Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

DESIGN AND TECHNOLOGY **6043/12**

Paper 1 Technology **October/November 2018**

MARK SCHEME

Maximum Mark: 100

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 2018 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
Section A Part A – Product Design		
1	**A** Countersink hole **B** Clearance hole **C** Pilot hole **1** × 3	**3**

Question	Answer	Marks
2	To allow the tap to bite, cut into the material	**1**

Question	Answer	Marks
3(a)	Hardening the surface whilst allowing the core/inside to stay soft	**1**
3(b)	Heat treatment makes the steel tougher and reduces brittleness	**1**

Question	Answer	Marks
4(a)	Thermochromic material changes colour due to heat	**1**
4(b)	To indicate visually that the food is cool enough to feed a baby	**1**

Question	Answer	Marks
5	Hand width Hand breadth Grip diameter Finger thickness **1** × 2	**2**

Question	Answer	Marks
6	Clamp to prevent spinning, possibly causing injury Tie hair back so as not to get caught Wear goggles/face mask to prevent injury Check long sleeves/ wear lab coat Remove chuck key, prevent flying out when turning machine on Guard down to prevent eye injury **2** × 3	**6**

Question	Answer	Marks
7(a)	Any suitable hardwood – including beech, maple, walnut, box, ash Reason – Heavy, hard, close grain, doesn't split, impact resistant **1** × 2	**2**
7(b)	Polyethylene (PE) – accept polythene Easily formed, quickly produced in quantity, can be printed on, good strength to waste ratio, see through to view contents **1** × 2	**2**

Question	Answer	Marks
8	Marking, measuring, checking 90° angles Purpose **1** Sketch **1**	**2**

Question	Answer	Marks
9	**A** washer **B** cold rivet, solid rivet plain rivet, button head rivet **C** nut **1** × 3	**3**

Question	Answer	Marks
10	Datum line – line that measurements should be taken from or references from **1** accuracy in measurement **1** reduces compound error **1**	**3**

Question	Answer	Marks
	Part B Section 1 – Tools and Materials	
11(a)	**A** Machine vice (engineering vice) Clamping work for drilling/machining, can clamp round or flat material **B** G clamp / C clamp Clamping material to workbench or drill table, clamping pieces for gluing **C** Wood vice Holding soft materials, wood, plastic so as not to damage work **2** × 3	**6**
11(b)(i)	To clamp round, hexagonal or odd shaped material **1** To secure and prevent coming loose when be drilled, machined **1**	**2**
11(b)(ii)	clamp work **1** expanded answer **1**	**2**
11(b)(iii)	to act as soft jaws **1** so as not to damage work being clamped , can be replaced if they get damaged **1**	**2**
11(c)(i)	Use scrap material **1** Between clamping surfaces to protect/spread load **1**	**2**
11(c)(ii)	Allow bar to be added **1** to increase torque/leverage when turning handle to clamp/unclamp work **1**	**2**
11(d)	Identifiable bench mounted metal working vice **1** Drawing **1**	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>12(a)</td><td>
<table>
<tr><th>material</th><th>use</th><th>properties</th></tr>
<tr><td>chipboard</td><td>Laminated surfaces, large furniture – wardrobes, work tops. Buildings – floor boards, wall panelling
[1]</td><td>Large surfaces available, dimensionally stable,
Can be veneered
[2]</td></tr>
<tr><td>mahogany</td><td>High quality furniture, veneers, boat building, musical instruments
[1]</td><td>Stable, even texture, polishes well, durable, attractive colour
[2]</td></tr>
<tr><td>plywood</td><td>Thin ply used for laminated shapes, flooring, construction
[1]</td><td>Large surfaces available, cross grain effect very strong
dimensionally stable, with water resistant adhesive can be used outdoors
[2]</td></tr>
<tr><td>Pine</td><td>General use, joinery, interior use such as door frames and architrave, cheap furniture
[1]</td><td>Soft, lightweight, straight grained, resinous, easy work
[2]</td></tr>
</table>
</td><td>12</td></tr>
<tr><td>12(b)</td><td>Trees can be replaced by replanting once one is chopped down.</td><td>1</td></tr>
<tr><td>12(c)</td><td>Sawing logs into usable planks</td><td>1</td></tr>
<tr><td>12(d)(i)</td><td>correct 2D drawing given</td><td>1</td></tr>
<tr><td>12(d)(ii)</td><td>correct 2D drawing given</td><td>1</td></tr>
<tr><td>12(e)</td><td>Plain sawn 1 as there is no waste and no additional setting up as is required with quarter sawn 1</td><td>2</td></tr>
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Question	Answer	Marks
13(a)	Relatively low cost, finishes well, readily available, doesn't rust, can be machined easily, doesn't need a finish **1** × 2	**2**
13(b)	Knurling. **1** To add grip and look attractive **1**	**2**
13(c)	Centre drill, drill bit, tap , tap wrench	**2**
13(d)(i)	Centre lathe, lathe. **1** Processes include; turning, drilling, facing off, tapping, knurling **1** × 3	**4**

Question	Answer	Marks
13(d)(ii)	A – chuck, B – tool post, C – tail stock, D – saddle	**4**
13(d)(iii)	Remove chuck key, goggles worn, hair tied back, apron worn, no loose clothing, safety guard down. Any two correct points with suitable explanation.	**4**

Question	Answer	Marks
14(a)	Material can be shaped or moulded. The pattern can be cut out while still allowing the edges to be finished. The material can be cleaned, is hygienic, waterproof etc. as food will be stored in it..	**2**
14(b)(i)	Coping saw, piercing saw, abrafile, tin snips	**1**
14(b)(ii)	Scroll saw, jig saw	**1**
14(b)(ii)	Powder coating, dip coating, spray paint or paint	**1**
14(c)	Any **three** from: file or needle file emery cloth wet and dry wire wool	**3**
14(d)	Using a cloth and polish then buffing to a high shine	**2**
14(e)	Forming acrylic – mould/former made from any suitable hard material, acrylic heated in oven and draped over former and pressed into shape using female mould until cool. Forming sheet aluminium – mould/former made from any suitable hard material. Soap surface, heat with brazing torch until it turns brown, drape sheet over former and press into female mould until cool. – fully detailed 3–5 – some detail, 0–2 quality of sketches up to 2	**7**

Question	Answer	Marks
	Section 2 – Processes	
15(a)	Material could be – acrylic or GRP (fibreglass) ABS	**1**
15(b)	**2** marks for full explanation. Draft angle allows mould to be separated from formed tray easily and without damage to end product.	**2**
15(c)	Give marks for either vacuum forming or GRP. Vacuum forming – former is made, reference to draft angle required for full marks, mould put on table, plastic sheet clamped so air tight, plastic sheet heated until soft, sheet lowered over mould OR mould raised into sheet, pump turned on to evacuate air and sheet shapes over mould. When cool, air blown into mould/forming to release it, plastic sheet removed and excess material cut off. Edges smoothed with file, scraper and rubbed down with wet and dry paper. GRP – female former is made, reference to draft angle required for full marks, mould sealed and release agent applied so adhesive doesn't stick to it, gel coat added onto mould for smooth finish, fibre glass strands/matting laid over mould, resin mixed and applied to matting, repeat layering of matting then resin until correct thickness made. Leave to cure fully, then release mould and trim excess. quality of description: – fully detailed 7–9 – some detail, 4–6 – limited detail 0–3 quality of sketches up to 2	**11**
15(d)	Award marks for improvements such as grip added, drainage slope/channels, lower sides and for quality of communication. Each improvement is given **1** mark for clear sketch **1** mark for clear notes 2 × 2	**4**

Question	Answer	Marks
16	**A rebate joint** – marking out with try square, steel ruler, pencil, marking knife, marking gauge – cutting with tenon saw, router, chisel – reference to measurements for full marks i.e. the depth of the cut in relation to the thickness of material **B drilling and brazing** – marking out includes centre punch first – drilling could be, clamping in machine vice, pillar drill and safety procedures – preparation could be cleaning with file, emery cloth or wet and dry (don't touch with oily fingers), parts placed together on fire bricks in brazing hearth – brazing – use of flux/borax (or cleaning agent), soap, heat til orange, add brazing rod until runs round joint, remove from heat **C drilling and bending acrylic** – drilling could be flat acrylic sheet placed on solid sacrificial material on either pillar drill or table/bench, work clamped down, sharp drill bit same size as acrylic rod. – bending could be use of strip heater to bend along required line, bend around former or bending jig until cool so as not to spring back (allow heat in oven or with heat gun if bending jig/former used afterwards) – gluing could be liquid solvent cement, tensol cement or other suitable adhesive. Hold rod in place until dry. quality of description: – fully detailed 4–7 – some detail, 0–3 quality of sketches up to 2 Most stages made then **9** marks awarded**.** **9** × 2	**18**

Question	Answer	Marks
17(a)	Suitable materials – beech, maple, any dimensionally stable wood that doesn't splinter	**1**
17(b)(i)	Cutting – cutting jig described, to include a description of how the material locates, is held in place and how the saw is located at the correct distance on the cutting jig. Reference to cutting jig being clamped firmly for cutting. Any other response that ensures quick and easy cutting of same size block every time. Process **4** Sketches **1**	**5**

Question	Answer	Marks
17(b)(ii)	Drilling – drilling jig required that will be clamped when in use and allows material to be held firmly in place while drilling. Only give marks if the holes would be identical every time. Process **4** Sketches **1**	**2**
17(c)	suitable specific material to include polypropylene, HIPs **,** ABS, HDPE or other suitable material	**1**
17(d)	suitable process injection moulding **–** split mould prepared – plastic granules fall from hopper into heating chamber – archimedes screw injects into mould – remove and trim Quality of explanation – detailed, labelled 4–6 – some /limited/ detail 0–3 For full marks clearly labelled machine that explains points **6**	**6**

Question	Answer	Marks
18(a)	**A** suitable joining method e.g. bridle joint or mortice and tenon or other suitable, including explanation with correct equipment given. [6] **B** answer to include a groove in the framework, either routered or milled, for board to locate [6] **C** answer to include method of tray locating onto framework and how it will be held securely in place [6] – detailed, labelled 4–6 – some /limited/ detail 0–3 **6** × 2	**12**
18(b)	Appropriate method for adjusting height – detailed, labelled 4–6 – some / limited / detail 0–3	**6**