UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

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.

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Section A

1 **(a)** Greater freedom without cord, ease of use, use it anywhere, easily moved around, portable [1]

(b) Not as powerful, needs recharging, can run flat, needs batteries [1]

2 **(a)** Flat/hand Half round/ed Round/ed or Rat tail Square/d 4 square (4x1) [4]

(b) Check to make sure that the handle is not loose, handle fixed firmly/securely, safe handle on it [1]

3 **(a)** Vernier callipers. Accept vernier gauge, vernier [1]

(b) Accurate measuring of internal/external diameters/depth, thickness [1]

4 **(a)** Even drying out of timber, produce high quality wood, does not need/use energy [1]

(b) Faster than open air seasoning, can be controlled [1]

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

(b) Stainless steel, aluminium, copper [1]

6 Correct labels: mortise tenon shoulder haunch (4x1) [4]

7 Two ways include: plane to middle, stop, [plane from other end]
position scrap wood at end of grain
use a shooting board
clamping the edge during planing (2x1) [2]

8 Completed drawing of 'foot' shown against edge of metal (1)
Completed drawing of spur making the mark (1) [2]

9 Drawing of blockboard to show top and bottom plies (1)
Drawing of blockboard to show strips running along length (1) [2]

10 Two benefits: positive grip, good leverage, easy to undo, fits exactly into hole, strongly tightened, Allen key doesn't take up much room, no slippage, ensures screw is tight (2x1) [2]

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Section B

11 (a) Award 1 mark for ref. to human measurements. Award 1 mark for ref. to tray design
Anthropometric data includes: height of tray, width of tray is dependent on reach / access by person using it. Reference to hands/arms.
For 2 marks there must be reference to the tray sizes in relation to the person. [2]

(b) Allow modification to original construction
Some form of pivot: metal or wooden pegs or metal hinge shown (0–3)
Additional notes and details: e.g. name of hinge/screws, important sizes (0–2) [5]

(c) (i) 2 ways to prepare dowel include: chamfer (1)
saw cut across end (1) [2]

(ii) sash cramp shown clearly across clamping legs (0-2)
correct position over dowel (1) [3]

(iii) Adhesive: accept trade names such as EvoStik Resin W, Cascamite or generic term such as synthetic resin or PVA [1]

Drying time must correspond to named adhesive: for example:
PVA 1-3 hours, Cascamite 6 hours, Aerolite 6 hours. [1]

(d) Must be a sketch for 2 marks. Notes only award 1 mark.
Lipping to edges of tray, some sort of hand holds, holes or recesses for cups, use of plastic surface, legs redesigned for comfort, replace dowel with rectangular rail
Award 0-2 for each improvement. (2x2) [4]

(e) (i) polyurethane varnish suitable: protects, hardwearing, tough, durable, resistant to heat/moisture, attractive finish, smoother surface [2]

(ii) Preparation only: apply medium grade of glasspaper,
wipe down,
repeat with finer grade of glasspaper,
wipe down. (3x1) [3]

(f) 2 advantages: more durable / resistant to marks, can be attractive appearance, easier to wipe down and remove marks, no finish needed, more attractive than wood [2]

12 (a) properties: relatively cheap, durable, easy to shape, high tensile strength, malleable, easy to work with, easy to bend, hard, tough, strong enough to hold tools [2]

(b) 2 pieces of information: type of tools to be stored, how many, where, sizes of tools weight of tools [2]

(c) Cut out shape [radiused ends not necessary] (1)
Hole positions [centres marked or holes drawn] (1) [2]

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(d) **(i)** Centre punch provides location for drill, drill will not slip, prevents distorted hole, accurate, hole is drilled accurately [1]

(ii) 2 safety precautions: clamp work piece down, scrap material underneath, correct speed, remove chuck key, drill secure, guard in position
Accept references to personal safety: goggles, hair tied back, jewellery removed. [2]

(e) 2 reasons: speed, repetitive accuracy, avoids individual marking and measuring, easier to mark out [2]

(f) **(i)** Cutting the mild steel:
steel held in vice or hand or clamped (1)
cut with tin snips or cold chisel sketched (0–2)
limited use of shears/hacksaw 1 only
accuracy of named tools
references to CAM must be supported with detailed accurate information (1) [4]

(ii) Bending the mild steel:
sketch showing steel held in a vice (1)
being shaped around a former/round rod (1)
and hit with a wooden mallet/hammer and scrap wood (1)
accuracy of named tools (1) [4]

(g) **(i)** 2 reasons: protect the steel, preserve material, improve appearance, cover scratches [2]

(ii) **Prepared for painting**: accept reference to file /filing, wire brush, steel wool, wet and dry, clean and degrease metal, medium grade and fine grades of emery cloth, support/set up work for painting [2]

(h) Sketch of round head screw (1)
Named round head screw (1) [2]
Not accept raised head screw

13 **(a)** Ergonomics considered: clear layout of paints, finger 'dips' for ease of access to paints, overall size for carrying. (Quality of explanation 0–2) [2]

(b) **(i)** Practical solution includes some sort of applied bead/corner blocks (0-2)
Accept sitting on its own base.
Additional notes: reference to any **one** of materials, sizes, method of fixing (0–1) [3]

(ii) 2 advantages of using vacuum formed tray: paints fit individually, lightweight for carrying, easier to clean, no sharp corners, easily removed and replaced, paints fit better [2]

(c) **(i)** butt hinge [1]

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(ii) marking knife, try square, marking gauge [2]

(iii) Use of mallet and chisel to cut out recess (0–2)
Method described (0–1) [3]

(d) Sketch showing use of rebate, groove or applied bead. (0–2)
Additional explanatory notes (0–1) [3]

(e) Pre-manufactured fitting: hasp and staple, catches, clips and locks
Accuracy of recognised fitting (0–3) [3]
Use of unrecognised/improvised fitting award maximum 2 marks.
Padlock drawn without hasp and staple award 0 mark.

(f) Paintbrushes stored securely (0–2)
Bristles protected (0–2)
Details of materials and fittings (0–2) [6]
Including: vacuum forming, strips/blocks of wood, use of compliant materials such as leather and rubber bands

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