

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

**MARK SCHEME for the October/November 2010 question paper
for the guidance of teachers**

6043 DESIGN AND TECHNOLOGY

6043/01

Paper 1, maximum raw mark 95

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Part A

- 1 Sketch of:
(a) mortice hole, (b) tenon. (2 × 2) [4]
- 2 **Two** methods of joining such as rivets, screws, Brazing, etc. (2 + 1) [3]
- 3 The process is extrusion moulding. (1 × 2) [2]
- 4 Anthropometric data is the 'measurement of man'.
So that designs will fit a certain group of people. (1 × 2) [2]
- 5 **Three** safety features such as no sharp edges, non-toxic paint, no loose parts,
strong construction, etc. (1 × 3) [3]
- 6 **Two** fixing devices named.
A hexagonal nut
B plain washer (1 × 2) [2]
- 7 **Two** ways to heat acrylic – from strip heater, oven, gas torch, etc. (1 × 2) [2]
- 8 In **A** the place is cutting with the grain,
in **B** it is cutting against the grain so tearing it. (1 × 2) [2]
- 9 Sketched joints
(a) folded edge
(b) wired edge
or added edge (2 × 2) [4]
- 10 (a) The plastic is flexible so can bend, it is also hygienic and easy to clean.

(b) Injection moulding. (2 + 1) [3]

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Part B

11 (a) Three saws identified and example of use.

A – tenon or dovetail saw – used for cutting accurate woodwork joints such as the tenon, dovetail, etc.

B – hacksaw – used for general cutting of metal and plastic.

C – coping saw – used for cutting curves in both wood and plastic. (2 × 3) [6]

(b) (i) The thicker material is called a **back** and helps to keep the blade straight and give it extra weight to cut more easily.

(ii) The wing nut is used to loosen the blade when blunt so it can be replaced, then to tension the new blade when replaced.

(iii) The two pins are used as a **guide** to keep the blade in line when it is being turned into a new position. They also hold the blade. (2 × 3) [6]

(c) Sketch of **one** other saw and its purpose explained.

May be bow, hand, tension, junior, piercing, etc. (1 × 5) [5]

12 (a) Copy of chart

Practical task	Danger Involved	Special clothes or equipment needed
Turning hardwood on a lathe	In the main wood dust and splinters being thrown into the face and eyes.	It will need two items of protection: (a) face mask for the dust and (b) a face shield for the eyes.
Laying up a mould with G.R.P.	Two areas of danger (a) the fumes given by the resin and (b) the handling of materials.	This again will need (a) face mask for the fumes and (b) rubber gloves for the hands.
Cleaning copper in an acid bath	Acid is a very dangerous material and can burn clothing, bare skin, eyes.	We need to wear a suitable apron, rubber gloves, tongs and a face shield.
Cutting sheet polystyrene with a hot wire cutter	In this case it is the toxic fumes that are a danger when the sheet is cut.	We need to wear a face mask and have good ventilation in the room.
Casting molten aluminium	This time we are working with very hot liquid metal which can burn both us and our clothes badly.	Its important that the correct clothing is worn such leather leggings, apron and gloves. We should also use a face shield.

(3 × 5) [15]

(b) Any form of dust from wood, plastic, etc can cause breathing and lung complications; it can also get into the eyes giving painful sight problems. Certain dusts can also cause skin reactions as well. (1 × 2) [2]

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13 (a) Use stated.

- (i) M.D.F. board – is a useful lightweight board which comes in large sheets and is used for general indoor use. It takes paint well and gives a smooth surface finish. It is ideal for furniture, wall boarding etc.
- (ii) Mild steel tube – is a very lightweight material with excellent strength. It can be bent into different shapes quite easily without losing its strength. It could be used for a go-kart frame, lightweight chairs, etc.
- (iii) Expanded polystyrene foam – is a very lightweight material, buoyant in water, with excellent thermal insulation properties. It can be used as packaging for items such as electrical equipment, food insulation, etc.

(3 × 3) [9]

- (b) (i) Chipboard sheeting – is mainly used because it is low cost and can be hidden with a more expensive covering of plastic or real wood.
- (ii) P.V.C. is a cheaper option than real leather and other more expensive fabrics. However, it is hardwearing and can be obtained in a range of colours, sizes, etc.
- (iii) Copper wire is used because it is a good conductor of electricity and will resist corrosion. It is also very soft and malleable.

(2 × 3) [6]

- (c) **Two** reasons for working materials in liquid form: (i) Enables components to be made easily and cheaply without the need for expensive machine. (ii) Complex shapes can be made without the need to fabricate.

(1 × 2) [2]

14 (a) Reason for selecting and rejecting.

- (i) Aluminium – can be easily cast to the complex shape, strong, etc. Will be quite heavy, could hurt someone if dropped, etc.
- (ii) Birch plywood – will take some time to cut out the shape, not waterproof, etc. Lightweight, easy to carry, takes a good finish, etc.
- (iii) Nylon – can be cast to shape, tough, etc. limited colour range, etc.

(2 × 3) [6]

- (b) (i) Method of base production – this must relate to one of the materials in (a) – so could be casting, cutting from solid, vacuum forming, etc. Process described in detail, tools, equipment, materials, etc.

(1 × 7) [7]

- (ii) Sketch of **two** locating and fixing methods for the pegs – hole, shoulder, peg, threaded, riveted, etc.

(2 × 2) [4]

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15 (a) Suitable material chosen and **two** valid reasons, such as easy to bend, colourful, hygienic, easy to clean, etc. (1 × 2) [2]

(b) Using material in **(a)** – with notes and sketches.

(i) cutting out slots – holding, drills, drilling, holding, saws, cutting, finishing, tools, etc.

(ii) cutting outside shape – holding, cutting, shaping, finishing, tools etc. (2 × 5) [10]

(c) Forming the shape explained – must relate to chosen material, mould, formers, heating, bending, etc. (1 × 5) [5]

16 (a) **One** reason for each material:

(i) hanging cord – nylon: tough, weather resistant, resistant to temperature extremes, colourful.

(ii) chimes – copper: good sound quality, weather resistant, nice colour, etc. (1 × 2) [2]

(b) **Two** of the following processes describing the making of the house in detail:

(i) injection moulding – plastic powder, hopper, heater, screw, ram, mould, cooling, etc.

(ii) built up – marking out, cutting to shape, hole, method of joining, holes, screws, glue, etc.

(iii) casting – pattern, boxes, sand, ramming, sprue pins, runner, riser, etc. (7 × 2 plus 1 for extra detail) [15]

17 (a) Reasons for using given material:

(i) mild steel tube – strong structure, lightweight, easily joined and coloured.

(ii) mahogany – attractive colour, strong hardwood, easily worked, durable.

(iii) polyurethane lacquer – clear, lets the colour of wood show, hardwearing, waterproof, etc. (2 × 3) [6]

(b) **Two** of the following processes described:

(i) boring a hole for rail – holding, working as a pair, drill type, size, action, etc.

(ii) screwing slats to supports – clearance hole, pilot hole, countersunk, screw type, action, etc. – spacing of slats.

(iii) lacquering the mahogany – cleaning the surface, bush, tin, action, time factor, coats, etc.

(5 × 2 plus 1 for extra detail) [11]

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18 (a) Three features – must be waterproof and not corrode, lightweight so it can turn in the wind, tough enough to withstand strong winds, clear lettering, etc.

(1 × 3) [3]

(b) (i) Method of creating the letters described:

marine plywood – may be painted, stained, added material, burnt, etc.

brass – cut out, added material, colouring, etching, etc.

acrylic – cut out, added material, transfers, stickers, etc.

(2 × 3) [6]

(ii) Joining method explained:

compass letters to support plate – must relate to chosen material, such as cut slot in disc, fit letter into slot, method of fixing or similar method.

(1 × 3) [3]

(c) Turning boss on lathe – holding, facing, turning down, boring, parting off.

(1 × 5) [5]