CAMBRIDGE
International Education

Cambridge IGCSE™

DESIGN AND TECHNOLOGY **0445/33**

Paper 3 Resistant Materials **May/June 2024**

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 2024 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 descriptions 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 **two** advantages: better quality, less likely to split/chip/crumble, more hardwearing, more durable, stronger, more attractive (not aesthetically pleasing) [2×1]	**2**	Accept any other valid advantages Do not accept 'prevents splinters'

Question	Answer	Marks	Guidance
2(a)	Ball pein, engineer's hammer	**1**	
2(b)	Completed 'dome' shape [0–2] Dependent on technical accuracy	**2**	'semi-circular' end drawn = 2 'round' = 1

Question	Answer	Marks	Guidance
3	Male and female formers shown clearly [2×1] Added descriptive notes; e.g. clamping, reference to steam bending [1]	**3**	

Question	Answer	Marks	Guidance
4	Flexible property: ability to prise sides of menu stand apart [1] to insert menu [1]	**2**	

Question	Answer	Marks	Guidance
5	A mixture of two or more pure metals with other elements [1] To create a metal with special properties (not found in a single metal) [1]	**2**	

Question	Answer	Marks	Guidance
6	**Inside box**: block of wood glued to underside of lid **or** added small strips **or** rebated edges to locate inside box **OR** **Outside of box**: strips of wood [pinned and] glued to edge of lid or corner pieces added to the edges of the box Practical idea [1] Added details: e.g. sizes, constructions [0–2]	**3**	Do not accept modifications to box. Do not accept sliding lids. Do not accept lids joined on top; e.g. finger joints

Question	Answer	Marks	Guidance
7	Explanation: Improves function by giving ‘warning’ of temperature changes Examples include: baby spoons and cups, ceramic mugs, battery test strip	**2**	Candidates may use an example. Maximum marks can still be awarded **without** an example.

Question	Answer	Marks	Guidance
8(a)	Blow moulding	**1**	
8(b)	Sketch should show ‘dome’ shape between the clamping rings [1]	**1**	

Question	Answer	Marks	Guidance
9	**A** round [1] **B** raised [1] **C** countersunk/countersink [1]	**3**	

Question	Answer	Marks	Guidance
10	Brass sheet flat [1] Over edge of bench [1] Clamped in position [1]	**3**	Accept board with 'V' shape cut out

Question	Answer	Marks	Guidance
11(a)	Any **two** specification points: attractive, represents D&T 'theme', stable as a freestanding award, title of award bold and clear, no sharp edges, fit in a person's hand, colourful [2x1]	**2**	Accept any other valid points Do not accept lightweight. Do not accept durable.
11(b)(i)	Speed, accuracy, easy to mark out 'unusual' shapes [1]	**1**	Accept any other valid benefits
11(b)(ii)	**Cut out acrylic and mahogany:** Hegner saw, scroll saw, band saw, coping saw [1] **Held securely:** use of woodworkers, engineers vice, G cramp [1] **Edges made smooth**: combination of files, glasspaper, wet and dry [silicon carbide] paper [1] **Quality of communication**: [1]	**4**	**Award 1 mark for 'Held securely'** if Hegner saw, scroll saw, band saw is used to cut as this method is held by hands and is not clamped in position.
11(b)(iii)	Materials that are prepared for but do not require an applied finish [1] Their appearance is enhanced by cleaning and polishing [1]	**2**	
11(c)	To prevent the sheet from 'snagging', spinning and cracking To prevent the underside of the sheet from splintering as the drill passes through the sheet To ensure that the hole is drilled in the correct position, accurate [2x1]	**2**	Accept references to personal safety

Question	Answer	Marks	Guidance
11(d)	**Both the cap and the rod:** held in a vice [1] Die or tap named [1] Die or tap drawn [1] Technique used to cut threads [1]	**4**	Use of a centre lathe named only [1 mark]
11(e)	Any **four** stages: design letters using software, transfer data to CNC machine, set up acrylic work piece in machine, set tool parameters to engrave letters [4x1]	**4**	Accept any valid stages. Accept imbalance between CAD and CAM. Do not reward laser cutter 'on its own'.
11(f)	Practical idea [1] Constructional details: making the 'stand' + joining the trophy to it [0–2] Named materials **appropriate** [1]	**4**	
11(g)	Mahogany trees can be replaced/replanted [1] Brass and acrylic are finite resources [1]	**2**	

Question	Answer	Marks	Guidance
12(a)	Metal that contains iron	**1**	
12(b)	Any **two** advantages: variety of editing tools available, speed of edit, more realistic image, files saved/shared electronically, more precise, transfer data to CAM, less waste of resources [2x1]	**2**	Accept any other valid advantages Do not accept quicker, easier
12(c)(i)	**A** hacksaw [1] **B** tin snips, snips, shears [1]	**2**	
12(c)(ii)	Guillotine is limited to straight cuts [1] Not be able to cut diagonal lines or into corners without damaging the material [1]	**2**	

Question	Answer	Marks	Guidance
12(c)(iii)	Use of tools & equipment including: former, vice, soft jaws, clamp, mallet, hammer + scrap wood [3x1] Technical accuracy of named tools + equipment used [1] Quality of communication [1]	**5**	Accept any other correctly named tools or equipment
12(d)(i)	Chamfer makes it easier for the cutting tool to start cutting the thread [1]	**1**	
12(d)(ii)	Grease lubricates the cutting tool to make it easier to cut the mild steel rod [1]	**1**	
12(e)	Practical idea: Some form of plate/bracket [0–2] Attached to underside of base of bird feeder [0–2] Attached to top of Ø25 mild steel tube [0–2]	**6**	Award 0 marks if no additional materials are shown. Accept use of nuts & bolts or screws: award 1 mark maximum for **each** of the 'headings' in the answer column.
12(f)	Five specific stages in the manufacture of the tray [5x1]	**5**	Tray can be **vacuum formed** or **fabricated** after sides and base are cut from acrylic sheet or **acrylic development** [net] is cut out and bent to shape.

Question	Answer	Marks	Guidance
13(a)	Any **two** specification points: gun must sit safely in stand, stand must be stable, made from durable material not affected by heat from gun, heat resistant, safe in use [2x1]	**2**	Accept any other valid points Do not accept easy to clean or reference to aesthetics/appearance
13(b)(i)	Wood-based material made by compressing and bonding thin sheets of wood, pulp or particles with an adhesive [1]	**2**	Accept reference to use of 'waste' materials
13(b)(ii)	MDF	**1**	Do not accept chipboard, blockboard

Question	Answer	Marks	Guidance
13(b)(iii)	Any **two** advantages: more stable, less likely to shrink or warp, cheaper, no grain direction to consider [2x1]	**2**	Accept any other valid advantages Do not accept easier to work, lighter in weight
13(c)(i)	Forstner, saw tooth	**1**	
13(c)(ii)	Work piece secure, guard in position, drill tight in chuck, chuck key removed, correct speed for drill, set depth gauge to 5 mm[2x1]	**2**	Accept any other valid checks **Not** PPE
13(d)	Workpiece held securely [at any stage] [1] Use of Ø30 drill bit [1] Saw down straight lines into hole [1] Use of files/glasspaper to make sawn edges smooth [1]	**4**	Award maximum 3 marks if hole is **not** drilled
13(e)(i)	Drilling jig: Metal ‘plate’ or sheet [template] with 2 holes drilled in correct position [1] Fits on top of plywood base [1] Jig secured + 1 ‘location’ [1] Jig secured + 2 ‘locations’ [1]	**4**	Award marks for any practical method that gives accurate positions
13(e)(ii)	Saw cut to guide saw blade or 15 mm measurement marked on jig [1] Dowel held securely while cut to length [1] Jig held securely in vice or clamp [1]	**3**	
13(f)	Some form of container, block, bracket, grooves to fit **into** or **onto** the stand [0–2] Added details [1] Appropriately named materials [1]	**4**	