Cambridge Assessment International Education

Cambridge IGCSE™

DESIGN & TECHNOLOGY **0445/33**

Paper 3 Resistant Materials **October/November 2022**

MARK SCHEME

Maximum Mark: 50

Published

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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer		Marks	Guidance
1	**A** spanner, wrench **B** screwdriver **C** allen key, hexagon wrench, hexagon screwdriver	1 1 1	**3**	**Not** mole grips, **Not** posidrive, Phillips screwdriver

Question	Answer		Marks	Guidance
2	Twist drill, hole saw Hegner, bow, pad, jig, scroll, coping saw Glasspaper, sandpaper, aluminium oxide, garnet paper	1 1 1	**3**	**Not** wet and dry paper, abrasive paper

Question	Answer	Marks	Guidance
3(a)	Benefit: wood is less likely to split/splinter when turned **or** in use, tough, dense	**1**	**Not** durable, hardwearing, strong
3(b)	[Outside], [external] calipers, vernier	**1**	**Not** calipers, micrometer

Question	Answer	Marks	Guidance
4(a)	Hardwearing, weather resistant, long lasting, durable	**1**	
4(b)	Electroplated, galvanised	**1**	**Not** plastic coated

Question	Answer		Marks	Guidance
5	**A** shown in headstock **B** shown in tailstock	1 1	**2**	Accept answers where the parts of the lathe are drawn on the centre lathe

Question	Answer	Marks	Guidance
6	Height of tenon 1 thickness of tenon 1 length of tenon 1	**3**	Tenon clearly drawn Equally proportioned shoulders

Question	Answer	Marks	Guidance
7(a)	No need to carry spoon, convenience	**1**	
7(b)	Uses material from finite source, spoon thrown away	**1**	

Question	Answer	Marks	Guidance
8	Award 1 mark for practical design. Award 1 mark for supporting notes	**2**	Examples of notes: heatproof to hold, safe to carry, size, constructions, named materials

Question	Answer	Marks	Guidance
9(a)	Injection moulding	**1**	
9(b)	**Metal heated** 1 **Former**: base with pegs to position metal rod around former **or** use of metal rod/tube/cylinder held in vice with metal rod clamped in position 1 **Method of bending** 1	**3**	

Question	Answer	Marks	Guidance
10	Benefits: more resistant to outdoor conditions, recycled materials save resources, does not require a finish, less maintenance, easy to clean, better for environment 2×1	**2**	Accept any valid benefit **Not** cheaper

Question	Answer	Marks	Guidance
11(a)	2 reasons: to cover unattractive surface, to give the appearance of quality solid wood, more cost effective than using expensive hardwood 2×1	**2**	
11(b)(i)	Minimum Ø6 – maximum Ø12	**1**	
11(b)(ii)	Length 15 mm – 30 mm	**1**	
11(b)(iii)	Minimum 3 – maximum 6	**1**	
11(c)	Benefit: easy to apply, quick drying, easy to remove surplus, strong	**1**	Accept any valid benefit
11(d)	Problem: when sawing, planing or chiselling it can crumble, chip, break off 1 Solution: support chipboard whenever possible 1	**2**	Accept any valid problem **Not** references to non-water resistance
11(e)	Correct position of cam in drawer side 1 Correct position of screw inside drawer front 1 Cam locked explained 1	**3**	Accept position of cam inside **or** outside drawer
11(f)(i)	Practical design of handle 0–2 Method of attachment to drawer front 1 Named **specific** material 1	**4**	
11(f)(ii)	Drawer slides in and out: Use of ‘cut’ grooves or applied beads to side of drawer and inside cabinet or use of single batten for drawer to ‘run’ on 0–2 Method of stopping drawer going too far 1 Details of fittings and fixings 1	**4**	Award 1 mark only for use of pre-manufactured runners, rails

Question	Answer	Marks	Guidance
11(g)	Method: use of groove or rebate [cut out or applied beads] 1 Technical accuracy/correct size and proportion 0–2	**3**	
11(h)	**Minimum** dimensions of parts of cabinet **600** × **400** × **100** 3 × 1 **Maximum** " " " " " **700** × **500** × **200**	**3**	

Question	Answer	Marks	Guidance
12(a)(i)	2 properties: easy to form to shape, inherent colour, hygienic, does not require an applied finish, easy to clean, heat resistant, stain resistant, water resistant	**2**	Accept any valid property
12(a)(ii)	Backing film protects the surfaces from scratches, marker pen can be used to mark out on	**1**	
12(b)	2 items of research: type of products that will be carried on the tray, the sizes of the products and the quantity of products, ergonomics 2 × 1	**2**	Accept any valid item of research
12(c)	Advantage of 'open' corners: easier to form during manufacture, ease of cleaning	**1**	
12(d)	Ergonomics: size and shape of hand holds, overall size of the tray must be appropriate and comfortable to user	**2**	**Considerations:** Safety Comfort Ease of use Performance Aesthetics
12(e)(i)	2 benefits: ease of editing, ability to transfer data to connected CNC machine, 3D model can be created, shared with others on-line, files can be saved 2 × 1	**2**	Accept any valid benefits
12(e)(ii)	Drawback: cost of pc, software, loss of electricity, training required, files may become corrupted	**1**	Accept any valid drawbacks
12(f)(i)	Scroll saw, band saw, Hegner saw, jig saw	**1**	**Not** router
12(f)(ii)	Coping saw, hacksaw, junior hacksaw, tenon saw, dovetail saw, abra file	**1**	
12(g)	Hand	**1**	

Question	Answer	Marks	Guidance
12(h)	Use of strip heater/line bender/hot air gun 1 Use of former or settings made to line bender 1 Details relating to sequence of bends to be made 1 Method of retention while acrylic cools 1 Technical accuracy relating to the process and equipment used 1	**5**	**Not** oven **Not** use of vice as a former
12(i)	Design of handle extends to sides of tray 1 Attached to sides of tray [e.g. nut and bolt] 1 Locked securely in upright position 1 2 important sizes 2 × 1 Materials used 1	**6**	

Question	Answer	Marks	Guidance
13(a)	2 items of research: specific types of jewellery, quantity, material jewellery is made from, specific sizes and best ways to store/support jewellery, ergonomics 2 × 1	**2**	Accept any valid item of research
13(b)(i)	**A** mitre square 1 **B** sliding bevel 1	**2**	Accept ‘adjustable bevel’
13(b)(ii)	Use of string + dowel inserted to tighten or use of rubber bands, ‘ratchet straps’ ‘corner blocks’ mitre cramps 0–2	**2**	Traditional sash/G cramps not appropriate
13(c)	3 **unequal** parts shown 1 Constructional details 0–3 Appropriate named materials 1	**5**	Examples of method include solid wood partitions housed or a single vacuum formed insert
13(d)(i)	2 marking out tools: scriber, odd leg calipers [odd-legs, Jenny calipers], steel rule, engineers square, try square, engineers [marking] blue 2 × 1	**2**	**Not** use of dot or centre punch, markers, felt tip pens
13(d)(ii)	2 precautions: drill piece tightened in chuck, chuck key removed, correct speed set, workpiece clamped securely, centre punched brass to assist drilling 2 × 1	**2**	Accept references to drilling machine only

Question	Answer	Marks	Guidance
13(d)(iii)	Sketch showing use of mallet or hammer and scrap wood, vice as a former 0–2 Correctly named tools and equipment 1	**3**	Accept sheet metal bender: details must be given for max. 3 marks
13(e)(i)	Wet and dry [silicon carbide] paper	**1**	Do not accept emery cloth
13(e)(ii)	Explanation: too fine a grade will not remove marks and too coarse a grade will scratch the surface 0–2	**2**	
13(f)	Some sort of screw/nut and bolt arrangement at **A** and **B** 2 × 1 Details of fitting: e.g. countersunk, type of head, length 0–2	**4**	