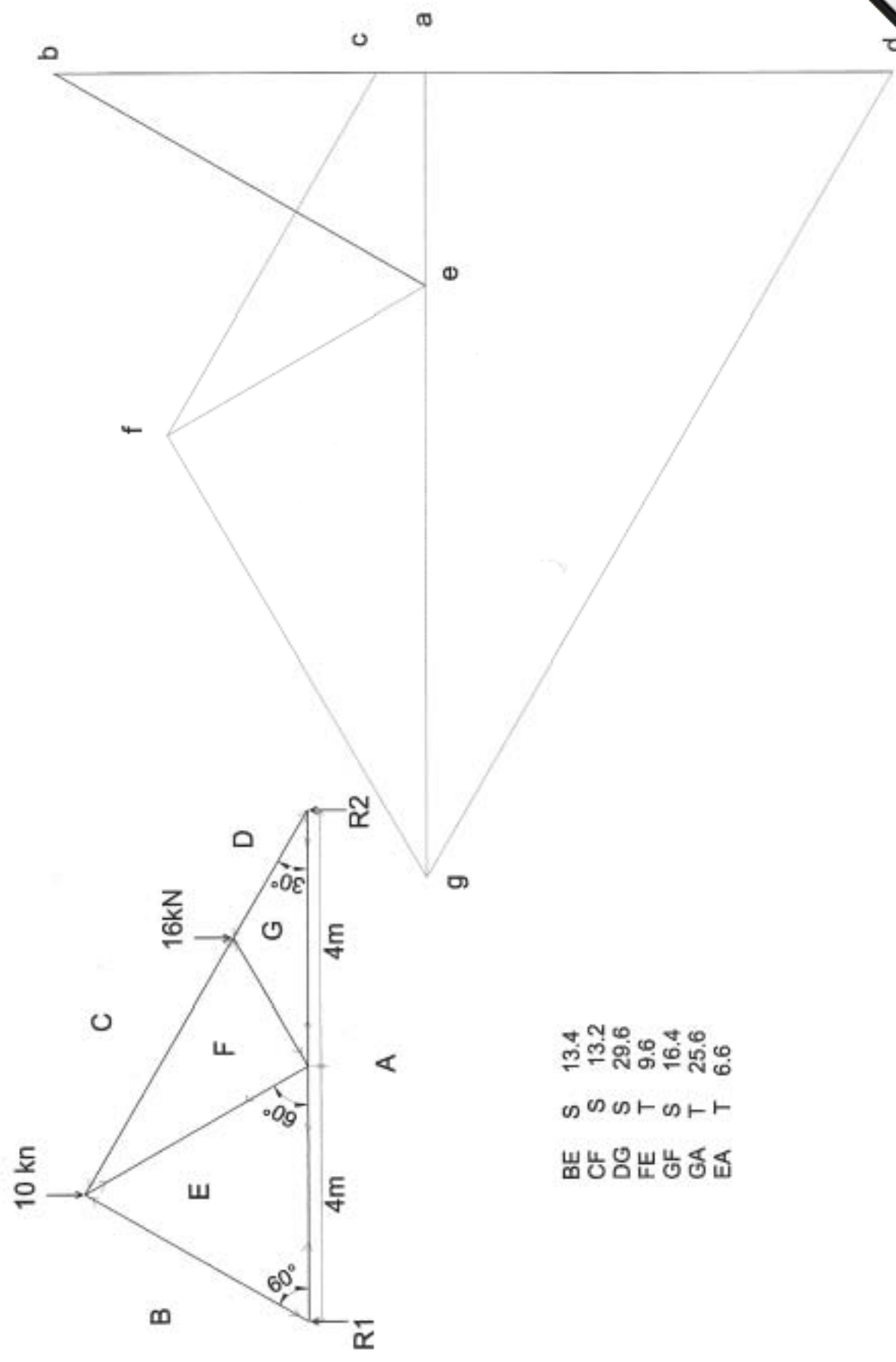
2

7

3 [14]

**[Total: 20]**

5 (b) (ii)



BE	S	13.4
CF	S	13.2
DG	S	29.6
FE	T	9.6
GF	S	16.4
GA	T	25.6
EA	T	6.6

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6 Discussion could include:

Invention – new device/product/process – need to create new products/cost of design teams

Innovation – may be radical or incremental improvement in products– usually significant changes

Evolution – products slowly developing to meet consumer needs, small incremental changes over time

- competitive markets
- consumer needs/fashion/trends
- legal protection

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

- dust pan brush – vacuum cleaner
- phone development
- specific 'new' product 4

**[Total: 20]**

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**Part C – Graphic Products**

<b>7</b>	Scale	2
	Correct orthographic	2
	Assembly	2
	Part 1 detail	3
	Part 2 detail	3
	Part 3 detail	3
	Part 4 detail	2
	Machine screws	1
	Accuracy/line quality	2

**[Total: 20]**

**8 one-off architectural model**

- Hand skills/studio tools
- Time taken
- Net / intersection
- Hand applied bought finish

**50000 credit cards**

- Plastic (PVCA) rolled
- Silk screen / magnetic print
- Add components / chips
- Lamination / cut / emboss

**1000 A4 presentation folders**

- Card size/colour selected
- Press forme created
- Folding machine

quality of description/including communication:

- fully detailed
- some detail
- Comparisons / contrasts

**[Total: 20]**

<b>9</b>	correct 1 point perspective	3
	window	2
	work surface fridge / freezer	3
	work surface / cooker	3
	wall cabinet	3
	table	3
	overall accuracy	3

**[Total: 20]**