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DESIGN & TECHNOLOGY

0445/32

Paper 3 Resistant Materials

May/June 2026

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. Do **not** use correction fluid or tape.
- 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.

Section A

Answer **all** questions in this section.

- 1 Figure 1.1 shows a child's trike made from plastic.

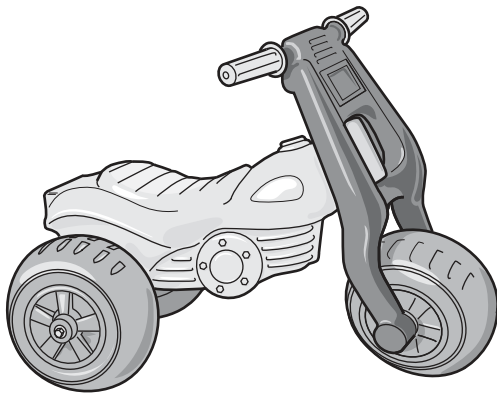


Figure 1.1

Give **three** benefits of using plastic for the trike.

- 1
- 2
- 3

[3]





2 Complete Figure 2.1 to show a finger (comb) joint.

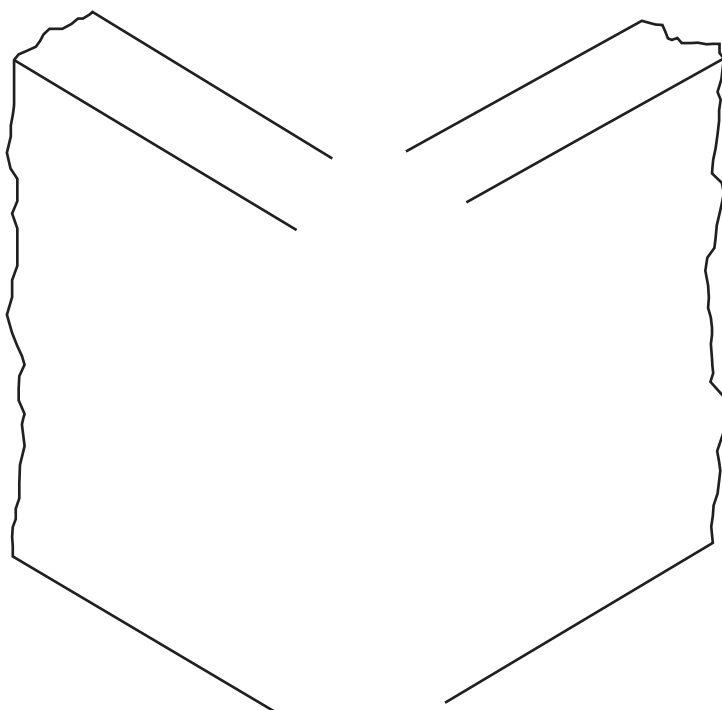


Figure 2.1

[3]

3 Figure 3.1 shows two woodscrews, **A** and **B**.

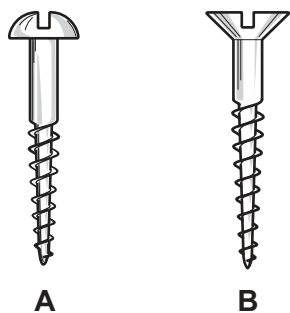


Figure 3.1

Name the type of head for each screw.

A head

B head
[2]



4 Figure 4.1 shows a bracket that has been made from a length of mild steel strip.

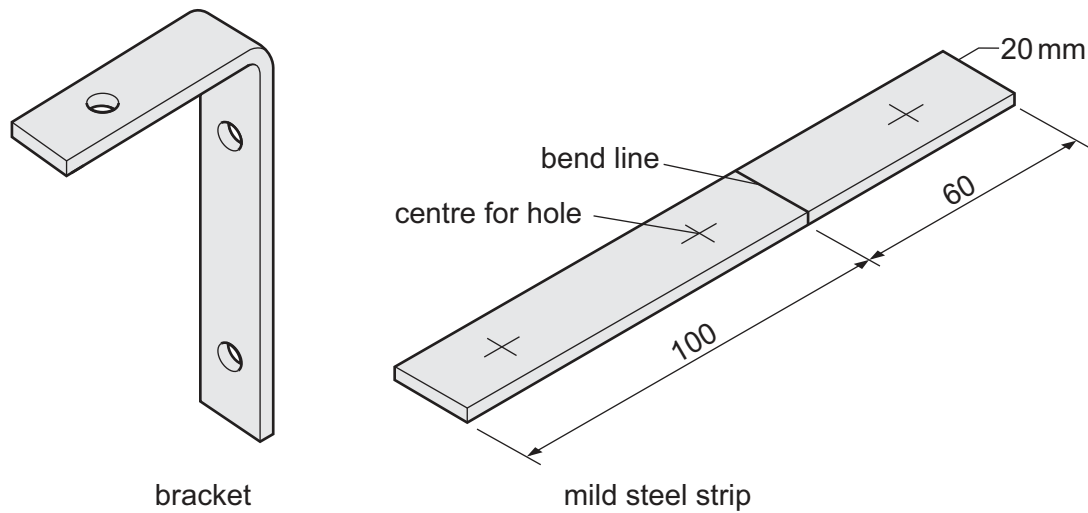


Figure 4.1

Name **two** different marking out tools that could be used to mark out:

(a) the centre for the hole

..... [1]

(b) the bend line.

..... [1]



- 5 Figure 5.1 shows a takeaway food container made from expanded polystyrene.



Figure 5.1

Give **two** properties of expanded polystyrene that make it suitable for the food container.

1

2 [2]

- 6 Figure 6.1 shows an electric kettle. As the water inside the kettle is heated to boiling point, the colour of the kettle changes.



Figure 6.1

Name the smart material that has been applied to the kettle to make it change colour.

..... [1]



- 7 Figure 7.1 shows two joints, **A** and **B**, that are made from hardwood parts. The parts will be joined together with nails.

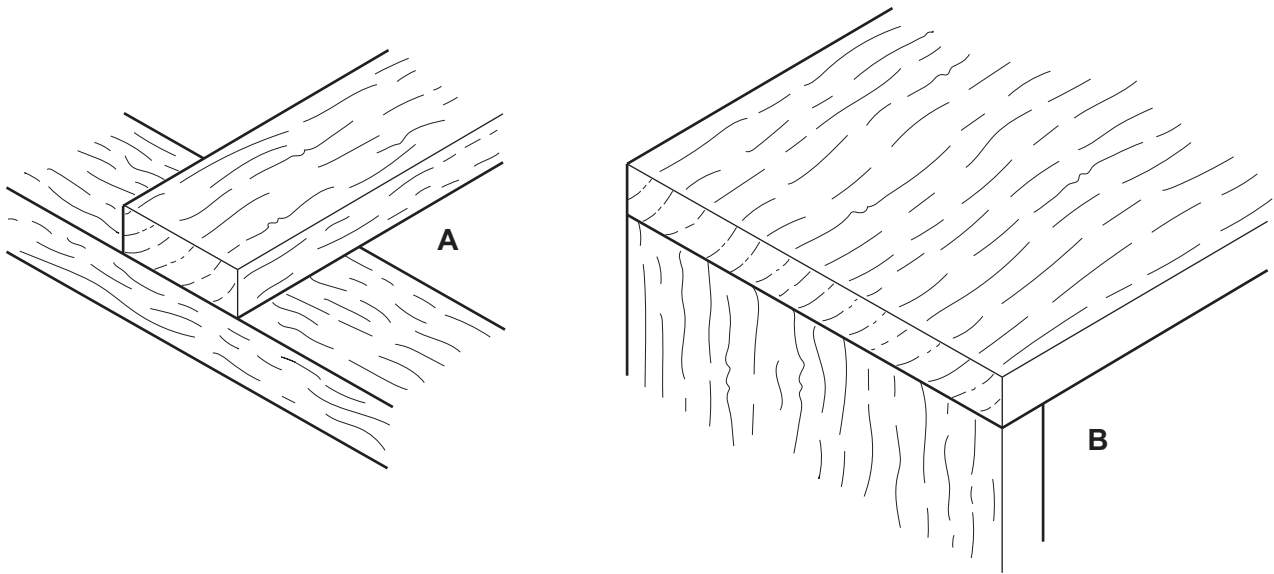


Figure 7.1

- (a) Add sketches to joint **A** to show how the parts could be joined together by staggered nailing. [2]

- (b) Add sketches to joint **B** to show how the parts could be joined together by dovetail nailing. [2]

- 8 Figure 8.1 shows three standard metal forms **A**, **B** and **C**.

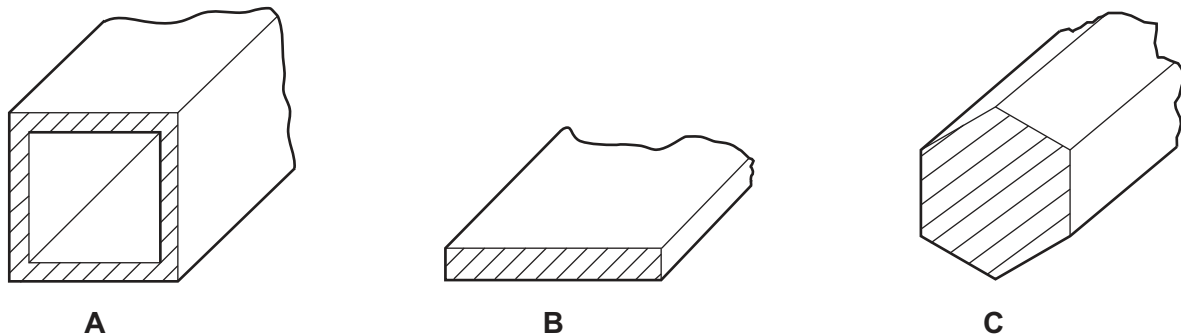


Figure 8.1

Complete the names of the standard metal forms **A**, **B** and **C**.

A square

B flat

C hexagonal

[3]



- 9 Figure 9.1 shows a box made mainly of softwood.

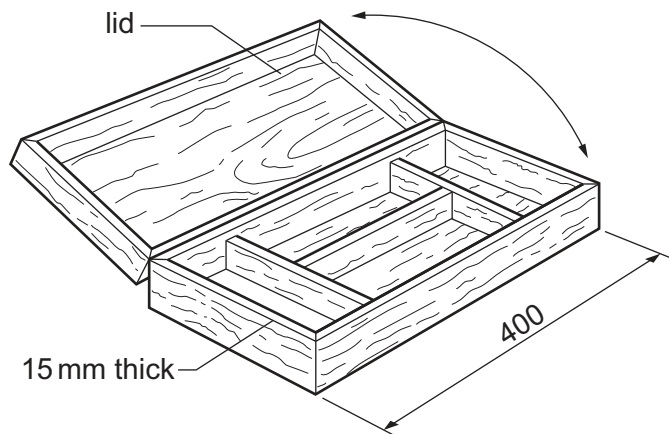


Figure 9.1

Name **two** different types of hinge that could be used to join the lid to the box.

- 1
- 2 [2]

- 10 Figure 10.1 shows views of an incomplete design for a tape holder made from 3 mm thick acrylic.

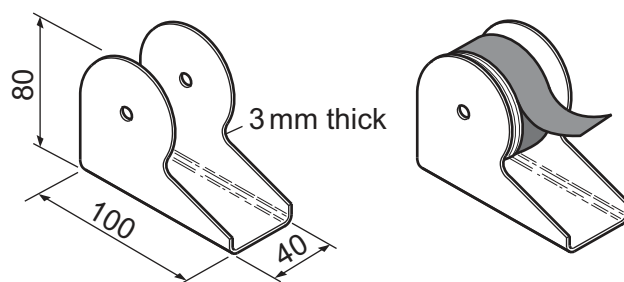


Figure 10.1

Use sketches and notes to show a modification to the design of the tape holder so that a length of tape could be cut from the roll.
Name all the materials used and show all constructions clearly.



Section B

Answer **one** question from this section.

- 11 Figure 11.1 shows views of an incomplete design for a cookbook stand used in a kitchen. The stand is made of hardwood and could be made in a school workshop.

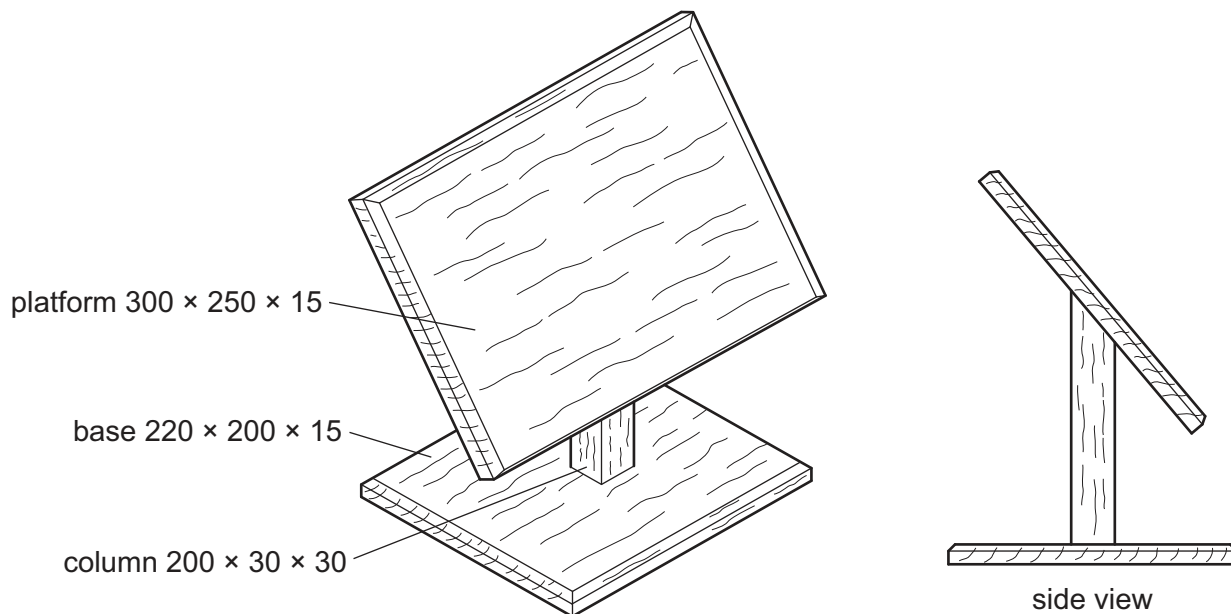


Figure 11.1

- (a) Give **two** benefits of using hardwood for the cookbook stand.

- 1
- 2

[2]



(b) Figure 11.2 shows the column marked out ready to be sawn from a length of hardwood.

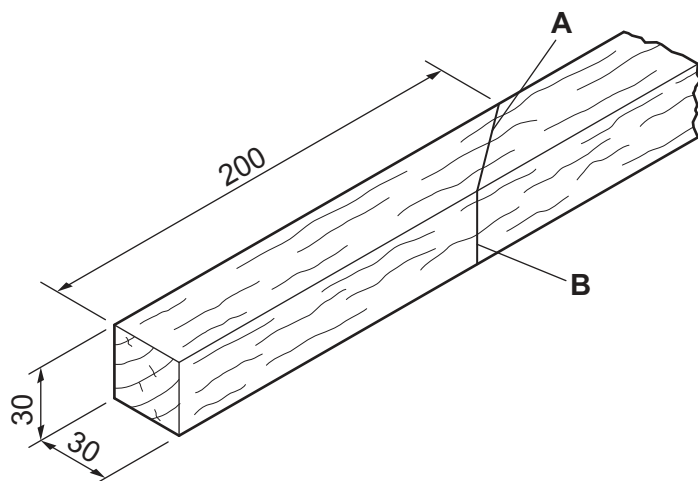


Figure 11.2

(i) Complete the name of the tool that could be used to mark out line **A**.

sliding [1]

(ii) Complete the name of the tool that could be used to mark out line **B**.

try [1]

(iii) When the column has been cut to length, the sawn end will need to be made flat before it can be joined to the platform.

State **two** safety precautions that must be taken when using a disc sander to make the sawn end flat.

1

2

[2]



- (c) Figure 11.3 shows the end of the column that will be joined to the platform using a dowel joint.

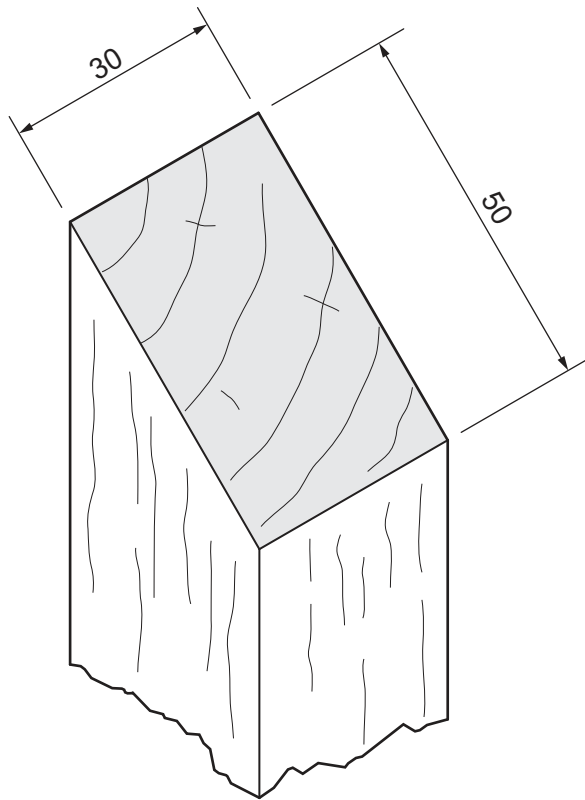


Figure 11.3

- (i) State a suitable diameter for the dowel.

..... mm [1]

- (ii) Mark out accurately on the end of the column the positions for **two** dowel pegs that will be used to join the column to the platform. [2]



- (d) The column will be joined to the base by means of a twin mortise and tenon joint. Complete Figure 11.4 to show an exploded drawing of a twin mortise and tenon joint.

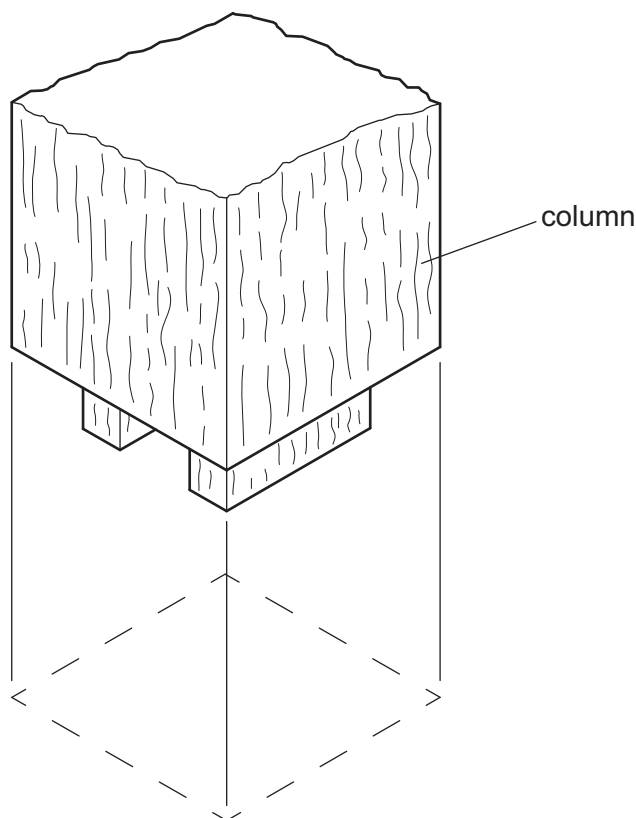


Figure 11.4

[3]

- (e) The cookbook stand shown in Figure 11.1 does not provide any support for a book placed on the platform to prevent it from sliding off. Use sketches and notes to show how a book could be supported on the platform. Include all constructional details and name the materials used.

[3]

[Turn over



- (f) Figure 11.5 shows the column that will be glued to the platform using a dowel joint and to the base using a twin mortise and tenon joint.

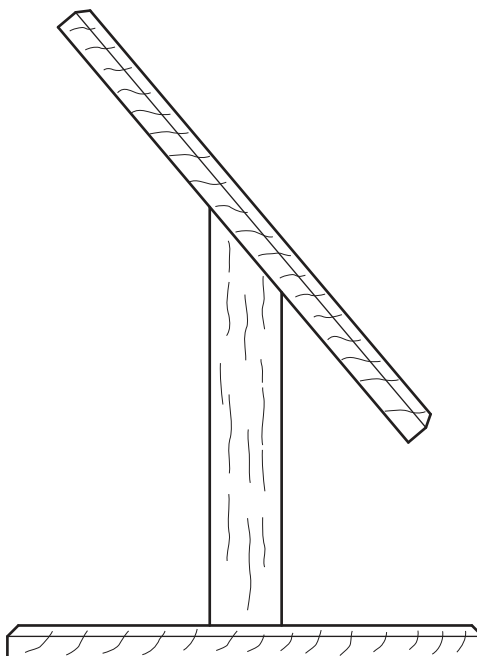


Figure 11.5

- (i) Add sketches and notes to Figure 11.5 to show how the joints could be clamped together while the adhesive sets. [3]
- (ii) Name the type of cramps used. [1]
-
- (g) The parts of the cookbook stand will be glasspapered before a finish is applied.
- (i) Give **one** reason why it is important to glasspaper the hardwood along the grain and not across it. [1]
-
- (ii) State **two** problems that can occur when using a brush to apply a finish. [2]
- 1
- 2



- (h) Figure 11.6 shows a different type of cookbook stand made from MDF with a spray painted finish. The two parts of the stand slot together at **A**.

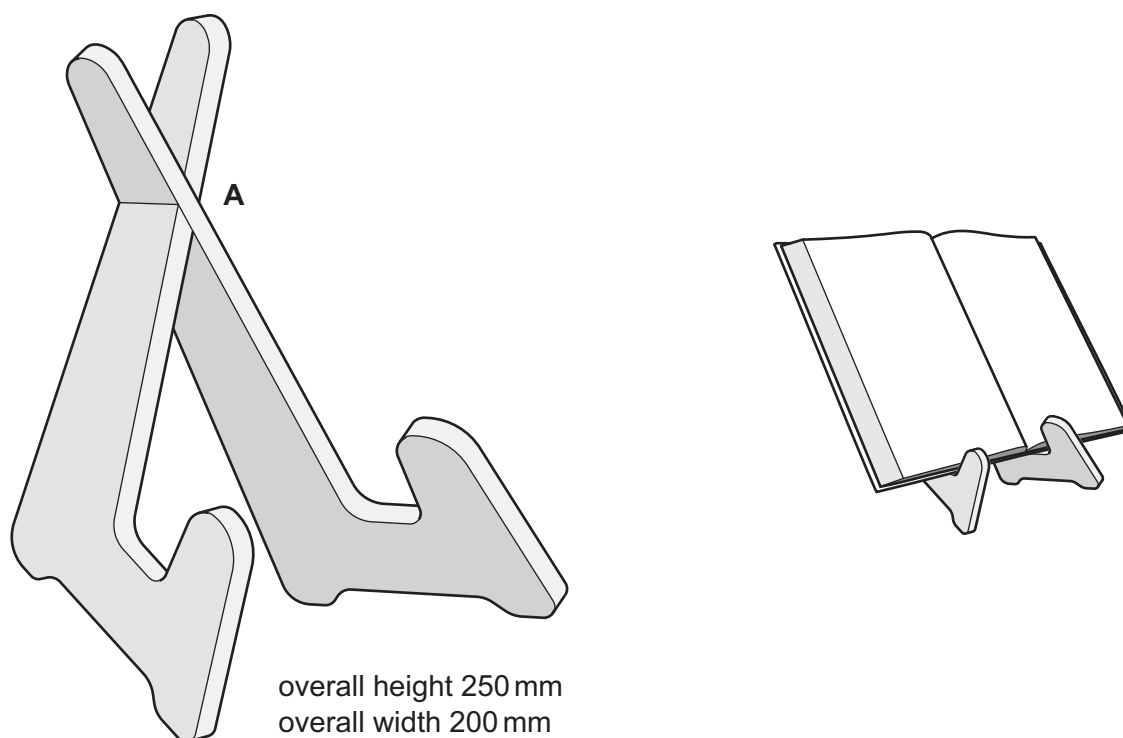


Figure 11.6

Give **three** reasons why consumers may prefer to purchase the cookbook stand shown in Figure 11.6 rather than the cookbook stand shown in Figure 11.1.

- 1
- 2
- 3

[3]



- 12 Figure 12.1 shows views of an incomplete design for a clock. The clock case and sides are made from 3 mm thick acrylic. The clock movement is purchased.

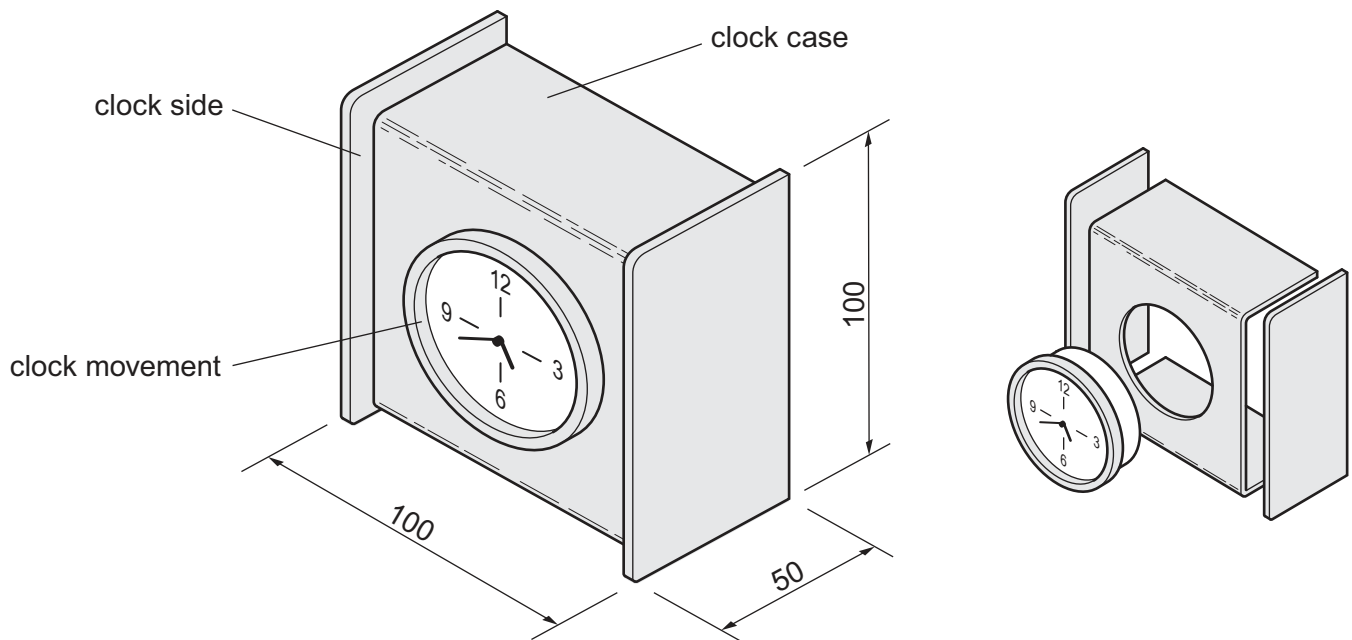


Figure 12.1

- (a) Give **two** properties of acrylic that make it suitable for the clock case and sides.

1

2 [2]

- (b) Figure 12.2 shows the development (net) of the clock case marked out, ready to be shaped.

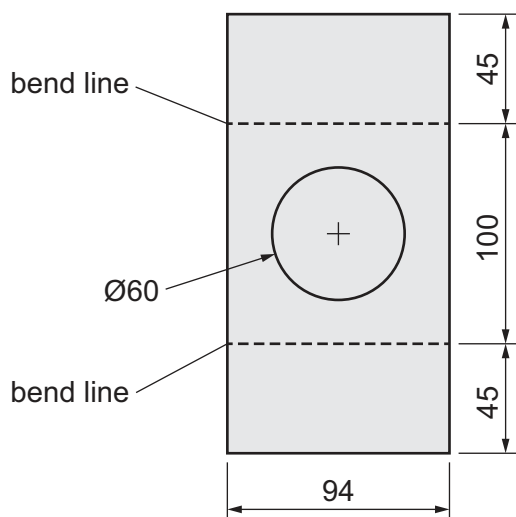


Figure 12.2



- (i) Give **one** reason why a marker pen would be used to mark the bend lines rather than a scribe.

..... [1]

- (ii) Name a tool that could be used to mark the circle for the Ø60 hole.

..... [1]

- (iii) Use sketches and notes to show how the Ø60 hole could be produced.
Name all the tools and equipment used.

[4]

- (c) Use sketches and notes to show how the development (net) of the clock case in Figure 12.2 could be bent to shape. Name all the tools and equipment used.

[3]



- (d) Figure 12.3 shows one of the clock sides cut out and shaped. The edges will be finished to a high quality.

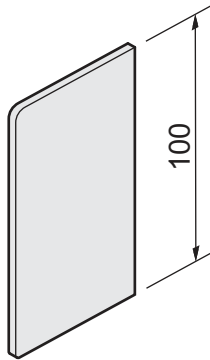


Figure 12.3

State **three** stages needed to finish the edges to a high quality.

- 1
- 2
- 3 [3]

- (e) The clock sides will be joined to the clock case using acrylic adhesive. State **two** dangers that can occur when using acrylic adhesive and give a precaution taken to overcome each of the dangers.

- danger 1
- precaution
- danger 2
- precaution [4]

- (f) Use sketches and notes to show how the clock sides could be clamped to the clock case while the acrylic adhesive sets.



(g) Figure 12.4 shows the clock at a height of 75 mm above a flat surface.

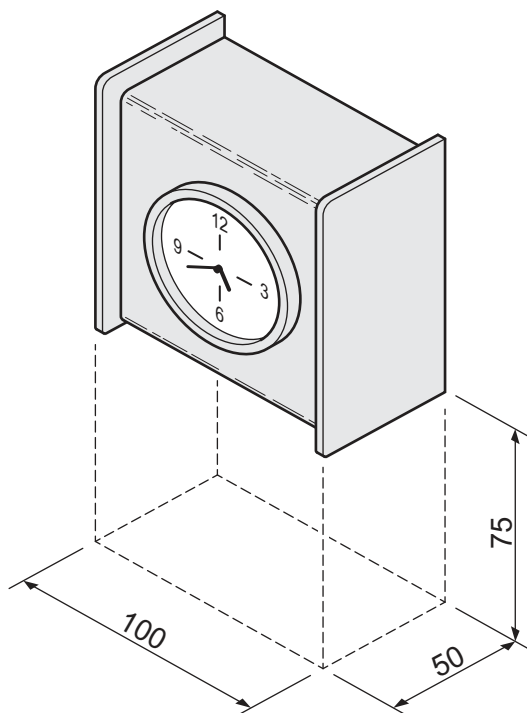


Figure 12.4

A stand, made from acrylic, is required to support the clock at the height shown.
Use sketches and notes to show a design for a stand that could be fitted permanently to any part of the clock.
Give details of constructions used.



- 13 Figure 13.1 shows views of a plant stand to be used indoors. The legs are made of softwood. The shelves are made from manufactured board.

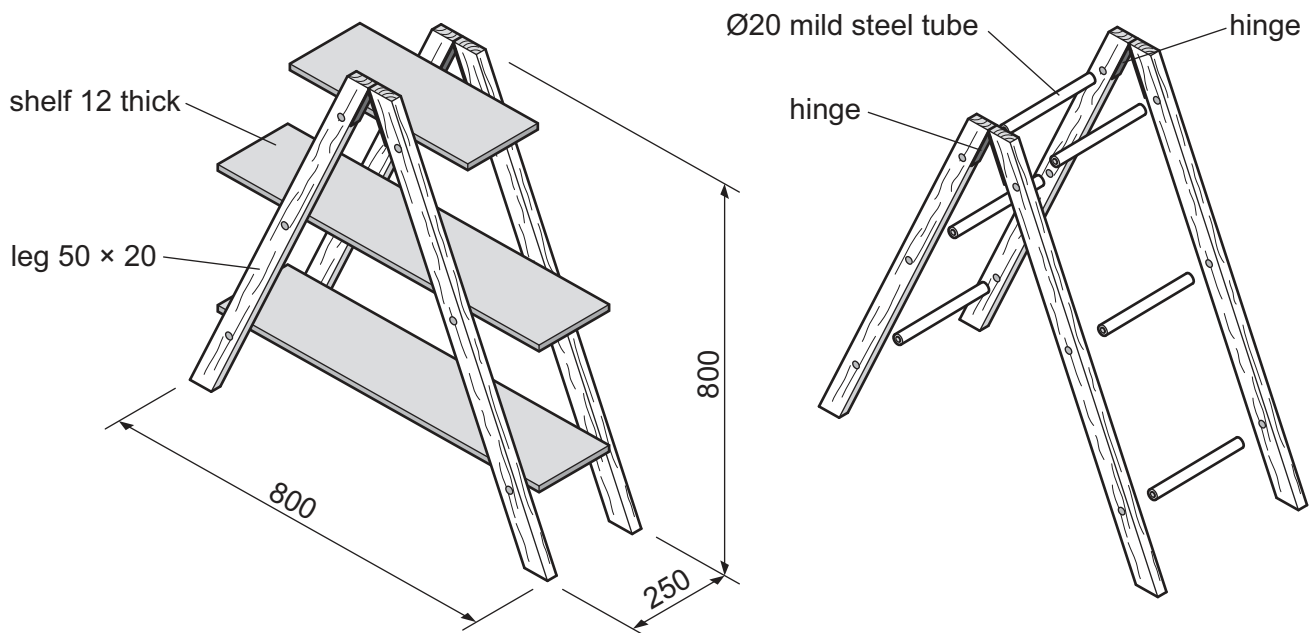


Figure 13.1

- (a) (i) Name a suitable softwood for the legs of the plant stand.

..... [1]

- (ii) Name a suitable manufactured board for the shelves.

..... [1]

- (iii) Give **one** advantage of using softwood rather than hardwood for the legs of the plant stand.

..... [1]

- (b) The plant stand has been designed as a flat-pack product for self-assembly by consumers. Give **two** reasons why flat-pack, self-assembly products are popular with consumers.

1

2

[2]



- (c) Figure 13.2 shows how the front and back legs are joined.
The mild steel tubes are screwed to the front and back legs.

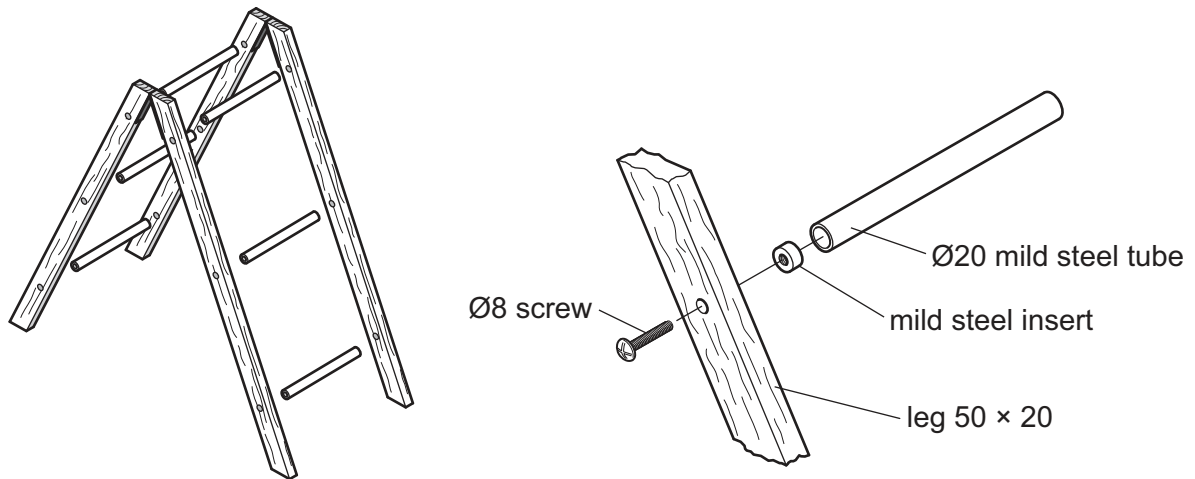


Figure 13.2

Figure 13.3 shows the mild steel insert that will be brazed into the end of the mild steel tube. Items of equipment, **A** and **B**, that could be used to cut the screw thread in the inside of the mild steel insert are also shown.

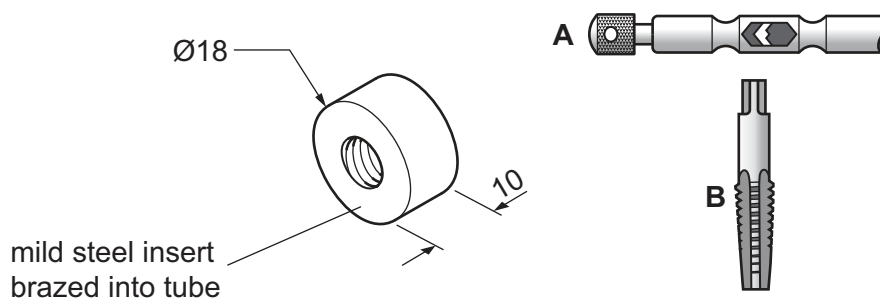


Figure 13.3

- (i) Name the items of equipment, **A** and **B**, shown in Figure 13.3.

A

B

[2]

- (ii) Use sketches and notes to show how the equipment could be used to cut the screw thread in the inside of the mild steel insert.

[4]

[Turn over]





- (d) Figure 13.4 shows the underside of the top shelf. The shelf fits over the mild steel tubes.

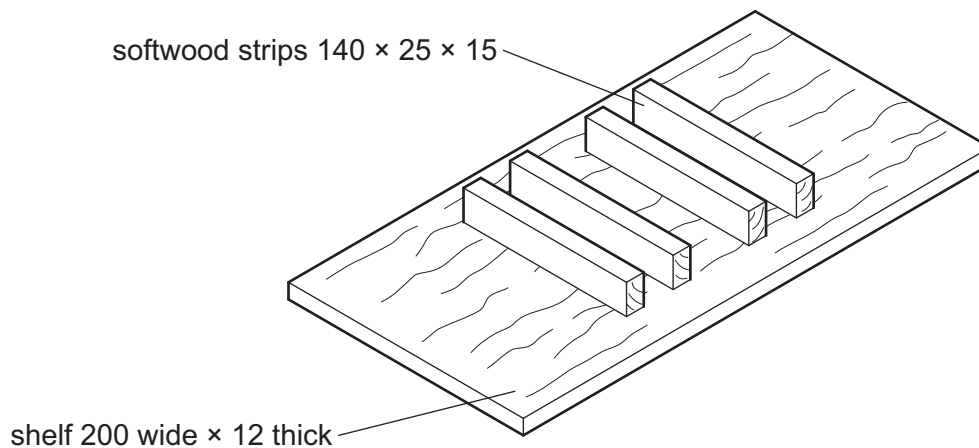


Figure 13.4

A total of 12 softwood strips are needed for all three shelves. Use sketches and notes to show a jig that could be used when sawing 12 softwood strips, each 140 mm long. Describe how the jig would be used.

[4]

- (e) Name **two** clear finishes that could be applied to the softwood legs of the plant stand.

1

2

[2]

- (f) The shelves will be spray-painted. Give **two** safety precautions that must be taken when using spray paints.

1

2

[2]



- (g) Figure 13.5 shows a cover that will be fitted over the ends of the legs. The cover is made from 1.6 mm thick mild steel sheet.

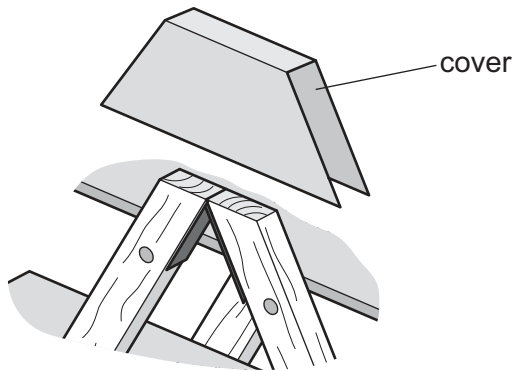


Figure 13.5

Figure 13.6 shows the development (net) of the cover.

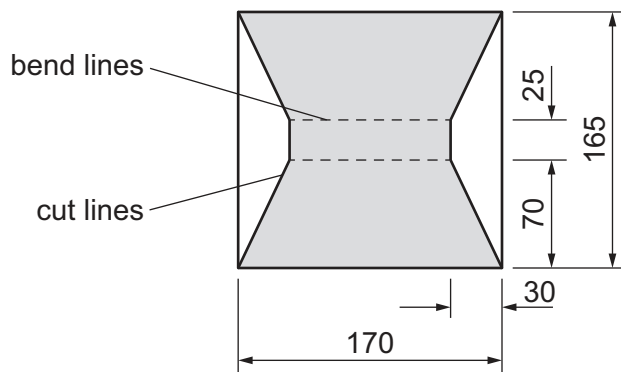


Figure 13.6

- (i) Use sketches and notes to show how the development (net) could be cut out and bent to shape. Name all the tools and equipment used.





- (ii) The mild steel cover will be painted.
Give the names of **two** abrasive papers that could be used to prepare the mild steel cover for painting.

1

2

[2]







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