UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 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.

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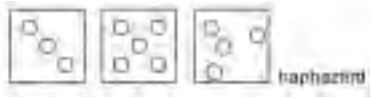
1 Length of bolt, diameter of bolt, diameter of nut, type of head of nut or bolt, quantity, type, size, size of thread, diameter for bolt, thickness of material the bolt goes through. (3 × 1) [3]

2 Left to right: **strip square plank dowel** (4 × 1) [4]

3 Correct angle of stock
Stock completed to correct shape [2]

4 Used to cover cheaper manufactured boards
Give appearance of more expensive wood, better looks / appearance, furniture will not warp, cheaper than solid wood, easily laminated / bent. [2]

5 For maximum 2 marks 4 nails must be positioned staggered. [2]



Award 1 mark for those shown above.

6 **(a)** Injection moulding [1]

(b) Extrusion / extrusion blow moulding [1]

7 **(a)** Tinsnips [1]

(b) To cut sheet metal / metal. [1]

8 Correct drawing of each screw head (3 × 1) [3]

9 **A** headstock **B** saddle **C** tool post (3 × 1) [3]

10 **A** ear defenders must be warn due to risk of hearing damage caused by loud noise, wear protection. [1]

B safety glasses must be worn to protect eyes while carrying out an operation, wear protection for glasses / spectacles [1]

11 (a) Tends to be cheaper than ready assembled furniture
Personal satisfaction
Can collect from retailer without ordering
Easy to store
Less manufacturing costs (2 × 1) [2]

(b) Customer can paint to own preference
Makes manufacturing faster
Cheaper to produce since less labour and materials are used (2 × 1) [2]

(c) (i) Less likely to warp
Available in wide boards
Shape can be produced more efficiently from boards
Less expensive / cheaper (2 × 1) [2]

(ii) MDF gives a smoother finish / smoother
MDF has a better edge finish than plywood / looks better
MDF is cheaper
Less likely to splinter
Easier to cut (2 × 1) [2]

(d) (i) Shape cut out:
Award 0–4 dependent upon technical accuracy and quality of communication:
including appropriately named saw(s) and method of holding

Sawn edges made smooth:
Award 0–4 dependent upon technical accuracy and quality of communication:
including the use of appropriately named files / glasspaper, sanding disc, sander, cork rubber / block [8]

(ii) Precautions do not have to relate to processes in **(d)(i)**
Workpiece clamped down
Eye protection worn
No trailing leads from jig saws
Items of personal protection inc. tie hair back, loose clothing tucked away (2 × 1) [2]

(e) Recognised KD fitting
Correct position
Quality of communication (0–2) [4]

(f) 3 pieces of wood with rails over stile
Correct grain direction
Fillets drawn on rails appropriately [3]

12 (a) Research includes:
important sizes of parts of cycles [reward reference to each size provided]
type of maintenance carried out, height of user, weight of bike, size of bike, type of bike (2 × 1) [2]

(b) Award 0–3 dependent upon technical accuracy and quality of communication for each:

Marking out (0–3)

Cutting the mild steel (0–3)

Squaring the ends (0–3)

All tools must be named for each process to achieve maximum marks. [9]

(c) (i) Award 0–3 dependent on practicability of design (0–3) [3]
Stability, suitable constructions, suitable materials

(ii) Accuracy of technical information (0–3) [3]

(d) Adjustment by means of screw or bolt tightened through upright and stem into nut or boss attached to outside of upright
Accuracy of technical information includes:
Ease of tightening dependent on type of screw or bolt head
Diameter / length of screw thread
Details of nut or boss

Designs that involve limited number of holes / pegs = 2 maximum
Designs that involve screw thread only tightening against inside stem = 2 maximum [4]

(e) (i) Paint / electroplating / dip coating / powder coating / galvanising [1]

(ii) Sharp edges / ends would be filed

Surfaces would be smoothed using emery cloth [various grades] wet and dry

Surfaces would be degreased [3]

13 (a) Acrylic suitable due to its inherent colour, durability, attractive appearance easy to work / cut. (2 × 1) [2]

(b) Cut out using tendon saw / Hegner saw / scroll saw or equivalent, coping saw, fret saw, band saw.
Accept laser cutter, but for maximum marks information about the process is required

Sequence of cuts not required
Accuracy of technical information and quality of communication (0–3) [3]

(c) Suitable joint includes: butt, mitre, lapped, rebate

Accuracy / quality of communication (0–2) [2]

Correct name of joint [1]

(d) (i) Polystyrene, ABS [1]

(ii) 3 considerations: draft angle, radiused corners / edges, vent holes, no 'undercuts' smooth surfaces [3]

(iii) There are many stages in vacuum forming. Main stages only required:

position mould on platen and lower, bring heater across and heat until soft, test plastic for pliability, switch on pump, raise platen, allow to cool, release from mould.

Award 0–3 marks for quality/accuracy of technical information drawn. (0–3)

Award 0–4 marks for technical accuracy of stages written. (0–4) [7]

(e) (i) Tray **B** vacuum-formed plastic tray [1]

(ii) Reasons include: quicker process, fewer stages than wooden tray, less waste, former can be reused (2 × 1) [2]

(f) Modifications to tray **A** include the addition of a lid to prevent the pieces from becoming lost.

Practical idea (0–2)
Details (0–1) [3]