



Cambridge IGCSE™

DESIGN AND TECHNOLOGY

0445/33

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.

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.

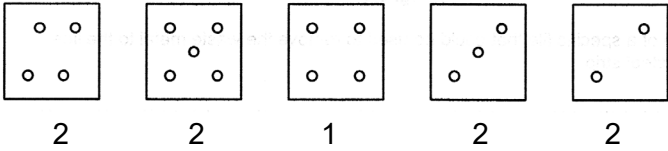
GENERIC MARKING PRINCIPLE 5:

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)	ABS, PP, PETE, PET, HDPE, HIPS	1	Not PVC, Acrylic, Polystyrene, Polyethene, Polyethylene
1(b)	2 spec. points: colourful, lightweight, smooth finish, ability to make rounded corners/edges, non-toxic material, safe/suitable sizes, easy to clean, aesthetics, durable, water resistant	2	Accept any valid spec. points

Question	Answer	Marks	Guidance
2(a)	Minimum 2 nails shown Maximum 5 nails Marks: 	2	
2(b)	Nail or pin punch, hammer	1	

Question	Answer	Marks	Guidance
3(a)	Casting, sand casting	1	Not die casting
3(b)	Gauntlets [gloves], [leather] apron, spats	1	

Question	Answer	Marks	Guidance
4	A rod/bar shown inside tips of calipers How it is used: measuring external diameters	1 1	Names of tools not required
	B tube shown inside tips of calipers How it is used: measuring internal diameters	1 1	

Question	Answer	Marks	Guidance
5	User	1	

Question	Answer	Marks	Guidance
6	Rebate, applied beads or groove recognised Technical accuracy: accurate sizes/proportion of panel-frame	1 0–2	3 No marks for glued only

Question	Answer	Marks	Guidance
7	A faceplate turning B between-centres turning	1 1	2

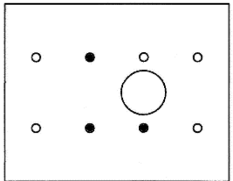
Question	Answer	Marks	Guidance
8(a)	Polycarbonate	1	
8(b)	Expanded polystyrene	1	

Question	Answer	Marks	Guidance
9(a)	Stainless steel, cast iron	1	
9(b)	Duralumin	1	

Question	Answer	Marks	Guidance
10	Device fits/grips cross head effectively Head extended to provide longer lever Accuracy of design idea	1 1 1	3 Named materials not required

Question	Answer	Marks	Guidance
11(a)	CAD file transferred/downloaded to CNC machine, type of CNC machine named, setting up of acrylic workpiece, setting of machine parameters, turn on machine 4 × 1	4	Accept any 'subsidiary' stages; e.g. within the setting of tool parameters
11(b)	Acrylic can be heated and formed When reheated acrylic will return to its original state	1 1	2
11(c)	Use of a strip heater/line bender/hot air gun/heat gun Sides of a container bent to shape Use of a former/block Method of retention while acrylic cools Repeat process to complete shape of container	1 1 1 1 1	5 Method of heating can be stated or sketched
11(d)(i)	2 safety precautions: use of gloves/barrier cream, face mask, goggles, well ventilated area, no naked flames 2 × 1	2	Not Apron
11(d)ii	Use of adhesive tape, clothes peg, strap cramp, spring cramp, small G cramp 0–2	2	Award any innovative method

Question	Answer	Marks	Guidance
11(e)	Additional base recognised Organiser stable in use Some form of pivot Appropriate Materials Practical constructions to enable device to rotate	1 1 1 1 1	5
11(f)	Handle recognised in appropriate position Appropriate material for handle Method of attachment Ergonomic handle	1 1 0–2 1	5

Question	Answer	Marks	Guidance
12(a)	3 items of research: type of cycle, tyre sizes, wheel diameter, weight of cycle, ease of access, where it is placed, method of attachment to wall, materials	3	Accept any valid items of research Do not reward height and length of bike
12(b)(i)	Scriber, engineers square, try square, odd-leg/jenny calipers	3	
12(b)(ii)	'Plate' or sheet with hole/s positioned accurately Plate located against 1 edge Plate located against 1 edge and 1 side Appropriate named material Important size	1 2 3 1 1	5 Accept one whole sheet or corner jig Important size: For example 250 × 150, 20 × 20 or thickness of material for jig
12(c)(i)		3 × 1	3 Award 1 mark for each correctly positioned pin
12(c)(ii)	Heating softens the metal and makes it easier to bend, malleable	1	Accept prevents steel from 'cracking'

Question	Answer	Marks	Guidance
12(d)(i)	Blowtorch, propane torch, gas torch, brazing torch	1	
12(d)(ii)	Emery cloth, wet and dry [silicon carbide paper], steel/wire wool	2 × 1	2
12(d)(iii)	Flux keeps the joint clean, free from oxides, to allow the brazing rod to flow	1	
12(e)	Dip-coated, electroplated, plastic coated, oil/chemical blacking, powder coating, galvanised	2	
12(f)	Method of attachment: use of screws/clips/magnets Method enables quick removal Technical accuracy: materials and fittings	0–2 1 1	4

Question	Answer	Marks	Guidance
13(a)(i)	Pine, red deal, redwood, spruce, fir, parana pine, yew, cedar	1	Accept any valid softwood
13(a)(ii)	Plywood, MDF, chipboard	1	Not blockboard
13(b)	2 factors: moisture/steam resistant materials, corrosion resistant metal, colour co-ordination, attractive appearance, easy to clean, size of bathroom, chemical resistance	2 × 1	2 Accept any valid consideration Must relate to bathroom e.g. not 'no sharp edges'
13(c)	'Tenon' shown on top part of frame 'Slot' shown on upright part of frame Accurate size/proportion	1 1 1	3
13(d)	Recognised joint includes: dowel, biscuit, T&G, housing Modification to end frame Modification to shelf Technical accuracy	1 1 1 1	4 Maximum numbers of dowels 4 Minimum of 2 biscuits

Question	Answer	Marks	Guidance
13(e)	Shelf joined to end frame Can be moved to 3 different positions Shelf does not move horizontally Appropriate named materials Details of constructions and fittings used	1 1 1 1 0–2	6 If shelf and/or frame size altered award no marks.
13(f)	Additional supporting rail, 'back' or brackets shown Method of fitting/joining additional rail, 'back' or brackets to existing shelf unit Method of attaching unit to wall (screws/hooks etc.) Technical accuracy	1 1 1 1	4 Award one mark max for using screws to fix unit directly to wall.
13(g)	Advantage to manufacturer: quicker to produce, less labour involved Disadvantage to manufacturer: single sheet would be more expensive	1 1	2 Accept any valid advantage or disadvantage for manufacturing
13(h)	Explanations could include: Some (not all) manufactured boards can be made from recycled materials/waste products, Softwoods are fast growing so more readily available, Softwood trees can be replanted, to replace those cut down.	2 × 1	2 Reference could be made to either the manufactured board or softwood