

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Advanced Level**

## **MARK SCHEME for the October/November 2013 series**

### **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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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)** wood turning
- perfect cylinder produced
  - high quality finish
  - quicker than carving
- Injection moulding
- complex shape
  - large numbers required
  - identical products
- casting
- minimal wastage
  - one piece production
  - difficult shaping/material removal required otherwise 3 × 2      [6]
- [Total: 20]**
- 2 (a)** suitable material including:
- appropriate hardwood/softwood
  - plywood/mdf
  - aluminium
  - acrylic/ABS
  - card 1
- Reasons including:
- quality of finish – colour/attractive grain/texture
  - easy to bend/join
  - rigid 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** Discussion could include:

- vandalism
- material selection
- safety / security
- anthropometric considerations
- finish/Protection

examination of issues

- wide range of relevant issues
- limited range

5–9

0–4

quality of explanation

- logical, structured
- limited detail,

4–7

0–3

supporting examples / evidence

- products: eg. garden furniture
- specific materials
- specific finishes

4

**[Total: 20]**

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## Part B – Practical Design

### 4 (a) specific product:

|               |                                                     |
|---------------|-----------------------------------------------------|
| Concrete      | e.g. building components, flooring                  |
| Chipboard     | e.g. furniture (veneered), building cladding        |
| Plywood       | e.g. construction, storage boxes                    |
| Lead          | e.g. as alloy – solder, weights, buildings          |
| Polythene     | e.g. food packaging, toys (HDPE)                    |
| ABS           | e.g. vacuum cleaner casing, car dashboards          |
| Melamine      | e.g. surfaces, plates, bowls                        |
| Polypropylene | e.g. hinges, chemical storage, pipes                |
| Aluminium     | e.g. building cladding, aircraft parts, kitchenware |
| Rubber        | e.g. tyres, gloves                                  |
| Mild steel    | e.g. tools, general engineering components          |
| Brass         | e.g. hinges, door handles, light fittings           |

Accept any other appropriate application

1 × 5 [5]

### (b) appropriate properties related to product

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| Concrete      | e.g. rigid, durable, variety of shapes                           |
| Chipboard     | e.g. large sheets, relatively inexpensive, can be veneered/faced |
| Plywood       | e.g. strong in both directions, large sheets, can be bent        |
| Lead          | e.g. heavy, easily cast                                          |
| Polythene     | e.g. see through, easily formed, range of colours                |
| ABS           | e.g. very tough, chemical resistant, range of colours            |
| Melamine      | e.g. thermosetting, heat resistant, compression moulded          |
| Polypropylene | e.g. does not fracture, easily thermoformed, tough               |
| Aluminium     | e.g. does not corrode, lightweight                               |
| Rubber        | e.g. flexible, hard wearing                                      |
| Mild steel    | e.g. tough, easily machined/joined widely available              |
| Brass         | e.g. attractive, does not corrode                                |

Accept any other appropriate property

Explanation of suitability

up to 3 3 × 5 [15]

**[Total: 20]**

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5 (a) (i) clockwise 1 [1]

(ii) gears A and B ratio 3:1  
gears C and D ratio 4:1

$$\frac{3}{1} \times \frac{4}{1} = \frac{12}{1} \quad 12:1$$

Workings 2 correct ratio 1 [3]

(b) lubricating methods could be:

Oil sump  
Oil ring  
Grease nipple

Appropriate method

Quality of description/communication

1  
up to 3 4 × 2 [8]

(c) explanation could include:

advantages:

Grip on surfaces, shoes, tyres, handles  
Nails cannot work without friction

disadvantages:

Heat generated  
Reduction in efficiency (more fuel in vehicles)  
Noise

quality of explanation:

- logical, structured
- limited detail,

5–8  
0–4 [8]

[Total: 20]

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- 6 Structure could be:  
**lamination**  
 roof supports  
 Laminated flooring



#### Braces

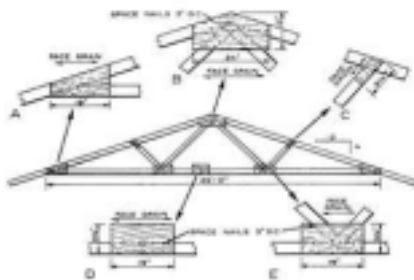
Stage supports, oil rigs, folding tables

#### Ribs.

Castings, drill table, plastic trays

#### Gussets

Roll cage support,  
 roof frame



#### Triangulation

Pylons, bridges, crane joists

Appropriate structure

1 × 4 [4]

quality of explanation and communication including appropriate example up to 5

4 × 4 [16]

[Total: 20]

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## Part C – Graphic Products

|                                                                 |  |     |                    |
|-----------------------------------------------------------------|--|-----|--------------------|
| <b>7</b> Discussion could include:                              |  |     |                    |
| – technical/functional factors                                  |  |     |                    |
| – importance of visual impact to attract interest/sales         |  |     |                    |
| – specific product use                                          |  |     |                    |
| – chosen material/finish/texture                                |  |     |                    |
| – colour and fashion trends                                     |  |     |                    |
| 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                                  |  |     |                    |
| – Specific products e.g. space for essential working components |  |     |                    |
| – Packaging features                                            |  |     |                    |
| – specific finishes                                             |  | 4   |                    |
|                                                                 |  |     | <b>[Total: 20]</b> |
| <b>8</b> (a) linkage construction                               |  |     |                    |
| correct loci                                                    |  | 4   |                    |
| accuracy                                                        |  | 5   |                    |
|                                                                 |  | 3   | [12]               |
| (b) profile construction                                        |  |     |                    |
| correct profile                                                 |  | 3   |                    |
| accuracy                                                        |  | 3   |                    |
|                                                                 |  | 2   | [8]                |
|                                                                 |  |     | <b>[Total: 20]</b> |
| <b>9</b> correct 1 point perspective                            |  |     |                    |
| window                                                          |  | 3   |                    |
| worktops                                                        |  | 2   |                    |
| cabinets                                                        |  | 3   |                    |
| table                                                           |  | 3   |                    |
| stool                                                           |  | 4   |                    |
| overall accuracy                                                |  | 2   |                    |
|                                                                 |  | 3   |                    |
|                                                                 |  |     | <b>[Total: 20]</b> |

|               |                                            |                 |              |
|---------------|--------------------------------------------|-----------------|--------------|
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## Section B

### Analysis

Analysis of the given situation/problem. [5]

### Specification

Detailed written specification of the design requirements.  
At least five specification points other than those given in the question. [5]

### Exploration

Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection.

- range of ideas [5]
- annotation related to specification [5]
- marketability, innovation [5]
- evaluation of ideas, selection leading to development [5]
- communication [5]

### Development

Bold sketches and notes showing the development, reasoning and composition of ideas into a single design proposal. Details of materials, constructional and other relevant technical details.

- developments [5]
- reasoning [5]
- materials [3]
- constructional detail [7]
- communication [5]

### Proposed solution

Produce drawing/s of an appropriate kind to show the complete solution. [10]

- proposed solution [5]
- details/dimensions

### Evaluation

Written evaluation of the final design solution. [5]

**[Total 80]**