
DESIGN AND TECHNOLOGY

6043/01

Paper 1 Technology

For Examination from 2016

SPECIMEN MARK SCHEME

2 hours 30 minutes

MAXIMUM MARK: 100

This document consists of **6** printed pages.

Part A – All questions to be answered.

- 1 Any two of the following simple tests – cutting, heating, smell, scratch, flame colour, etc. (1 × 2) [2]
- 2 (a) Tool maker's clamp. [1]
- (b) Parallel grip for holding small pieces together for assembling, riveting or screwing. [1]
- 3 Knock down fitting – used on manufactured boards such as chipboard, blockboard, that make up modern furniture. Flat pack and self assembly. [2]
- 4 (a) Two reasons from lightweight, absorbs shocks, heat insulator, sound insulator. (1 × 2) [2]
- (b) One reason such as pollution, lack of biodegradability, harmful to wildlife. [1]
- 5 **Processes**
- (a) Laminating – shape built up with layers of material bonded together. [1]
- (b) Blow moulding – shape created by blowing compressed air onto a softened plastic surface. [1]
- (c) Casting shape is formed by pouring a molten material into a hollow mould. [1]
- 6 Sketch of
- (a) hexagonal bolt. [2]
- (b) butt hinge. [2]
- 7 (a) Name – such as coping, fret, vibro, etc. with reason, small thin blade which can cut round corners. [2]
- (b) Stop splitting by fixing paper or tape on reverse side of plywood. [2]
- 8 Two reasons from – wide range of colours, hard, strong, heat and stain resistant, hygienic, etc. (1 × 2) [2]
- 9 Three wood adhesives from – scotch, casein, synthetic resin, PVA, resorcinol, epoxy, etc. (1 × 3) [3]
- 10 Swarf is the sharp metal waste material that is produced when drilling or cutting on a machine such as the lathe. It can cut a person's hand if touched, flying swarf dangerous to eyes, etc. (1 for explanation plus 1 × 2 for two ways) [3]

**Part B – Two questions to be answered from Section 1,
two questions to be answered from Section 2.**

Section 1 – Tools and Materials

- 11 (a)** Three tools identified and use stated.
 A – **Tin snips (straight)** – cutting thin sheet metal or plastic
 B – **Pincers** – pulling out nails from wood
 C – **Combination pliers** – used to grip small items (2 × 3) [6]
- (b) (i)** It is limited in that it can only cut straight lines and thin sheets of metal. [2]
- (ii)** The jaws of the tool grip the nail just under its head, the rounded outside shape of the tool is now rolled over with the long handles so giving good leverage. [2]
- (ii)** The tool can grip both flat and round material, it can also cut thin wire, and shear thicker wire. [2]
- (c) (i)** Sketch of forge tongs, this may be any type; purpose, handling hot metal.
(2 for sketch plus 1 for purpose) [3]
- (ii)** Sketch of tap wrench; purpose, holding and turning hole threading taps.
(2 for sketch plus 1 for purpose) [3]
- 12 (a) Purpose** – to remove scratches or marks and give a smooth surface. (1 × 2) [2]
- (b) (i)** Wood dust is airborne, also an irritant and can cause respiratory and eye problems.
- (ii)** Copper issues related to the poisonous effect of this metal in water systems, soil, etc.
- (iii)** Issues related to plastic dust and also its inability to biodegrade.
(1 × 3 plus 1 for extra detail = 4) [4]
- (c)** Sketches showing the following –
- (i)** an abrasive paper wrapped around a file blade, rubbing a piece of work held in a vice or on a block.
- (ii)** an abrasive paper wrapped around a wooden block and rubbing a work piece in one direction. (3 × 2) [6]
- (d)** Sketch showing the
- (i)** use of a chisel blade on an oil stone, being rubbed forward and back (sharpening).
- (ii)** use of screwdriver on a grindstone, angle setting (grinding). (3 × 2) [6]

13 (a) **Specific** material and **one** reason.

- (i) **Metal** such as brass, copper, aluminium – gold, bronze, silver colour, durability, working qualities, ability to take a high polish. (1 + 1) [2]
- (ii) **Plastic** – acrylic, nylon, polythene – wide range of bright colours, hygienic, water resistant, working qualities. (1 + 1) [2]
- (iii) **Wood** – pine, teak, mahogany, etc. – colour/texture, grain pattern, ease of working, availability, lightweight. (1 + 1) [2]

(b) Names and sketches of tools and materials used to

- (i) join the three parts together – must relate to the materials chosen e.g. beech and mahogany – adhesive named and clamping tool sketched. [3]
- (ii) method of holding work and tool used to drill the finger hole. Could be machine vice and tank cutter, etc. [3]
- (iii) method of holding and tools used for cutting the outside shape. Could be bench vice and coping saw, band saw, etc. [3]

- (c) Two of the materials, metal and plastic, are both reusable to a small degree but rely on large amounts of energy to reform them and in the main use limited natural resources. Wood is the only one that can be said to be sustainable, by replanting and growing new trees. Other reasons relating to sustainability of timber/wood include: beneficial environmental/natural effects of re-growing; the material is easier/cheaper to recycle/re-use; it is also biodegradable making it easier/safer to dispose of. (1 + 2) [3]

14 (a) Copy of chart.

Material	Process / Use	Reason for use
Soft solder	Joining together metals at low temperatures and in small areas.	Because the joining takes place at very low temperatures, such things as electrical components can be joined without damage.
Acid	Used when cleaning non ferrous metal.	Before metal can be shaped it is heated to soften. This causes oxides to form. Only a diluted sulphuric acid can clean the surface.
Plastic cement	Used when joining acrylic to acrylic.	The Tensol cement is in fact an acrylic solvent. When applied to both surfaces they can be bonded and left to harden.
Wire wool	Used when finishing the surface of wood.	The wire wool acts as a very fine abrasive, and is mainly used in the final stages of polishing.
Sand	Used in the casting of hot metals.	When mixed with a degree of water or oil, sand can be made to take up the shape of an object into which hot metal can be poured.

(1 for process/use, 2 for reason, $1 \times 5 + 2 \times 5$) [15]

(b) Lead is a very toxic material when handled or heated, giving off fumes, so quite dangerous when soft soldering. It can also build up in the environment polluting water, etc. (1 × 3) [3]

Section 2 – Processes

15 (a) Material named and process given – such as aluminium, nylon, processes such as casting, injection moulding, etc. No waste by these methods as surplus material can be reused. (1 + 2) [3]

(b) Processes described (must relate to material in (a)), the material could be wood, metal or plastic. Must involve tools, equipment, stages in the process. (1 × 8) [8]

(c) (i) Sketch of the design that could be applied to the peg – could be a figure or pattern, etc. [2]

(ii) Design applied to surface explained – may be inlay, paint, transfer, etc. Details of tools, method, etc. (1 × 5) [5]

16 Notes and sketches on **two** of the following –

- (a) mild steel bars cleaned, fluxed, area fluxed, soft iron, wired, brazing hearth, brazing torch, spelter, types, heating, temp, cooling, etc.
- (b) cutting the dovetail joint first, holding, dovetail saw, angles, straight cuts, marking for second piece, holding upright in vice, cutting verticals, coping saw, removing centre waste, trimming with chisel, fitting.
- (c) cleaning, heating base, oven or strip heater, former, bending, masking, joining area, Tensol, application, holding, etc. (1 × 9 × 2) [18]

17 (a) Any suitable material that can provide the strength at this section e.g. beech. Joining must be moveable – e.g. rivet, screw, etc. (1 + 1) [2]

- (b) (i) Marking out the arms – must relate to chosen material e.g. wood-pencil, ruler, try square, gauge, dividers, etc. [5]
- (ii) Cutting to shape – holding method, cutting, saw, shaping tools, etc. [5]
- (iii) Suggested alternative more efficient method of producing the arm – could be injection moulding, die casting, drop forging, etc. Little or no waste and speed of production. [2]

- (c) Notes and sketches describing fitting pegs to rack – must be some form of countersunk rivet system, drilling, countersinking, peg shape with a shoulder, spacer between arms, holding, riveting. [4]

18 (a) Sketches and notes showing the processes – (1 mark for suitable materials and 4 marks for description of process)

- (i) Supporting and cutting the holes – the work cannot be done on a drilling machine. Working as a pair, supporting, waste material, clamping, tools, action, etc. (1 + 4) [5]
- (ii) Spacing and positioning bars, holding, drilling or marking for fixing, method of fixing, nails, screws, tools, etc. (1 + 4) [5]
- (iii) Construction of support legs, built up, joints, welding, adhesives, fixings, etc. (1 + 4) [5]

- (b) Sketch of a release system – could be a hinged bottom bar with a quick release catch, pin release bottom bar, etc. [3]