



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

DESIGN AND TECHNOLOGY

0445/31

Paper 3 Resistant Materials

May/June 2016

MARK SCHEME

Maximum Mark: 50

Published

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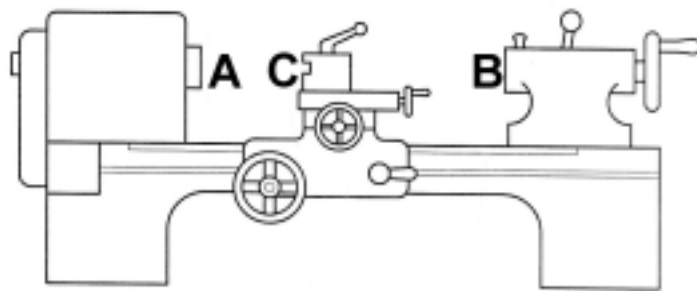
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Section A

- 1 (a)** Smoothing: not jack [1]
- (b)** Grain shown either horizontal or emerging from right to left.
Do not accept an arrow. Grain must be drawn on wood. [1]
- 2** 3 specification points. The desk tidy must:
store a variety of items, be attractive, allow for easy access of items, be stable,
fit specific location, easy to move, compact, easy to clean
Accept any other valid points 3×1 [3]
- 3** Carbon steel [1]
- 4** Award 0–3 dependent upon accuracy of sketch 0–3 [3]
- 5 (a)** Polystyrene, polypropylene [1]
- (b) (i)** Keeps food hot 1
- (ii)** Can produce litter, cannot be recycled, does not decompose 1 [2]
- 6 (a)** Mortise [1]
- (b)** Thick handle, squarer/stronger blade, [leather] washer/shock absorber
Handle with ferrule to withstand blows from matter. 2×1 [2]
- 7** 3 ergonomic features: buttons easy to see, comfortable/rounded shape in hand,
appropriate size to fit in hand, colour coded buttons for ease of operation,
rubber buttons for better selection. 3×1 [3]
- 8** Award 0–2 dependent upon accuracy of sketch 0–2 [2]
- 9 (a)** Steam bending, laminating [1]
- (b)** Fewer joints to construct, sturdier construction, attractive curved appearance,
less waste, stronger must be qualified [1]

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[3]

Section B

- 11 (a) (i) Redwood, pine, parana pine, whitewood, fir [1]
- (ii) Manufactured board: hardboard, plywood, MDF [1]
 Suitable thickness: 4.6 or 9mm standard thickness [1]
- (b) (i) 2 benefits: ready-made, available from D-I-Y centres, professional finish, variety of materials, range of sizes 2 × 1 [2]
- (ii) Award 1 mark for correct position in the cabinet and 1 mark for brief description of how it would be fitted.
- Handle: attached to either left or right side of vertical rail [stile] of door using screws and/or glue. [2]
- Butt hinge: attached to **any** part of the door frame using screws. [2]
- Magnetic catch: 2 parts attached to side opposite butt hinge using screws. [2]
- Wall plate: screwed to the back of the cabinet then screwed to the wall. [2]
- (c) Suitable permanent joint, butt pinned and glued, half lap, dovetail, finger [comb] joint, dowel named
- Award 0–3 dependent upon accuracy of sketch 0–3 [4]
- (d) Use of pegs or pins or pre-manufactured studs 1
 3 different positions 1
 Technical accuracy: materials, spacing, sizes 1 [3]
- (e) (i) Suitable joint: dowel, mortise and tenon, corner halving, corner bridle named [1]
- (ii) Use of rebate, groove or applied beads 0–1
 Method of production 0–1
 Correct size/proportion 0–1 [3]
- (f) Benefit: lighter weight, see-through is convenient, could be cheaper [1]

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12	(a)	(i)	Mild steel: stronger, less likely to bend, cheaper, durable	1	
			OR Aluminium: lighter, does not corrode, needs to finish	1	[1]
	(ii)		Some form of insert/bush/sleeve/plate	0–2	
			Materials named. Not rubber.	0–1	[3]
	(b)	(i)	Epoxy resin mixed in equal quantity with hardener	1	
			Epoxy resin applied to both parts and held while resin sets	1	[2]
		(ii)		Add hot water to granules of polymorph to soften them	1
			Remove from water and wrap it around the metal rod	1	
			Mould to shape of hand grip	1	[3]
	(c)	(i)	Use of grub screw, pin, rivet	0–1	
			Technical accuracy of sketch and added notes	0–2	[3]
		(ii)	4 stages:		
			Granules fed into hopper	1	
			Plastic granules heated to liquid form	1	
			Forced by screw into injector	1	
			Injected into mould	1	[4]
			Accept any valid intermediary stages given by candidates		
	(iii)	Cost of tooling is very expensive to produce	1		
		Large quantities are needed to recover the costs	1	[2]	
(d)		[Sand] casting		[1]	
	(e)	Scoring system must meet spec points:			
Use of rods/sliding counters, flip cards or similar to show score		0–2			
Fixed to cabinet		1			
Record maximum 5 goals scored		1			
Materials and fittings used		0–2	[6]		
13	(a)	(i)	2 benefits: quicker, more accurate, easier to mark out on paper/card and transfer, can be used as a model, wastes less material	2 × 1	[2]
		(ii)	When large quantities are to be marked out a paper or card template would not last.	1	
	Therefore a resistant material that would stand up to wear is required.		1	[2]	
	(b)	(i)	Self-finished means no applied finish	1	
			The material can be cleaned and buffed to a high quality	1	[2]

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- (ii)* **Aluminium**
 Cut out using combination of:
 Abra file aw, tinships, junior hacksaw 0–2
 Edges smooth using files and emery cloth 0–2
 Tools and equipment named 0–1 **[5]**
- *OR**
- Acrylic**
 Cut out using coping, Hegner, scroll, band, tenon saw 0–2
 Edges smooth using files and wet and dry paper 0–2
 Tools and equipment named 0–1 **[5]**
- (c) (i) Bending acrylic:
 strip heater/line bender 1
 use of former 1
 method of retention 1 **[3]**
- (ii) Bending aluminium:
 use of folding bars, vice and scrap wood 1
 use of former 1
 method of force: mallet or hammer and scrap wood 1 **[3]**
- (d) Countersink head screws remove thickness from the material making it too thin. 1
 Round head screws make no impact on thickness of material and support the material. 1 **[2]**
- (e) The hardwood shelf can expand and contract depending on room temperature and humidity and therefore must have allowance for movement. 1
 No allowance for movement is provided when glued, therefore there is a danger that the hardwood will split. 1 **[2]**
- (f) Modifications include: recessed or housed slot in shelf or additional folds to a modified bracket
 Security front to back 1
 Security vertically up and down 1
 Technical accuracy/added notes 0–2 **[4]**