Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

DESIGN AND TECHNOLOGY **0445/33**

Paper 3 Resistant Materials **October/November 2019**

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

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	Lightweight, tough, impact resistant, rigid, weather resistant 2×1	2

Question	Answer	Marks
2	Wood: woodturning, wood lathe 1 Metal: casting, die-casting, centre lathe turning 1 Plastic: injection moulding, blow moulding 1	3

Question	Answer	Marks
3	2 pairs of nails shown angled	2

Question	Answer	Marks
4(a)	Phenol formaldehyde 1 Hard, hardwearing, heat resistant 1	2
4(b)	Stainless steel 1 Heat resistant, does not corrode, attractive 1	2

Question	Answer	Marks
5	1. pilot hole 2. clearance hole 3. countersunk hole 3×1	3

Question	Answer	Marks
6	Board shown cupping [narrower top of board/wider below]	1

Question	Answer	Marks
7(a)	Galvanised means coating the metal with zinc	1
7(b)	Zinc coating with prevent the mild steel body from corrosion	1

Question	Answer	Marks
8	Seat and backrest: width of torso and height of torso. Distance from foot steering dependent on leg length. Length of steering rope dependent on arm length/reach 2×1	2

Question	Answer	Marks
9(a)	Between-centres turning	1
9(b)	To make the start of turning easier, to prevent splitting	1

Question	Answer	Marks
10(a)	Tap	1
10(b)	Die	1
10(c)	Practical idea: small ‘tommy bar’, ‘wing’ joined to rod 0–2	2

Question	Answer	Marks
11(a)	3 layers shown 1 Grain shown at 90° to each layer 1 Notes to explain 1	3
11(b)	Award marks dependent on technical accuracy, orientation, proportion 0–3	3
11(c)(i)	Hole saw	1
11(c)(ii)	Cut out: use of variety of hand and machine saws 1 Finished accurately: use of disc sander, files, glasspaper 1	2
11(d)	Large quantity of frames requires a template that will remain accurate and material such as paper or card would distort/ become damaged	1
11(e)	CAD allows on-screen modelling, more accurate, easier editing, amendments can be made quicker, drawings can be transferred to CNC machines 3×1	3
11(f)	Some form of pivot, bearing 0–2 Additional stand [appropriate shape/size] 0–2 Details of constructions and materials used 0–2	6
11(g)(i)	Glasspaper scratches the surface of the plywood 1 Using a finer grade replaces more coarse scratches 1	2
11(g)(ii)	Well-ventilated area, face mask to prevent inhalation of fumes, eye protection, gloves to protect skin 2×1	2
11(h)	Wide variety of dimensional checks of various parts of the desk tidy to ensure fit. Checks to ensure smooth finish, no rough edges. Checks for stability of desk tidy, Checks for rotation. General visual checks.	2

Question	Answer	Marks
12(a)	The toothbrush holder must: be easy to clean, be stable in use, keep the brushes separate, be attractive, keep the brushes upright, be water resistant attractive appearance 2×1	**2**
12(b)(i)	Marks can be erased whereas a scriber leaves permanent mark, possible damage to surface	**1**
12(b)(ii)	Some form of clamping device 1 G cramp named 1 Use of scrap wood underneath acrylic sheet 1	**3**
12(c)	Thermoplastics can be heated and formed 1 Can be reheated and formed 1	**2**
12(d)(i)	Draw filing	**1**
12(d)(ii)	Wet and dry paper scratches the surface of the acrylic 1 Using a finer grade replaces more coarse scratches 1	**2**
12(e)(i)	Drilling jig: 'template' with holes drilled 1 Template located against 1 edge 1 Template located against 2 or more edges 1	**3**
12(e)(ii)	Bending: use of a former or mould 1 Method of heating acrylic; oven, line bender, strip heater 1 Method of retention: use of clamping devices 1	**3**
12(f)	Basic shape **must be enlarged** 1 Some form of hole or cut-out to support tube of toothpaste 1 Toothpaste supported 1 Notes to explain details of modification 1	**4**
12(g)(i)	Stainless steel is attractive, it is extremely hardwearing, it does not corrode, it can be easily cleaned 2×1	**2**
12(g)(ii)	Expensive to manufacture: several parts that need to be machined and assembled 1 increased time to manufacture which increases the cost of the product 1	**2**

Question	Answer	Marks
13(a)	Manufactured board: more stable, wider boards available, less likely to split 2×1	2
13(b)	Method: drill hole inside curved shape, cut out shape using band saw, jig saw, coping saw, smooth shape with files, glasspaper 3×1 Tools and equipment named accurately 1	4
13(c)(i)	4 centres or dowels shown 1 Correctly spaced 1	2
13(c)(ii)	Drilling jig: 'template' with holes drilled 1 Template located against 1 side 1 Template located against 2 sides 1 Template located against 2 sides and 1 edge 1	4
13(d)	Mild steel sheet: hardwearing, tough, can be bent to shape, relatively cheap	1
13(e)	To visualise final product, to check for errors, to allow for quick modifications, to check sizes, prevents wastage of materials, check sizes, can be used with CAM 2×1	2
13(f)	Bench shears. Tinsnips 2×1	2
13(g)(i)	Weld, solder, braze	1
13(g)(ii)	Epoxy resin adhesive, riveting	1
13(h)(i)	**B** 1 Mild steel sheet is too thin for a countersunk headed screw 1	2
13(h)(ii)	Make sure it is clamped securely, scrap wood underneath for support, correct speed of drill 2×1	2
13(i)	Manufactured board rack would be more expensive 1 Material is more expensive, more materials are used, there are more processes; e.g. cutting shape and joining, resulting in longer manufacturing time and higher costs 1	2