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**DESIGN AND TECHNOLOGY**

**0445/31**

Paper 3 Resistant Materials

**October/November 2019**

MARK SCHEME

Maximum Mark: 50

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**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 October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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This document consists of **6** 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
1	Electrical plug: injection or compression moulding	1
	Guttering: extrusion	1
	Sandwich container: vacuum forming, blow moulding	1

Question	Answer	Marks
2	<b>A</b> scribe, marker pen, oddleg calipers	1
	<b>B</b> centre or dot punch	1
	<b>C</b> dividers	1

Question	Answer	Marks
3	Wall-mounted saves space, can be operated with one hand, cannot be moved about	2
	2: 1	

Question	Answer	Marks
4(a)	To remove the majority of moisture in a board	1
	To minimise future problems relating to shrinkage and expansion	1
4(b)	Open air or natural seasoning	1

Question	Answer	Marks
5	Clamping device shown gripping above and below machine table	1
	Use of sacrificial board <b>under</b> and on <b>top</b> of acrylic	2: 1

Question	Answer	Marks
6	Use of scrap wood clamped to the edge/s to provide support so that the plane can travel across the entire end grain without splitting occurring	2

Question	Answer	Marks
7(a)	oak	1
7(b)	pine	1

Question	Answer	Marks
8	Strengthening requires: use of a single brace [flat strip] joined to the tube, or a triangular shaped gusset joined to the tube Method of joining: soldering, brazing, welding Technical accuracy	1 1 1 <b>3</b>

Question	Answer	Marks
9(a)	Knurling	<b>1</b>
9(b)	To provide additional grip	<b>1</b>

Question	Answer	Marks
10	Laminated table cheaper: fewer constructions, quicker manufacture Fabricated table: less material used, expensive moulds not required, simple constructions	2· 1 2· 1 <b>2</b>

Question	Answer	Marks
11(a)	Stable, hardwearing, water resistant	2· 1 <b>2</b>
11(b)	Tough, attractive, range of colours, fairly quick process, even application resists corrosion	2· 1 <b>2</b>
11(c)	Use of dowels, screws or corner blocks to join <b>sides</b> together Use of screws to join <b>base</b> to underneath sides	0–2 0–2 <b>4</b>
11(d)(i)	Join at <b>X</b> : by means of <b>either</b> an 'insert' <b>or</b> an additional tube over existing tube Practical method shown Added details	0–2 0–2 <b>4</b>
11(d)(ii)	Join at <b>Y</b> : by means of disc insert in [right hand] tube with threaded hole Screw or bolt through [left hand] tube into threaded hole	0–2 0–2 <b>4</b>
11(e)	Use of screws, nuts and bolts for quick removal Use of small 'bracket' or 'clips' shaped over round tube, joined permanently to tube or temporarily Technical accuracy	1 0–2 0–1 <b>4</b>
11(f)	650–700 length · 325–350 width · 70–80 depth	3· 1 <b>3</b>
11(g)	Answers should relate to the reusable property of manufactured board or that some are made from waste or recycled materials Mild steel can be disassembled, melted down and reused	1 1 <b>2</b>

Question	Answer	Marks
12(a)	Stable, stronger than 6 mm solid wood, can be worked without danger of splitting, fairly lightweight	2 2· 1
12(b)	Stage 1: pencil, compass, template Stage 2: drill, variety of suitable hand and machine saws, router Stage 3: files, glasspaper	1 1 1 <b>3</b>
12(c)	Does not need clamping for hours, immediate bonding, quick	2· 1 <b>2</b>
12(d)	Saw cut: to provide space for the glue otherwise it would be forced out Chamfer: to provide ease of entry	1 1 <b>2</b>
12(e)	Marking out: chinagraph pencil, marker pen, scribe, steel rule Cutting out: use of coping saw, tenon saw, Hegner, scroll saws Curved shape: use of oven, strip heater, hot air gun Use of former and method of retention	1 0–2 1 1 <b>5</b>
12(f)	Appropriately named specific material Design of rotor blade Method of fitting onto dowel allowing for rotation 2 important sizes	1 1 0–2 0–2 <b>6</b>
12(g)	3 ways include: moving parts, curved/rounded edges, appropriate size, easy to hold, safe materials	3· 1 <b>3</b>
12(h)	Environmentally friendly: some boards can be recycled or use recycled materials. Boards are made from sustainable materials	<b>2</b>

Question	Answer	Marks
13(a)	Permanent construction: dowel, mortise and tenon, biscuit named Quality of sketch dependent on technical accuracy, proportion, orientation	1 0–3 <b>4</b>
13(b)(i)	At least 2 cramps shown across the 'ladder' Award 1 mark for 1 cramp only	<b>2</b>
13(b)(ii)	Sash, speed, 'F' cramps/clamps	<b>1</b>
13(b)(iii)	Suitable adhesive: PVA, synthetic resin	<b>1</b>
13(b)(iv)	2 checks: squareness using try square or winding strips/diagonals Is the ladder flat on the cramps, removal of surplus glue	2: 1 <b>2</b>
13(c)(i)	Polystyrene, acrylic, ABS	<b>1</b>
13(c)(ii)	Former must show the draft angle rounded corners 'mirroring' the plant pot	1 1 <b>2</b>
13(c)(iii)	Award 0–4 for specific stages: Place mould in machine [on platen] Clamp plastic in place Bring heater across to soften plastic Check flexibility of plastic Bring up mould into soft plastic Turn pump on to remove air Lower mould [on platen] and leave to cool  Award 0–2 for technical accuracy of sketches	0–4         0–2 <b>6</b>
13(d)	Practical idea: some form of 'hook' or bracket or clip over rung Appropriate material/s Appropriate construction/s	0–2 1 1 <b>4</b>
13(e)	Modification: some form of 'cap' or cover, material with added friction	0–2 <b>2</b>