UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

0445 DESIGN AND TECHNOLOGY

0445/03 Paper 3 (Resistant Materials), maximum raw mark 50

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Section A

1 **(a)** 1 mark for each cramp shown positioned across ends of frame.
If G cramp is shown, award 0 marks. [2]

(b) Sash cramps. [1]

2 **A** Hammer. Ignore any reference to 'pin', 'ball pein' etc. and award 1 mark. [1]
B Scrap wood, waste wood, block of wood, but **not** 'former'. [1]
C Folding bars, bending irons. [1]

3 Grain must be shown at right angles to next layer. 1 mark if only 2 layers shown. [2]
If 3 layers are drawn with grain shown in same direction award 0 marks.

4 Draw filing. [1]
No alternative answers.

5 Two methods of planing end grain include: [1 + 1]
- plane to middle, stop, plane to middle from opposite end;
- position scrapwood at end of wood at plane across;
  award benefit of doubt to wood positioned at side of that being planed.
- shooting board.

6 **(a)** Odd leg or 'Jenny' calipers. Accept 'calipers'. [1]
Used to draw lines on metal or plastic parallel to an edge. [1]
Candidates can still achieve 1 mark for correct description even if incorrectly named. [2]

(b) Rule shown **under foot** of calipers with point on required distance. [1]

7 Completed joint 0–3 dependent upon accuracy/clarity. [3]

8 Suitable specific finish for:
solid wood table top: polyurethane varnish, varnish, wax polish or cellulose lacquer.
Do **not** accept French polish. [1]

wooden chopping board for vegetables: olive oil, linseed oil or no finish.
Do **not** accept 'glasspaper' or references to covering with a plastic laminate. [1]

9 Soft drinks bottle: extrusion blow moulding, blow moulding. Do **not** accept 'blow forming'. [1]
Canoe: GRP, moulding, lay up. [1]
Bucket: injection moulding. [1]

10 **A** Tool post [1]
B Bed [1]
C Lead screw [1]
There are no alternative correct answers to these 3 terms.

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Section B

11 (a) Two reasons include: easy to bend, lightweight, does not corrode outside, easy to work. [1 + 1]
Accept 'light' but not references to quality of sound produced by metal.

(b) (i) Two marking out tools include: rule, scriber, try square, odd legs. [1 + 1]
Accept 'scribe', 'marker pen', 'felt tip'.
Do not accept: 'square', 'pencil', 'divider' or 'template' as this is given in part **(ii)**.

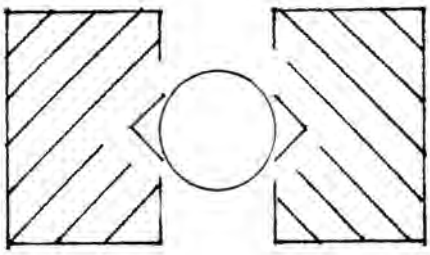
(ii) One benefit of using a template: allows you to mark out on paper or card accurately then glue onto metal, quick, saves time, accurate. [1]

(iii) Use of tin snips/named and sketched correctly. (0–2)
Could also include use of guillotine.
Do not accept: 'hacksaw' or use of 'vice' as the metal should be clamped flat.

Notes relating to holding sheet metal/accuracy of technical detail. (1) [3]

(c) Jig can saw 3 **different** lengths. (1)
Held **securely**. Use of vice 1 mark only (0–2)
Location of saw blade. (1)
Accuracy/quality of details. (0–2) [6]

(d) (i) Tube located in vice jaws accurately. (1)
45° recesses to grip tube. (1) [2]



If a circle is drawn without the 45° recesses to grip tube award 1 mark.

(ii) Purpose of centre punch before drilling: to provide a guide for the drill. (1)
To prevent slipping. (1) [2]
Do not accept: 'shows where you will drill'.

(e) (i) Suitable finish: lacquer, anodised, electroplating. [1]
Do not accept: 'galvanised'.

(ii) If finish is incorrect in part **(i)** part **(ii)** can still be correct.
Aluminium prepared by means of wet and dry paper, emery cloth. (1)
Various grades – finish with fine grade. (1) [2]

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(f) Modification needs to include a simple bracket or provision in back of support to be screwed to a wall.

Award up to 2 marks for practical idea. (0–2)
Clearly communicated with accurate technical detail. (0–2)
Technical detail could include:
the materials the modification is made from, the sizes and/or the joints involved. [4]

12 (a) Two items of research include: size of DVD, number of DVDs, location, space for rack, available materials, evaluation/consideration of existing racks, anthropometric data. [1 + 1]

If candidate gives 2 answers such as 'length of DVD' or 'width of DVD' award only 1 mark for reference to sizes.
Do not accept: 'weight of DVD', or vague references to 'materials' or 'safety'.

(b) (i) Accept any correct stage/process even if not in correct order.
Do not accept: repeated processes or repeated tools/equipment.

Stages	Process	Tools/Equipment
1	Marking out	Chinagraph pencil, felt marker, scriber, rule, try square
2	Drill hole	Drilling machine, drill
3	Insert saw blade, saw to shape	Coping saw, Hegner saw or equivalent. **Not** jig saw
4	File to shape	Flat or hand file

Accept any **one** correct process or tool. [7]

(ii) Problems include:
- snagging/cracking when drilling sheet;
- can be brittle;
- sawing or filing too high in the vice;
- scratching surface while working;
- using Tensol cement;
- personal injury. [1]

Overcome:
- clamp work piece down;
- support with wooden blocks;
- lower position in vice/support;
- retain backing sheet;
- well ventilated room;
- goggles. [1]

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(c) **(i)** Two tools used to finish include: drawfiling/file, wet and dry paper, [1]
[silicone carbide paper], polishing mop, polishing compound, Perspex polish. [1]
Do not accept: 'water paper'.

(ii) Edges are finished before bending because it is much easier to work flat. [1]

(d) Strip **heater**/line bender/oven named and drawn showing plastic being heated. (0–2)
Means of **holding** plastic to required angle/use of former, including method of retention while cooling. (0–2)
Accuracy of added technical notes/**detail.** (0–2) [6]

(e) Practical idea including use of additional 'flaps' or bracket. (0–3)
Details of materials, constructions, fittings. (0–2) [5]

Must involve a modification to the rack in Fig. 10 and not a completely new design, otherwise award 0 marks.
Candidates can achieve maximum 3 marks for a practical idea but 0 marks for incorrect/inappropriate details.

13 **(a)** **(i)** Hardwood: beech. Accept a wide range of possible hardwoods used today. [1]
Apart from balsa wood accept any named hardwood.

(ii) Properties include: extremely hard, close-grained, dense, will not split easily. [1]
Candidates can achieve 1 mark for this part even if the answer to part **(i)** is incorrect.

(b) The constructions drawn must relate to the parts/shape of the truck and not just be a generic view of the joint, otherwise award maximum 2 marks.

Candidates can draw a correct joint and achieve maximum 3 marks even if the named joint is incorrect.

Two constructions include: dowelled joint, housing, mortise and tenon, butt joint*.

*Butt joints must be shown with nails or screws and glue for maximum 3 marks otherwise maximum 1 mark.

Accept 2 different variations of a housing joint or a mortise and tenon joint.
Do not accept K-D fittings.

1 mark for correctly named **and** appropriate joint. [1]
Completed joint 0–3 dependent upon accuracy/clarity. [3]

1 mark for correctly named **and** appropriate joint. [1]
Completed joint 0–3 dependent upon accuracy/clarity. [3]

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(c)	Suitable/practical method of **fixing** to sides of truck.	(0–2)	
	Three different **heights**: method of adjustment.	(0–2)	
	Accuracy of technical detail.	(0–2)	[6]
(d)	Use of nuts, bolts, screws, star washers, captive caps, circlips to **fix**.	(0–2)	
	Safe in use.	(1)	[3]
(e)	Allow either wood or metal turning lathe. There must be a description of the stages.		
	Preparation of wood for either between centres or faceplate.	(0–2)	
	Setting up on faceplate or between centres.	(0–2)	
	Method of turning wood to shape/size.	(0–2)	[6]

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