

**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.

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

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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]
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- 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 worn 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]

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

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- 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]

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