

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0445 DESIGN AND TECHNOLOGY

0445/33

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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Section A

- 1 Three safety precautions: [3]
visor, work clamped, chuck guard, apron, fingers behind work, hair back, no loose jewellery
NOT ear defenders 3×1

- 2 Two advantages of chipboard: [2]
stable/will not warp, cheaper than solid wood, availability, wide boards, recycled wood, fewer defects, can be veneered to look like solid wood, environmentally friendly 2×1
NOT durable, easy to work, doesn't splinter, stronger, cheap

- 3 [3]

Use	Adhesive
gluing plastic laminate to a manufactured board table top	Impact / contact adhesive, 'Thixofix'
wooden boat building	Synthetic resin, 'Cascamite', waterproof PVA
gluing metal parts together	Epoxy resin, 'Araldite' NOT superglue

- 4 aluminium comb: anodised 1 [3]
NOT self-finished, electroplating
wooden chopping board vegetable/olive oil / no finish 1
NOT teak oil
handle of junior hacksaw: plastic / dipcoated/ powder coat 1

- 5 Two advantages of die casting: intricate designs possible, reusable moulds, little or no machining necessary, fast process, identical multiple parts, mass production possible [2]
2×1
NOT accurate, water resistance

- 6 Riveting / pop riveting [1]

- 7 (a) stronger, avoid splitting, more stable [1]

(b) round wire, French wire, oval wire/brad, panel pin [1]

(c) pincers, claw hammer [1]

- 8 **Completed marking out** of mortise and tenon joint. 3×1 [3]
1 mark = tenon, 1 mark = mortise, 1 mark correct spacing
Award 1 mark for drawing of completed M&T joint

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9	A facing off	B parting off	2×1	[2]
10	Food tray	polypropylene, GRP, melamine	1	[3]
	Plumbing pipe	MDPE, polythene, PVC, ABS	1	
	Curtain track	nylon, polypropylene, polythene NOT HDPE	1	

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Section B

11 (a) [4]

Stage	Tool / item of equipment	Use
1	Scriber	Mark lines to be sawn
2	Hegner or scroll saw	Cut off waste
3	Hand file	Make edges flat / smooth/accurate shape
4	Wet and dry paper	Fine finishing

(b) Two safety precautions: well-ventilated area, face mask, gloves or barrier cream, safety glasses, use tool to apply it 2×1 [2]

NOT apron

(c) Two properties of aluminium: easily bent, self-finished, attractive, malleable 2×1 [2]

NOT does not rust, waterproof, lightweight, durable

(d) Award 3×1 stages: **Do not reward marking out** [5]

- Drill hole 1
- Insert abra file blade, Hegner saw [or equivalent] piercing saw to saw to line 1
- File flat and smooth 1
- Technical accuracy: 2 correctly named tools / equipment 0–2

Use of cold chisel/hacksaws/ tinsnips: award maximum 4 marks

NOT laser cutter

(e) **Correct sequence of stages** include: [3]

degrease, steel wool, wet and dry [medium grit], wet and dry [fine grit], polishing mop, polishing compound, metal polish [Brasso] 3×1

NOT use of files, emery cloth, applied finishes

(f) Wooden former / jig / folding bars required 1 [5]
 Method of securing former / jig 1
 Application of force: mallet or hammer **and** scrap wood 1
 Ease to batch produce 1
 Technical accuracy 1

NOT use of bending machine

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- (g) (i) **CAD** accuracy, ease of editing, on-screen modelling, send designs electronically to clients, fully dimensioned drawings, can be outputted to linked machines **[2]**
NOT quicker, faster
- (ii) **CAM** consistent quality, repetitive accuracy, quicker production times, complex shapes can be created, minimum waste **[2]**
- 12 (a) Durable, hardwearing, water/weather resistant, attractive, tough **[1]**
- (b) Wide range of hardwoods available: elm, oak, mahogany, teak and softwoods including Douglas fir, cedar, pine **[2]**
 2×1
NOT beech
- (c) Paint, wood preservative, polyurethane varnish, oil, teak oil, lacquer **[2]**
 2×1
NOT beeswax
- (d) Modifications include added handles, cut out hand holds, rope and drilled holes **[4]**
 Practical idea 0–2
 Details of materials used **AND/OR** method of construction 0–2
- (e) (i) **For maximum 4 marks for each, full details must be provided and must be appropriate to the specific parts of the planter [12]**
- Wood screws:**
 rail---leg rail---base lower side---base
- NOT** sides---ends leg---lower side
- Nuts and bolts:**
 rail---leg rail---base
- Dowels and adhesive:**
 top side---lower side sides---ends leg---lower side rail---base
- Look for technical accuracy, appropriate construction 3×4
 Award 1 mark if only the parts of the planter are shown
- (ii) Stages include: **[4]**
 4×1
- Top and lower sides to ends
 Top side to lower sides
 Rails to legs
 Rail to base
 Leg to lower side
 Base to ends and/or lower sides
 Rails and legs to base
- Correct sequence not essential** as the parts can be assembled in different ways.

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- 13 (a) Award 3 areas of research identified: [3]
- 3×1
- Available resources/materials
 Relevant sizes of magazines, types and quantity required. Allow sizes only once.
 User preferences
 Location/environment
 Costs
 Existing products
- NOT** weight of magazines
- (b) speed, accuracy, awkward shapes can be repeated quickly, fewer mistakes means less waste [2]
- 2×1
- (c) (i) heated by means of strip heater/line bender 1 [3]
 use of former to bend around 1
 retain while acrylic cools 1
- NOT** left under water to cool
- (ii) the oven heats the whole of the acrylic 1 [2]
 making it difficult to achieve the sharp bend achieved by either
 the strip heater or the line bender 1
- (d) (i) Principle is to use some form of jig or to tape the strips together. [2]
 After using one strip use it as a measure for next strip.
 Award 0–2 marks dependent on technical appropriateness.
- NOT** laser cutter, template
- (ii) Award 0–2 marks for showing how the strips could be fixed and equally spaced [4]
 Award 0–2 marks for showing how the strips would be held while the cement sets
- Equal spacing requires some form of spacer the same size as the strip 0–2
 Method of fixing in position using cramps 0–2
- NOT** use of a rule to measure gap
- (e) (i) **Ends** shaped and made from specific named manufactured board: plywood, MDF 0–2 [6]
- Strips** shaped and made from specific named solid wood: wide variety available 0–2
- Methods of construction:** use of pins and/or screws with glue 0–2
- Award maximum 3 marks for total redesign

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(ii) Answers may include reference to specific points including:

Some plastics are not recyclable

Plastics are not biodegradable

Plastics made from oil, finite source

Plastics give off poisonous fumes during manufacture

Wood used to manufacture can be replaced

Woods can be recycled into manufactured boards

Award 1 mark for each relevant point made

0–3

[3]