**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

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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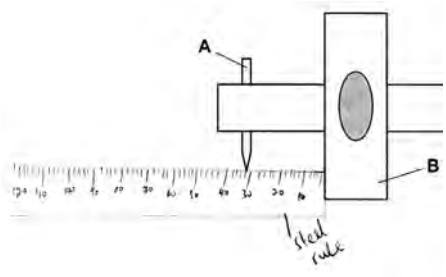
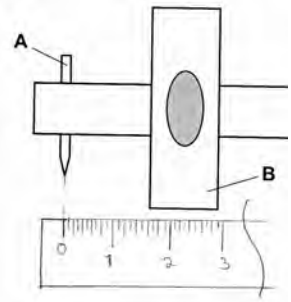
**1** **(a)** Smoothing plane/jack plane.

**(b)** 2 reasons: planing against the grain. [1]
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 × 1) [2]
Accept drawing of end of bevel edge chisel for 1 mark.

**6** **(a)** Gear wheels: nylon, polythene.

**(b)** Property: hard, tough, good bearing surface, self-lubricating, wear and friction resistant. [1]

**(c)** Manufacturing process: injection moulding. [1]

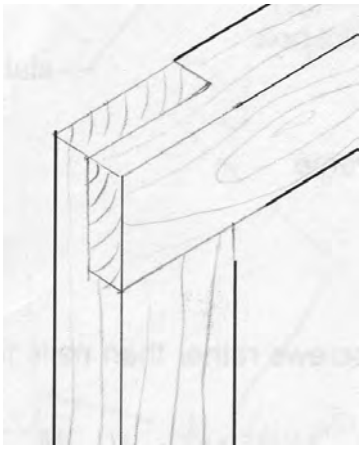
**7** **(a)** Process: sand casting/die cast/stamped sheet steel. Accept 'casting'. [1]

**(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, [1]
increase surface area of cramping pressure. [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, [1]
unlikely to be pulled out, no sharp heads, nails can split near end of wood,
holds tighter. [1]

**(iii)** Advantage of brass over steel: does not rust. [1]

**(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, [1]
work out correct order of bends, check jars fit. [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]

**(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]