Cambridge Assessment International Education

Cambridge IGCSE™

DESIGN AND TECHNOLOGY **0445/31**

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 **8** 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	3 items: length, type of head, type of 'slot', gauge, material, size, width of screw, type of screw 3×1	**3**	Accept recognised length of screw stated

Question	Answer	Marks	Guidance
2(a)	Rebate joint, lap joint, half lap	**1**	Accept 'lap' variants
2(b)	Minimum 2 pins shown angled. 2 pairs of angled pins	**2**	

Question	Answer	Marks	Guidance
3	**A** [engineers] try square **B** mitre square **C** combination square 3×1	**3**	

Question	Answer	Marks	Guidance
4	3 stages: apply flux, wire joint, lay hard solder along joint, heat joint [with blowtorch], apply solder at appropriate temperature, remove heat when solder runs, leave to cool 3×1	**3**	Accept reference to 'heating' Incorrect sequence: award 1 mark max. for any **one** correct stage

Question	Answer	Marks	Guidance
5(a)	Scroll saw, coping saw, jig saw, fret saw	**1**	
5(b)	Piercing saw, abra file saw	**1**	Accept bow saw

Question	Answer	Marks	Guidance
6	2 reasons: tough, will not break easily, shapes well, bright colours available, easily cleaned, durable, attractive, lightweight, safe to eat from, does not scratch, will not shatter, heatproof 2×1	**2**	Accept any valid reasons Not weather resistant/weatherproof

Question	Answer	Marks	Guidance
7	Redwood	**1**	

Question	Answer	Marks	Guidance
8	**A** marking gauge **B** odd leg calipers 2×1	**2**	Accept odd legs, Jenny calipers

Question	Answer	Marks	Guidance
9	'Slot' construction principle 1 Technical accuracy of sketches showing various parts joined using slots 0–2	**3**	

Question	Answer	Marks	Guidance
10(a)	**A** fastened inside edge of door 1 **B** fastened inside right side of cabinet 1	**2**	
10(b)	Suitable hinge: butt	**1**	Accept piano hinge

Question	Answer	Marks	Guidance
11(a)	2 reasons: hardwearing, attractive, relatively easy to work, long lasting, durable	**2**	Accept any valid reasons
11(b)	Barrel shown in side or top edge of rail 1 Screw shown in end of leg 1 Technical accuracy of joint shown 1	**3**	
11(c)(i)	Accuracy of one-piece or two-piece corner block 0–2	**2**	Award 1 mark for simple block Award 2 marks for block showing screw holes
11(c)(ii)	Corner block shown against middle rail 1 Corner block shown against side rail 1	**2**	
11(d)(i)	Use of veneer or strip of solid wood shown clearly 1 Explanatory notes: for example, method of attachment 1	**2**	Not paint, stain
11(d)(ii)	Drill hole, insert saw blade, cut out waste, clean up sawn edges 3×1	**3**	Accept router. For maximum marks details required on setting up etc.
11(d)(iii)	Use of rebate, applied strips 1 Technical accuracy and added details 0–2	**3**	Accept reference to ‘ledge’
11(d)(iv)	Screw in side rail 1 Screw in table top 1 Appropriate length of screw stated 1	**3**	Award 0 if screw is through top Accept ‘pocket screwing’ and counterboring’
11(e)(i)	Drying out of excess moisture in newly cut wood	**1**	Accept answers that include reference to ‘drying out’
11(e)(ii)	 Award 0–2 mark for clear, accurate ‘cupping’.	**2**	Award 1 mark for reference to ‘cupping’

Question	Answer	Marks	Guidance
11(f)	2 benefits to manufacturers: no assembly required, less labour costs, reduced prices passed on to customers, less storage space required, reduced transport costs, easier to manufacture, less packaging 2 × 1	**2**	Accept any valid benefits Cheaper + justification √

Question	Answer	Marks	Guidance
12(a)	2 stages: cut off corners, sanding disc/belt sander or files to round shape 2 × 1 Technical accuracy of tools and equipment stated 1	**3**	
12(b)	Shape cut: use of coping, scroll saws, band saw 0–2 Edges made flat: use of files 1 Edges polished: use of draw file, scraper, wet and dry paper, buffing wheel 0–2 Method to provide identical shapes: tape together 1	**6**	Accept use of one shape to be used as a template for a second piece
12(c)	4 methods: mortise machine, router, chisel and mallet, drilled holes and chisel Award 0–3 dependent on technical accuracy of method and tools stated	**3**	Machine methods require details for max.3 marks
12(d)	Round wooden former 1 Saw cut to guide straight end of shape 1 Pegs to clamp start of bend and final inside bend 1 At least 4 pegs around outside of shape to hold against former 1 Correct tools and equipment stated 1	**5**	
12(e)	**A** facing off **B** taper turning **C** parting off 3 × 1	**3**	
12(f)(i)	Tap	**1**	
12(f)(ii)	Die, circular split die	**1**	
12(g)(i)	Paint, electroplating, dip-coating, powder coating, plastic coating 2 × 1	**2**	
12(g)(ii)	Clear finish allows grain characteristics to be seen	**1**	

Question	Answer	Marks	Guidance
13(a)	2 benefits: plastic materials are lightweight, can be used outdoors effectively, easily worked, self-coloured, easily shaped, weather resistant 2 × 1	**2**	Accept any valid benefits
13(b)	2 reasons: check sizes, appearance, test function, avoids mistakes and waste of materials 2 × 1	**2**	Accept any valid reasons
13(c)(i)	Checks include: secure workpiece in chuck, remove chuck key, correct speed, guard in position	**1**	Accept any valid checks
13(c)(ii)	Centre drill, slocombe drill	**1**	
13(c)(iii)	Twist drill	**1**	
13(c)(iv)	Hacksaw	**1**	Only acceptable answer
13(d)	An interference or friction fit between two parts in which one part is forced under pressure into a slightly smaller hole in the other.	**2**	Award 0–2 dependent on accuracy of explanation
13(e)	4 stages include: place former on platen, clamp plastic sheet, turn on heater, check for pliability, raise platen, remove air, leave to cool 4 × 1 Award technical accuracy of sketches and notes 0–2	**6**	Accept any valid stages
13(f)	Modification required: some sort of fastening to weather vane and column 0–3 Retained in position **A** 1 Fittings to allow rotation 1	**5**	Look for any practical method
13(g)	Use of CAD to design the letters, model fonts and sizes 0–2 Use of CAM to transfer data to machine to engrave or cut out vinyl to apply 0–2	**4**	Reward an imbalance between information provided for CAD and CAM