CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 series

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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CAMBRIDGE
International Examinations

Section A

1 **(a)** Speed, [repetitive] accuracy, shape could not be marked out with traditional tools **[1]**

(b) Coping saw, fret saw, Hegner saw, scroll saw or equivalent **[1]**

2

Product	Specific material	Reason for choice
 plastic gears	Nylon	Self-lubricating
 wooden rolling pin	Beech	Hardwood, hard, close-grained

4 × 1 **[4]**

3 **A** Countersunk head **B** Flat head **C** Round/snap head 3 × 1 **[3]**

4 Strips shown across the end 1 Sandwiched top and bottom with ply 1 **[2]**
Blocks shown on both edges 1 only

5

Safety equipment	Situation where it must be worn
ear defenders	Any sensible situation involving noisy machinery or tools
gauntlets	Operations involving heat or chemicals
apron	Wide variety of workshop situations– must give specific situation

[3]

6 Pencil, marking knife, rule, try square, marking, mortise and cutting gauges 3 × 1 **[3]**

7 **(a)** vacuum forming, blow moulding, press forming/moulding **[1]**

(b) injection moulding **[1]**

8 Wide variety includes nuts and bolts, screws, dowel, mortise and tenon,
butt joint [pinned/nailed and/or screwed and glued], KD fittings — 2 × 1 **[2]**

9 Understanding of safe edge– it has no teeth — 1
Used against the vertical side without removal of material — 1 **[2]**

10 The copper becomes work hardened [or equivalent terms]
Annealing will soften the metal
Allowing it to be shaped — any 2 × 1 **[2]**

Section B

11 (a) The type of tools, their sizes, quantity, weight, methods of accessibility 2 × 1 **[2]**

(b) (i) Relatively cheap compared to hardwood, hardwearing, durable, easy to work

(ii) Accept any reference to pine, red wood, red/white deal, parana pine **[1]**

(c) Mortise and tenon, dowel, butt pinned and glued, lapped, dovetail, finger [comb]
Correct name 1
Accuracy/quality of sketch of joint 0–3 **[4]**

(d) (i) Jigsaw, router **[1]**

(ii) Answers can refer to **any** portable power tool: trailing leads, clamping work securely, personal protection equipment **[1]**

(e) Some form of handle: dowel or metal tube/rod between the two ends 1

Named material appropriate 1

Constructions appropriate 1 **[3]**

(f) Methods include: pin or screw and glue flush [accept one only], rebate, groove, applied beads **[3]**
Award 0–3 for each method dependent upon technical accuracy 2 × 3 **[3]**

(g) Three different size areas 0–2

Appropriately named materials 0–1

Constructions appropriate and shown clearly/accurately 0–3 **[6]**

12 (a) (i) Thermoplastic **[1]**

(ii) Thermoplastics can be heated and shaped/formed and process repeated 1
Thermosetting plastics can only be heated and shaped/formed once 1 **[2]**

(b) Accuracy of outline of net 0–2

Accuracy of position of 2 lugs 0–2 **[4]**

(c) Use of oven only [not strip heater/line bender] 1
Use of former/mould shown clearly with acrylic draped 1
Accuracy of technical detail 1 **[3]**

(d) Description of method should include: drill a hole, insert blade of coping saw, Hegner saw or equivalent, cut out shape, file to final size — 3 × 1 **[3]**

(e) **(i)** Sketch shows 2 lines bisecting to provide centre — 1
At least one tool or item of equipment named — 1 **[2]**

(ii) Acrylic clamped securely in position — 1
Additional reference to speed of drill, safety precautions — 1 **[2]**

(f) Three safety precautions include:
adequate ventilation, mask to prevent breathing in fumes,
gloves or use of barrier cream, no naked flames — 3 × 1 **[3]**

(g) **(i)** wet and dry used to make the edges smooth **[1]**

(ii) polishing mop and compound used to polish the edges **[1]**

(h) To overcome protruding lugs the back needs to be brought away from the wall
Award 1 mark for recognition of solution — 1

Technical accuracy of solution to include some form of 'spacer' — 0–2 **[3]**

13 **(a)** **(i)** Mild steel, stainless steel **[1]**

(ii) Aluminium, brass, copper **[1]**

(iii) Do not corrode, self-finished, attractive appearance, bends easily — 2 × 1 **[2]**

(b) Any 4 stages including:
Rod held securely in vice
Chamfer filed on end of rod
Use of die in die stock/holder
Use of lubricant
Method of cutting thread described — 4 × 1 **[4]**

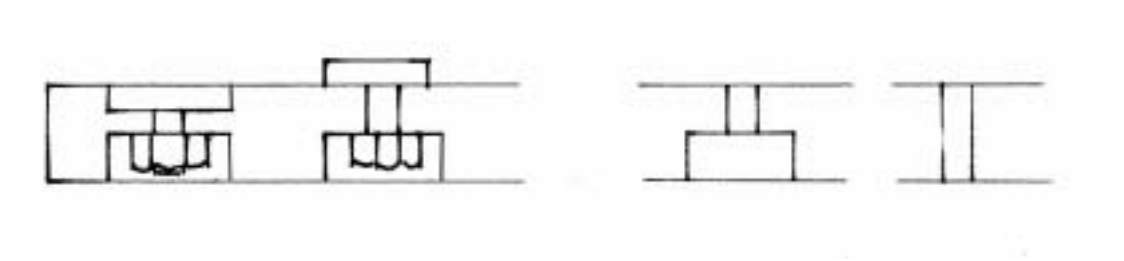
(c) Start position for end of rod — 1

Use of former: 15mm Ø bar to bend around held securely in vice — 1

Hold one part of rod in position for bending — 1

Method of force required: mallet [not hammer] — 1 **[4]**

(d) Shows rod and nut in place = 3 marks = 2 marks = 1 mark



[3]

(e) Face plate turning
glue hardwood block to softwood block with paper between screw block onto faceplate
set up on lathe
set up tee rest
use of scrapers/gouges to produce shape
check required diameter

Sawing from sheet/block and making round.
Mark out diagonals/circle on wood, secure to bench/flat surface, use of tenon saw to remove most waste or use of Hegner/vibro saw or equivalent, e.g. coping saw with wood held in vice, use of files and glasspaper to make round or use of sanding disc.

Award 0–4 marks for details of main stages 4
Award 0–2 marks for quality of communication 2 **[6]**

(f) (i) Suitable finish: varnish, oil, preservative, paint, white/French polish **[1]**

(ii) Glasspaper, remove dust, glasspaper [finer grade], use of brush or rag to apply carefully along the grain, avoid 'runs' and drips 3 × 1 **[3]**