MARK SCHEME for the May/June 2014 series

0445 DESIGN AND TECHNOLOGY

0445/32 Paper 3 (Resistant Materials), maximum raw mark 50

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.
Section A

1  (a) Aluminium [1]

(b) Lightweight, light, corrosion resistant, good strength-weight ratio, low density [1]

2 Handle tight, pins in line, blade facing correct way, wood held securely, blade tight, blade is not damaged, blade is sharp (2×1) [2]

3  (a) Accuracy of drawing: two parallel edges for 2 marks (0–2) [2]

(b) Safe edge correctly labelled [1]

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<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Specific use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Guillotine, bench shears</td>
<td>Cutting thin metal/small section metal</td>
</tr>
<tr>
<td></td>
<td>Jack plane</td>
<td>Preparation of material, quick removal of waste material</td>
</tr>
</tbody>
</table>

(4×1) [4]

5  (a) Vacuum forming, injection moulding [1]

(b) Release from mould [1]

(c) To add strength, rigidity [1]

6 2 measurements indicated: floor to behind knee, behind knee to backside, backside to lumber area (2×1) [2]

7 1 mm thick mild steel: scribe, odd legs, scribing gauge, scribing block [1]

3 mm thick acrylic: chinagraph pencil, marker pen, felt-tip, leave backing paper on or apply masking tape and use pen or pencil [2]

8  Sheet metal shown between folding bars (1)

Folding bars shown in vice (1) [3]

Use of mallet or hammer and scrap wood
9  (a) Soft solder

(b) Tinplate work, plumbing

10  Two advantages of moulded polypropylene include: weather resistance, durability, more easily moved around, comfortable armrests, will not rust, easier to clean, stronger must be qualified  

\[2 \times 1\]
Section B

11. (a) Suitable joints include: M&T, halving, bridle, dowel
   Award 0–3 dependent upon accuracy of sketch
   Must be in correct orientation otherwise max. 2 marks
   1 dowel only shown = 2 marks max.
   Suitable joint named to match sketch
   [Do not accept tenon or mortise on their own]
   (0–3) [4]

   (b) (i) Variety of glues include: trade names such as Evo-Stik Resin W, Cascamite, or
genetic synthetic resin, PVA
   [Do not accept epoxy resin]
   Time to set to correspond with named glue: PVA 1–4 hours, synthetic resin 6–24 hours
   (1) [2]

   (ii) Sash cramps
   (1)

   (iii) 2 checks include: square, flat, joints pulled together, removal of excess glue,
   measure diagonals, use of scrap wood to spread pressure or prevent damage,
   clamped straight, clamps not over tightened, clamps tight/secure
   (2×1) [2]

   (c) Table of drilling machine shown
   Some form of ‘wedge’ to provide 20° angle or rotate table and lock
   Work piece secured/clamped
   (1) [3]

   (d) Some form of base
   Male and female formers/rods
   Method of retention
   (0–2) (1)

   OR

   Male and female formers
   Retention at start of bend
   Method of force
   (0–2) (1) [4]

   (e) Award up to 3 marks max. for practical method that is hidden behind frame
   Use of glued blocks/KD fittings/visible bracket/corner plates max. 2 marks
   Award 0–1 for details of sizes and materials
   (0–3) (0–1) [4]

   (f) Frame:
   Award 1 mark for recognition that frame needs to be in 4 separate parts
   Use of KD fittings/dowel/screws to connect separate parts
   (0–1) (0–2)

   Rods:
   Award 1 mark for recognition that rods need to be in 3 separate parts
   Method of connecting 3 separate parts for each rod
   (0–1) (0–1) [5]
12 (a) 2 benefits include: check sizes, appearance, will it work, cheaper than making it from wood [Do not accept references to a template] (2×1) [2]

(b) Suitable method: dowel, M&T, added metal or wood support on surface of base
Award 0–3 dependent on technical accuracy (0–3) (0–3)

Award up to max. 3 marks for support shown into mortise without shoulders
1 dowel only = max. 2 marks
Use of screws or nails from underneath = max. 2 marks
1 nail or screw = max. 1 mark
Name of method to correspond to sketch (1) [4]

(c) (i) Quicker, more accurate, cuts fibres of wood, cannot be rubbed off (2×1) [2]

(ii) Acceptable methods:
Use of plane, hand-powered router, band saw table tilted at 45° angle (1)
Wood secured for plane and hand-powered router
Band saw requires fence/guide (1)
Technical accuracy of named tools and equipment (1) [3]

(d)

<table>
<thead>
<tr>
<th>Process</th>
<th>Tools/equipment used</th>
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<tbody>
<tr>
<td>Mark out</td>
<td>Pencil, rule, sliding bevel, marking knife, mitre square</td>
</tr>
<tr>
<td>Saw off waste</td>
<td>Tenon saw, coping saw, various machine saws including Hegner, band saw, jig saw</td>
</tr>
<tr>
<td>Make sawn edges smooth</td>
<td>Sanding disc, file, chisel, plane, glasspaper/sandpaper</td>
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(3×1) [3]

(e) (i) Panel pins, oval wire, oval nail, round nail, round head, round wire, lost head [1]

(ii) PVA, synthetic resin, contact [impact] , accept trade names such as Resin W. [Do not accept epoxy resin, animal or scotch glue] [1]

(iii) Easier to clean, remove debris, allows water to escape [1]

(f) Problems involve weather/climate:
too hot or cold, too wet or dry, fungal/insect attack, windy conditions
woods can shrink or expand, rot
metals can rust, plastics can fade
award 1 mark for each sensible problem identified (2×1)
award 1 mark for each method to overcome problem
e.g. painted to protect, choice of material for specific environment (2×1) [4]
(g) End of D [or support] shaped to fit under roof
Reinforced using block or strip of wood
[Do not accept screwing of roof to shaped end of support]
Details of materials and constructions used

(b) (i) Sketch to show work low in the vice to prevent it cracking
Added notes to describe how problem is overcome
(ii) Award work piece clamped in position/use of machine vice
Award work piece supported underneath
Award slow speed of drill/correct cutting angle/pilot drills

(c) Use of wet and dry paper, polishing wheel, mop and compound/polish
Award any 2 items of equipment described

(d) Heated over a line bender/strip heater/hot air gun to become soft
Use of former or round bar
Softened acrylic draped over former/round bar and held
Technical accuracy

(e) Practical solution/ concept
Details of sizes and constructions
[Materials used must be appropriate for 4 mm thick acrylic otherwise 0 marks]