Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

DESIGN AND TECHNOLOGY **0445/31**

Paper 3 Resistant Materials **October/November 2016**

MARK SCHEME

Maximum Mark: 50

Published

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Section A

1 Metal can: tin[plate], [mild]steel, aluminium (1)
Plastic gears: nylon (1)
Outdoor hinge: brass, aluminium, stainless steel (1) **[3]**

2 Award 0-2 dependent upon accuracy of sketch (0–2) **[2]**

3 **(a)** Bench hook, sawing board (1) **[1]**

(b) Saw shown cutting wood held up against the bench hook
Award 0–2 dependent upon accuracy of sketch (0–2) **[2]**

4 Award 0–2 dependent upon accuracy of sketch (0–2) **[2]**

5 **(a)** Extrusion **[1]**

(b) Anodise, paint, lacquer, powder coat/dip coat, electroplating **(**2×1) **[2]**

6 Tenon saw: small scale general woodworking processes (1)
Coping saw: cutting curves in thin wood (1)
Hacksaw: cutting metal sections (1) **[3]**

7 2 stages include: set distance between spurs [with chisel],
set distance from stock to first spur/pin
lock stock (2 × 1) **[2]**

8 **(a)** Plastic: injection moulding (1)

(b) Metal: die-casting, pressed (1) **[2]**

9 2 faults: end splits, splits/cracks along the grain, warping, shrinkage (2 × 1) **[2]**

10 **(a)** Laminating **[1]**

(b) **A**: former, mould
B: [sash/F] cramp (2 × 1) **[2]**

Section B

11 (a) 2 benefits: cheaper than pre-assembled products, can be transported home, compact, satisfaction of self-assembly. (2 × 1) **[2]**

(b) Drill hole for saw blade, insert saw blade and reconnect, saw out waste, file edge smooth and flat. Power router. (3 × 1)

Technical accuracy (0–1) **[4]**

(c) Methods include use of added strips or blocks [above or below] (0–2)
Appropriate method of permanent fixing (0–2) **[4]**

(d) (i) Min. 6mm–12mm max.(1) **[1]**

(ii) Spacing must not set dowels closer than 15mm from ends and be centrally positioned (0–2) **[2]**

(e) Material: steel or brass (1)
Length: minimum 19mm – maximum 35mm (1)
Type of head: countersunk (1)
Number required: minimum 2 – maximum 4 (1)
Technical accuracy of sketch (0–2) **[6]**

(f) (i) Explanation:
B is made from 2 pieces of wood joined together and is stronger (1)
A is made from a single piece with the grain weaker (1) **[2]**

(ii) Explanation: **A** would be made from a single piece of wood that would need to be cut out to shape (1)
The piece cut out would produce waste. (1) **[2]**

(g) 2 properties: must be hardwearing, attractive, stainproof, heatproof, waterproof (2 × 1) **[2]**

12 (a) 2 properties: range of colours, inherent colour, easily formed, easily worked, cleaned easily, self-finished, attractive (2 × 1) **[2]**

(b) 2 items of research: sizes of items to be stored, number of items, location (2 × 1) **[2]**

(c) 2 reasons: easier to drill while flat, quicker, more accurate, safer (2 × 1) **[2]**

(d) Use of saw to cut shape (1)
Use of file to make smooth (1)
Correct names of appropriate saw and file (1) **[3]**

(e) Use of strip heater or line bender (1)
Appropriate former (1)
Method of retention (1)
Technical accuracy (1) **[4]**

(f) Pencils prevented from sliding: use of holes in base or additional shelf added with holes drilled for pencils to locate (0–2)
Method of storing paper clips: some form of container (0–2) **[4]**

(g) (i) 1 benefit: hardwood is hardwearing, attractive, gives base weight/stability **[1]**

(ii) Suitable thickness: minimum 10mm – maximum 20mm **[1]**

(iii) Hardwood held in vice (1)
Use of plane to remove waste (1)
Technical accuracy of sketch/named tools and equipment (1)
Power router (0–3) **[3]**

(iv) Method of joining must include use of screws **not** adhesive
Award 0–3 dependent on accuracy of spacing, number of screws and added explanatory notes **[3]**

13 (a) 2 reasons: aluminium can be shaped easily, does not corrode, lightweight (2×1) **[2]**

(b) (i) 2 marking out tools: scriber, rule, try square, odd legs (2×1) **[2]**

(ii) Shape cut out using combination of: tinsnips, guillotine, hacksaw
Award 0–3 dependent on appropriately named tools and their use. **[3]**

(iii) Aluminium sheet held securely in vice or clamped to bench (1)
Appropriate use of former (1)
Method of force: mallet or hammer and scrap wood (1)
Technical accuracy (1) **[4]**

(c) (i) Description includes: holes drilled in roof and back of feeder (1)
Rivet is pushed into rivet gun (1)
Rivet is pushed into pre-drilled holes and trigger squeezed (1) **[3]**

(ii) Pop riveting is quicker than traditional riveting, easier, less distortion **[1]**

(d) (i) Award 0–3 for a practical container:
appropriate size (1)
appropriate shape (1)
suitable method of attachment to feeder (1) **[3]**

(ii) Mould must conform to design in previous part.
Draft angles (1)
Rounded corners/edges (1)
Appropriate depth (1) **[3]**

(iii) polystyrene, ABS, acrylic **[1]**

(e) Practical solution includes the use of some form of 'hook' (1)

Materials and fittings used (0–2) **[3]**