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**DESIGN AND TECHNOLOGY**

**0445/31**

Paper 3 Resistant Materials

**October/November 2016**

MARK SCHEME

Maximum Mark: 50

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**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]

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### 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]

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- (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: scribe, 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]

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- (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]