Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

DESIGN AND TECHNOLOGY (9–1) **0979/32**

Paper 3 Resistant Materials **May/June 2021**

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 2021 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	Damage: bruising to softwood, scratching, crushing, marking, spoiling, marked 1 Prevention: use of scrap wood, sponge, cardboard between cramp and softwood 1	**2**	Not ‘crack’,’ break’ or ‘snap’

Question	Answer	Marks	Guidance
2	Sliding bevel: to mark out chamfer or sides of slot. Mark out angle 1 Tenon saw: to saw down the sides of the slot or chamfer, cut straight lines 1 Bevel-edge chisel: to cut out/ remove the waste after sawing 1	**3**	Must relate to the stand Not ‘mark out’ on its own Not ‘cut out’ on its own Consider sequence when awarding marks

Question	Answer	Marks	Guidance
3	Hard	**1**	

Question	Answer	Marks	Guidance
4	Recognised ‘halving’ shown on each piece 2x1 Accuracy and proportion 1	**3**	Award 1 mark for halving shown not exploded Award 2 marks for halving shown not exploded but showing accurate hidden detail

Question	Answer	Marks	Guidance
5	Sheet **A**: mould too deep, too tall, too high 1 Sheet **B**: moulds too close together, too many moulds on 1 sheet 1	**2**	

Question	Answer	Marks	Guidance
6	Temporarily: nut and bolt, nut and screw, self tapping screw 1 Permanently: rivets, pop rivets 1	**2**	For 1 mark nut **and** bolt or nut **and** screw. Do not accept heat processes or gluing. Not 'bolt' or 'screw' on its own

Question	Answer	Marks	Guidance
7(a)	Hole **A** hole saw, tank cutter, forstner bit 1 Hole **B** forstner, hole saw, sawtooth, flat bits 1 Hole **C** twist drill, forstner bit 1	**3**	Only accept name of bit used **once**
7(b)	Splitting can occur on the underside of the sheet Snagging/spinning if not secured properly, spinning, splinters, splintering	**1**	

Question	Answer	Marks	Guidance
8	Model toy car: die casting 1 Guttering: extrusion 1	**2**	Not 'casting'

Question	Answer	Marks	Guidance
9	**A** Rebate 0–2 **B** Groove 0–2	**4**	Award 0–2 dependent on accuracy of drawings Do not reward drawings with **added** pieces of wood to make rebate or groove Accept rebate drawn as part of a half lapped joint =2 Grooves drawn in end or across the grain =1 Award 1 mark for routered groove Rebate and groove must be drawn on Fig.9.1 otherwise 0 marks

Question	Answer	Marks	Guidance
10(a)	Anodising, electroplating, electrolysis	**1**	
10(b)	To prevent corrosion, protect, hardwearing, durable, longlasting	**1**	

Question	Answer	Marks	Guidance
11(a)	Two reasons: hardwearing, attractive, finishes well, tough, durable, long lasting, resistant to scratches 2×1	**2**	Not 'easy to work with' Not 'can be used outdoors' or 'weather resistant'
11(b)(i)	Wider boards are not available, hardwood boards have limited width 500 mm wide boards are more expensive	**1**	Candidates giving 'warping' or 'cupping' in 11(b)(i) can be awarded 1 mark but do not accept a repeated answer in (b)(ii)
11(b)(ii)	Boards arranged with alternating positions for end grain to provide stability 1 Without the arrangement the whole table top would 'cup', prevents splitting, prevents deforming over time 1	**2**	Candidates giving 'warping' or 'cupping' in 11(b)(i) can be awarded 1 mark but do not accept a repeated answer in (b)(ii)
11(c)	Movement of solid wood occurs across the grain 1 Slots allow the screw to move as the wood expands or contracts 1	**2**	Award 1 mark for 'ease of alignment of top to rails'
11(d)	(i) Grooves provide space for glue inside the drilled hole, allows excess glue/air to escape, provides better grip 1		
	(ii) Chamfer allows for easier entry into drilled hole 1	**2**	
11(e)(i)	Two marking out tools: scriber, try square, steel rule, metre rule, ruler, odd leg calipers, engineers/marking blue 2×1	**2**	Not 'centre punch'
11(e)(ii)	To guide the tip of the drill, to prevent tip of drill 'wandering', to provide an accurately positioned hole	**1**	

Question	Answer	Marks	Guidance
11(e)(iii)	Use of tin snips or hacksaw shown 1 Tin snips or hacksaw named 1 Held in vice or clamped 1	**3**	Accept 'guillotine', 'notcher'
11(e)(iv)	Use of a former the same shape as the section of legs/rails 1 Use of vice or clamps 1 Use of a mallet or hammer 1 Technical accuracy 1	**4**	
11(f)	Three stages include: edit CAD drawing score, engrave and cut lines, position CAD drawing on A2 size paper, turn on laser, position acrylic on bed of machine, enter 'set up' parameters , computer file 'Print', 'Run' 3×1	**3**	Accept any valid stages
11(g)	Use of a Ø12 rod or former 1 Heat the acrylic **or** the Ø12 rod or former 1 Bend around former 1	**3**	

Question	Answer	Marks	Guidance
12(a)	Two benefits: attractive appearance, colours available to 'match', resistant to moisture, easy to clean, water resistant 2×1	**2**	Accept any valid benefit Not 'lightweight'
12(b)	Two items of information: appropriate size/dimensions, will products fit/sufficient space, appearance/aesthetics, CAD modelling allows for on-screen modelling edits including colour, ease of removal of shelves 2×1	**2**	Accept any valid item of information as a result of modelling Accept only **one** ref. to dimensions
12(c)	CAD drawing data transferred to appropriate machine [e.g. laser cutter or equivalent CNC machine], machine parameters set, acrylic positioned on bed of machine, 'Run'. 0–4	**4**	Award 0-4 dependent on technical accuracy of relevant individual points.

Question	Answer	Marks	Guidance
12(d)	Two benefits of using a scroll saw: easy to control, easy to use/control/handle, thin blade, acrylic in flat position during cut and less likely to snap 2×1	**2**	Accept any valid advantage Not 'accurate'
12(e)(i)	Two hand tools: hacksaw, coping saw, variety of files, piercing saw, tenon saw, junior hacksaw, needle files 2×1	**2**	Do not reward marking out stages
12(e)(ii)	A line bender or strip heater only heats a small, specific area 1 An oven heats and softens the whole strip of acrylic 1	**2**	
12(e)(iii)	Sketch showing some form of female mould 0–2 Method of clamping across moulds in 2 directions 2×1	**4**	For maximum 2 marks each mould must 'fit' contour of front edge of shelf **and** allow for stable clamping Award 1 mark for use of G cramp or vice when curved part is glued **onto** the shelf [not edge]
12(e)(iv)	Barrier cream, gloves for hands, mask, good ventilation.	**1**	
12(f)	Some form of additional 'base' 0–2 Method of rotation 0–2 Materials and constructions 0–2	**6**	Reward practical ideas for a base and the method of rotation

Question	Answer	Marks	Guidance
13(a)	Wide variety of hardwoods available	**1**	
13(b)	Two items of information: appropriate sizes, proportions, appearance, manipulate adjustments to parts of the lamp 2×1	**2**	Accept any valid item of information as a result of modelling Accept only **one** ref. to dimensions
13(c)(i)	Jack, smoothing or block planes	**1**	

Question	Answer	Marks	Guidance
13(c)(ii)	Sketch showing [part of] woodworker's vice 1 Hardwood shown in vice 1	**2**	Award 1 mark if wood is shown in engineers vice Award 2 marks if wood is shown in engineers vice with scrap wood jaws
13(d)(i)	Preparation of hardwood parts: use of different grades of glasspaper/sandpaper/abrasive paper, wipe off dust, cabinet scraper, sander 2×1	**2**	Award 1 mark for one grade of glasspaper and 1 mark for a different grade of glasspaper. Not 'use of files', 'sanding disc', 'plane'
13(d)(ii)	Clear finish: varnish, white/French polish, Danish oil, Teak oil, lacquer, [bees]wax, epoxy resin	**1**	
13(d)(iii)	Two advantages: natural grain characteristics visible, colour, some finishes [lacquer, varnish] can chip and peel, oils and polishes easier to apply 2×1	**2**	Not 'more attractive' or 'aesthetically pleasing'
13(e)	Threaded rod shown through legs, tail and body 1 Some form of 'stopper', nut or cap on ends of rod 1 Can be finger tightened 1 Added notes and details 1	**4**	Accept any practical locking devices including wing nut
13(f)(i)	Two advantages of veneered plywood: cheaper, more stable, less likely to split, allows for use of thinner wood-based material, lightweight 2×1	**2**	Accept any valid advantage Not 'easier to work/cut/shape'
13(f)(ii)	Use of strips or blocks made from wood or thin metal brackets 0–2 Method of joining: use of pins, screws, adhesive 0–2 **OR** Accept laser cutter but must describe in detail for maximum 4 marks. 0–4 **OR** Award 0–2 marks for sketches and notes showing how the sides of the lampshade are cut out 0–2 **OR** Award 1 mark for use of suitable named adhesive. Award 1 mark for putting sides together 0–2	**4**	Look for answers that show additional parts. 4 mm thick plywood requires additional corner blocks as it is too thin to join without reinforcement. Accept 'lacing'. Do not reward marking out

Question	Answer	Marks	Guidance
13(g)	Some form of bracket attached to underside of lampshade 0–2 Bracket attached to underside of lampshade 0–2	**4**	