

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

6043 DESIGN AND TECHNOLOGY

6043/01

Paper 1, maximum raw mark 95

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2014	6043	01

Part A

- 1** Sketch of folding bar. Used for bending sheet metal. (1 × 3) [3]
- 2** Two reasons for use – safe, hygienic, will not blunt the knife, easy to clean, etc. (1 × 2) [2]
- 3** Terms explained:
- (a)** P.V.C. – Polyvinyl Chloride [1]
- (b)** G.R.P. – Glass Reinforced Plastic [1]
- 4** **(a)** Tool name – die holder [1]
- (b)** For turning a die when cutting screw threads on rods or bars. [2]
- 5** Three simple workshop tests such as heating, cutting, bending, floating on water, smell, etc. (1 × 3) [3]
- 6** Two examples showing edge to edge joining of wooden boarding e.g. T&G, biscuit, slot screw, etc. (1 × 4) [4]
- 7** **(a)** Two examples of personal appearance safety problems such as tie, scarf, long sleeves, rings, jewellery, etc. (1 × 2) [2]
- 8** **(a)** Vacuum forming, blow moulding, injection moulding [1]
- (b)** Two reasons for using plastic such as easy to produce, easy to clean, lightweight, colourful, etc. [2]
- 9** Two faults in timber such as knots, shakes, cupping, resin pockets, twisting, etc. (1 × 2) [2]
- 10** **(a)** Purpose of wires – they are used to hold and pull together the joint ready for soldering. [2]
- (b)** The metal is soft iron. [1]

Part B

- 11 (a)** Three drilling devices identified and method of holding drill bit or boring tool explained.
- A Hand drill – hand tightened three jaw self-centring chuck.
 B Carpenters Brace – hand tightened 2 self-centring jaws with V-shaped slots.
 C Rechargeable electric drill – key tightened three jaw self-centring chuck. (3 × 3) [9]

(b) Notes and sketches showing:

- (i) Being hand operated it is very slow and the drill bit has problems drilling hard materials such metal.
- (ii) The ratchet allows a part turn to take place when a full turn is not possible.
- (iii) The speed of the device allows all sizes of drill bit to cut all materials easily and much quicker. Rechargeable, screwdriver speed, etc. (2 × 3) [6]

(c) Friction can be a problem for drilling bits or boring tools due to the heat caused, which can soften a tool steel cutting tool. (1 × 2) [2]

12 (a) The missing information on joining materials:

Joining situation	Joining medium to be used	Range of reasons such as
Acrylic to Acrylic	Tensol cement or other solvent	Softens the joining edges so that they can fuse together.
Brass to Pine	Epoxy resin or super glue	Bonds most materials together and give a very strong joint.
Oak to Oak	A wide range of glues such as casein, PVA, scotch, synthetic resin.	Wide range of reasons such as non-staining, waterproof, easy to use.
Tinplate to Tinplate	Soft solder	Low temperature method using an alloy to give a strong joint.
Melamine to Blockboard	Contact/Impact Adhesive	Gives an instant bond on contact. Used for joining large surfaces.

(3 × 5) [15]

(b) Two examples of how poorly prepared surface can affect joining, such as when the surfaces are not true, gaps, etc. dirty surfaces, grease, paint or other material can prevent good joining. (1 × 2) [2]

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2014	6043	01

- 13 (a)** Two properties of a material for the salad server – such as easy to form shape, easy to clean, hygienic, waterproof, colourful, etc. (1 × 2) [2]
- (b)** Materials considered:
- (i)** Acrylic – easy to shape, hygienic, waterproof, colourful. Brittle, not dish washer proof, etc.
- (ii)** Beech – strong, easy form shape, hygienic, nice appearance. Not waterproof, can stain, may splinter.
- (iii)** Copper – easy to form shape, colour, waterproof. Will discolour, may bend at this thickness, only one colour, sharp edges. (2 × 3) [6]
- (c)** How heat and steam are used on the three materials given in [b] to form shape.
 Beech – Use of steam container to soften and make wood more pliable for bending to curved shape.
 Acrylic – Use of oven to soften the acrylic so that it can be bent round a former.
 Copper is heated until a dull red [500 °C] and allowed to cool slowly this called annealing or softening the structure. (2 × 3 plus 1 extra detail) [7]
- (d)** Why it is difficult to cut shape or drill after bending. It would be difficult to hold the work piece safely, the accuracy of the drilling would be very poor, etc. (1 × 2) [2]
- 14 (a)** Safety factors when designing toys for children, such as no small parts which can be put in the mouth, no sharp edges, non-toxic paint, etc. (1 × 3) [3]
- (b)**
- (i)** Brazing the mild steel frame together – such cleaning and fitting joint area, material, fluxing joint, borax, supporting joint, wire, weight, heating, cherry red, spelter, melting, cooling.
- (ii)** Drilling the different parts – Marking out hole positions, holding tube and seat together, centre punch, drilling support and holding, drill size, action, head drilled with pilot holes, countersinking, screws, action, etc.
- (iii)** Cutting out the plywood head – Support vice/g-cramp, waste wood, limited vertical hold, type of tool, jig saw, coping or bow saw, chisel, rasp, spokeshave, glass paper, action, etc. (1 × 7 × 2) [14]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2014	6043	01

- 15 (a)** Two properties for step – must be strong, waterproof, easy to form shape, colourful, etc. (1 × 2) [2]
- (b)** Making the container by the methods given.
- (i)** Number of parts – four side pieces, cut to form leg shape, rebate to take top insert, mitre the ends to form frame, round edges/corners, glue and pin frame together, all tools and action, etc.
- (ii)** One piece – this may be cast, blow moulded, injection moulded, etc. [Difficult from a solid mass?] Must have all the process such as casting – mould, cope and drag, sand, ramming, sprues, runner, riser, vents, etc. (1 × 6 × 2) [12]
- (c)** Sketches showing improved aid – Some form of grip system on feet, top surface, material, etc. (1 × 3) [3]
- 16 (a)** Danger – the small pieces can prove a danger for small children who may put them in their mouths and swallow them. (1 × 2) [2]
- (b)** Notes and sketches describing the making of:
- (i)** the board – may be made from solid material, injection moulding, cast, etc. Process must relate to material with all tools, materials, action, etc. (1 × 6) [6]
- (ii)** the pieces – these should be made of a lathe, woodworkers, centre, with all details of holding, support, cutting tools, finishing, action, etc. (1 × 6) [6]
- (c)** Design element of pieces must have two differing sets, such as noughts and crosses, etc. Marks, cuts, other possible methods. (1 × 3) [3]
- 17 (a)** Two possible sheet materials and reasons for choice – such as copper, acrylic, brass, teak, silver, etc. Decorative, easy to work, lightweight, colourful, etc. (2 × 2) [4]
- (b)** Details of making ring such as from sheet material, marking out, cutting to shape, tools, action, finishing, heating, former, bending, etc. All action, materials and tools. (1 × 7) [7]
- (c)** Two ideas for holders – may vertical or horizontal, material into which four rings must store, be decorative, functional, practical. (1 × 3 × 2) [6]

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2014	6043	01

- 18 (a)** Will depend of shelving material, so may be mild steel, nylon, plywood, etc. With two reasons such as strength, tough, rigid, lightweight, etc. (1 × 3) [3]
- (b) (i)** Marking out described – must relate to material such as metal-marking blue, scribe, ruler, try square, odd leg calliper, dot punch, centre punch, etc. (1 × 4) [4]
- (ii)** Making the slot – supporting, clamping, drilling end holes and slot, cutting out waste from slot, saw, file or chisel, finishing, etc. (1 × 4) [4]
- (iii)** Cutting to shape – holding work, vice/g-cramp, bench, saws, corner shaping, tools, glass paper, etc. (1 × 4) [4]
- (c)** Reasons for slot explained, useful for adjustment or alignment, bolts or screws can be positioned more easily, etc. (1 × 2) [2]