

Part A

Attempt **all** questions.

- 1 Fig. 1 shows a plastic bucket.

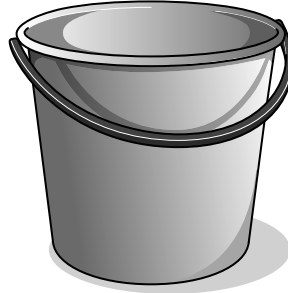


Fig. 1

(a) State a suitable plastic for the manufacture of a plastic bucket.

(b) Give a reason for your choice of plastic. [2]

- 2 Sketch the following marking out tools.

(a) marking gauge

(b) scribe [4]

- 3 (a) Define what is meant by the terms:

(i) ductility

(ii) elasticity. [2]

(b) Name a material that is:

(i) ductile

(ii) elastic. [2]

- 4 Fig. 2 shows a tool used on a lathe.



Fig. 2

Name the tool shown in Fig. 2 and describe how it is used. [2]

5 Fig. 3 shows a wood joint.

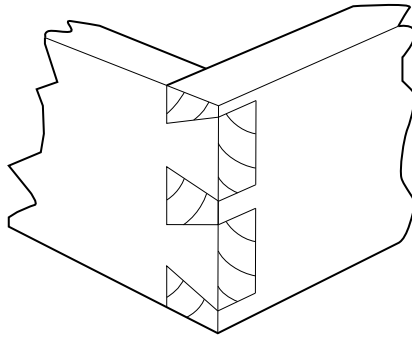


Fig. 3

(a) Name the wood joint shown in Fig. 3.

(b) Identify a product which uses the wood joint in its construction and explain why the joint is appropriate. [3]

6 A former used on a vacuum forming machine has features that ensure successful forming.

Use a sketch to show **two** features of a former that will ensure a successful vacuum formed shape. [2]

7 Give **two** reasons why aluminium is used for the manufacture of window frames. [2]

8 Name the abrasive that would be used to:

(a) finish the edge of a piece of acrylic sheet

(b) smooth the surface of a length of 50 × 25 section softwood

(c) clean the surface of a length of 18 × 3 section mild steel strip. [3]

9 Use a sketch to show how you would plane the end grain of the hardwood shelf shown in Fig. 4. [2]

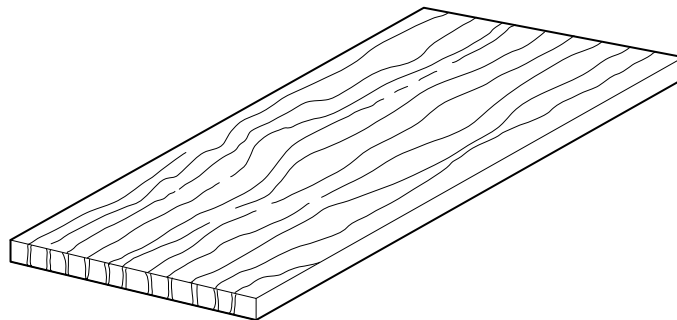


Fig. 4

- 10 (a) A key tag with keys and the key tag shape are shown in Fig. 5.
Two identical acrylic key tags are required.

Describe how you would mark out the shapes on a sheet of acrylic.

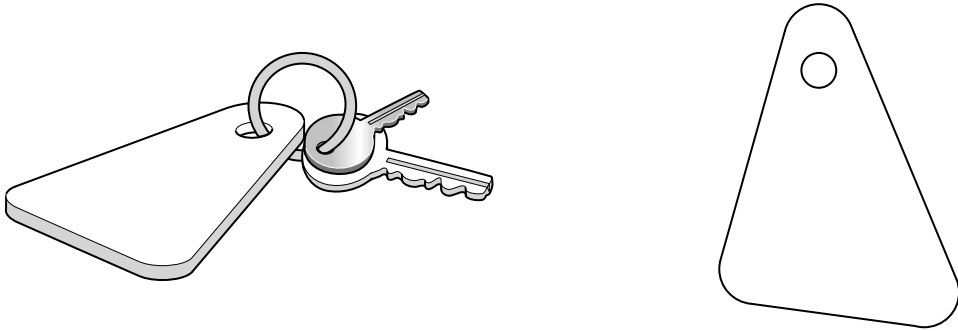


Fig. 5

- (b) Fig. 6 shows an acrylic shape which is to be added to the key tag.

Describe how you would permanently attach the shape to the key tag.

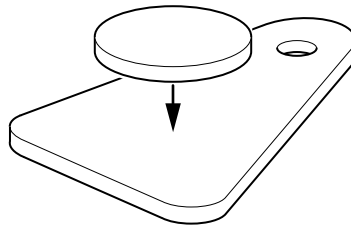


Fig. 6

[4]

Part B

Attempt **four questions**, **two** from Section 1 and **two** from Section 2.

All questions carry equal marks.

Section 1 – Tools and Materials

11 Three different saws are shown in Fig. 7.

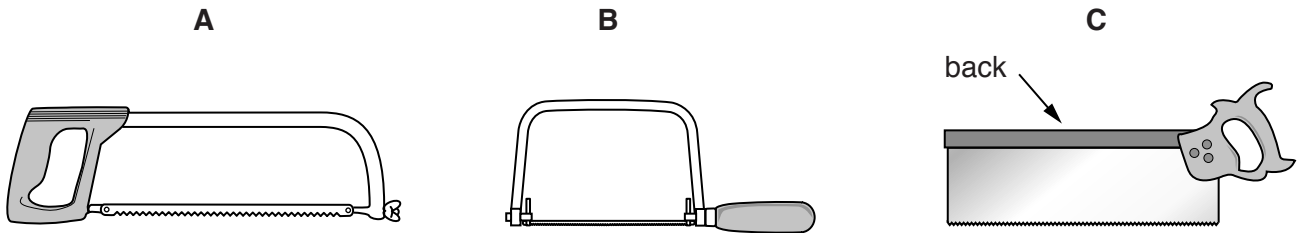


Fig. 7

- (a) Name the saws shown in Fig. 7 and state a use for each. [6]
- (b) Explain:
- (i) why the blade in saw **A** can be fixed at 90° to its normal cutting position
 - (ii) how the blade is held and tensioned in saw **B**
 - (iii) the purpose of the 'back' on saw **C**. [6]
- (c) Sketch the following and explain the purpose of each.
- (i) tension file
 - (ii) hole saw [6]

12 Modern and smart materials are being increasingly used in the design and manufacture of products.

(a) Copy and complete the chart below.

Smart material	Properties/function	Product application
Colour changing materials		
Shape memory alloys		
Quantum-tunnelling composite		
Piezo electric materials		

[12]

(b) Briefly explain the sustainability issues relating to products made of **two** of the following material groups.

- (i)** wood
- (ii)** metal
- (iii)** plastic

[6]

13 Fig. 8 shows items of personal protection equipment that would be used in workshops.

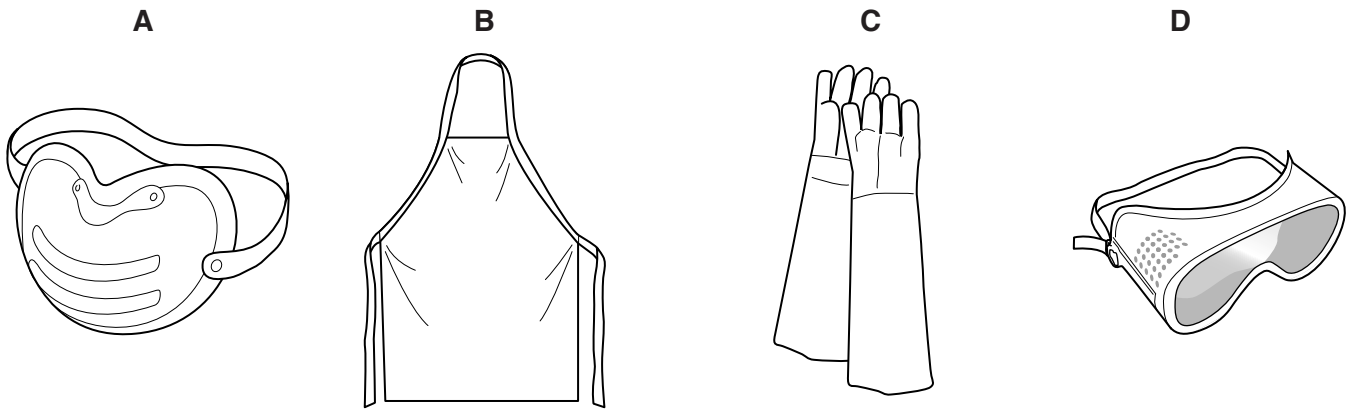


Fig. 8

- (a) Name and describe a specific use for each item of personal protection equipment shown in Fig. 8. [8]
- (b) Describe the health and safety precautions, other than the wearing of personal protection equipment, that you would consider when:
- (i) using a wood chisel in a workshop
 - (ii) facing off a length of $\text{Ø}20$ aluminium bar
 - (iii) working with a contact adhesive. [6]
- (c) Describe, using a sketch and notes, how you would safely drill a $\text{Ø}10$ hole in the centre of a 500×500 sheet of 2 thick mild steel. [4]

14 Fig. 9 shows a prototype design of a cycle helmet for a young adult.

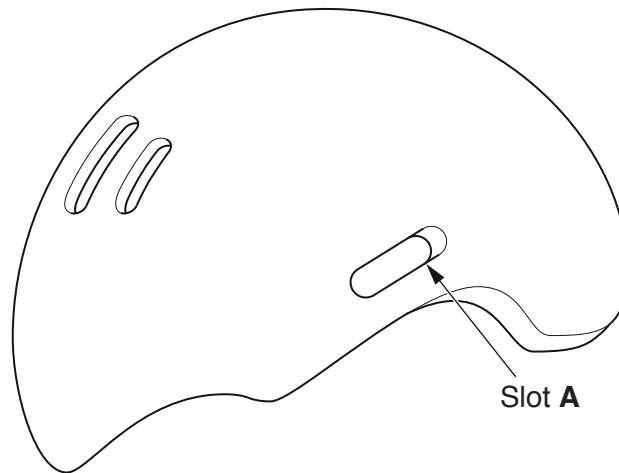


Fig. 9

- (a) State **two** properties that a material should have to be suitable for a cycle helmet. [2]
- (b) A range of materials for the cycle helmet was proposed but rejected. Give reasons why the following materials would not be suitable.
- (i) Mild steel
 - (ii) Acrylic
 - (iii) Plywood [6]
- (c) Describe **one** simple test that could be used to check that a material has appropriate properties to be used as a cycle helmet. [3]
- (d) (i) State a suitable material to use to make the prototype cycle helmet. [1]
- (ii) Sketch **two** tools that could be used to make slot **A** in the helmet. [6]

Section 2 – Processes

15 Fig. 10 shows the outline design of a toothbrush holder.

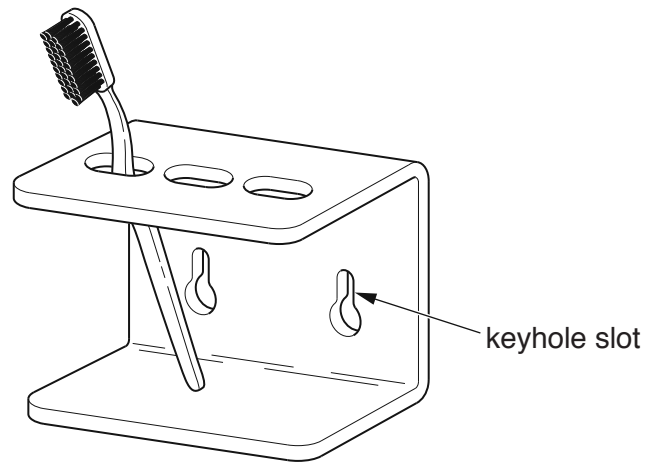
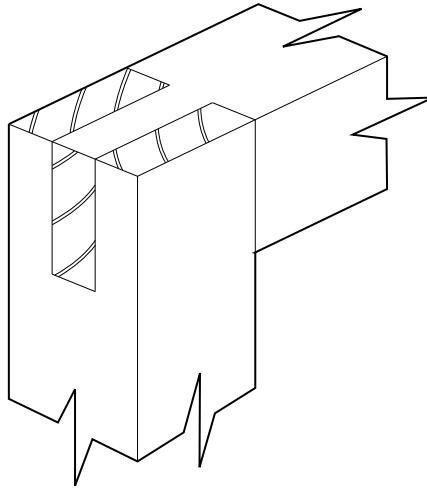


Fig. 10

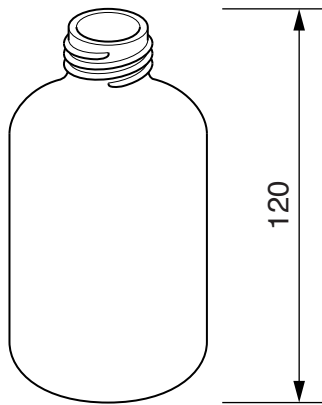
- (a) Choose a suitable material for the toothbrush holder and describe how you would finish the material. [2]
- (b) For the material chosen in (a), use sketches and notes to describe:
- (i) the process of marking out the keyhole slots [4]
 - (ii) the process of cutting the slots for the toothbrushes [4]
 - (iii) how the bends in the toothbrush holder would be formed. [5]
- (c) The toothbrushes do not stand upright when placed in the holder.
Use a sketch to show how you would modify the design to prevent this from happening. [3]

16 Choose **two** of the following processes from Fig. 11.
For each, use sketches and notes to describe how they are carried out.

(a) Cutting out a bridle joint for a chair frame made from hardwood.



(b) Blow moulding a HDPE shampoo container.



(c) Turning a brass light pull.

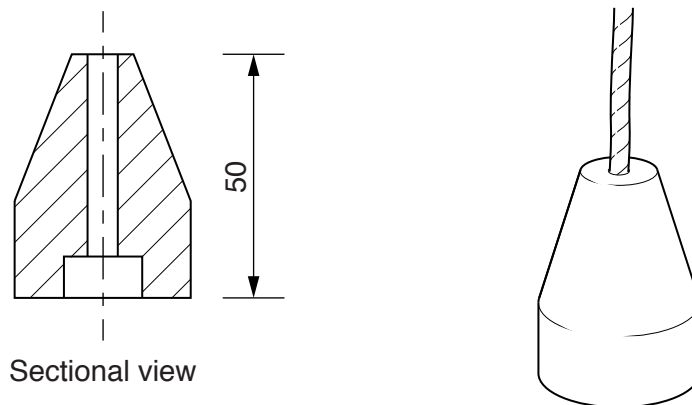


Fig. 11

[18]

17 Details of an idea for a study lamp are given in Fig. 12.

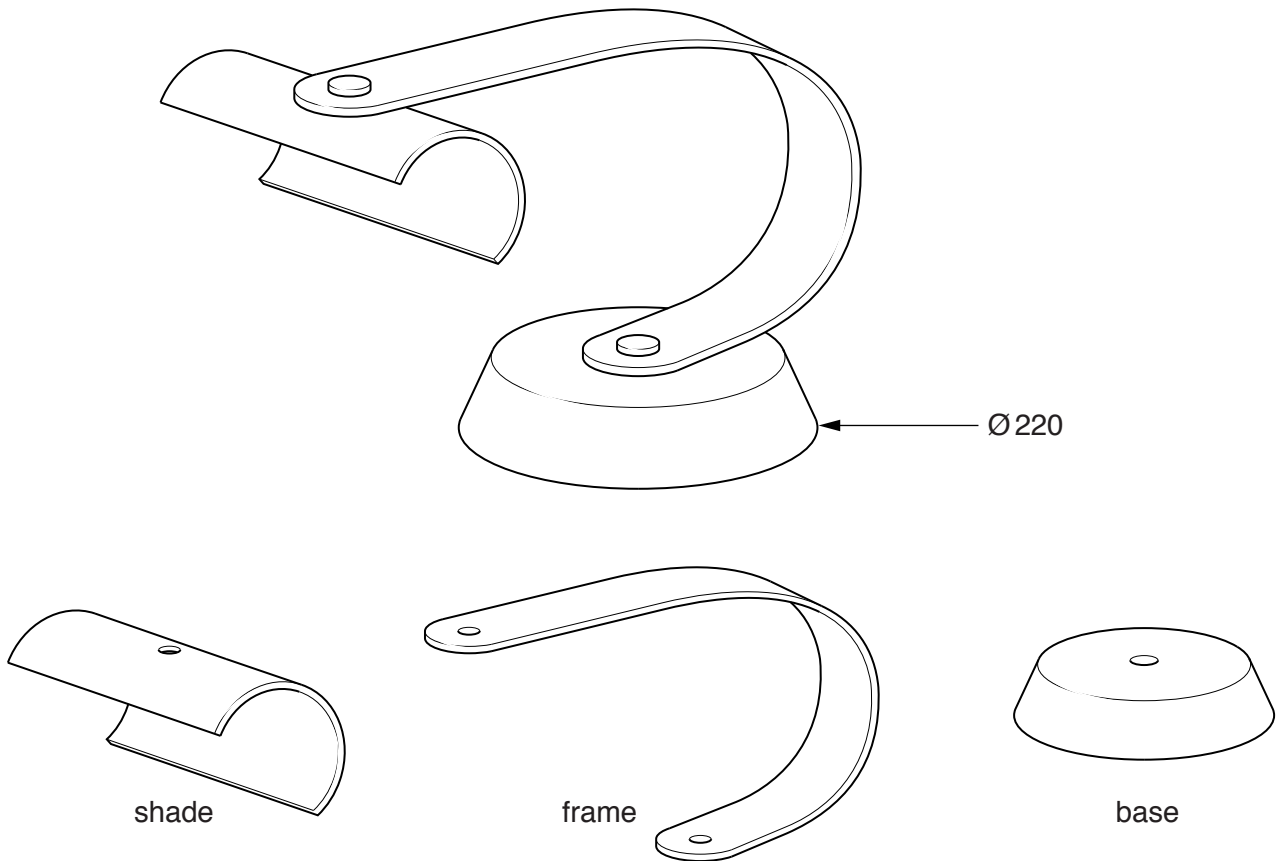


Fig. 12

- (a) For each named part of the study lamp, identify suitable materials to be used and describe, using sketches and notes, the following processes:
- (i) forming the frame to shape [5]
 - (ii) making the shade [5]
 - (iii) making the base. [5]
- (b) Design, using a sketch and notes, a method of attaching the frame to the base that will allow the frame to rotate. [3]

18 The design for a child's toy is given in Fig. 13.

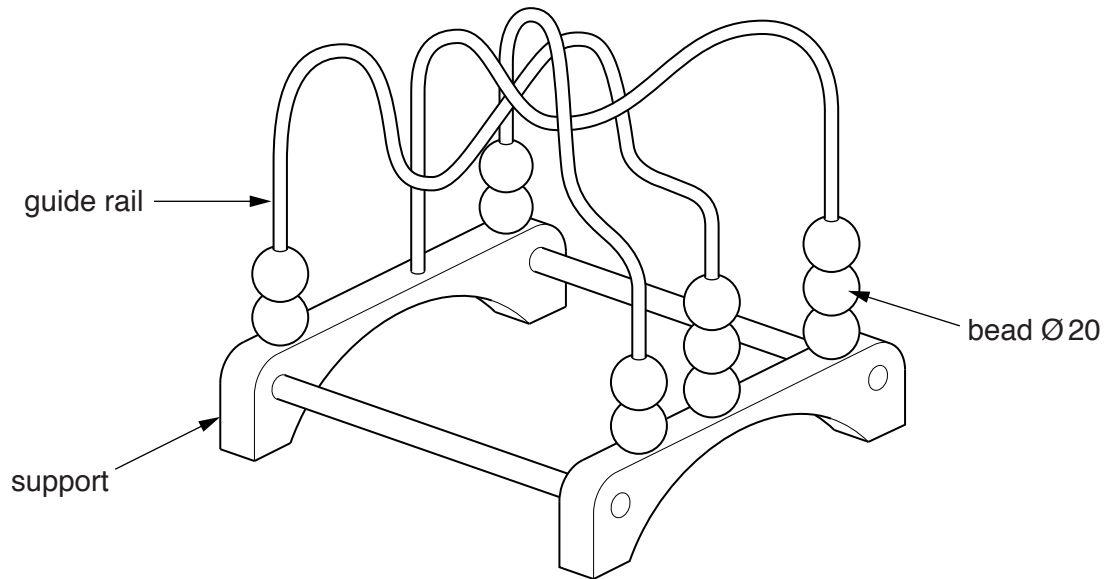


Fig. 13

(a) Suggest suitable materials for:

- (i) the supports
- (ii) the guide rails
- (iii) the beads.

Give a reason for each choice.

[3]

(b) Using the materials chosen in (a), describe, using sketches and notes how to:

- (i) cut one support to shape
- (ii) join a guide rail to the support
- (iii) make a bead.

[12]

(c) Explain how you would apply colour to the guide rails and the beads.

[3]

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