



Cambridge IGCSE™

DESIGN AND TECHNOLOGY

0445/32

Paper 3 Resistant Materials

May/June 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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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	2 processes: laminating, steam bending 2 × 1	2	Must include the term 'steam'

Question	Answer	Marks	Guidance
2(a)	Correct position of countersunk hole 1		
2(b)	Correct position of clearance hole 1	2	

Question	Answer	Marks	Guidance
3	Tempering	1	

Question	Answer	Marks	Guidance
4	Sketch showing end of rod chamfered Produced by filing, centre lathe 1 1	2	

Question	Answer	Marks	Guidance
5	Lasts for a fixed period of time	1	

Question	Answer	Marks	Guidance
6(a)	PETE, HDPE, PVC, LDPE, PET, Polythene, Polyethylene	1	Not HIPS, polystyrene, ABS, polypropylene
6(b)	Benefits: hygienic, keeps food fresh, protects food, can withstand extremes of environment, maintains high quality produce, easily recycled, fast manufacturing process, water resistant, transparent, does not react with food, lightweight	1	Accept any valid benefit 'Cheap' must be qualified Not long lasting, attractive

Question	Answer	Marks	Guidance
6(c)	Drawbacks: is a finite resource, non-biodegradable, wasteful, can cause pollution when thrown away, doesn't decompose, references to landfill, not environmentally friendly, unsustainable	1	Accept any valid drawbacks

Question	Answer	Marks	Guidance
7(a)	Corner block, bloc fitting, two-piece bloc, 2 piece connector	1	Accept authentic variations.
7(b)	KD fitting joined/positioned against 2 sides Technical accuracy/proportion	2 × 1 1	3 Do not accept fitting on outside of cabinet

Question	Answer	Marks	Guidance
8	3 advantages: lightweight, less bulky to carry, more comfortable canvas seat, easier to clean, easier to open/close, packs away smaller, does not splinter, fewer moving parts	3	Not weatherproof, not more stable, durable, or attractive

Question	Answer	Marks	Guidance
9(a)	Router	1	
9(b)	Tenon saw, dovetail saw Firmer, bevel-edge chisel, mortise chisel	1 1	2 Accept 'bevel chisel'

Question	Answer	Marks	Guidance
10	Recognised base Method of attachment Dimension	1 0–2 1	4 Epoxy resin, 'Araldite' = 2 marks Contact adhesive = 1 mark Glued only = 1 mark

Question	Answer	Marks	Guidance
11(a)(i)	Hardwearing, easily shaped, relatively cheap, takes a variety of finishes, malleable	1	Accept any valid property Not durable, weatherproof, heat resistant
11(a)(ii)	Paint, dip-coated, electroplated, plastic coated, powder coated, galvanised, chrome plated 2 × 1	2	
11(b)(i)	Benefit: check sizes, appearance, prevent mistakes and waste of material, allows for modifications	1	Accept any valid benefit Must be different benefits for (bi) and (bii)
11(b)(ii)	Benefit: 3D models can be created, editing can be carried out quickly, no materials used, designs can be replicated, designs can be transferred to CAM	1	Accept any valid benefit
11(c)(i)	2 marking out tools: scribe, odd-leg calipers, permanent marker, marker pen, engineers square, try square, [steel] rule, engineers blue, sliding bevel 2 × 1	2	
11(c)(ii)	Tinsnips, snips, hand shears	1	
11(c)(iii)	Brazing, soldering, welding, hard/silver soldering	1	
11(c)(iv)	Epoxy resin, 'Araldite' or equivalent trade names, Gorilla Weld	1	Not Gorilla generic, superglue
11(d)	Use of strip heater/line bender/hot air gun/heat gun Use of former to bend 4 sides to shape Use of former to bend base to shape Method of retention while acrylic cools Technical accuracy of sketches/terms used 1 1 1 1 1	5	
11(e)	Practical idea: some form of pin, peg through top into body of lantern, clip, clasp, magnets Details of construction/fittings used 0–2 0–2	4	Accept modifications to the lid and body of lantern Lid must lift off . Not hinged Parts (e) and (f) are not connected Mark these as completely separate questions

Question	Answer	Marks	Guidance
11(f)	Method of suspension: Modification lid and/or support rod Can be detached Details of constructions/fittings	0–2 1 0–3	6 Reward any practical design that shows potential success Award 1 mark of 3 for use of string under 'Details of constructions/fittings etc'.

Question	Answer	Marks	Guidance
12(a)	2 properties: hardwearing, close-grained, finishes well, high impact resistant, attractive, tough 2×1	2	Accept any valid property Durable must be qualified
12(b)	2 safety considerations: no sharp edges, fingers should not be trapped, risk of ball flying out, cover to prevent ball flying out, ball large enough to prevent choking hazard 2×1	2	Accept any valid consideration
12(c)	Variety of acceptable corner constructions: butt, rebate, lap joint, mitre, dovetail, finger [comb] joint, dowel Named Technical accuracy/proportion of sketched construction	1 0–3	4 Award maximum 2/3 for butt joint Dowel joint: maximum number of dowels 2
12(d)(i)	Saw tooth bit, forstner bit	1	Not hole saw
12(d)(ii)	2 reasons: prevent damage to work surface, prevents splitting of wood as drill cuts through, cleaner cut hole, protect drill table 2×1	2	Focus on the use of scrap wood, not clamping Not provide stability, not prevent wood flying off
12(e)	2 advantages: less likely to be pulled off sides [stronger], edges not visible [more attractive], gluing not required, more secure, lasts longer 2×1	2	Not greater surface area
12(f)(i)	Router, scroll saw, band saw, jig saw, laser cutter, CNC milling machine 2×1	2	

Question	Answer	Marks	Guidance
12(f)ii	Benefit of PVA: stronger joint, more time to clamp parts, no toxic fumes, does not cause skin irritation 1 Benefit of contact adhesive: immediate bond, no clamping required, quicker to dry/set 1	2	
12(g)	Method of bending: use of steam bending process 1 use of formers/moulds 1 method of clamping 1 attachment to base 1	4	
12(h)	some sort of 'leg' support that remains upright 1 support can fold flat 1 constructions 1 materials 1	4	

Question	Answer	Marks	Guidance
13(a)(i)	Benefits: inherent colour, easily moulded, lightweight, attractive, range of colours, impact resistant, weather resistant	1	Accept any valid benefit
13(a)(ii)	Benefits: hardwearing, close grained, finishes well, attractive, smooth surfaces, tough	1	Accept any valid benefit
13(b)(i)	3 processes: place acrylic on bed of machine, set tool parameters, computer 'print', 'run', transfer data to CNC machine, extractor unit on 3 × 1	3	Accept any valid process
13(b)(ii)	Contact adhesive applied to both surfaces 1 Allow to dry then stick together on contact [impact] 1	2	No use of cramps
13(c)(i)	2 advantages: no grain texture to mark plastic, easier to work, cheaper, does not shrink or warp, smoother surfaces, more stable 2 × 1	2	Accept any valid advantage Not available in wider boards

Question	Answer	Marks	Guidance
13(c)(ii)	2 features: smooth surfaces, rounded corners/edges, draft angle [tapered sides] no undercuts 2×1	2	
13(c)(iii)	4 processes: clamp plastic to machine, turn on heater, check pliability of plastic, raise platen, turn on pump to remove air, leave to cool 4×1	4	Ignore sequence Do reward 2 stages given as one: for example, 'push mould into plastic [1] and turn pump on to remove air' [1]
13(d)	Some sort of hinge/pivot Hinge shown in position on tipper Hinge shown in position on base Appropriate materials Constructions Fittings 1 1 1 1 1 1	6	
13(e)	Some form of axle Axle fitted onto wheel and secured Wheel/axle rotates freely Use of washers/'spacers' 1 1 1 1	4	Axle could be 'stub' or one continuous axle fitted to two front wheels and one fitted to two rear wheels