Cambridge Assessment International Education

Cambridge IGCSE™

DESIGN AND TECHNOLOGY **0445/33**

Paper 3 Resistant Materials **October/November 2020**

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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **8** printed pages.

PUBLISHED

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	**A** strip [1] **B** square [1]	**2**	**A** accept 'batten'.

Question	Answer	Marks	Guidance
2	Measuring: steel rule, ruler, rule, measuring tape [1] Marking out: scriber [1] Cutting to length: hacksaw, junior hacksaw [1]	**3**	Marker pen/felt tip=0

Question	Answer	Marks	Guidance
3	Two features: draft angle, rounded edges/corners, air holes, smooth surfaces [2 × 1]	**2**	

Question	Answer	Marks	Guidance
4	Some sort of rebate to provide a 'sleeve' for the label. Hold label in place [1] Easy to change label [1] Added details to explain design [1]	**3**	

Question	Answer	Marks	Guidance
5(a)	Mirror	**1**	
5(b)	Benefits include: accuracy, allows for editing, on-screen modelling, can transfer design to CNC machine	**1**	Quicker = 0

Question	Answer	Marks	Guidance
6	Metalwork vice: cast iron [1] Fast food container: polystyrene, Styrofoam [1] Softwood cabinet: pine, redwood, scots pine, fir, red deal [1]	**3**	Larch = 0

Question	Answer	Marks	Guidance
7	Suitable hinge: butt, piano. 2 equal 'flaps' [1] Appropriate number/spacing of screw holes [1] Centre 'pin' [1]	**3**	

Question	Answer	Marks	Guidance
8	Handle of pliers: plastic dip coating, fluidisation [1] Aluminium comb: anodised, lacquer [1] Steel bucket: galvanised, zinc [1]	**3**	

Question	Answer	Marks	Guidance
9	Correct position of barrel [1] Correct position of screw [1]	**2**	

Question	Answer	Marks	Guidance
10	Thermochromic pigment applied to the spoon will change colour when immersed in hot liquid [1] Therefore, person feeding child can monitor safe temperature [1]	**2**	

Question	Answer	Marks	Guidance
11(a)	Odd number of plies shown [1] Alternate grain direction shown [1] Notes to explain why this provides a stable board [1]	**3**	Accept answers that relate to short grain on solid woods.
11(b)	Hold plywood securely [1] Cut outer shape: jig, Hegner, scroll, band saws, router [1] Cut inner shape: drill hole for jig saw, coping saw, router [1] Use of jig saw to cut inner shape [1] Correctly named tools and equipment [1]	**5**	Files = 0 Laser = 0
11(c)(i)	Ø 6–9 mm	**1**	
11(c)(ii)	Use of dowel jig with studs or panel pins [heads cut off] to mark accurate centres for drilled holes [0–2] Correct sequence [1] Additional explanatory notes [1]	**4**	Award 0–3 marks dependent on accuracy of detailed notes. Holes drilled in end of **B.** Dowel jig/panel pins used to mark centres on frame **A**. Holes drilled in **A**. Repeat process for frame joined to leg **C**.
11(d)(i)	Corners removed: makes it easier to turn round shape, avoids splitting, safer [2 × 1]	**2**	
11(d)(ii)	Checks include: free rotation of workpiece, correct height and clearance of tee rest, correct speed	**1**	Clothing caught =0
11(d)(iii)	Faceplate, tee rest, gouge, scraper, chisel [2 × 1]	**2**	Files=0 Glasspaper =0
11(e)	Additional strips of wood joined to top of frame to increase area to which table top can be fastened **OR** Additional strips of wood joined to underside of table top into which the top of the frame will ‘sit’. [0–2] Methods of fastening; use of screws, brackets [0–2]	**4**	Use of screws, brackets without additional strips = 0–2 marks
11(f)(i)	Quicker to apply paint before assembly, easier to paint all areas [especially corners]	**1**	

Question	Answer	Marks	Guidance
11(f)(ii)	Primer coat: ensures better adhesion of paint, inceases durability of paint, provides additional protection, paint goes on smoother, less absorption [2 × 1]	**2**	Accept 2 separate points

Question	Answer	Marks	Guidance
12(a)	Easy to bend to shape, inherent colour, attractive, stylish, range of colours, easy to work with [2 × 1]	**2**	Accept any valid property. Lightweight = 0 Cheap = 0
12(b)	Model can show final product, can check dimensions/function, changes can be made, avoids costly mistakes [2 × 1]	**2**	Accept any valid reason.
12(c)	The position of the tablet on the stand must be at the correct angle for the tablet screen to be viewed comfortably [1] The tablet must be easy for the user to position on the stand [1]	**2**	Award marks for one point well discussed or two separate points.
12(d)(i)	Marker pen, felt tip pen, chinagraph pencil	**1**	
12(d)(ii)	Scriber	**1**	
12(e)(i)	Coping, Hegner, scroll, band saws	**1**	Laser = 0 Acrylic cutter = 0 Tenon/hacksaw/jigsaw = 0
12(e)(ii)	Acrylic sheet can crack/snap due to vibration when sawing.	**1**	Stop it moving = 0
12(f)(i)	Draw filing	**1**	
12(f)(ii)	Silicon carbide [wet and dry] paper	**1**	

Question	Answer	Marks	Guidance
12(g)	Method of heating acrylic: use of strip heater, line bender, heat gun [1] Bending: use of an appropriately shaped former [1] Acrylic retained by some form of clamping [1] Sequence for 3 bends [1] Technical accuracy [1]	**5**	Oven = 0 Award 1 mark for technical accuracy if most terms, names of tools and equipment are correct.
12(h)(i)	Modification to stand to hold tablet securely: Some form of 'lipping' or 'sides' to retain the tablet [0–2] Materials and constructions used to make modification [0–2] Two important sizes [2 × 1]	**6**	
12(h)(ii)	Two safety precautions: wear protective gloves, use of barrier cream, well-ventilated area, face mask, googles [2 × 1]	**2**	Eye protection = 0 Glasses = 0

Question	Answer	Marks	Guidance
13(a)	Non-ferrous metal does not contain iron [1] Alloy is a mixture of two or more metals [1]	**2**	
13(b)(i)	Templates allow quick marking out of irregular shapes, repetitive accuracy, avoids errors [2 × 1]	**2**	
13(b)(ii)	**A** tin snips [1] **B** junior hacksaw, hacksaw [1]	**2**	
13(c)(i)	Emery cloth: used to clean the joint [1] Fire bricks: tube is positioned on firebricks so that heat from torch is reflected [1] Flux is used to keep the joint clean and allow the spelter to flow [1] Silver solder is heated and melted to make the joint [1] Blow torch is used to heat the metal to the required temperature [1]	**5**	

Question	Answer	Marks	Guidance
13(c)(ii)	**A** Die is secured in a die stock or holder End of tube is chamfered Die is placed firmly on end of tube and turned to start cutting thread Die is turned back to break off swarf cuttings [3 × 1] **B** Tap is secured in a tap wrench Tap is placed firmly in hole Tap is turned with pressure to start cutting thread Tap is turned back to break off swarf cuttings [3 × 1]	**6**	Reward any valid, technically correct stages.
13(d)(i)	Jig saw, band saw, scroll saw, Hegner saw	**1**	
13(d)(ii)	Smoothing, jack.	**1**	
13(e)(i)	Wide choice of types of paint and colours available. Could be used to 'match' surroundings [1]	**1**	
13(e)(ii)	Clear varnish allows the natural colour and grain features to be seen [1]	**1**	
13(f)	Two stages include: dip into an acid bath to 'pickle', clean metal with pumice powder, use of fine grades of silicon carbide [wet and dry] paper, buff to a fine finish on a polishing wheel and compound, use of metal polish [2 × 1]	**2**	
13(g)	Epoxy resin is presented as two separate components: resin and hardener [1] Equal amounts of resin and hardener are mixed thoroughly before application [1]	**2**	