Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

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

Paper 3 Resistant Materials **May/June 2023**

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 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U 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	Any 3 specification points from the list below: Appropriate size to fit hand [1] Must be comfortable to hold [1] As lightweight as possible [1] Easy to read numbers and symbols [1] Well-spaced numbers and symbols [1] Button placement [1] Aesthetic features must be qualified [1]	**3**	Accept any valid specification points

Question	Answer	Marks	Guidance
2	**A** end [1] **B** short [1]	**2**	

Question	Answer	Marks	Guidance
3	**B** heater/heating chamber [1] **C** feed screw [1] **D** mould, die [1]	**3**	Accept any reference to ‘screw’

Question	Answer	Marks	Guidance
4	Shape of plug must fit inside yoke [1] Draft angle on plug [1] Dowel pegs to locate in yoke [1]	**3**	Award 1st mark without draft angle shown Accept drawing added to press form moulding

Question	Answer	Marks	Guidance
5	Aluminium [1]	**1**	

Question	Answer	Marks	Guidance
6	Drill holes at top and bottom centres [1] Insert blade of saw and remove waste [1] Use of files to finish keyhole shape [1] Accept use of chain drilling + file for 3 marks	**3**	Do not accept use of laser cutter, hole saw, jig saw, hacksaw Accept following: piercing, coping, Hegner and scroll saws with metal cutting blade, abra file saw

Question	Answer	Marks	Guidance
7(a)	Aluminium / brass / copper / gilding metal / duralumin [1]	**1**	
7(b)	Use of a template / tessellation / stencil / marking jig [1] Suitable marking out tool: scriber / chinagraph pencil / marker pen / felt tip pen [1]	**2**	Do not accept use of laser cutter

Question	Answer	Marks	Guidance
8	Cutting gauge to mark out the lines of the housing across the grain [1] Tenon saw to saw down the lines of the housing, cutting out joint [1] Bevel-edge chisel to remove the waste wood [1]	**3**	Accept use of cutting gauge to mark out area to be cut out, provides a guide for tenon saw Do not accept to ‘smooth wood’

Question	Answer	Marks	Guidance
9	Hardboard [1]	**1**	

Question	Answer	Marks	Guidance
10	Stage 2 transfer data to CNC machine [1] Stage 2 position workpiece on bed of CNC machine [1] Stage 3 set machine parameters [1]	**3**	Accept any valid stages. Do not accept repeats of designing process given in Table. Do not accept use of extraction unit

Question	Answer	Marks	Guidance
11(a)	Any two from the list below: Protect the guitar from damage/scratches / stable in use / easy to place the guitar on the stand / attractive / hold guitar securely / ease of access / easily transported / easily stored / folds up small / size of guitar [2 x 1]	**2**	Accept any valid specification points Do not accept waterproof, lightweight Durable must be qualified
11(b)	Suitable joint: dowel / mortise and tenon [variants] / biscuit [1] Through M&T with shoulder [3] Through M&T without shoulder [2] Mortise drawn only [1] Cut-out [flat recess] [1] Screw from underneath [with or without glue] [1]	**4**	Dependent on size, proportion and orientation Do not accept use of nails
11(c)	Butt hinge named [1] 2 leaves [1] 2 or 3 holes [1] Size/proportion to legs [1] **OR** Back flap hinge named [1] 2 leaves [1] 3 holes [1] Size/proportion to legs [1]	**4**	Reference to, or shown in sketch to match width of leg [30mm]
11(d)(i)	Close-grained / not liable to splitting/splintering/cracking [1]	**1**	Do not accept hard or durable
11(d)(ii)	Saw cut to locate the end of the fork centre / support/hold wood being turned [1]	**1**	
11(d)(iii)	To provide lubrication for the dead centre in tailstock [1]	**1**	Accept smoother rotation
11(d)(iv)	Correct height essential for lathe tool to cut safely and effectively / chisel does not get caught / prevents damage [1]	**1**	

Question	Answer	Marks	Guidance
11(e)	Use of heat to make rod malleable [1] Use of at least one former [1] One end of rod secured to allow bending around formers [1] Method of force: hammer or hide mallet [1]	**4**	
11(f)	Some sort of 'connecting strip' or base between two legs [0 – 2] Method of locking in several dedicated **or** any positions [1] Named materials and constructions [0 – 2]	**5**	Do not accept 3D printer
11(g)	Beech is more sustainable because it can be replaced by tree planting [1] Aluminium [bauxite] is a finite resource [1]	**2**	

Question	Answer	Marks	Guidance
12(a)	Front 130 wide [1] Side 130 long [1] × 90 wide [1]	**3**	Accept side 90 long × 130 wide
12(b)(i)	MDF held securely in a vice / clamped to bench or table [1] Sketch showing plane positioned correctly [1] Method: Plane from end to middle-stop-plane to middle from other end [1] **OR** Clamp 10 mm scrap wood at end of MDF and plane across end [1]	**3**	
12(b)(ii)	Sketch showing tool [1] Correct position of tool [1] Try square, engineers square or combination square named [1]	**3**	
12(c)	Mortising machine / power router / table router [1]	**1**	Do not accept laser cutter
12(d)(i)	Panel pins [1]	**1**	Do not accept any other answer
12(d)(ii)	20 mm – 25 mm / ¾" – 1" [1]	**1**	Accept any size between

Question	Answer	Marks	Guidance
12(d)(iii)	Minimum 3 panel pins – maximum 6 [1] Evenly spaced [1]	**2**	
12(e)(i)	Drawing paper allows the MDF disks to be separated after they have been made [1]	**1**	
12(e)(ii)	Saw off waste leaving a small amount of MDF to remove up to the line [1] Use of sanding disk to make round [1] Correctly named tools and equipment [1]	**3**	Accepted: coping, jig, Hegner, scroll, band saws Use of hole saw must include relevant details including material clamped and diameter to access 3 marks
12(f)(i)	Saw tooth bit/ Forstner bit [1]	**1**	
12(f)(ii)	Bit tightened securely / chuck key removed / work piece securely clamped / sacrificial board under work piece / guard in position / no loose clothing / hair tied back [1]	**1**	
12(g)	Some sort of back fits against or inside coin box [1] Details showing method of fitting the back [0-2] Method allows for quick and easy access [1] Technical accuracy [1]	**5**	Methods include use of hinges and brass ‘turns’ to keep in place or back is inserted with strips screwed to edge of box to retain back

Question	Answer	Marks	Guidance
13(a)	Any **two** benefits from the list below: Easy to shape / resistant to corrosion / easy to clean / low maintenance / transparent / water **or** weather resistant / self-finishing / variety of colours [2 x 1]	**2**	Accept any valid benefits Do not accept lightweight Durability and strong must be qualified
13(b)(i)	Any **two** of: Scriber / chinagraph pencil / marker pen / felt tip pen [2 x 1]	**2**	Do not accept sharpie
13(b)(ii)	Bending jig or former must show 60º angle [1] Additional notes [1]	**2**	

Question	Answer	Marks	Guidance
13(b)(iii)	Acrylic heated: line bender, strip heater, hot air gun [1] Use of jig or former [1] 3rd mark accept any **one** from: Method of retention while acrylic cools / repeat process for other bends / leave to cool [1]	**3**	Do not accept oven
13(c)(i)	Acrylic clamped securely [1] Sacrificial board under acrylic sheet [1] Scrap material to protect acrylic from pressure of cramp or retain protective sheet [1]	**3**	
13(c)(ii)	Dividers [1]	**1**	
13(c)(iii)	Drill small hole in corner of shape **B** [1] Undo blade of coping saw or scroll saw and insert to cut out shape [1] File to line **or** use of wet and dry paper [1] Minimum **2** correctly named tools [1]	**4**	Do not accept bobbin sander, laser cutter Do reward use of appropriate saw even if hole is not drilled
13(d)(i)	Any **two** reasons for danger from: toxic fumes / fire risk / harmful to skin [2 x 1]	**2**	Do not accept burns skin
13(d)(ii)	Use of cramps or weights [1] Use of scrap material either side of the feeder to distribute pressure evenly and to protect surfaces of feeder [1] Additional technical notes [1]	**3**	Award 1 mark for use of adhesive tape, rubber bands
13(e)	Practical modification to feeder [1] Method of suspension: use of string / rope / wire / metal rod [1] Clarity of sketches and additional notes [1]	**3**	