

MARK SCHEME for the May/June 2014 series

0445 DESIGN AND TECHNOLOGY

0445/32

Paper 3 (Resistant Materials), maximum raw mark 50

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

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|---------------|------------------------------|-----------------|--------------|
| Page 2 | Mark Scheme | Syllabus | Paper |
| | IGCSE – May/June 2014 | 0445 | 32 |

Section A

- 1 (a) Aluminium [1]
- (b) Lightweight, light, corrosion resistant, good strength-weight ratio, low density [1]
- 2 Handle tight, pins in line, blade facing correct way, wood held securely, blade tight, blade is not damaged, blade is sharp (2×1) [2]
- 3 (a) Accuracy of drawing: two parallel edges for 2 marks (0–2) [2]
- (b) Safe edge correctly labelled [1]

4

| Tool | Name | Specific use |
|---|--------------------------|--|
|  | Guillotine, bench shears | Cutting thin metal/small section metal |
|  | Jack plane | Preparation of material, quick removal of waste material |

(4×1) [4]

- 5 (a) Vacuum forming, injection moulding [1]
- (b) Release from mould [1]
- (c) To add strength, rigidity [1]
- 6 2 measurements indicated: floor to behind knee, behind knee to backside, backside to lumber area (2×1) [2]
- 7 1 mm thick mild steel: scribe, odd legs, scribing gauge, scribing block
- 3 mm thick acrylic: chinagraph pencil, marker pen, felt-tip, leave backing paper on or apply masking tape and use pen or pencil [2]
- 8 Sheet metal shown between folding bars (1)
- Folding bars shown in vice (1)
- Use of mallet or hammer and scrap wood (1) [3]

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|---------------|------------------------------|-----------------|--------------|
| Page 3 | Mark Scheme | Syllabus | Paper |
| | IGCSE – May/June 2014 | 0445 | 32 |

- 9 (a)** Soft solder [1]
- (b)** Tinplate work, plumbing [1]
- 10** Two advantages of moulded polypropylene include: weather resistance, durability, more easily moved around, comfortable armrests, will not rust, easier to clean, stronger must be qualified (2×1) [2]

| Page 4 | Mark Scheme | Syllabus | Paper |
|--------|-----------------------|----------|-------|
| | IGCSE – May/June 2014 | 0445 | 32 |

Section B

- 11 (a)** Suitable joints include: M&T, halving, bridle, dowel
Award 0–3 dependent upon accuracy of sketch (0–3)
Must be in correct orientation otherwise max. 2 marks
1 dowel only shown = 2 marks max.
Suitable joint named to match sketch (1) **[4]**
[Do not accept tenon or mortise on their own]
- (b) (i)** Variety of glues include: trade names such as Evo-Stik Resin W, Cascamite, or generic synthetic resin, PVA
[Do not accept epoxy resin]
Time to set to correspond with named glue: PVA 1–4 hours, synthetic resin 6–24 hours **[2]**
- (ii)** Sash cramps **[1]**
- (iii)** 2 checks include: square, flat, joints pulled together, removal of excess glue, measure diagonals, use of scrap wood to spread pressure or prevent damage, clamped straight, clamps not over tightened, clamps tight/secure (2×1) **[2]**
- (c)** Table of drilling machine shown (1)
Some form of 'wedge' to provide 20° angle or rotate table and lock (1)
Work piece secured/clamped (1) **[3]**
- (d)** Some form of base (1)
Male and female formers/rods (0–2)
Method of retention (1)
- OR**
- Male and female formers (0–2)
Retention at start of bend (1)
Method of force (1) **[4]**
- (e)** Award up to 3 marks max. for practical method that is hidden behind frame (0–3)
Use of glued blocks/KD fittings/visible bracket/corner plates max. 2 marks
Award 0–1 for details of sizes and materials (0–1) **[4]**
- (f)** Frame:
Award 1 mark for recognition that frame needs to be in 4 separate parts (0–1)
Use of KD fittings/dowel/screws to connect separate parts (0–2)
- Rods:
Award 1 mark for recognition that rods need to be in 3 separate parts (0–1)
Method of connecting 3 separate parts for each rod (0–1) **[5]**

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|---------------|------------------------------|-----------------|--------------|
| Page 5 | Mark Scheme | Syllabus | Paper |
| | IGCSE – May/June 2014 | 0445 | 32 |

12 (a) 2 benefits include: check sizes, appearance, will it work, cheaper than making it from wood [Do not accept references to a template] (2×1) [2]

(b) Suitable method: dowel, M&T, added metal or wood support on surface of base
Award 0–3 dependent on technical accuracy (0–3) (0–3)

Award up to max. 3 marks for support shown into mortise without shoulders

1 dowel only = max. 2 marks

Use of screws or nails from underneath = max. 2 marks

1 nail or screw = max. 1 mark

Name of method to correspond to sketch (1) [4]

(c) (i) Quicker, more accurate, cuts fibres of wood, cannot be rubbed off (2×1) [2]

(ii) Acceptable methods:

Use of plane, hand-powered router, band saw table tilted at 45° angle (1)

Wood secured for plane and hand-powered router

Band saw requires fence/guide (1)

Technical accuracy of named tools and equipment (1) [3]

(d)

| Process | Tools/equipment used |
|------------------------|---|
| Mark out | Pencil, rule, sliding bevel, marking knife, mitre square |
| Saw off waste | Tenon saw, coping saw, various machine saws including Hegner, band saw, jig saw |
| Make sawn edges smooth | Sanding disc, file, chisel, plane, glasspaper/sandpaper |

(3×1) [3]

(e) (i) Panel pins, oval wire, oval nail, round nail, round head, round wire, lost head [1]

(ii) PVA, synthetic resin, contact [impact] ,accept trade names such as Resin W. [Do not accept epoxy resin, animal or scotch glue] [1]

(iii) Easier to clean, remove debris, allows water to escape [1]

(f) Problems involve weather/climate:

too hot or cold, too wet or dry, fungal/insect attack, windy conditions

woods can shrink or expand, rot

metals can rust, plastics can fade

award 1 mark for each sensible problem identified (2×1)

award 1 mark for each method to overcome problem

e.g. painted to protect, choice of material for specific environment (2×1) [4]

| Page 6 | Mark Scheme | Syllabus | Paper |
|--------|-----------------------|----------|-------|
| | IGCSE – May/June 2014 | 0445 | 32 |

- (g) End of **D** [or support] shaped to fit under roof (1)
 Reinforced using block or strip of wood (1)
 [Do not accept screwing of roof to shaped end of support]
 Details of materials and constructions used (0–2) **[4]**

13



- (a)
- (i) Award 1 mark for each cut shown above (5×1) **[5]**
 Incorrect orientation = 0 marks
- (ii) Quicker, more accurate, repetitive accuracy (2×1) **[2]**
 Template can be used as a 2D model
- (b) (i) Sketch to show work low in the vice to prevent it cracking (0–2)
 Added notes to describe how problem is overcome (0–1) **[3]**
- (ii) Award work piece clamped in position/use of machine vice (1)
 Award work piece supported underneath (1)
 Award slow speed of drill/correct cutting angle/pilot drills (1) **[3]**
- (c) Use of wet and dry paper, polishing wheel, mop and compound/polish (2×1) **[2]**
 Award any 2 items of equipment described
- (d) Heated over a line bender/strip heater/hot air gun to become soft (1)
 Use of former or round bar (1)
 Softened acrylic draped over former/round bar and held (1)
 Technical accuracy (1) **[4]**
- (e) Practical solution/ concept (0–3)
 Details of sizes and constructions (0–3) **[6]**
 [Materials used must be appropriate for 4 mm thick acrylic otherwise 0 marks]