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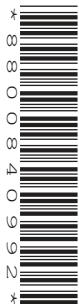
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DESIGN & TECHNOLOGY

0445/33

Paper 3 Resistant Materials

October/November 2020

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.

This document has **20** pages. Blank pages are indicated.

Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows two standard timber sections, **A** and **B**.

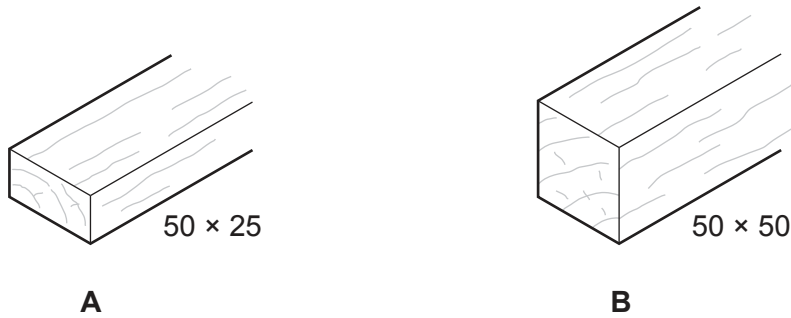


Fig. 1.1

Give the correct name for each of the standard timber sections.

A

B

[2]

2 Fig. 2.1 shows part of a length of Ø20 aluminium tube that will be cut into 50 mm long pieces.

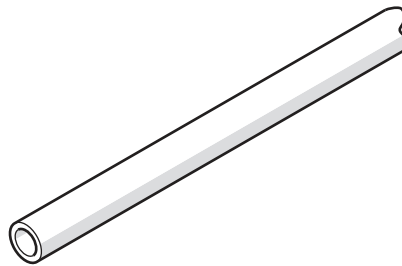


Fig. 2.1

Complete Table 2.1 by naming **one** tool or item of equipment for each stage of the process.

Table 2.1

Stage	Tool or item of equipment
Measuring	
Marking out	
Cutting to length	

[3]

3 Fig. 3.1 shows a former that will be used when vacuum forming plastic.

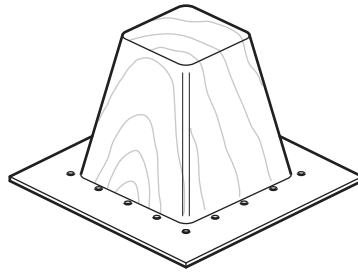


Fig. 3.1

State **two** features of the former that will ensure that the plastic will be vacuum formed successfully.

1

2

[2]

4 Fig. 4.1 shows a nameplate used in a garden centre. The nameplate is made from mild steel.

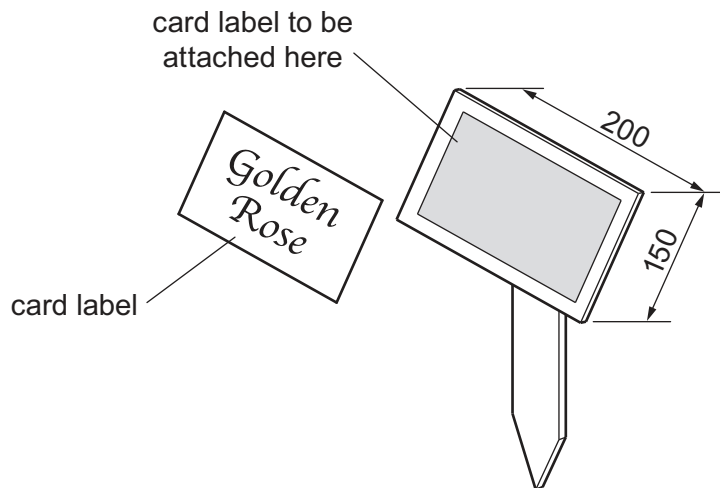


Fig. 4.1

Use sketches and notes to show a modification to the mild steel nameplate to allow the card label to be attached and removed easily.

[3]

- 5 Fig. 5.1 shows a leaflet holder made from acrylic sheet. A screen shot of an incomplete CAD drawing of the left-hand side of the development (net) of the leaflet holder is also shown.

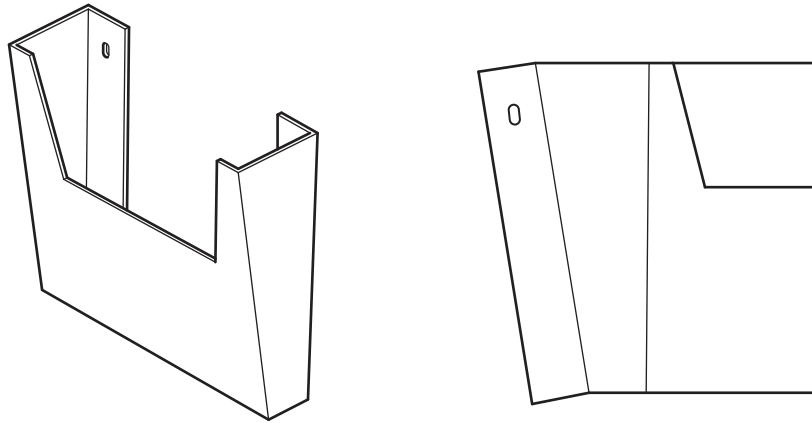


Fig. 5.1

- (a) Circle, from the list below, the command that would be used to complete the CAD drawing of the leaflet holder.

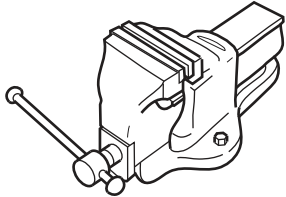

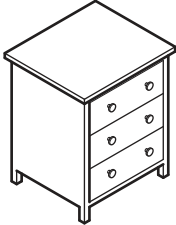
group **stretch** **rotate** **mirror** [1]

- (b) Give **one** benefit of using CAD to design the leaflet holder.

..... [1]

- 6 Complete Table 6.1 by naming a suitable specific material for each product.

Table 6.1

Product	Suitable specific material
 <p>body of metalwork vice</p>	
 <p>fast food container made from plastic</p>	
 <p>softwood cabinet</p>	

[3]

7 Fig. 7.1 shows a hardwood box.

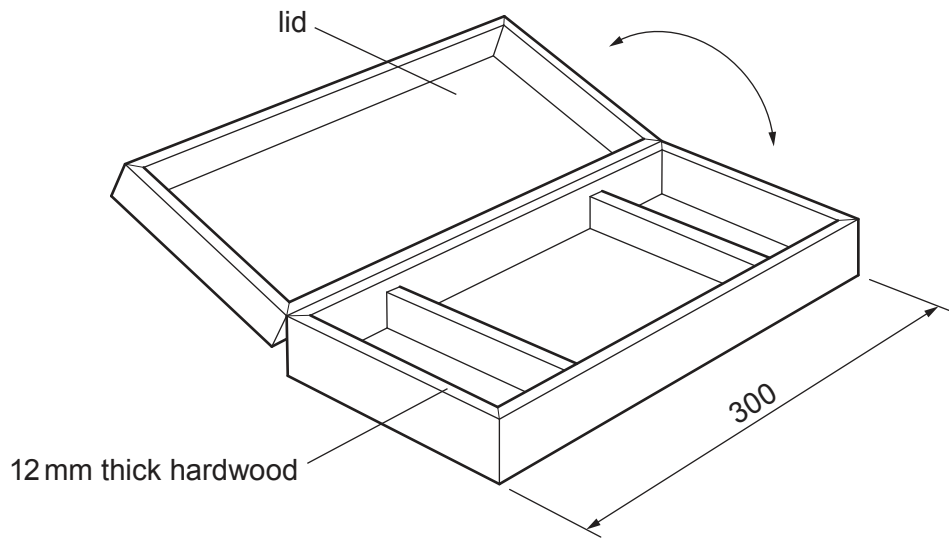


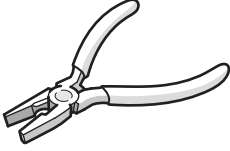
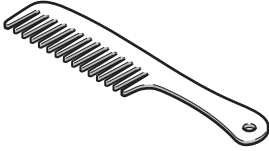

Fig. 7.1

Sketch a suitable type of hinge that could be used to join the lid to the sides of the box.

[3]

- 8 Complete Table 8.1 by naming a suitable finish, other than paint, for each of the products made from metal.

Table 8.1

Product	Suitable finish
 handle of steel pliers	
 aluminium comb	
 steel bucket	

[3]

9 Fig. 9.1 shows details of a knock-down (KD) fitting.

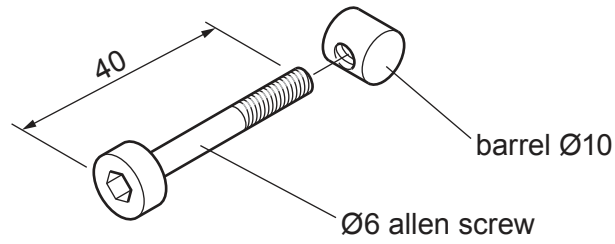


Fig. 9.1

Fig. 9.2 shows the corner of a small wooden box.

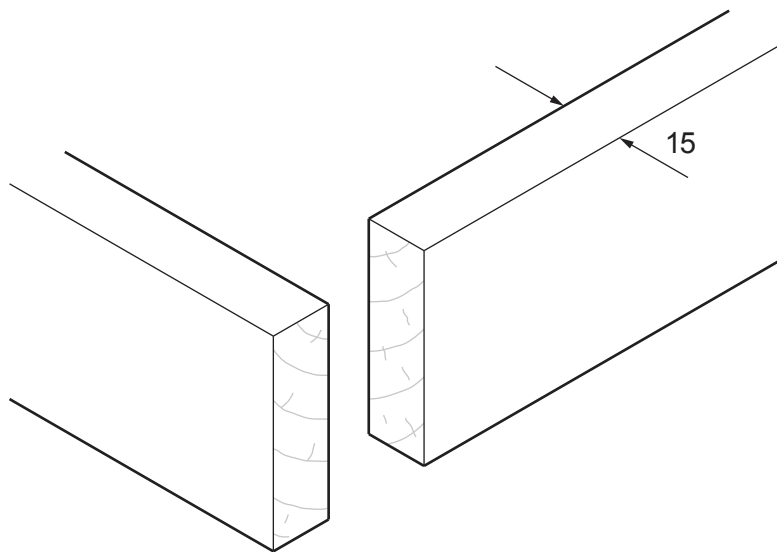


Fig. 9.2

Add sketches to Fig. 9.2 to show how a corner joint could be made using the knock-down (KD) fitting shown in Fig. 9.1. [2]

- 10 Fig. 10.1 shows a plastic fork and spoon used to feed very young children. Thermo-chromic pigment has been applied to the fork and spoon.



Fig. 10.1

Explain how thermo-chromic pigment would make the fork and spoon safer to use when feeding very young children.

.....

.....

..... [2]

Section B

Answer **one** question in this section.

- 11 Fig. 11.1 shows views of a small table made from 15 mm thick plywood. The table top has been removed to show details of the frame and legs. Legs **B** and **C** are joined through frame **A** by means of dowels.

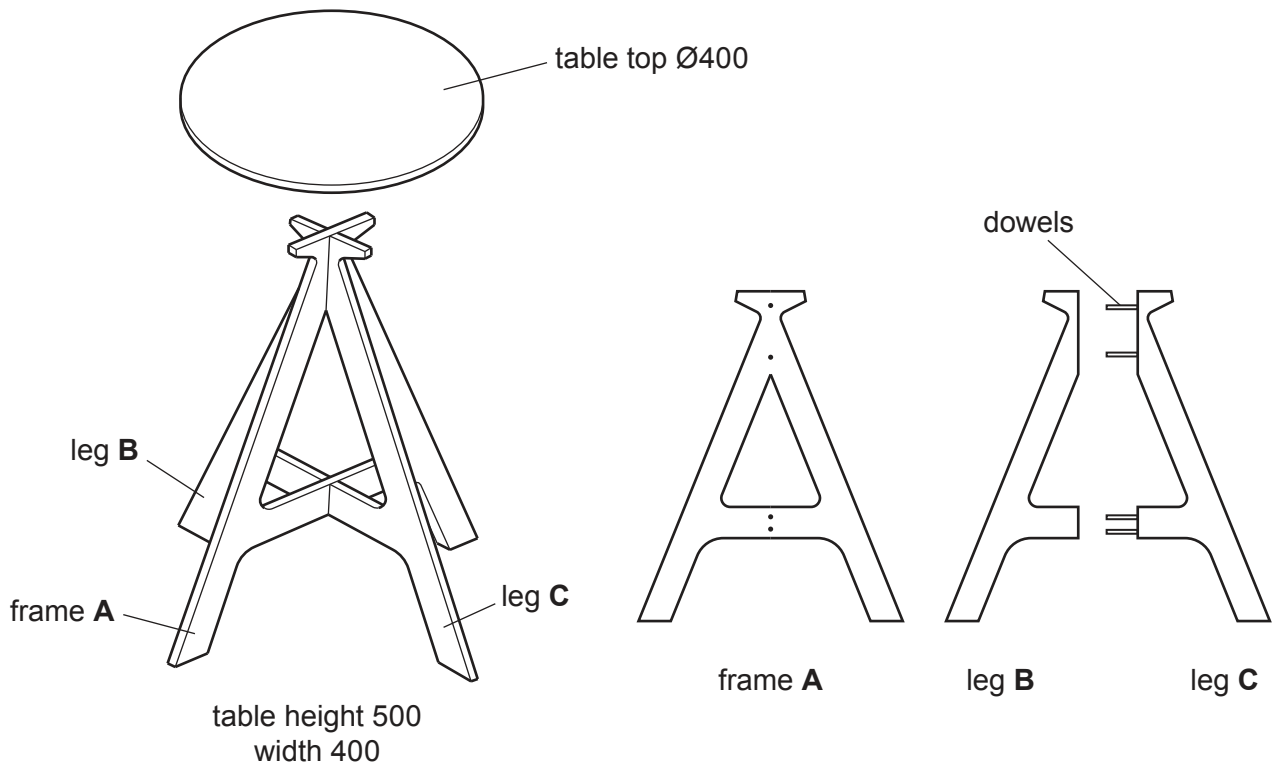


Fig. 11.1

- (a) Use sketches and notes to show why plywood is a more suitable material than solid wood for the design of this table.

[3]

- (b) Fig. 11.2 shows the shape of frame **A** marked out on a sheet of plywood. Use sketches and notes to show how the shape could be cut out. Name all the tools and equipment used.

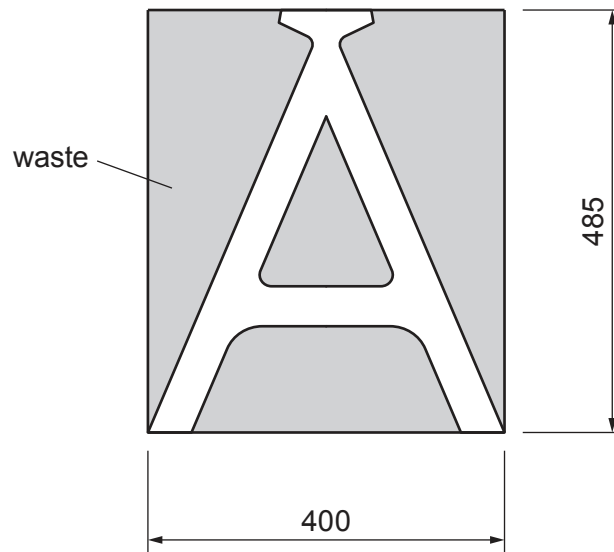


Fig. 11.2

[5]

- (c) Legs **B** and **C** will be joined through frame **A** by means of dowels. Fig. 11.3 shows details of leg **C**.

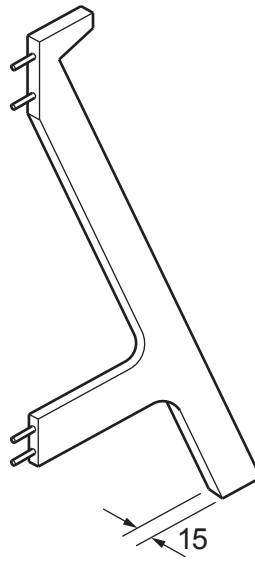


Fig. 11.3

- (i) State an appropriate diameter of dowel that could be used to join leg **B** to leg **C** through frame **A**.
..... [1]
- (ii) Use sketches and notes to show how the holes for the dowels could be drilled accurately in the legs and frame.

[4]

- (d) Fig. 11.4 shows the table top marked out on a sheet of plywood. The table top will be made on a woodturning lathe.

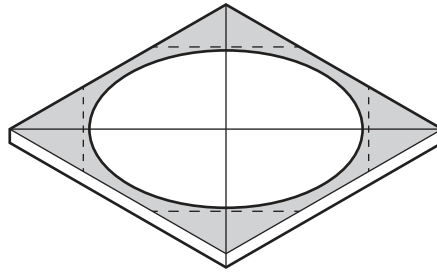


Fig. 11.4

- (i) Give **two** reasons why the corners need to be removed before the plywood is set up on the woodturning lathe.

1

2

[2]

- (ii) Describe **one** check that must be made when setting up the plywood on the woodturning lathe before the machine is switched on.

.....

..... [1]

- (iii) Name **two** tools or items of equipment that could be used when making the table top on a woodturning lathe.

1

2

[2]

- (e) Use sketches and notes to show a method of fixing the table top to the frame and legs. Additional materials may be used.

[4]

- (f) The table will have a painted finish.

- (i) Give **one** reason why the parts of the table would be painted before they are assembled.

..... [1]

- (ii) A primer coat will be applied first. Explain the purpose of a primer coat.

.....
.....
..... [2]

12 Fig. 12.1 shows views of an incomplete design of a stand for a tablet. The stand is made from 5 mm thick acrylic sheet.

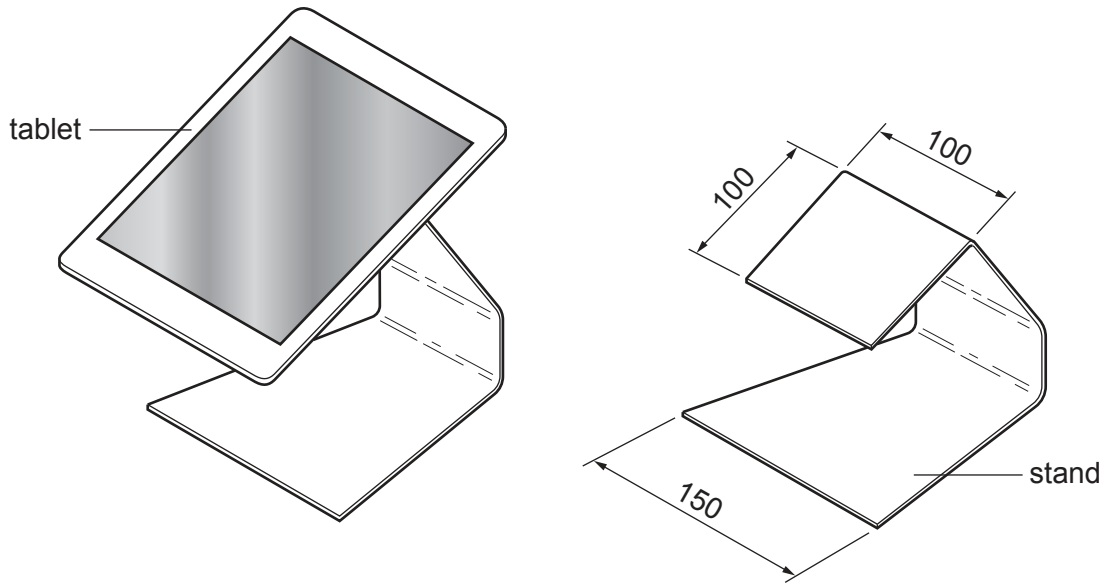


Fig. 12.1

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

- 1
- 2 [2]

(b) Give **two** reasons why it would be important to make a model of the stand before making it from acrylic.

- 1
- 2 [2]

(c) Explain why the designer would need to consider ergonomics when designing the tablet stand.

-
-
- [2]

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

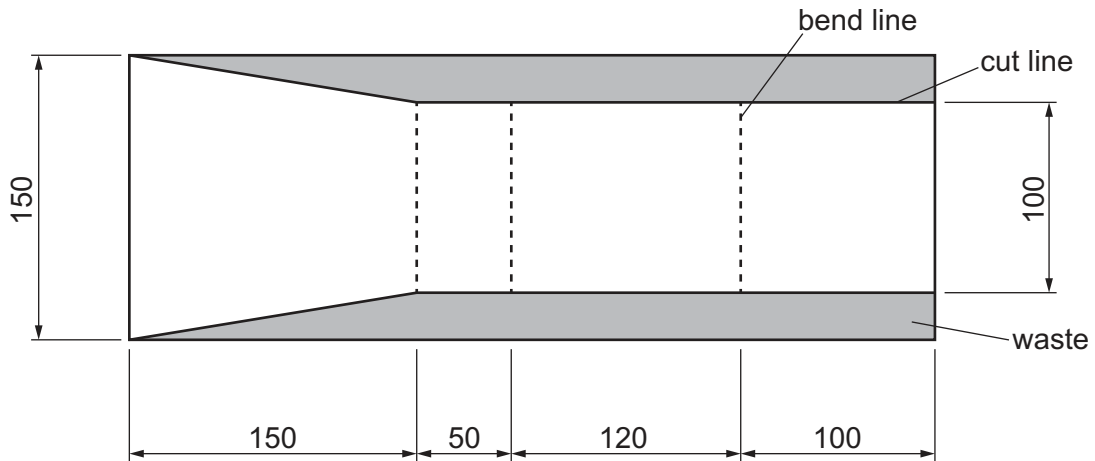


Fig. 12.2

Name **one** tool or item of equipment that could be used to mark on the surface of the acrylic:

(i) a bend line [1]

(ii) a cut line [1]

(e) Before the acrylic can be bent to shape the waste material will be sawn off.

(i) Give the specific name of a tool that could be used to saw off the waste.

..... [1]

(ii) Give **one** reason why acrylic sheet should be supported when it is being sawn.

..... [1]

(f) The edges of the acrylic will be finished to a high quality.

(i) Circle, from the list below, the correct method of filing used to make the edges of the acrylic smooth.

cross filing **draw filing** **hand filing** [1]

(ii) Circle, from the list below, the most appropriate abrasive used to make the edges smooth.

glasspaper **emery cloth** **silicon carbide (wet and dry) paper** [1]

- (g) Use sketches and notes to show how the acrylic could be bent to shape. Include details of:
- the method of heating the acrylic
 - the method of bending the acrylic
 - the method of retaining the acrylic while it cools
 - the sequence in which the bends will be produced.

[5]

(h) Fig. 12.3 shows details of the tablet and the stand.

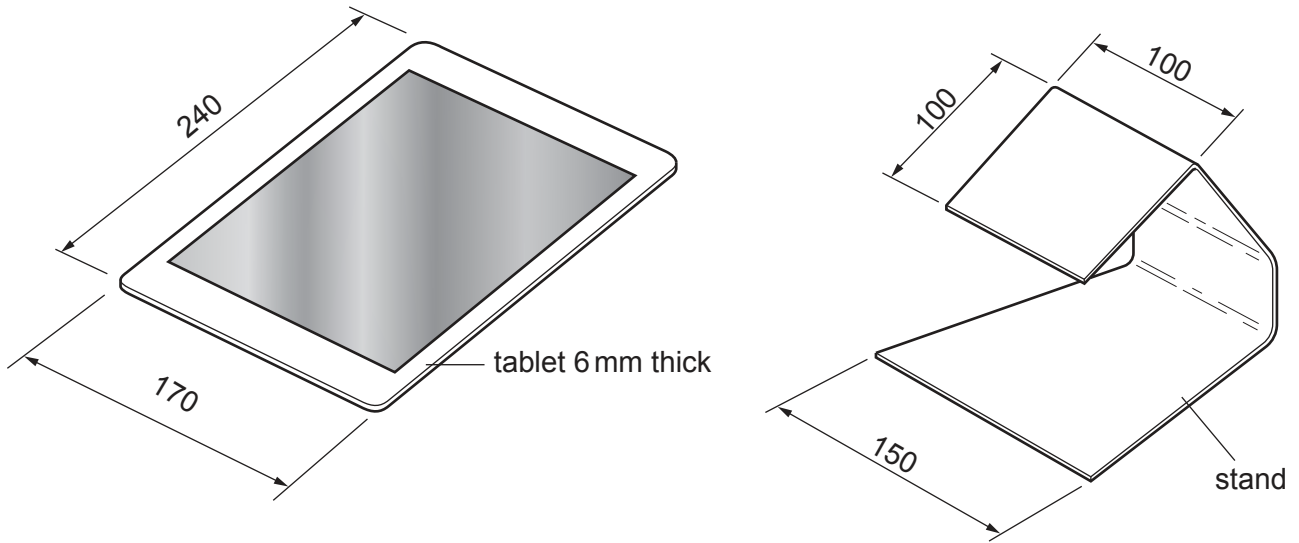


Fig. 12.3

- (i) Use sketches and notes to show how the stand could be modified so that the tablet is held securely in place.
Name all the materials used, construction details and **two** important sizes.

[6]

- (ii) Acrylic cement could be used to join parts of the modified stand.
Describe **two** safety precautions that must be taken when using acrylic cement.

1

2

[2]

13 Fig. 13.1 shows a table lamp that could be made in a school workshop.

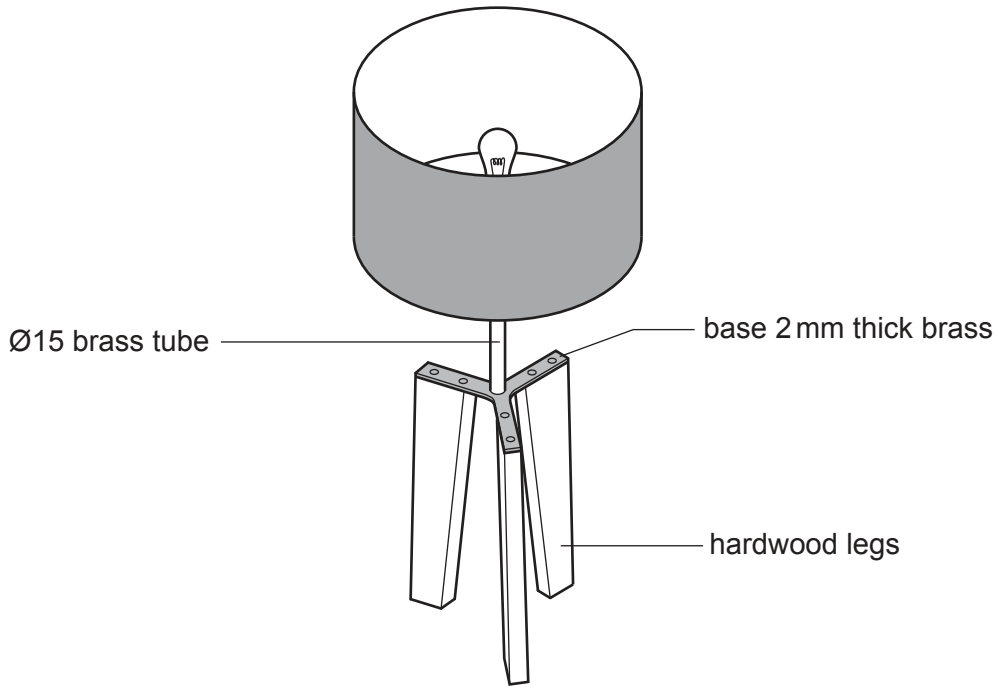


Fig. 13.1

(a) The base and tube of the lamp are made from brass. Brass is a non-ferrous alloy. Explain what is meant by the term 'non-ferrous alloy'.

.....

.....

..... [2]

(b) Fig. 13.2 shows the base of the lamp that will be cut from a sheet of 2 mm thick brass.

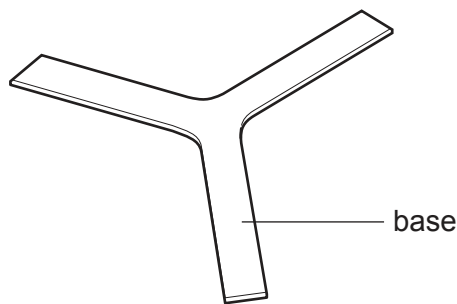


Fig. 13.2

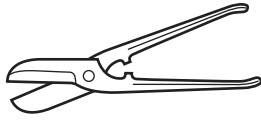
(i) Give **two** benefits of using a template to mark out the shape of the base on brass sheet.

1

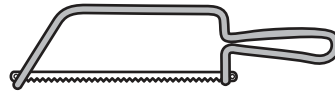
2

[2]

- (ii) Give the correct name of tools **A** and **B** shown below that could be used when cutting out the shape of the base.



A



B

A

B

[2]

- (c) (i) The Ø15 brass tube could be joined to the base by means of hard (silver) soldering. State the purpose of the following materials and items of equipment used during the soldering process.

emery cloth

fire bricks

flux

silver solder

blow torch

[5]

- (ii) The brass tube could be joined to the base by means of a screw thread. Use sketches and notes to describe how the items of equipment, **A** and **B** shown below, could be used to produce a screw threaded joint.



A



B

[6]

(d) Fig. 13.3 shows one hardwood leg marked out ready to be shaped.

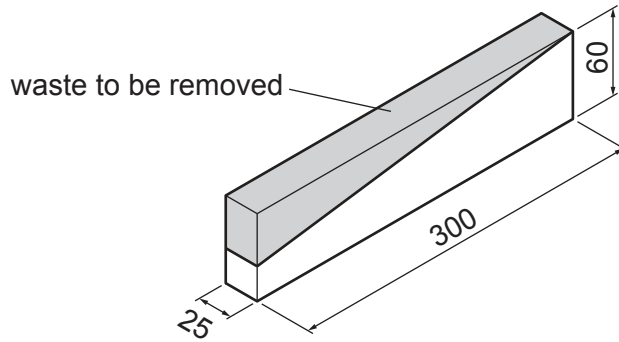


Fig. 13.3

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

..... [1]

(ii) Name **one** specific plane that could be used to make the sawn edge flat and smooth.

..... [1]

(e) The hardwood legs will have an applied finish to protect the wood and give it an attractive appearance.

Give **one** other benefit of applying:

(i) a painted finish

..... [1]

(ii) a clear varnish.

..... [1]

(f) Describe how the brass fittings could be polished to a high quality.

.....

 [2]

(g) The base will be joined to the legs using epoxy resin adhesive and brass pins. Describe how the epoxy resin adhesive would be prepared before it is applied.

.....

 [2]

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