

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2010 question paper
for the guidance of teachers**

0445 DESIGN AND TECHNOLOGY

0445/31

Paper 3 (Resistant Materials), maximum raw mark 50

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

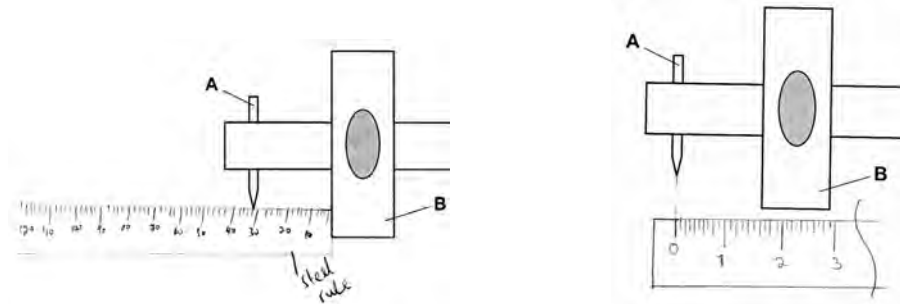
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- 1 (a) Smoothing plane/jack plane. [1]
- (b) 2 reasons: planing against the grain.
fibres will split making surface rough. [1]

- 2 (a) Steel rule must be shown accurately against the stock. (0-2) [2]



Maximum 2 marks

1 mark only if drawn below OR above

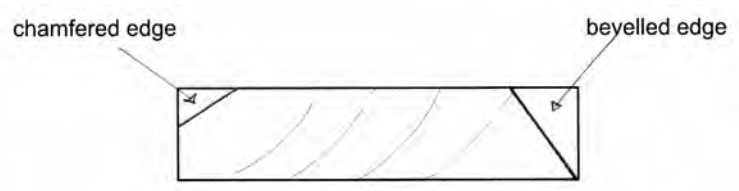
- (b) Part A: Spur, pin. [1]
Part B: Stock. [1]

- 3 (a) Hammer: engineers, ball pein. [1]
Do not reward 'ball' or 'ball head'

- (b) Wide variety of uses: riveting, bending metal, chiselling. [1]
Do not reward references to nailing.

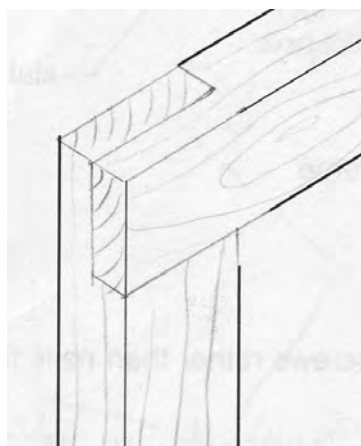
- 4 Corner butt strengthened: triangular plates, corrugated fastener, dowel, metal pins, feather, wooden block, modesty block. Use of nails = 1 mark only. Do not accept use of screws or bolts through end = 0 marks. Accuracy of correct method: (0-2) [2]

- 5 Correct drawing of chamfer and bevel. (2 x 1) [2]
Accept drawing of end of bevel edge chisel for 1 mark.



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- 6 (a) Gear wheels: nylon, polythene.
- (b) Property: hard, tough, good bearing surface, self-lubricating, wear and friction resistant.
- (c) Manufacturing process: injection moulding. [1]
- 7 (a) Process: sand casting/die cast/stamped sheet steel. Accept 'casting'. [1]
- (b) Suitable metal: aluminium, brass alloys.
Must be linked/suitable for process named in (a). [1]
- 8 Two reasons for scrapwood: guide for saw cut, protect surface of workpiece, increase surface area of cramping pressure. [1]
[1]
- 9 A: surface plate. [1]
B: surface gauge. Accept scribing block. [1]
- 10 Accurate corner halving joint: (0–3) [3]



- 11 (a) Suitable width: 30–40 mm. [1]
Suitable thickness: 12–20 mm. [1]
- (b) (i) Countersunk head shown: (1)
Clearance hole shown: (1) [2]
- (ii) Two advantages of screws over nails: can be removed, stronger, unlikely to be pulled out, no sharp heads, nails can split near end of wood, holds tighter. [1]
[1]
- (iii) Advantage of brass over steel: does not rust. [1]

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- (c) Measure: steel rule, tape. (1)
 Mark out: pencil or marking knife, try square. (2)
 Saw to length: tenon saw/machine saw, method of holding. (2)
- (d) Dowel joint or nuts and bolts drawn. (0–2)
 Do not accept nail. Screw = 1 mark only.
 Appropriate fixing of glued dowel/position of nut and bolt with washer. (1) [3]
- (e) (i) Suitable construction: dowel, mortise and tenon. [1]
 Do not accept nail.
 Named construction can be wrong but sketch correct:
 e.g. names a butt joint but sketches a dowel joint.
 If construction is wrong, e.g. butt joint and sketches a butt joint = 0 marks
 Accuracy of sketch: [3]
- (ii) Joint clamped: use of sash cramp. (1)
 Correct position shown. (1)
 Use of scrapwood. (1) [3]
- (f) (i) Suitable finish: paint, varnish or oil. Do not accept stain. [1]
 (ii) Two reasons: protect, preserve, enhance appearance. [1]
 [1]
- 12 (a) 3 bend lines. (3 × 1) [3]
- (b) Two reasons: visual final design, check sizes, cheaper than making mistakes in acrylic, work out correct order of bends, check jars fit. [1]
 [1]
- (c) Stages include: [mark out], drill, saw, file, clean up with wet and dry.
 Look for 3 clear stages each 0–2 dependent on quality/accuracy.
 Award 0–2 for any 3 detailed stages.
 Candidates can achieve maximum 6 marks with or without details of marking out. [6]
- (d) (i) Covering to protect from scratches. [1]
 (ii) No need for applied finish because it is self-finished. [1]
 (iii) Finishing process: scraper, draw file, wet and dry paper, polishing mop. (3 × 1) [3]
 Do not accept cross filing or use of glass/sandpaper.
- (e) Three precautions: clamp work down, correct speed, scrapwood under workpiece [1]
 drill ground to correct angle, slow feed. [1]
 [1]

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- (f) Ignore details of marking out as irrelevant.
 Method of heat: line bender, strip heater, oven. (0–2)
 Use of former or mould. (0–2)
 Method of retention. (0–2)
- 13 (a) (i) Specific sheet metal: mild steel, aluminium. OR
 Specific manufactured board: MDF, plywood. [1]
- (ii) Reasons include:
 for mild steel: relatively cheap.
 for aluminium: will not rust.
 for manufactured board: stable, will not split when working, available as thin sheet. [1]
- (iii) Suitable thickness:
 sheet metals: 1.00–2.00 mm.
 manufactured board: 4–6 mm. [1]
- (b) Two items of research: number of CDs, size of CDs, location, target market. [1]
 Accept one reference to sizes only:
 i.e. width of CD, thickness of CD, height of CD= 1 mark only. [1]
- (c) Template is quicker, repetitive accuracy. [1]
 [1]
- (d) (i) Candidates can answer in the material of their choice.
 Mark out: (0–2)
 Cut out shape: (0–2)
 Make final shape smooth and accurate:: (0–2) [6]
- (ii) Two safety precautions must be appropriate to processes in (d)(i). [1]
 [1]
- (e) Materials used can be different from those stated in (a)(i).
 Method of joining using combination of screws and added blocks/brackets.
 Must not be visible on outside of sides of hedgehog.
 Methods that do show on outside: award up to maximum of 2 marks for fitting and materials.
 Method of fitting: (0–3)
 Details of materials, fittings used: e.g. diameter of dowel. (0–3) [6]
- (f) (i) Prepare for finishing: [manufactured board or metals].
 Use of abrasive papers described clearly. (0–2) [2]
 Work through grades of paper from coarse to fine.
 Use of sander accepted.
- (ii) Suitable finish for mild steel: paint.
 Suitable finish for aluminium: lacquer, anodised, self-finish.
 Suitable finish for manufactured board: paint. [1]
 Reason: preserve, protect, enhance appearance. [1]