**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2012 series

## 0445 DESIGN AND TECHNOLOGY

**0445/33** 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 October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

## Section A

**1** Sheet metal is too thin to countersink, round head screws apply more pressure across sheet

**2** Two reasons: poor seasoning, uneven shrinkage, poor vertical stacking, effects of plain/slash sawing, accept references to excessive heat/moisture 2 × 1 **[2]**

**3** Completed drawing to show flat end 1
Completed drawing to show line for grinding angle 1
Award 1 mark for bevel edge chisel **[2]**

**4**

| Tool / item of equipment | Name | Specific use |
|---|---|---|
|  | **chuck key*** | **tightening chuck on drill** |
|  | **tap** | **cutting internal screw thread** |

* Award 1 mark for 'chuck' or 'key' if specific use is correct **[4]**

**5** square tube flat /strip 2 × 1 **[2]**
Accept square metal, square bar.
Accept flat metal, flat steel

**6** **(a)** ABS, polycarbonate, polypropylene, polyimide [nylon] **[1]**

**(b)** injection moulding **[1]**

**(c)** 2 advantages: lightweight, plastic does not become hot like metal, moulded shape, can be coloured, will not corrode/rust, poor conductor of heat/electricity **[1]** **[1]**

**7** Completed drawing to show frame of saw 1
Completed drawing to show blade positioned 1 **[2]**

**8** Brass is heated [to dull red] 1
Left to cool 1 **[2]**

**9** Completed drawing to show spur / point of flat bit 1
Completed drawing to show correct shoulder of flat bit 1 **[2]**

**10**

| Adhesive | Drying time | Specific use |
|---|---|---|
| PVA | **1–3 hours** | **general woodwork** |
| Synthetic Resin | **5–7 hours** | **boatbuilding** |

**[4]**

## Section B

**11 (a)** Plywood, MDF, chipboard, blockboard **[1]**
**[1]**

**(b)** Stability, wide boards available, cheap[er], can be coated with veneer/plastic, **[1]**
environmental benefits **[1]**

**(c)** Cheap[er] due to no assembly costs during production, buy off the shelf and take home, **[1]**
personal satisfaction of assembly **[1]**

**(d) (i)** Accuracy and quality of joint showing correct method 0–3 **[3]**

**(ii)** Accuracy and quality of joint showing correct method 0–3 **[3]**

**(e) (i)** Jig saw, router. Do not accept band saw, Hegner or Scroll saws **[1]**

**(ii)** No trailing lead, clear area below saw cut, work clamped down,
eye protection **[1]**

**(iii)** Wood shown at angle 1
Jack or smoothing plane used to make flat 1
Held in vice or clamped appropriately to bench 1 **[3]**

**(f)** Modifications to store computer tower Maximum 4
Modifications to store CDs Maximum 4

Some sort of fitted shelf / support principle 1
Stored inside desk [not outside] 1
Details of materials, constructions and fittings 0–2 **[8]**

**12 (a)** 2 advantages of aluminium over steel; easier to bend/work with, non-rust, variety of finishes, self-finished. Do not accept 'lighter'

**(b)**

| Stage | Process | Tools |
|---|---|---|
| 1 | Mark out blank on sheet of aluminium | **Scriber, rule, try square, odd-legs, marker pen** |
| 2 | Cut out blank | **Guillotine, tin snips** |
| 3 | Make edges flat | **File** |
| 4 | Mark out centres for holes | **Hammer, centre punch, scriber, rule, try square, odd-legs** |
| 5 | Drill holes | **[Machine or hand] drill** |
| 6 | Clean surface of blank | **Emery cloth, wet and dry [abrasive] paper, buffing wheel, metal polish** |

**[6]**

**(c)** Former with pins for holes to locate 0–2

Edges are bent over former to shape 0–2
Description of how it is used 0–2 **[6]**

**(d)** Insert some form of 'stop' at end of channel. Method of fitting clear 0–2 **[2]**

**(e)** Award 1 mark for any 4 correct stages: 4 × 1
Mark out shape
Cut acrylic to square shape using coping or Hegner saw/tenon saw
Square up sides using sanding disc / file
Drill hole for acrylic rod using machine drill
Fix rod into hole using acrylic cement **[4]**

**(f)** **MDF**
Award 1 mark for any 4 correct stages: 4 × 1
Mark out MDF
Cut out pieces for top, bottom and back, strips for groove
Glue together in sequence: back to top and bottom etc.
Clean up when dry with plane, glasspaper

Accuracy of technical detail 1

**OR**

**Acrylic**
Award 1 mark for any 4 correct stages: 4 × 1
Net of acrylic drawn
Cut out acrylic sheet
Heat using strip heater/line bender/oven
Use of former
Retained shape while cooling/repeat process for other bends

Accuracy of technical detail 1 **[5]**

**13 (a)** 3 items of research: what kind of garden tools, sizes, how many, location, target user, ergonomic/anthropometric considerations

**(b) (i)** Accuracy / quality of appropriate joint drawn — 0–3 **[3]**
Nail or screw only = 1mark
Nail or screw + glue = 2marks

**(ii)** Mortise and tenon, [stopped] housing, dowel, butt joint, biscuit joint **[1]**

**(c)** Award 1 mark for each of 5 correct stages: [Do not reward marking out detail] — 5 × 1

Drill 4 holes using brace and bit or saw tooth bit and drilling machine
Saw off waste using tenon saw, Hegner saw
Clean up sawn edge with smoothing plane
File sharp edges off to produce curved shapes for tools to fit
Use of glasspaper

Accuracy of technical detail — 1 **[6]**

**(d) (i)** Short grain clearly shown **[1]**

**(ii)** Manufactured boards are constructed from wood based material in a variety of ways — 1
this ensures that grain direction is minimised as a problem — 1 **[2]**

**(e) (i)** 2 reasons for applied finish: preserve, protect, enhance appearance, make more durable **[1]** **[1]**

**(ii)** 2 suitable finishes: wood preservative, [polyurethane] varnish, variety of oils, lacquer, stain, wax **[1]** **[1]**

**(iii)** Accept any 3 stages: — 3 × 1
Wipe off dust/clean surface
Surface can be planed using a smoothing plane
Various grades of glasspaper
Wipe down between grades **[3]**

**(iv)** Advantage **before** assembled: ensures that all parts are covered, parts could be multi-coloured **[1]**

Advantage **after** assembled: quicker because the whole unit can be supported and painted at one session, cover joints **[1]**