

**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

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 must be read in conjunction with the question papers and the report on the examination.

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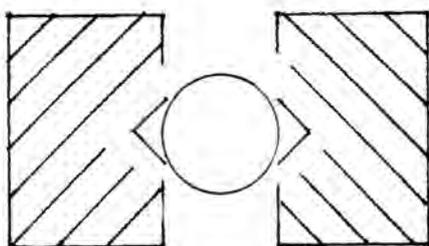
**Section A**

- 1 (a) 1 mark for each cramp shown positioned across ends of frame.  
If G cramp is shown, award 0 marks.
- (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.  
If 3 layers are drawn with grain shown in same direction award 0 marks. [2]
- 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]  
Accept 'light' but not references to quality of sound produced by metal.
- (b) (i) Two marking out tools include: rule, scribe, 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]

- (f) Modification needs to include a simple bracket or provision in back of support to be attached 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, scribe, rule, try square
2	Drill hole	Drilling machine, drill
3	Insert saw blade, saw to shape	Coping saw, Hegner saw or equivalent. <b>Not</b> 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, [silicone carbide paper], polishing mop, polishing compound, Perspex polish.  
**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)
- (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]