Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

DESIGN & TECHNOLOGY **0445/33**

Paper 3 Resistant Materials **May/June 2025**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Section A: answer **all** questions.
- Section B: answer **one** question.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Answer in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].
- All dimensions are in millimetres unless otherwise stated.

This document has **24** pages. Any blank pages are indicated.

DC (WW/SW) 343375/2

[Turn over

Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows timber being seasoned naturally in the open air.

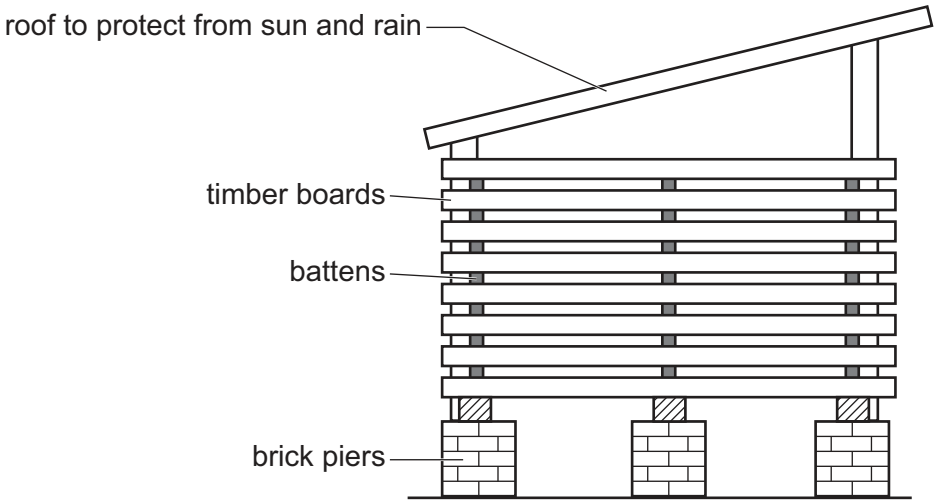


Fig. 1.1

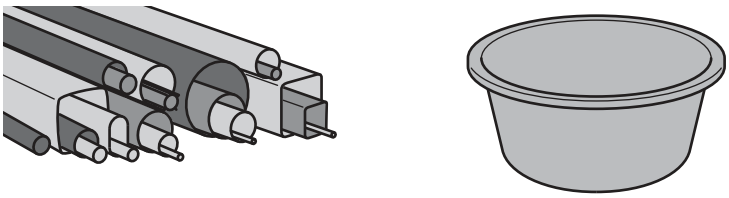
Explain why timber needs to be seasoned.

.....

.....

..... [2]

2 Fig. 2.1 shows two products, lengths of tube and a washing-up bowl, made from plastic.



tubes washing-up bowl

Fig. 2.1

Name a specific process that could be used to manufacture:

(a) the tubes

..... [1]

(b) the washing-up bowl.

..... [1]

3 Fig. 3.1 shows strips of hardwood glued and clamped together to make a chopping board.

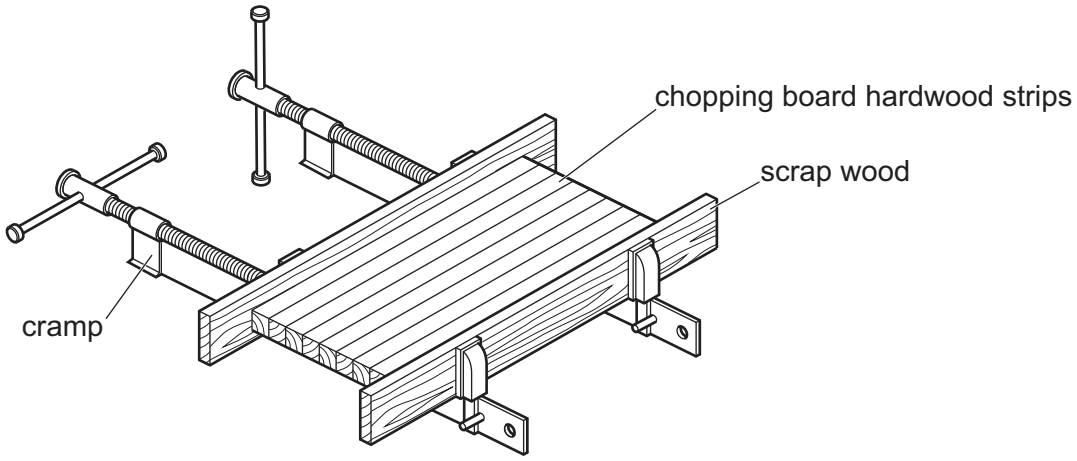


Fig. 3.1

(a) Name the type of cramps used.

..... [1]

(b) Give **two** reasons for the use of scrap wood.

1 .....

2 .....

[2]

4 Fig. 4.1 shows two tools, **A** and **B**, being used on the end of a round metal rod.

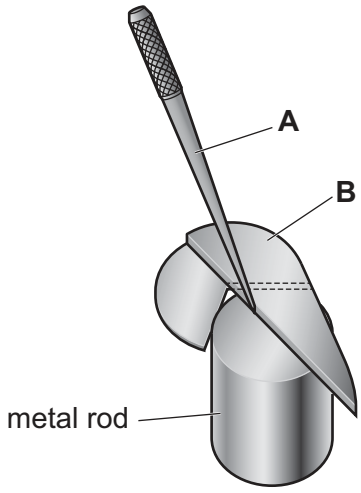


Fig. 4.1

Name tools **A** and **B**.

A .....

B .....

[2]

5 Fig. 5.1 shows a basic design for a letter rack made from 4 mm thick acrylic.

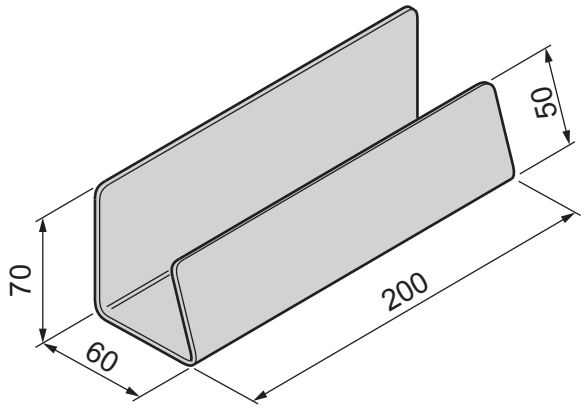


Fig. 5.1

(a) Draw a former that could be used when bending the acrylic to the shape of the letter rack.

[2]

(b) Give **one** advantage of using a line bender/strip heater rather than an oven to heat the acrylic so that it could be bent to shape.

.....

.....

..... [1]

6 Fig. 6.1 shows a handle made from polymorph.
Polymorph is a thermoplastic supplied as granules.

Fig. 6.1

Describe how the granules are used to make the finished handle.

.....

.....

..... [2]

7 Complete Fig. 7.1 to show a tee halving joint.

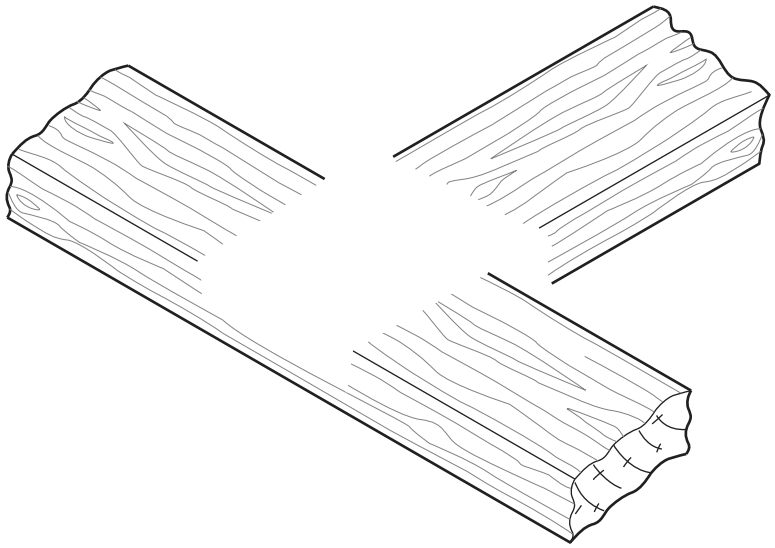


Fig. 7.1

[3]

8 Fig. 8.1 shows a box with a hinged lid.

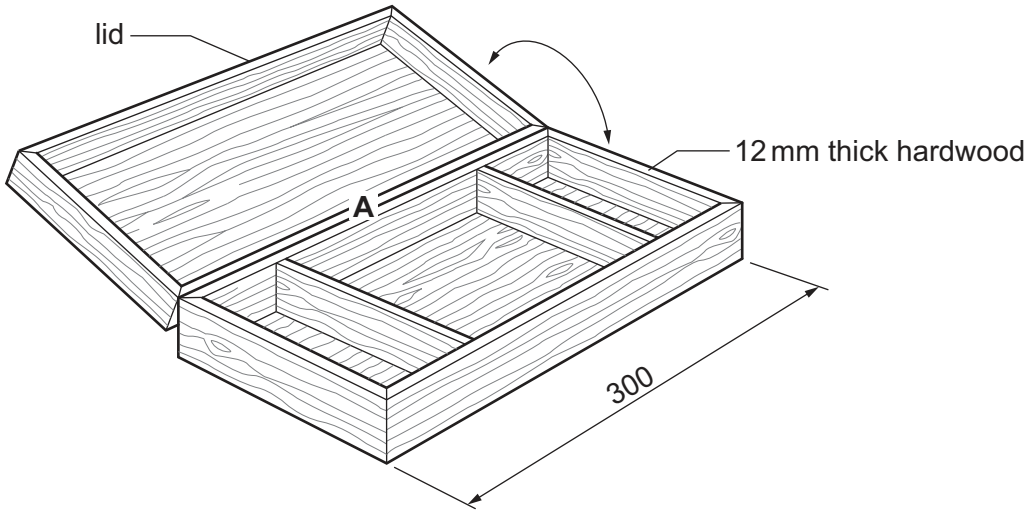


Fig. 8.1

Sketch and name a suitable hinge that could be used to join the lid to the box at **A** shown in Fig. 8.1.

[3]

9 Fig. 9.1 shows details of a jig used when bending a brass strip to shape.

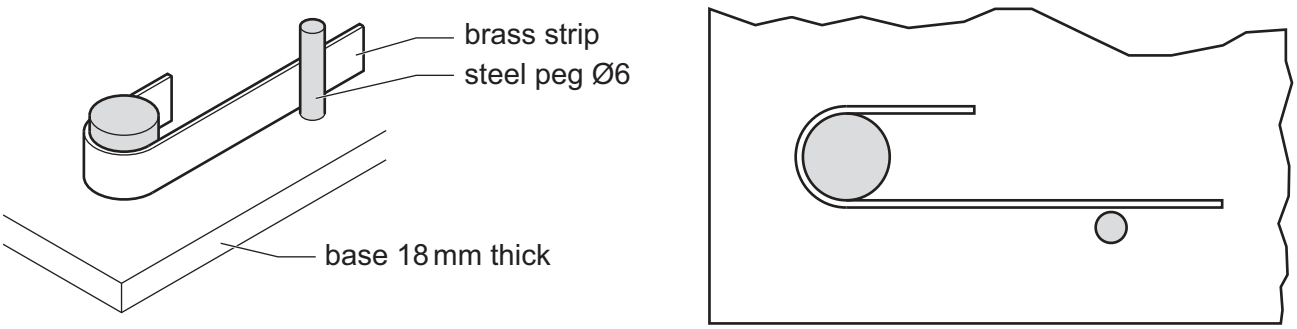


Fig. 9.1

Add sketches and notes to Fig. 9.1 to show how **three** additional steel pegs could be used so that the brass strip could be bent to the shape shown.

[3]

10 Fig. 10.1 shows two office chairs, **A** and **B**.

A **B**

Fig. 10.1

Identify **one** design feature on each chair.

Chair **A**

..... [1]

Chair **B**

..... [1]

BLANK PAGE

Section B

Answer **one** question from this section.

11 Fig. 11.1 shows a drill rack that will be attached to the pillar of a pillar drill.
The drill rack is made from 15 mm thick plywood.

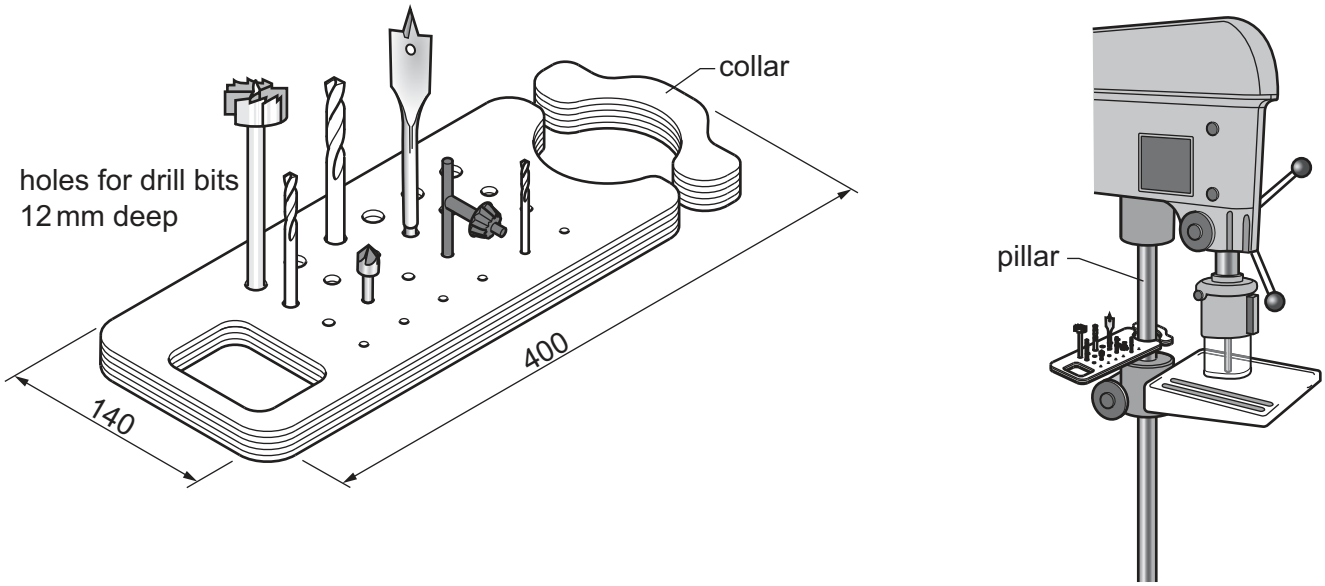


Fig. 11.1

(a) State **two** specification points that a designer would need to consider when designing the drill rack.

1 .....

2 .....

[2]

(b) **(i)** Use sketches and notes to show the construction of plywood.

[2]

(ii) Explain why plywood is more suitable than solid wood for the drill rack.

.....

.....

..... [2]

(c) Fig. 11.2 shows details of the recess and hole that need to be cut out.

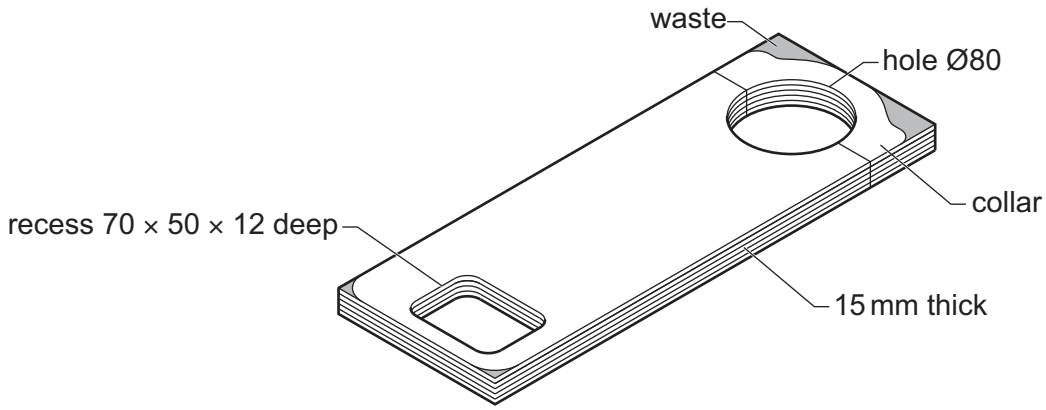


Fig. 11.2

(i) Name a tool that could be used to cut out the Ø80 hole.

..... [1]

(ii) Name a machine tool that could be used to cut out the recess.

..... [1]

(iii) Use sketches and notes to show how the waste plywood could be removed and the edges made smooth to produce the shape of the collar.
Name all the tools and equipment used.

[4]

(d) The holes in the rack to take the drill bits shown in Fig. 11.1 are drilled to a depth of 12 mm. Describe how the holes could be drilled to a depth of 12 mm.

.....

.....

..... [2]

(e) Fig. 11.3 shows the scan fitting that will be used to join the collar to the drill rack when the collar is fitted around the pillar of the pillar drill.

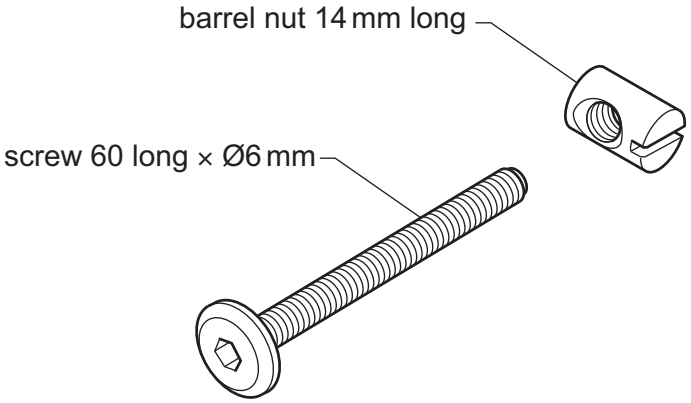


Fig. 11.3

(i) Name the type of tool that would be used to tighten the scan fitting.

..... [1]

(ii) Fig. 11.4 shows the positions for the scan fitting to join the collar to the drill rack.
Use sketches and notes to show how the scan fitting could be used to join the collar to the drill rack.

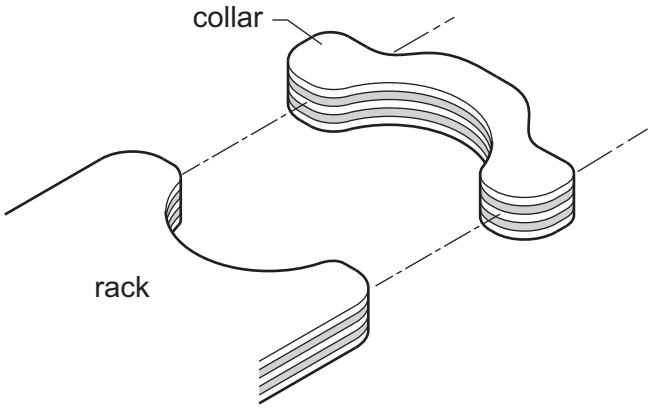
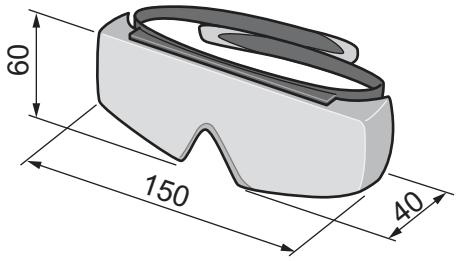


Fig. 11.4

[4]

(f) Fig. 11.5 shows a pair of safety glasses that will be worn when using the pillar drill.



sizes of safety glasses when folded

Fig. 11.5

Use sketches and notes to show a design for a container to store the safety glasses.
Include the following:

- a method to show how the safety glasses could be kept clean and free from dust
- a method to show how the container could be fixed to a wall
- details of all materials and constructions used to make the container.

[6]

12 Fig. 12.1 shows a child's xylophone that could be made in a school workshop.

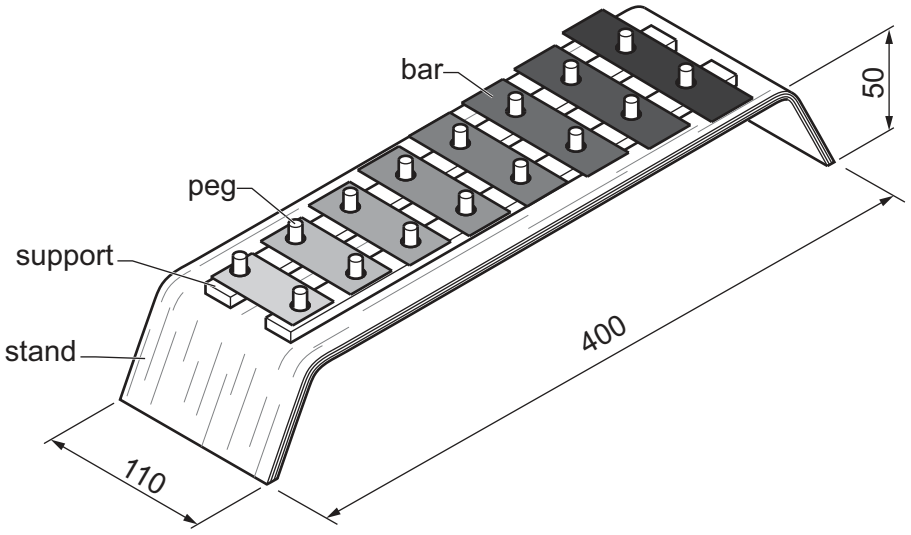


Fig. 12.1

(a) The stand is made by laminating beech veneers.
Describe what is meant by the term 'veneer'.

.....

..... [2]

(b) Use sketches and notes to show how veneers could be laminated to make the shape of the stand. Give details of all the tools, materials and equipment used.

[4]

(c) Fig. 12.2 shows one of the bars marked out on part of a length of mild steel strip.

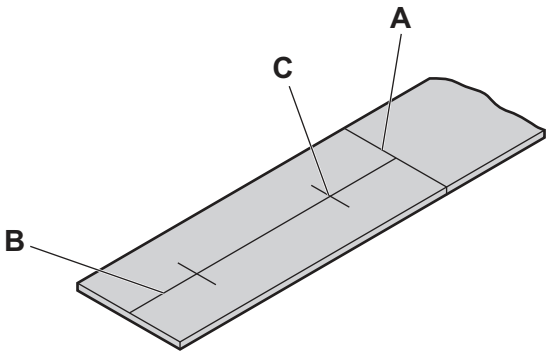


Fig. 12.2

(i) Name a tool that could be used to mark out line **A**.

..... [1]

(ii) Name a tool that could be used to mark out line **B**.

..... [1]

(iii) Name a tool that could be used to make an indentation in the metal at point **C**.

..... [1]

(iv) Name an appropriate saw that could be used to saw off the bar to the required length along line **A**.

..... [1]

(v) Name a specific file that could be used to make the sawn edge flat and square.

..... [1]

(d) Each of the mild steel bars will be spray painted a different colour.

(i) Give the names of **two** abrasives that could be used to prepare the bars for painting.

1 .....

2 .....
[2]

(ii) Give **two** advantages of spraying the paint onto the bars rather than by using a brush.

1 .....

2 .....
[2]

(iii) State **two** safety precautions that must be taken when spray painting.

1 .....

2 .....

[2]

(e) There are 16 pegs made of Ø9 beech dowel that need to be cut to length.
Use sketches and notes to show a design for a jig that could be used when sawing 16 pegs, each 25 mm long, from a length of Ø9 beech dowel.

[3]

(f) Fig. 12.3 shows the beater that will be used to strike the bars of the xylophone.

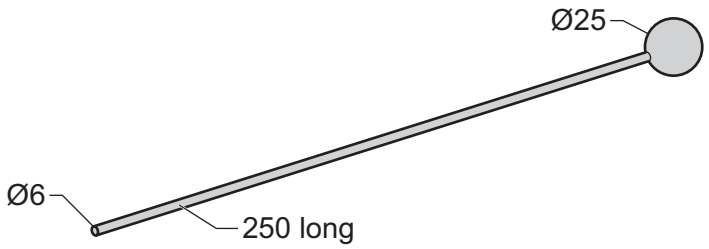


Fig. 12.3

Use sketches and notes to show a modification to the xylophone so that the beater could be stored safely and securely.
Give details of sizes, materials and constructions used.

[3]

(g) The main materials used to make the xylophone are mild steel and beech.
Compare both materials and decide which of the two could be considered more sustainable.

.....

.....

..... [2]

13 Fig. 13.1 shows a basic design for a headphone stand made from 5 mm thick acrylic.

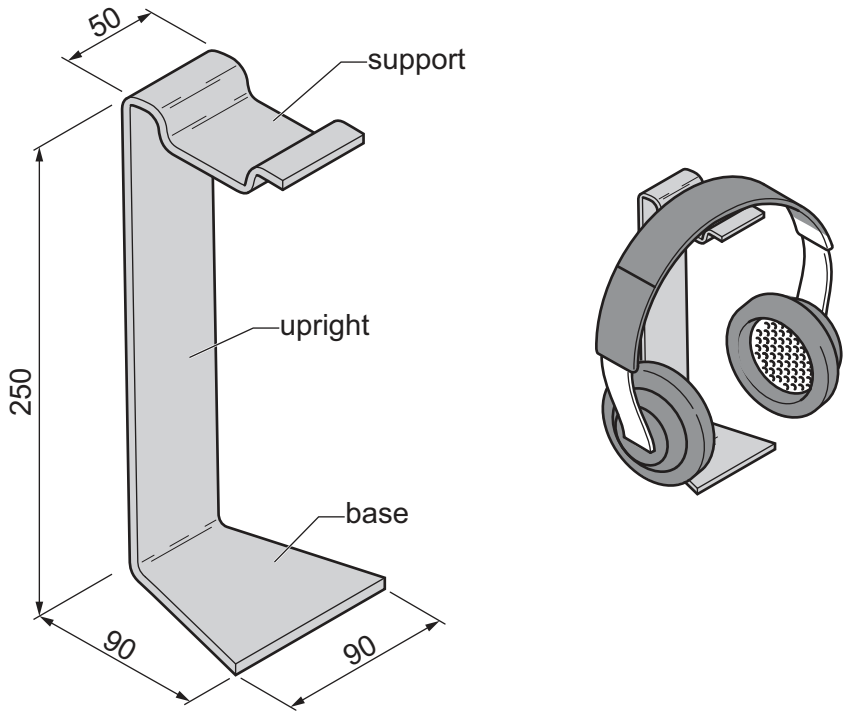


Fig. 13.1

(a) Give **two** properties of acrylic that make it suitable for the headphone stand.

1 .....

2 .....
[2]

(b) Fig. 13.2 shows the development (net) of the headphone stand marked out, ready to be cut to shape.

Key: waste ⁄ ⁄ ⁄ ⁄ ⁄ ⁄ ⁄ bend lines ----------

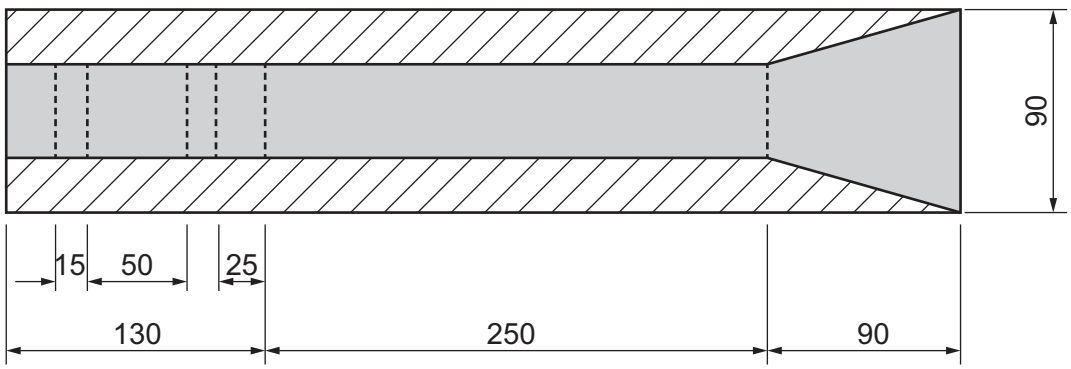


Fig. 13.2

(i) Name **one** machine saw that could be used to remove the waste acrylic.

..... [1]

(ii) Name a specific type of file that could be used to make the sawn edges flat and smooth.

..... [1]

(iii) Give the name of an abrasive paper that could be used to produce a smooth finish to the edges of the acrylic.

..... [1]

(iv) Fig. 13.3 shows a buffing wheel that could be used to polish the edges of the acrylic.

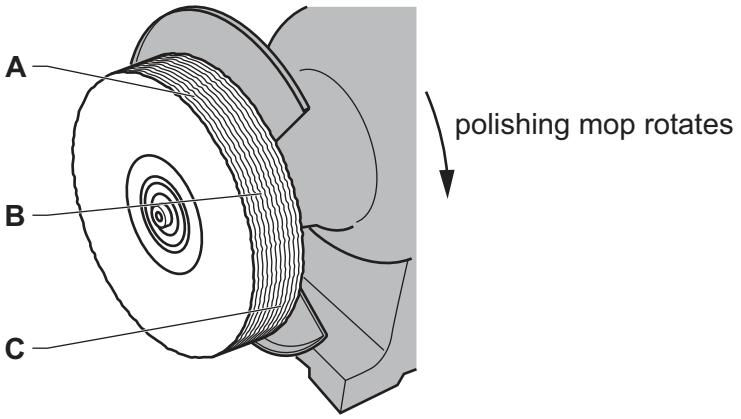


Fig. 13.3

Select the correct position, **A**, **B** or **C**, to show where the acrylic should be placed against the polishing mop.

Position ..... [1]

(c) The headphone stand could be produced using CAD/CAM.

(i) Give **two** benefits of using CAD to design the headphone stand.

1 .....

2 .....

[2]

(ii) Give **two** advantages of using CAM, rather than using hand tools and equipment, to cut out the headphone stand.

1 .....

2 .....

[2]

(d) Fig. 13.4 shows details of the support part of the headphone stand.

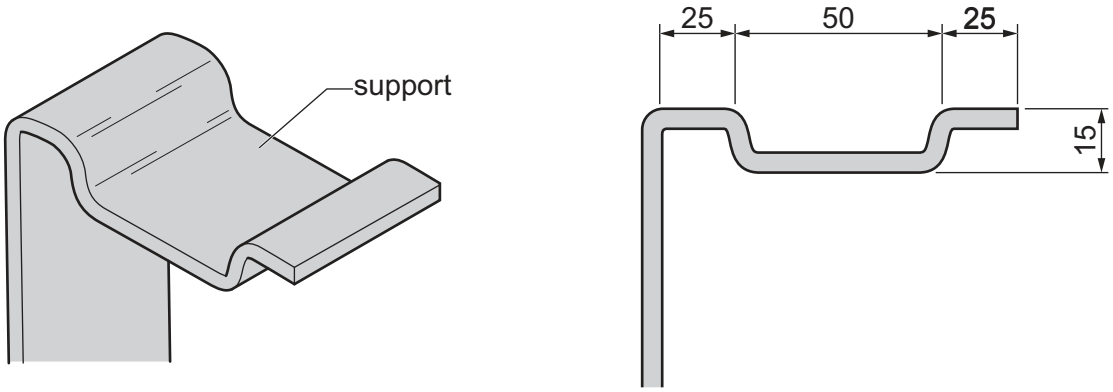


Fig. 13.4

Use sketches and notes to show how male and female formers would be used to produce the shape of the support.

[4]

(e) In use, when headphones are placed on the support, the headphone stand becomes unstable and could fall over.
Use sketches and notes to show how additional materials could be used to improve the stability of the headphone stand.
Give details of the additional materials and constructions used.

[4]

(f) Fig. 13.5 shows headphones that have a length of cable attached.

Fig. 13.5

Use sketches and notes to show how the headphone stand shown in Fig. 13.1 could be modified to enable it to store the cable safely.
Give details of all materials and constructions used.

[4]

(g) Explain why the manufacture and use of products made from plastic can be harmful to the environment.

.....

.....

.....

.....

..... [3]

BLANK PAGE

BLANK PAGE

BLANK PAGE

BLANK PAGE