



# Cambridge IGCSE™

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**DESIGN & TECHNOLOGY**

**0445/32**

Paper 3 Resistant Materials

**October/November 2022**

MARK SCHEME

Maximum Mark: 50

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**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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This document consists of **9** printed pages.

**PUBLISHED****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)	Stainless steel, aluminium, inox, duralumin	1	
1(b)	ABS, polypropylene, HDPE	1	<b>Not</b> polythene or polyethylene, PVC

Question	Answer	Marks	Guidance
2(a)	Benefit: quick method, requires no clamping	1	Accept any valid benefit <b>Not</b> water resistant, easy to use
2(b)	Disadvantage: adjustment of veneer to surface not possible, toxic, excess glue difficult to remove	1	Accept any valid disadvantage

Question	Answer	Marks	Guidance
3	Benefits: check sizes, appearance, check movement of linkages, prevents waste of resistant materials, cheaper, quick to make	2	<b>Not</b> to test stability, easier to make

Question	Answer	Marks	Guidance
4(a)	Mild steel	1	
4(b)	Brass	1	
4(c)	Melamine formaldehyde	1	

Question	Answer	Marks	Guidance
5	'Measure' stated Description: e.g. diameter, thickness of object stated	1 1	2 Reward answers that apply the description to a specific use: e.g. depth, thickness or length of an object

Question	Answer	Marks	Guidance
6(a)	Benefits: provides safe packaging of product, product is visible, material can be formed to shape of product, protects contents, easy to manufacture, airtight, lightweight, waterproof, dust free, no risk of oxidation, difficult for children to open	2	Accept any valid benefit <b>Not</b> cheap to manufacture
6(b)	Packaging can create litter, plastic is a non-renewable resource e.g. plastic is non-biodegradable = 1 therefore can cause pollution = 1	2	Accept any valid environmental problem

Question	Answer	Marks	Guidance
7	Sheet with 2 holes drilled	1	<b>Not</b> two ends
	Sheet with 2 holes drilled and located against one end	2	
	Sheet with 2 holes drilled and located against one end and one side	3	
8	Silver soldering, hard soldering, soft soldering, soldering	1	Do not accept repeats <b>Not</b> Araldite, epoxy resin, contact adhesive
	Brazing, welding	1	
	Acrylic cement, Tensol cement	1	

Question	Answer	Marks	Guidance
9	Support joined to underside of desk top	1	Accept support in position [not joined] Accept whole 'box' added under desktop Look for use of groove and bead as a runner or use of applied beads
	Some sort of 'runner' attached to drawer side	1	
	Drawer 'runner' attached to support	1	

Question	Answer	Marks	Guidance
10	Geothermal	1	

Question	Answer	Marks	Guidance
11(a)	Halving cut out of top rail Halving cut out of lower rail Accurate size/proportion	1 1 1	3
11(b)	Appropriate constructions at <b>B</b> : dowel, mortise and tenon, bridle named Correct orientation Technical accuracy of joint	1 1 0–2	4 Dowel joint must have 2 dowels = 2 marks 1 dowel = 1 mark
11(c)(i)	Band saw, scroll saw, circular saw, jig saw, Hegner saw, table saw	2 × 1	2 <b>Do not</b> accept both circular saw <b>and</b> table saw
11(c)(ii)	Faceplate		1
11(c)(iii)	2 checks: speed of lathe, position/tightening of tool rest, condition of turning tools, secure the wood, free rotation of work piece	2 × 1	2 Accept any valid checks
11(d)(i)	2 advantages: quicker, more even pressure, even finish, less effort, easier	2 × 1	2 Accept any valid advantages <b>Not</b> better finish
11(d)(ii)	Explanation: clear finish allows the natural features of hardwood to be seen, opaque finish hides them, aesthetic / attractive quality, grain and colour visible	2 × 1	2
11(d)(iii)	White polish, French polish, Danish oil, lacquer, teak oil, varnish, sealer, wax	2 × 1	2 Accept any valid clear finishes <b>Not</b> oil or polish
11(e)	Position of shrinkage plate on top rail [where <b>B</b> is marked] Shrinkage plate shown <b>screwed</b> to top rail Plate overhangs rail	1 1 1	3

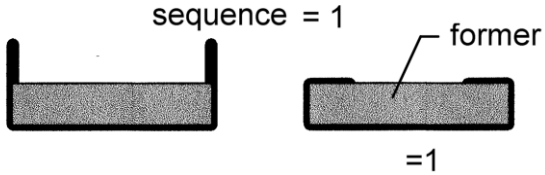
Question	Answer	Marks	Guidance
11(f)	Method: use of brackets/blocks/dowel pegs/metal pins Joined to legs Shelf shown at 140mm height Technical accuracy	1 1 1 1	4 Technical accuracy: e.g. materials used for brackets, pegs, pins, blocks, types of screws used

Question	Answer	Marks	Guidance
12(a)(i)	Card will become worn with use which will result in less accurate marking out	1	
12(a)(ii)	2 tools: scribe, permanent marker, chinagraph pencil, felt tip pen, felt pen, water soluble marker, marker 2 × 1	2	
12(b)	Drill hole for drill to access shape, insert saw blade and saw out shape Correctly named tools and equipment 2 × 1 1	3	Appropriate saws: coping, jig, Hegner, scroll, abra file, junior hacksaw, router
12(c)	<b>A</b> half round or round/rat tail <b>B</b> hand, triangle, 3 square, half round <b>C</b> warding, square, hand file, flat file 1 1 1	3	
12(d)	Method: tape several pieces together and cut/shape as one piece Cut out one end piece then mark around it [as a template] = 1 mark only	2	Accept use of CNC machine = 1 mark For 2 marks e.g. include references to software, file saved, data transferred to CNC machine
12(e)(i)	Aluminium, brass, copper, nickel silver, duralumin	1	
12(e)(ii)	Malleability	1	
12(e)(iii)	Metal heated to soften Use of formers, jigs to produce bends Will it work? Named tools and equipment 1 0–2 1 1	5	
12(e)(iv)	Annealing	1	

Question	Answer	Marks	Guidance
12(e)(v)	2 benefits: attractive finish, natural colour of metal visible, prevents corrosion, prevents tarnishing, easier to clean 2 × 1	2	Accept any valid benefits
12(f)	Acrylic book stand: adjustable and can take different size books, can be disassembled, and stored flat, attractive colours Metal book stand: simple design, good/minimal use of materials, attractive lacquered finish, stackable 0–2 0–2	4	Reward answers that state a point then expand upon it

Question	Answer	Marks	Guidance
13(a)	Hardwood: wide variety of suitable hardwoods Manufactured board: hardboard, plywood, MDF Non-ferrous metal: aluminium, duralumin Plastic: ABS, HIPS, HDPE, nylon, polypropylene 1 1 1 1	4	Use internet to check obscure named woods Must be appropriate for use <b>Not</b> chipboard <b>Not</b> acrylic, PVC
13(b)(i)	Mitre	1	
13(b)(ii)	Use of veneer 'feather' in outer edge, use of solid wood insert across top of joint, wooden block, K-D corner block inside, corrugated metal fastener, angled bracket inside, use of staples	2	Award 0–2 dependent on technical accuracy
13(c)	2 settings: correct diameter/type of router bit, securely fitted, depth gauge, adjust fence to width, insert and tighten bit, correct speed 2 × 1	2	Accept references to width and depth of rebate
13(d)	Some sort of enclosed 'box' or 'tray' shown Attached to side of cabinet or to base Details of materials, fittings and constructions 1 1 0–2	4	
13(e)(i)	Injection moulding	1	
13(e)(ii)	Epoxy resin, 'Araldite' or equivalent trade name	1	



Question	Answer	Marks	Guidance
13(f)(i)	<p>Use of strip heater/line bender, hot air gun</p>  <p>Method of retention while acrylic cools</p>	<p>1</p> <p>4</p> <p>1</p>	<p>Method of heating must be stated</p>
13(f)(ii)	<p>3 processes to <b>engrave</b> numbers: data from file transferred to CNC machine, place acrylic on bed of machine, set tool parameters, computer 'print', 'run' <span style="float: right;">3 × 1</span></p> <p>3 processes to <b>apply</b> numbers: data from file transferred to CNC machine, vinyl loaded into machine, set tool parameters, computer 'print', 'run' <span style="float: right;">3 × 1</span></p>	<p>3</p>	<p>Examples: use of laser cutter, CAMM2 CNC machine</p> <p>Example: CAMM1 vinyl cutter</p> <p><b>Do not</b> reward use of laser cutter or 3D printer to cut out numbers as they will not fit onto scoreboard with slider</p>
13(g)	<p>Method of protection from impact: use of soft/flexible 'washer' or 'spacer' fitted over rods</p> <p>Details of materials and fittings used</p>	<p>0–2</p> <p>1</p>	<p>3</p> <p>Protection can be shown inside or outside the cabinet</p>