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 must be read in conjunction with the question papers and the report on the examination.

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

CIE is publishing the mark schemes for the October/November 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.
Section A

Part A – Product Design

1. (a) Appropriate material including:
   - Aluminium/copper or similar sheet metal
   - Acrylic/ABS/polypropylene or similar plastic
   - Specific hardwood (1)

   Reasons including:
   - takes a good finish/easy to form/shape
   - attractive
   - easy to clean (2 × 1) [3]

(b) Description to include:
   - appropriate method
   - marking, shaping, turning, forming

   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 jigs, formers, moulds
   - simplification of design

   Quality of explanation:
   - logical, structured (4–7)
   - limited detail (0–3)

   Quality of sketches (up to 2) [9]

[Total: 20]
2  

(a) Reasons could be
- demand
- simple design
- very little assembly
- minimal processes

For 3 reasons (3 × 1) [3]

(b) Reasons could be
- wide range of size and style
- will wear out, new ones needed
- fashion/trends

For 2 reasons well explained (2 × 2) [4]

(c) Products could be
- bespoke furniture
- specialist clothing e.g. wedding dresses
- large structures e.g. buildings, bridges
- designer jewellery

For three products (3 × 1) [3]

(d) Discussion could include
- equipment – cost, maintenance, power requirements, range
- assembly – number of parts/operations, use of bought in/standardised parts, skill level required
- labour skills – complex operations, range of processes, training requirements, pay issues

Range of issues covered (3 × 2 marks)
Quality of discussion/examples (4) [10]

[Total: 20]
3 (a) Description of process
- fully detailed (3–5)
- some detail, (0–2)
Quality of sketches (up to 2)
(7 × 2) [14]

(b) Profile forming
- one step production, very quick
- consistent section
- high quality finish

Compression moulding
- excellent finish
- high tolerance level (must fit)
- moulds thermosetting plastic

Extrusion
- no wastage
- exceptionally quick/consistent standard
- grain structure enhanced
(3 × 2) [6]

[Total: 20]

Part B – Practical Technology

4 (a) (i) Elastic region [2]
(ii) Limit of proportionality/elastic limit/yield point [2]
(iii) Ultimate tensile strength [2]
(iv) Fracture/break point [2]

(b) Properties could be
- Ductility (1) ability to be drawn (2)
- Stiffness (1) to keep shape, hold paper (2)
- Yield stress (1) strong enough to keep shape (2)
For two properties explained (2 × 3) [6]

(c) Simple test showing
- secure one end of sample (1)
- mechanism to rotate other end (2)
- record force/effect (1)
Quality of communication (2) [6]

[Total: 20]
5  (a)  (i)  $1 \text{k}\Omega$  
(ii)  $0.36 \mu A$  
(iii) $0.07 A$  

(b)  (i)  $60 \text{W}$ (1) with calculation $P = V \times I$ (1)  
(ii) $I = \frac{P}{V}$  
(1) current = $12 \text{A}$ (1) resistance = $250/12 = 20.8 \Omega$ (or $21 \Omega$) (1)  

(c) Relay –  
Switch to turn other circuits on or off  
Current to movement (solenoid)  
Small current controls large current  

Example – audio amplifier, machine control  

**Micro switch** –  
Switch requiring little force to activate  
Safety/shut off device  
Very small/unobtrusive  

Example – fridge light
Darlington Pair –  Used in sensor circuits
               Uses 2 transistors
               Amplifies weak signals

Example – temperature sensor

LDR –  Light Dependent Resistor – resistance decreases with increasing light
       Photoconductor device
       Sensors/safety systems

Example – camera light meter, street lighting

Description/function (3)
Example (1)
For three well described components with example (4 × 3) [12]

[Total: 20]

6 Full description of mechanism (3)
Example (1)
For five mechanisms (5 × 4) [20]

[Total: 20]
Part C – Graphic Products

7 Explanation of when and why (3)
   Example (1)
   For five explanations and examples (5 × 4) [20]
   [Total: 20]

8 (i) Correct shaft diameter [1]
   (ii) In line wedge [1]
   (iii) Min distance [1]
   (iv) Anti clockwise [1]
   (v) 0–120 uniform [4]
   (vi) Dwell [1]
   (vii) 180–360 SHM [5]
       Displacement diagram [4]
       Quality of communication/accuracy [2]
   [Total: 20]

9 Correct isometric [3]
   Approx full size [2]
   Quality of linework [4]
   Overall shape/proportion [7]
   Rendering chrome [2]
   Matt texture [2]
   [Total: 20]