June 2003

GCE A AND AS LEVEL

MARK SCHEME

MAXIMUM MARK: 120

SYLLABUS/COMPONENT: 9705/01
DESIGN AND TECHNOLOGY
Written 1
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 2 x 1
Wear protective gloves, use tongs, goggles 2 x 1 4

(b) Fumes, toxicity, eyes 1
Fume cupboard, goggles, mask 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, 2
Labels 1 4 (8)

5 (a) Any suitable materials, eg. Timbers, metals, plastics 2 x 1 2

(b) Suitable solution presented:
Feasibility 2
Construction 2
Sketch or explanatory notes 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  
Use of clamps to hold tubes  
Accurate marking of line across ends using surface gauge  
Correct speed of drill  
Sketches  

Other suitable method would also gain marks

(d) Sketches and notes to cover the following stages:
Place and secure in chuck  
Face off one end  
Turn to diameter  
Centre drill  
Drill hole to suitable length  
Turn boss on end  
Use parting off tool to cut groove  
Part off component leaving allowance for second boss  
Replace in chuck  
Turn boss  

Section C

10 (a) (i) Injection moulding  
ABS, Polypropylene  
(ii) Magnesium alloy  
Die casting  

(b) (i) Appropriate reasons  
Quality of explanation up to  
(ii) Appropriate reasons  
Quality of explanation up to  

(c) Appropriate standards/features given up to 2 marks  
Critical examination of issues up to 2 marks  

11 (a) (i) Some understanding shown 1 mark  
Clear understanding 2 marks  
(ii)-(iv) As for (i)  

(b) (i) Advantages/disadvantages identified up to 3 marks  
Critical discussion of issues up to 3 marks  
(ii) As for (i)
<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
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</thead>
</table>
| **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  2 |
| **(e)** | Ergonomic factors identified  
Critical discussion of issues |
|   | up to 4  8  (20) |
June 2003

GCE A AND AS LEVEL

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<td>DESIGN AND TECHNOLOGY</td>
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<tr>
<td>Written 2</td>
</tr>
</tbody>
</table>
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
Exampl[es] 2

[5]

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

[5]

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

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

Exampl[es] 2

[10]

[Total: 20]
5 (a) Efficiency = \( \frac{\text{useful work output}}{\text{work input}} \times 100\% \)  
2

(b) (i) Example  
Description 1 x 1  
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  
2

(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  
8
For each:

<table>
<thead>
<tr>
<th>Description</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>1</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Examination of issues</th>
<th>1 mark</th>
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<tbody>
<tr>
<td>Quality of explanation</td>
<td>up to 3 marks</td>
</tr>
<tr>
<td>Supporting examples/evidence</td>
<td>1 mark</td>
</tr>
</tbody>
</table>

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

(b) (i) Correct orthographic 6
(ii) Fully dimensioned 6
(iii) Angle of projection 2

[Total: 20]