Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

DESIGN & TECHNOLOGY **0445/31**

Paper 3 Resistant Materials **October/November 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.

[Turn over

Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows two methods of seasoning wood.
Method **A** is kiln seasoning. Method **B** is open-air seasoning.

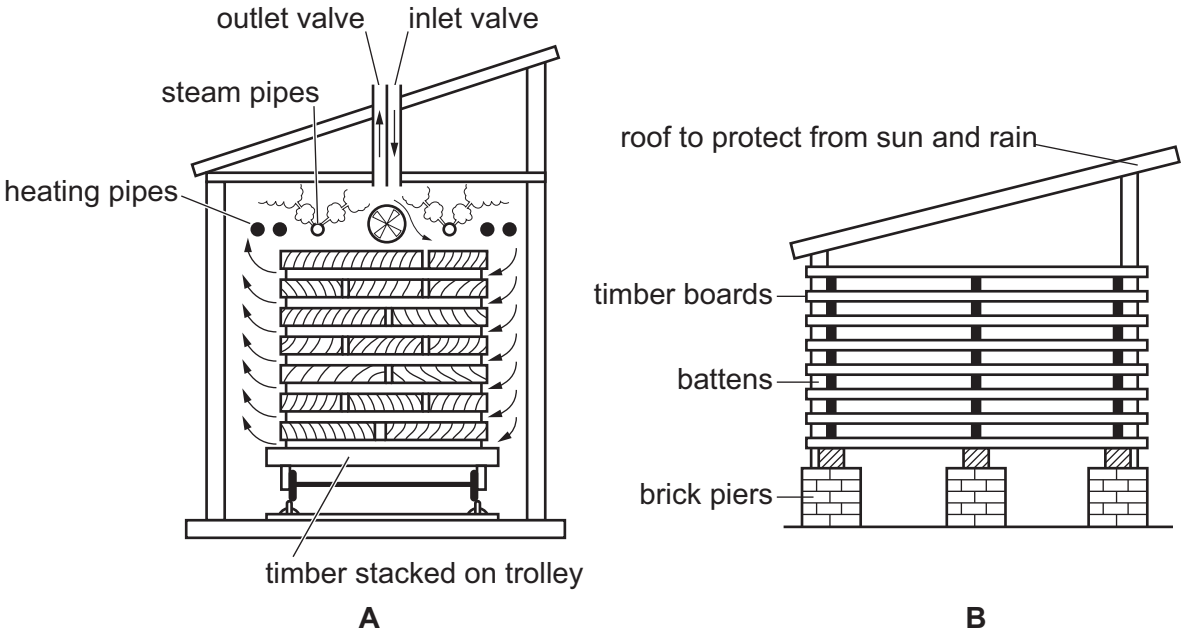


Fig. 1.1

(a) Give **one** advantage of kiln seasoning compared to open-air seasoning.

..... [1]

(b) Give **one** advantage of open-air seasoning compared to kiln seasoning.

..... [1]

2 Complete Fig. 2.1 to show the construction of blockboard.

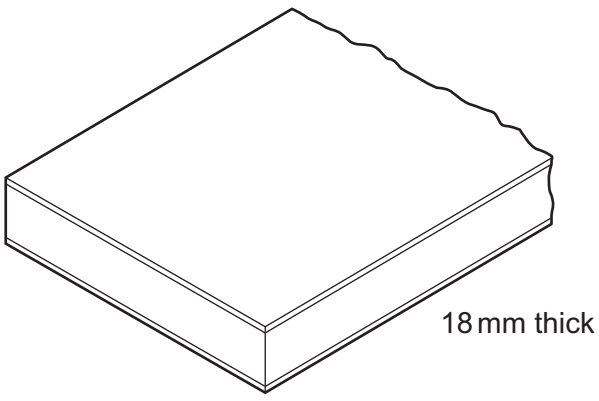


Fig. 2.1

[2]

3 Fig. 3.1 shows a tool used to mark a circle on metal surfaces.

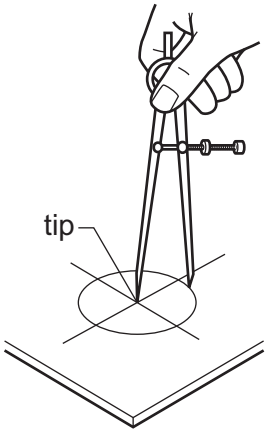


Fig. 3.1

(a) Name the tool shown in Fig. 3.1.

..... [1]

(b) Describe how the tip of the tool could be prevented from slipping when marking a circle.

.....

..... [2]

4 Fig. 4.1 shows a spray bottle with parts made from two different plastics.

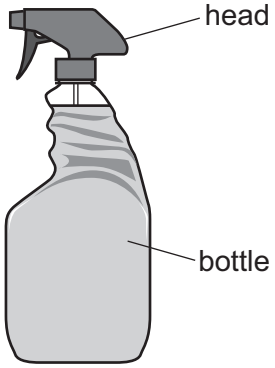


Fig. 4.1

Name a suitable plastic that could be used to make:

(a) the head

..... [1]

(b) the bottle.

..... [1]

5 Fig. 5.1 shows a hardwood block with line **A** marked across the grain and lines **B** marked along the grain.

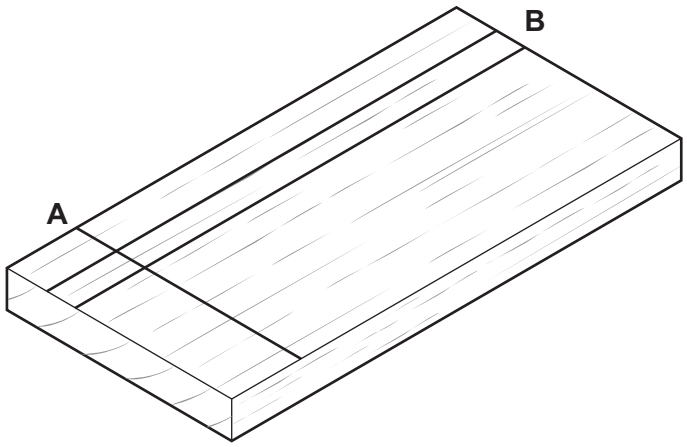


Fig. 5.1

(a) Name the type of gauge that would be used to mark out line **A**.

..... [1]

(b) Name the type of gauge that would be used to mark out lines **B**.

..... [1]

6 Fig. 6.1 shows an office chair.

Fig. 6.1

Give **three** ways in which anthropometric data has been used in the design of the office chair.

1 .....

2 .....

3 .....

[3]

7 Fig. 7.1 shows a table number made from 1.5 mm thick aluminium sheet, for use in a local café.

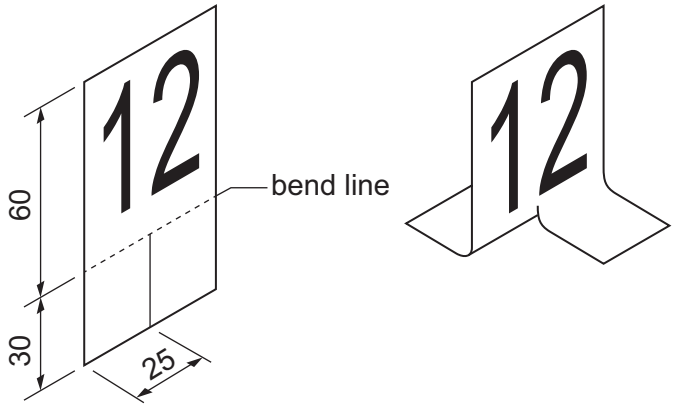


Fig. 7.1

Use sketches and notes to show how the aluminium sheet could be cut out and bent into shape. Name **one** of the tools or items of equipment used.

[4]

8 Fig. 8.1 shows a baby's feeding spoon.

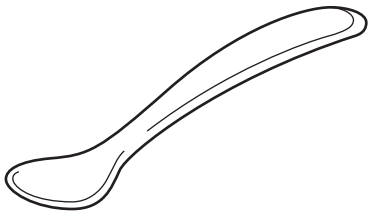


Fig. 8.1

Explain the benefit of applying thermochromic pigment to the baby's feeding spoon.

.....

.....

..... [2]

9 Fig. 9.1 shows two wooden boards that are to be joined together by means of a biscuit joint.

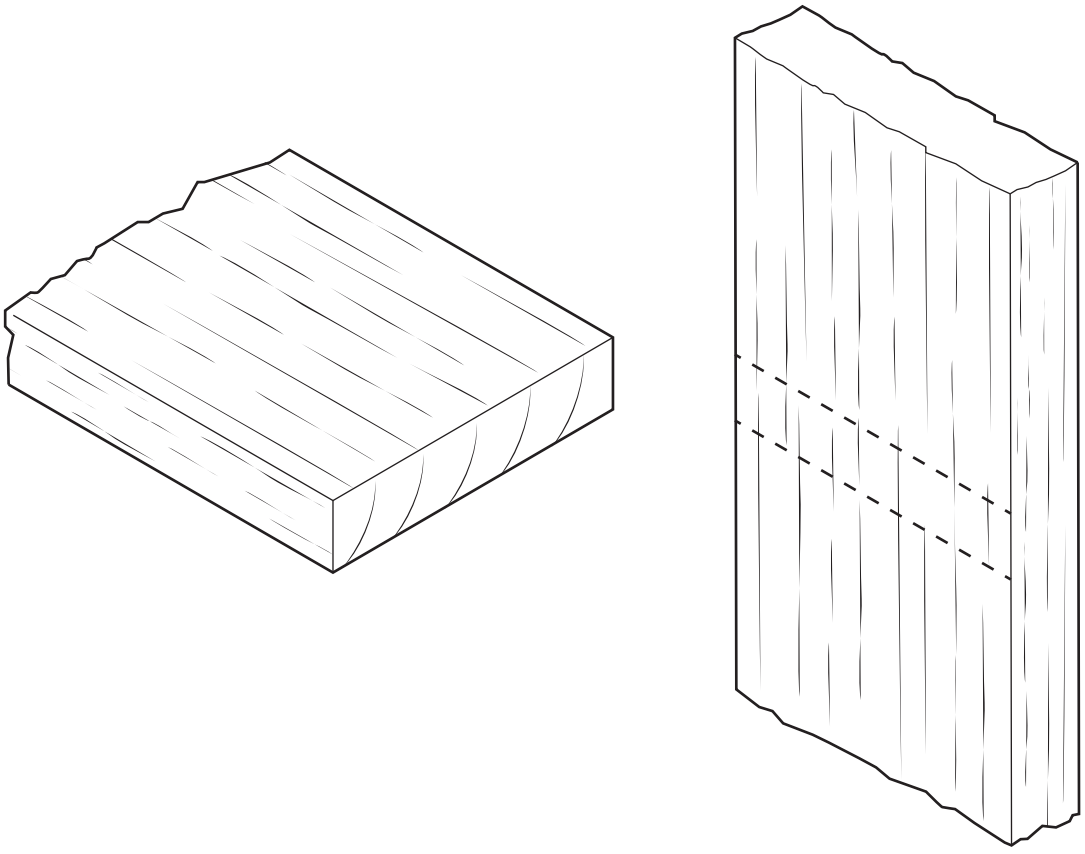


Fig. 9.1

Complete Fig. 9.1 to show how **two** biscuits could be used to make a biscuit joint. [3]

10 Fig. 10.1 shows an item of equipment that can be used to join pieces of metal permanently.

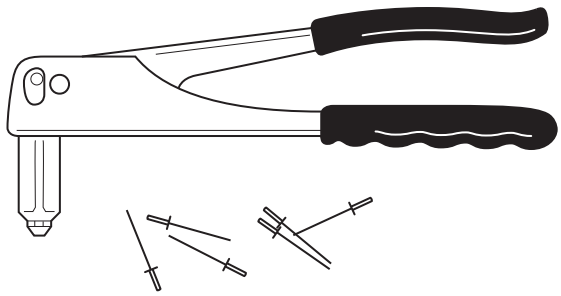


Fig. 10.1

(a) Name the item of equipment shown in Fig. 10.1.

..... [1]

(b) Name a method of joining metal permanently that uses heat.

..... [1]

Section B

Answer **one** question from this section.

11 Fig. 11.1 shows a child's toy bus made mainly from 12 mm thick plywood.

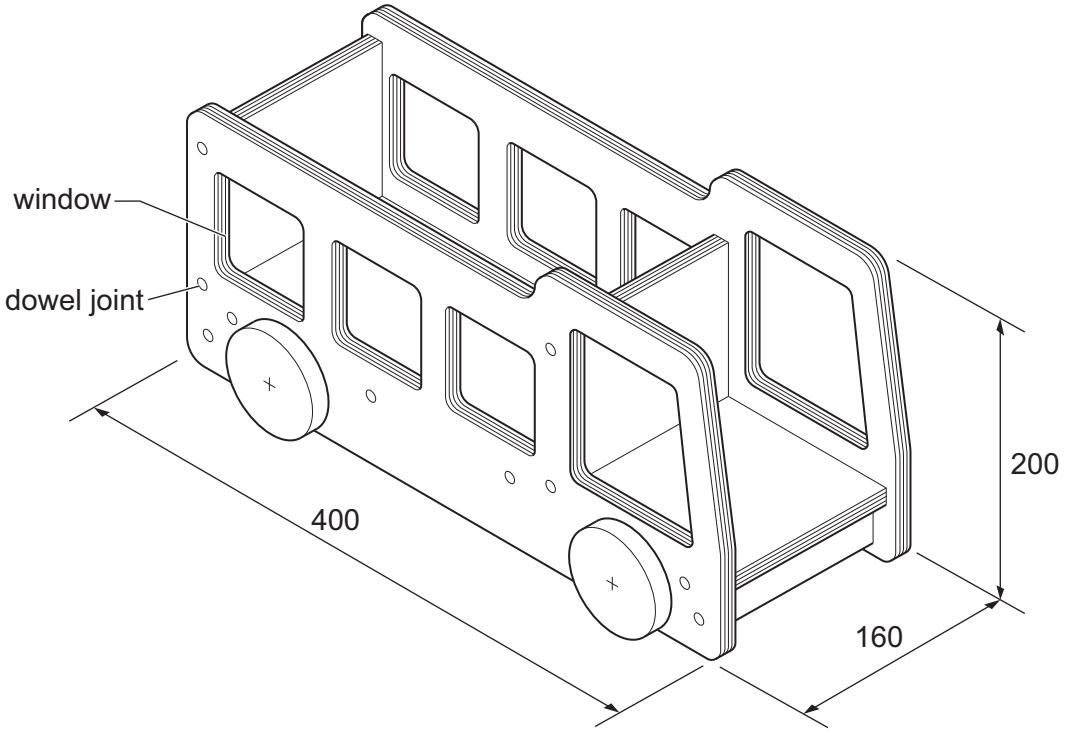


Fig. 11.1

(a) State **three** specification points a designer would have considered when designing the toy bus.
The toy bus must:

1 .....

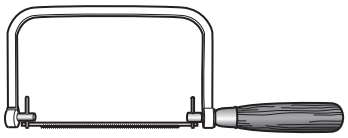
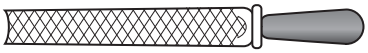
2 .....

3 .....

[3]

(b) Table 11.1 shows three tools that could be used when cutting out the shape of the windows. Complete Table 11.1 by naming each tool and giving a description of how each tool could be used to cut out the shape of the windows.

Table 11.1

Tools	Name of tool	Description of use
		
		
		

[6]

(c) Dowel joints are used to join the main parts of the toy bus.
Fig. 11.2 shows a length of dowel that could be used.

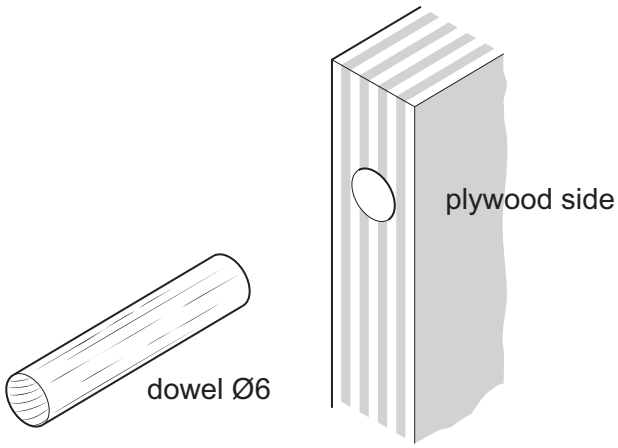


Fig. 11.2

Add sketches and notes to Fig. 11.2 to show how the dowel could be prepared so that:

- it is made easier to enter the hole in the plywood side
- there is space for the adhesive.

[2]

(d) Fig. 11.3 shows a length of hardwood that has been 'turned' on a woodturning lathe to produce the four wheels for the toy bus.

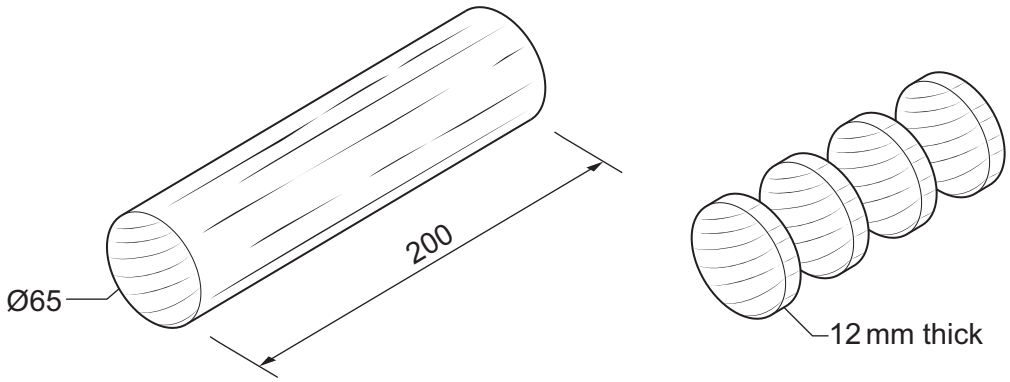


Fig. 11.3

Use sketches and notes to show a design for a jig that could be used when sawing off each of the wheels 12 mm thick.
Name the materials used for the jig and state **two** important sizes.

[5]

(e) Use sketches and notes to show how the **two** front wheels could be attached to the sides of the toy bus securely and allowed to rotate freely.
Give details of all materials, constructions and fittings used and state **one** important dimension.

[4]

(f) Use sketches and notes to show a modification to the toy bus to allow a child to pull it along. Give details of any materials and fittings used.

[3]

(g) Many children's toys are made from wood-based materials or from plastic.
Give **one** reason why consumers may prefer:

wood-based toys

.....

plastic toys.

.....

[2]

12 Fig. 12.1 shows a stand used to display a model yacht. The stand is made from 5 mm thick acrylic.

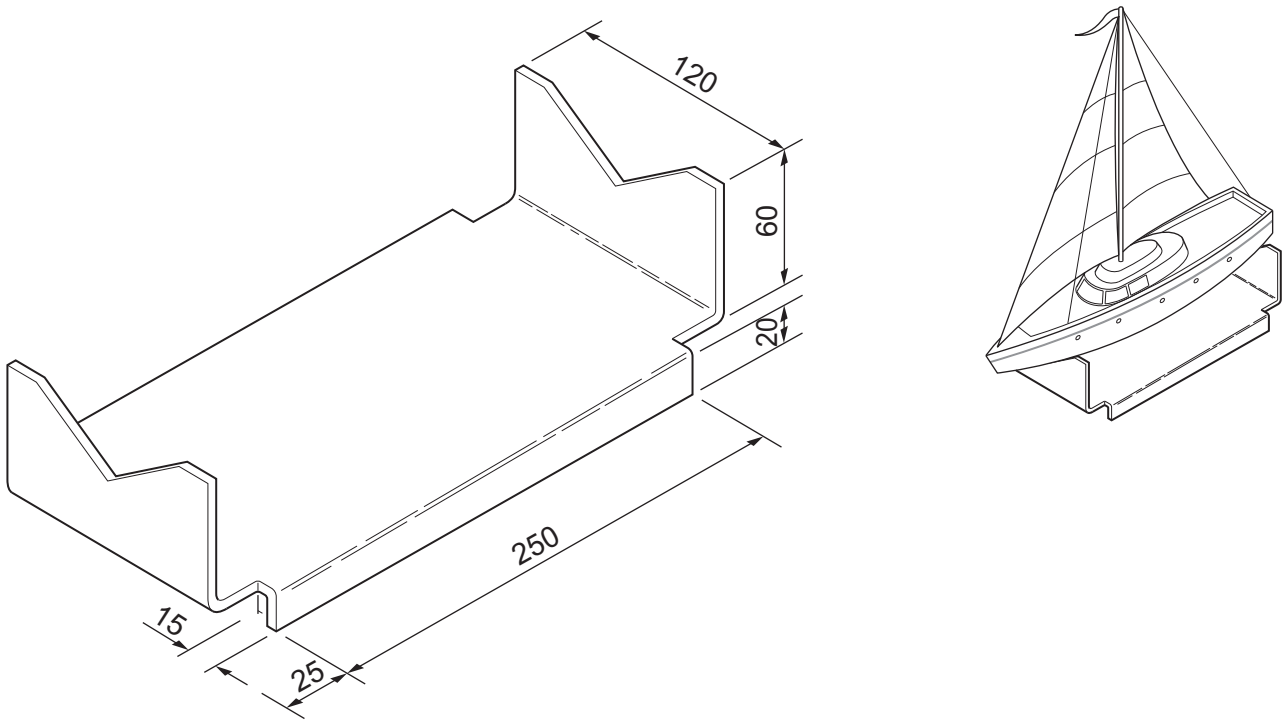


Fig. 12.1

(a) Acrylic is a thermoplastic.
Give **one** advantage of making the display stand from a thermoplastic rather than a thermosetting plastic.

..... [1]

(b) When working with acrylic the surfaces can become scratched easily.
State **one** way by which scratches could be prevented.

..... [1]

(c) The edges of the acrylic will be self-finished.
Explain what is meant by the term 'self-finished'.

.....

.....

..... [2]

(d) Fig. 12.2 shows the development (net) of the display stand.

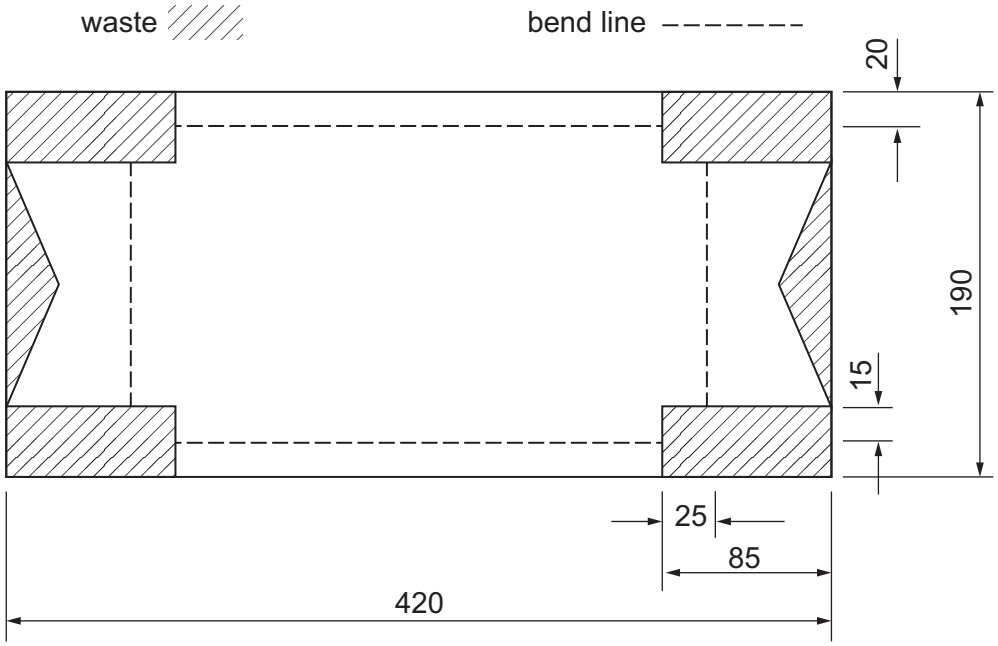


Fig. 12.2

(i) Give **one** reason why a chinagraph pencil would be used to mark out the bend lines rather than a scriber.

..... [1]

(ii) Use sketches and notes to show how the waste acrylic could be cut out and the sawn edges made flat and smooth.
Show how the acrylic could be held securely. Name all the tools and equipment used.

[6]

(e) Use sketches and notes to show how the ends of the display stand could be bent to shape. Name all the tools and equipment used.

[4]

(f) Fig. 12.3 shows a different design of display stand made from 6 mm thick MDF.
The display stand could be made in a school workshop. The sides and ends slot together.

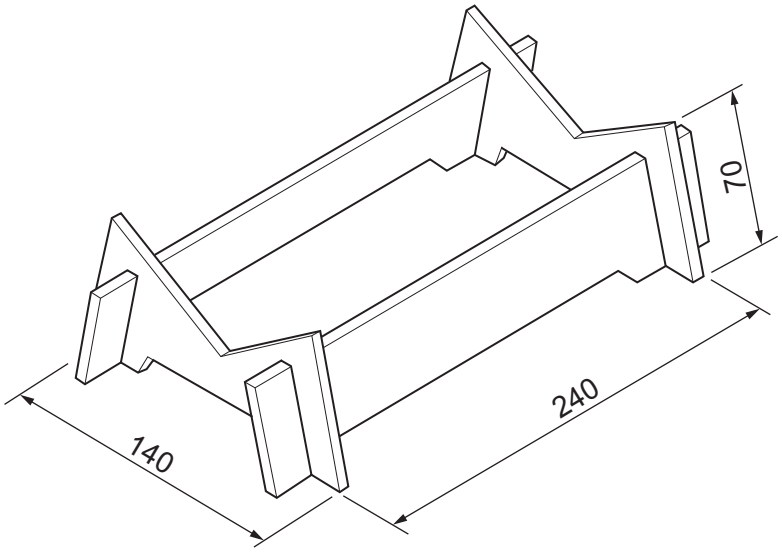


Fig. 12.3

Fig. 12.4 shows a CAD drawing of one of the sides and one of the ends.
The school has a CNC machine that could be used to cut out the sides and ends.

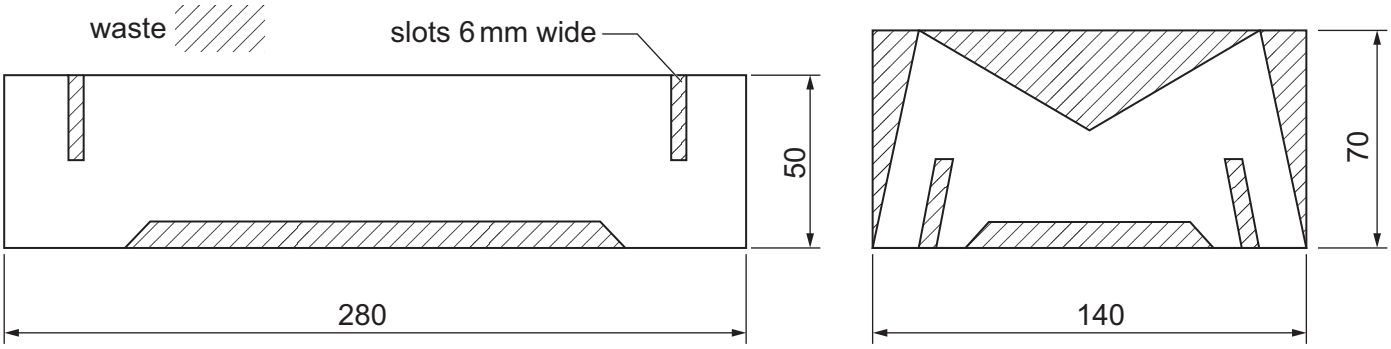


Fig. 12.4

Complete Table 12.1 to describe how the sides and ends could be cut out using a CNC machine.

Table 12.1

Stage	Description of process
1	File of CAD drawing saved
2	
3	
4	
5	

[4]

(g) Fig. 12.5 shows the parts of the display stand before they are assembled.
The sides and ends are assembled without the use of an adhesive.

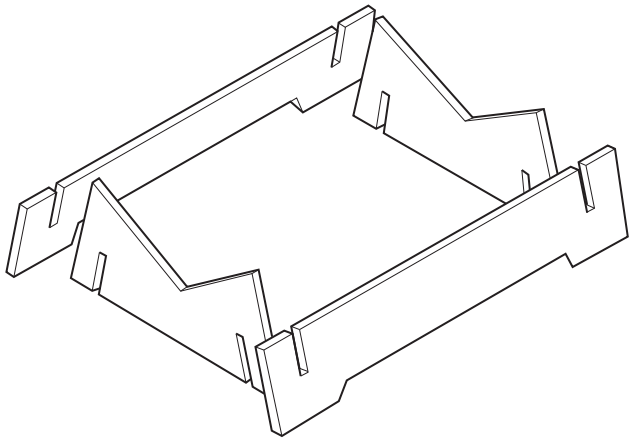


Fig. 12.5

Give **two** benefits to consumers of purchasing products that can be assembled without the use of an adhesive.

1 .....

2 .....
[2]

(h) When designing a product it is important to consider the impact of the materials used on the environment.
Explain why the use of MDF could be considered more environmentally friendly than using acrylic for the display stand.

.....

.....

.....

.....

.....

..... [4]

13 Fig. 13.1 shows a menu stand that has been produced by a D&T student for use in a local café. A batch of ten menu stands will be produced.

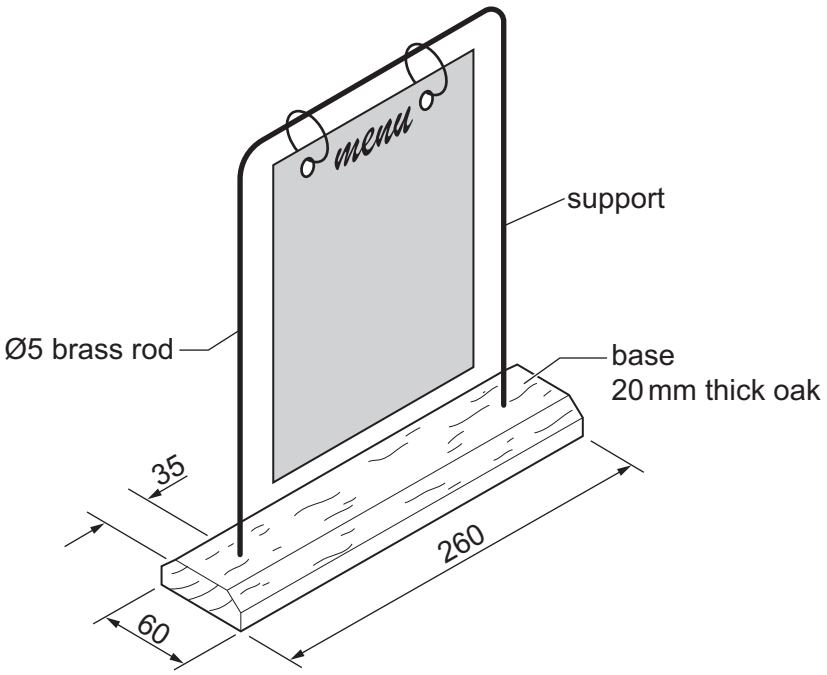


Fig. 13.1

(a) Give **three** specification points that the student would have considered when designing the menu stand.

The menu stand must:

1 .....

2 .....

3 .....

[3]

(b) Two Ø5 holes will be drilled in the base **before** it is shaped.
Use sketches and notes to show a jig that could be used to mark out the positions of the holes accurately when making a batch of ten menu stands.
Name the material from which the jig could be made.

[4]

(c) Fig. 13.2 shows a chamfer marked out on the base of the menu stand and the completed chamfer after the waste wood has been planed off.

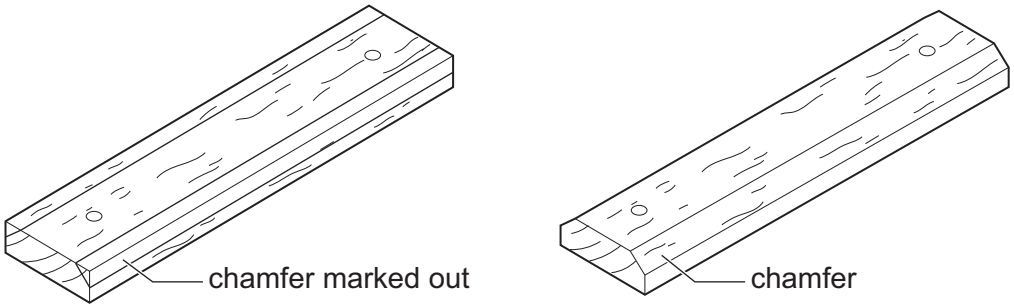


Fig. 13.2

(i) Give the name of a plane that could be used to produce the chamfer.

……..[1]

(ii) Use sketches and notes to show how the base could be held securely while the chamfer is planed.

[3]

(d) (i) The brass used for the rod is a non-ferrous metal.
Give the meaning of the term non-ferrous metal.

..... [1]

(ii) The brass rod needs to be made softer so that it could be bent to shape more easily.
State the name of the process that is used to make the brass softer.

..... [1]

(e) Fig. 13.3 shows details of the support bent to shape from a length of brass rod.
Use sketches and notes to show a design for a bending jig that could be used to produce **ten** identical supports. Give details of all materials and constructions used.

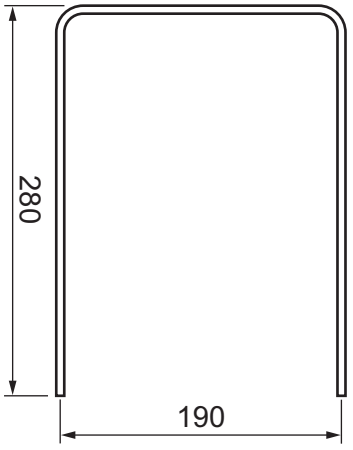


Fig. 13.3

[4]

(f) The oak base and the brass support will have a clear finish applied.

(i) Name a suitable clear finish that could be applied to the oak base.

..... [1]

(ii) Name a suitable clear finish that could be applied to the brass support.

..... [1]

(g) The brass support will be glued into the oak base using an epoxy resin adhesive.
Describe how the epoxy resin adhesive would be prepared before it is applied to the base.

.....

.....

..... [2]

(h) Fig. 13.4 shows menu stand **A**, produced by the D&T student, and a different menu stand **B**. Compare both menu stands and explain which of the two would be quicker to batch produce.

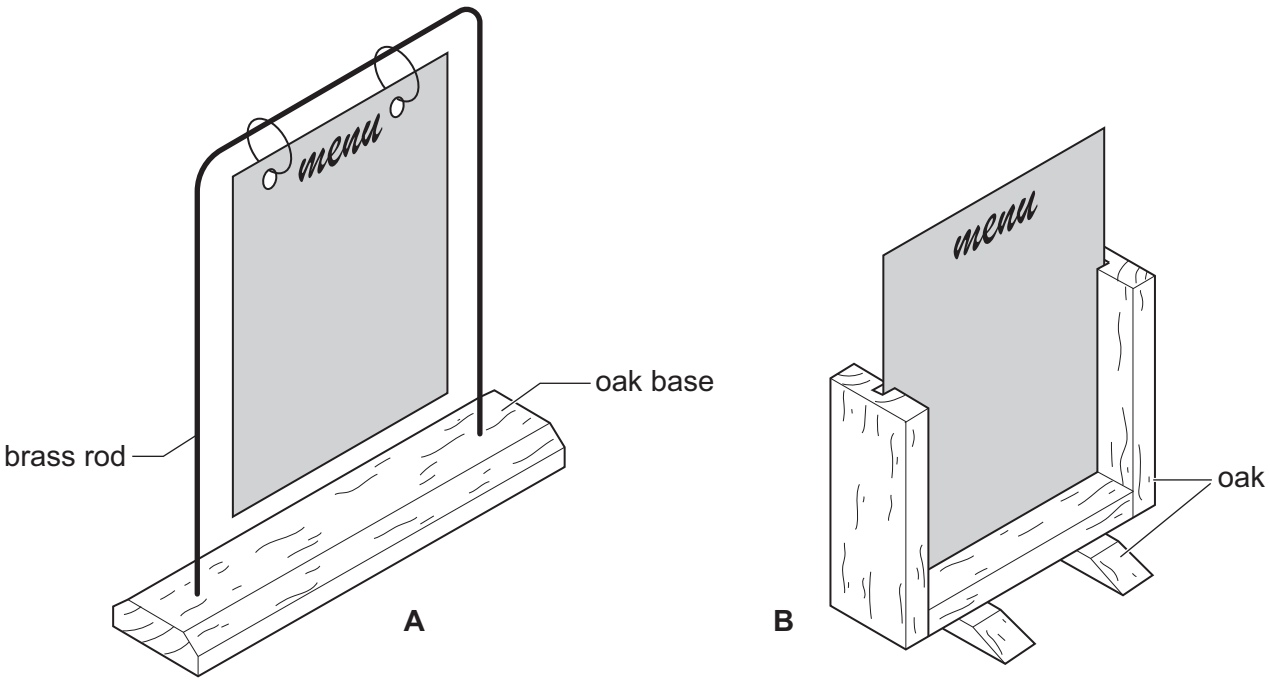


Fig. 13.4

.....

.....

.....

.....

..... [4]

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