Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

155811O091

DESIGN & TECHNOLOGY **0979/32**

Paper 3 Resistant Materials **May/June 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.

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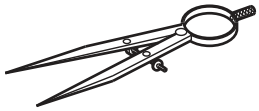
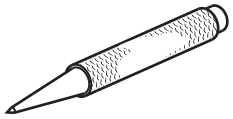
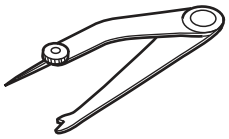
[Turn over

Section A

Answer **all** questions in this section.

1 Complete Table 1.1 by naming each of the tools that are used to mark out metal.

Table 1.1

Tool	Name of tool
	
	
	

[3]

2 Fig. 2.1 shows a drawer made from hardwood.
Sketch a suitable joint, other than a butt joint, that could be used at corner **A**.

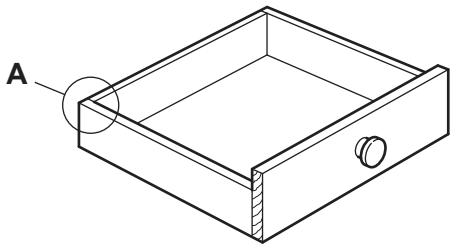
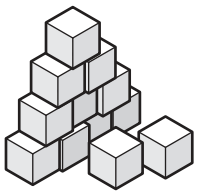
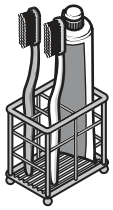
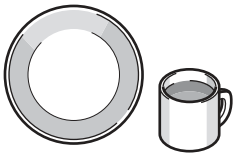


Fig. 2.1

[3]

3 Complete Table 3.1 by naming a suitable material for each product.

Table 3.1

Product	Suitable material
 wooden building blocks	
 metal toothbrush holder	
 plastic cup and plate	

[3]

4 Fig. 4.1 shows details of a shelf bracket and a length of softwood from which the bracket is made.

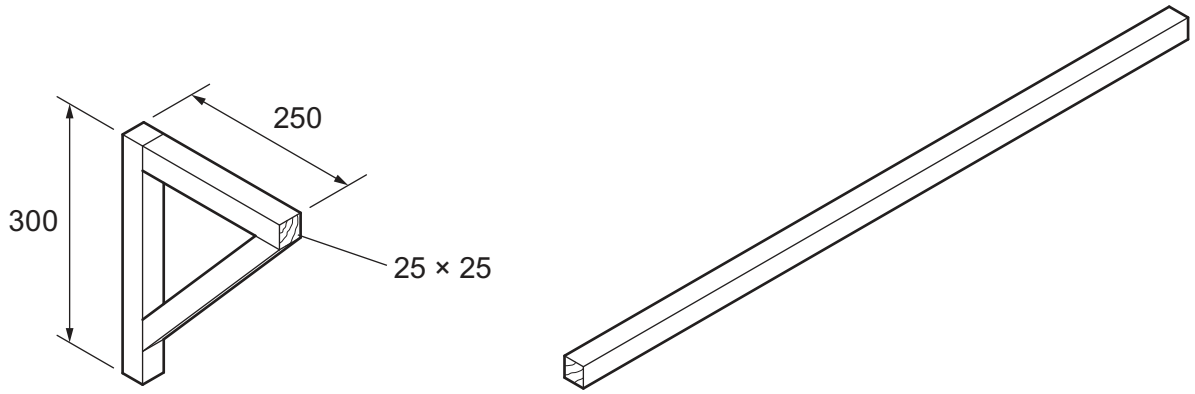


Fig. 4.1

State **three** processes that need to be carried out to produce the shelf bracket in Fig. 4.1.

1 .....

2 .....

3 .....

[3]

5 Fig. 5.1 shows a garden table made from plastic and the top of one of the removable table legs. The legs are fastened to the underside of the table top.

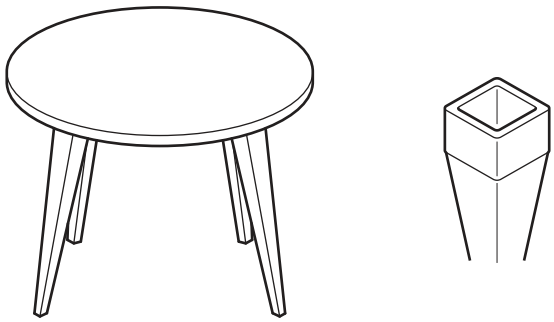


Fig. 5.1

Use sketches and notes to show how **one** leg could be fastened to the underside of the table top and be removable.

[2]

6 Fig. 6.1 shows a can opener in use.

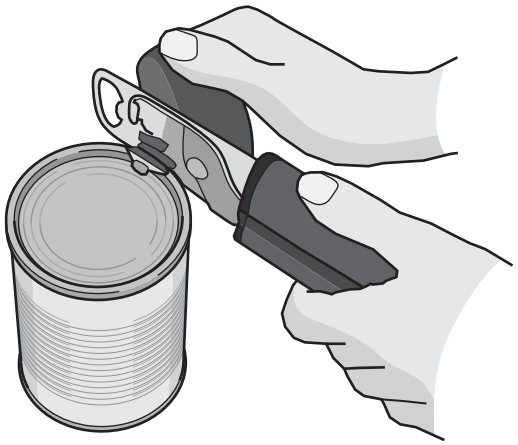


Fig. 6.1

Give **three** specification points for the can opener.

1 .....

2 .....

3 .....

[3]

7 Fig. 7.1 shows views of a bracket made from 3 mm thick aluminium.

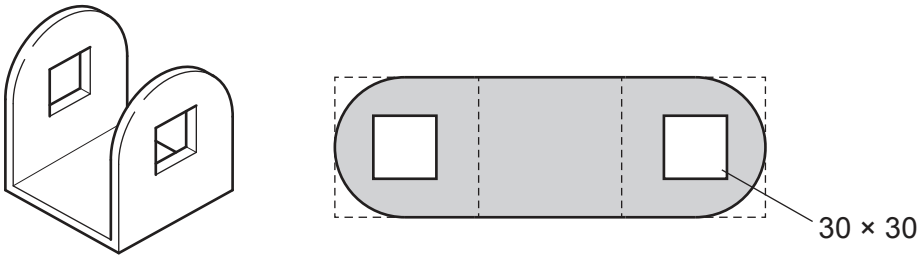


Fig. 7.1

Describe how the square holes 30 × 30 could be produced by hand.

.....

.....

..... [2]

8 Fig. 8.1 shows a draining rack used for drying crockery and cutlery.
The draining rack is made from steel and has a plastic coated finish.

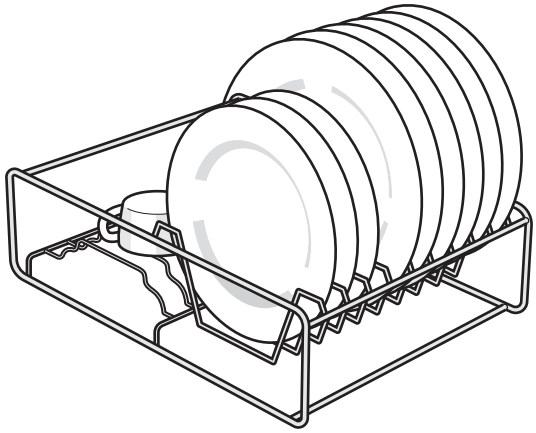


Fig. 8.1

(a) Give **one** benefit of a plastic coated finish on the draining rack.

..... [1]

(b) Give **one** drawback of a plastic coated finish on the draining rack.

..... [1]

9 Fig. 9.1 shows views of a coffee mug.
When hot liquid is added to the mug and the mug becomes warmer, a hidden image is revealed.

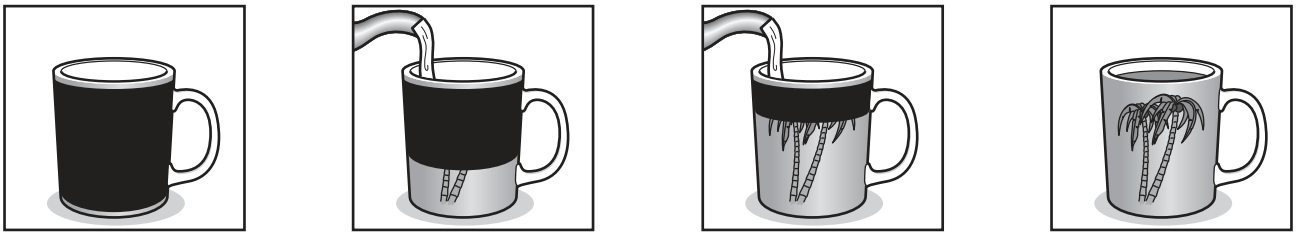


Fig. 9.1

Complete the statement:
The smart material that is added to the mug so that the image is revealed is known as

..... pigment. [1]

10 Fig. 10.1 shows views of a desk tidy made from 3 mm thick MDF.
The front, back and base fit into slots in the ends.

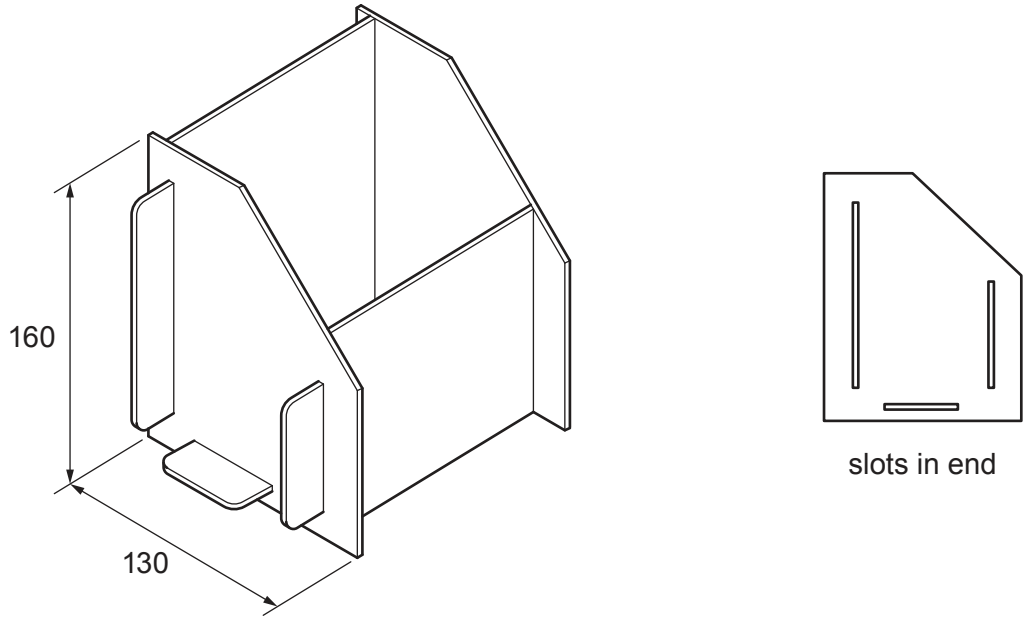


Fig. 10.1

Use sketches and notes to show how the parts could be 'locked' in position without the use of an adhesive.

[3]

Section B

Answer **one** question in this section.

11 Fig. 11.1 shows views of an incomplete design for a key rack made from hardwood. The front of the key rack can swing open and closed as shown.

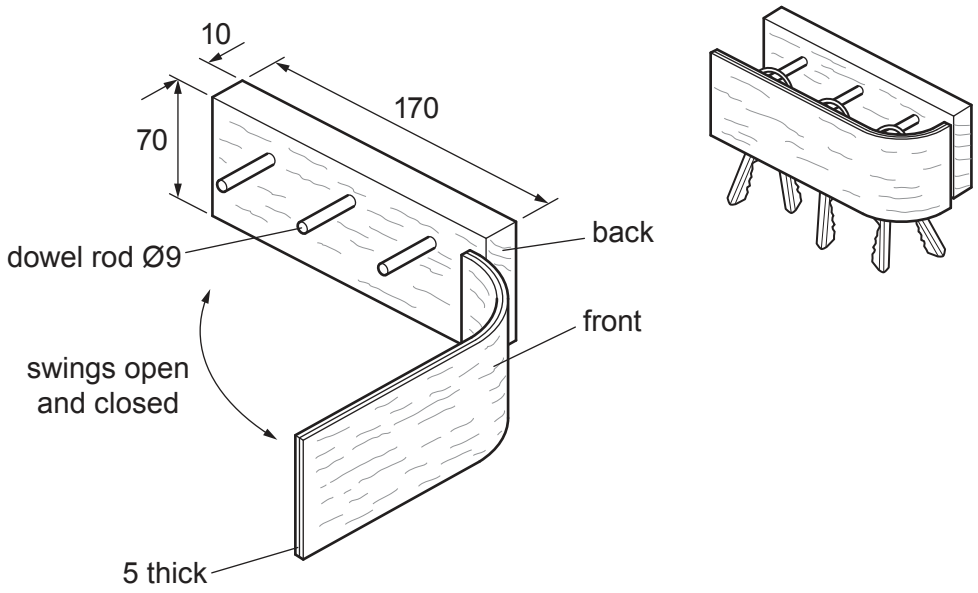


Fig. 11.1

(a) The front of the key rack is made by laminating wood veneers.
Use sketches and notes to show how the front could be produced.

[4]

(b) The keys will hang on Ø9 dowel pegs that are joined to the back of the key rack.
Use sketches and notes to show a modification to the dowel pegs so that the keys are prevented from sliding off.

[2]

(c) Use sketches and notes to show how the front could be joined to the back and allowed to open and close as shown in Fig. 11.1.
Include details of the materials and constructions used.

[4]

(d) **(i)** The front of the key rack will have a clear finish applied to it.
State **two** clear finishes, other than varnish, that would be suitable for the front of the key rack.

1 .....

2 .....
[2]

(ii) Give **two** stages of preparation that would need to be carried out before a clear finish could be applied to the front of the key rack.

1 .....

2 .....
[2]

(e) The key rack shown in Fig. 11.1 could be made completely from acrylic.

(i) Use sketches and notes to show how the front of the key rack could be formed when made from 5 mm thick acrylic sheet.

[3]

(ii) The dowel rods will be replaced with acrylic rod and the back replaced with acrylic sheet. Describe how the acrylic rod could be joined permanently to the back of the key rack.

.....

.....

..... [2]

(iii) The edges of the acrylic front and back will be self-finished to a high quality.
Complete Table 11.1 by describing **three** stages when self-finishing the edges of the acrylic.

Table 11.1

Stage	Process
1	Draw file edges using a hand file
2	
3	
4	

[3]

(f) When designing products, designers should select materials that are sustainable.
The key rack could be made from wood or plastic.
Explain why wood is considered to be more sustainable than plastic.

.....

.....

.....

..... [3]

12 Fig. 12.1 shows an incomplete design for a rack to store items of equipment used for cycle maintenance. Three trays will be supported inside the rack.
The rack is made from 12 × 12 mild steel tube and the trays from high impact polystyrene (HIPS).

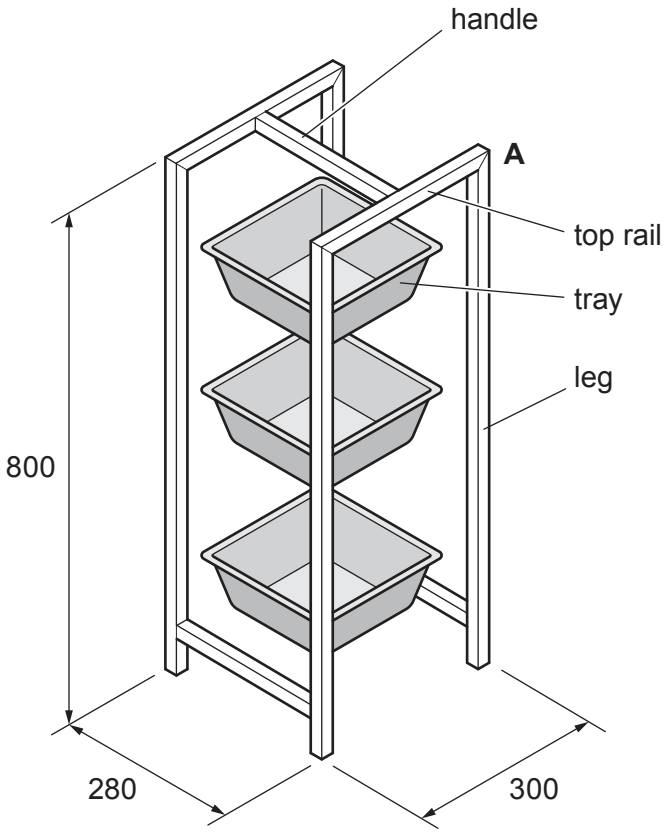


Fig. 12.1

(a) Fig. 12.2 shows parts of the top rail and leg of the rack marked out, ready to be cut, folded and brazed to form the corner at **A**.

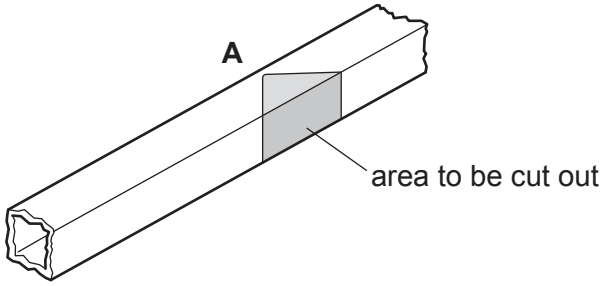


Fig. 12.2

Use sketches and notes to show how the joint could be cut out and the edges made flat using hand tools.

[4]

(b) The tubes will be joined together by brazing.
Complete Table 12.1 by stating the purpose of the items used when brazing the mild steel tube.

Table 12.1

Stage	Item of equipment	Purpose
1	emery cloth	
2	firebricks	
3	flux	
4	blow torch	
5	brazing rod	

[5]

(c) Fig. 12.3 shows part of the handle that will be joined to the top rail by means of an M8 screw.

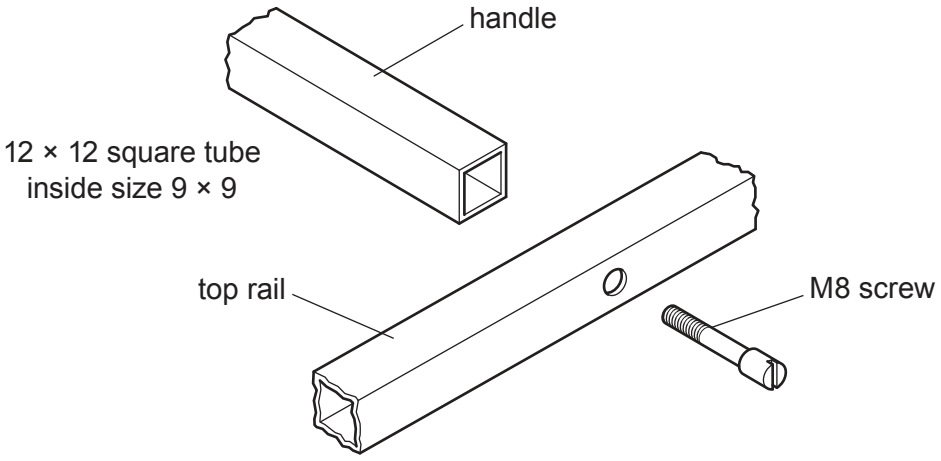


Fig. 12.3

Use sketches and notes to show a modification to the end of the handle so that the top rail and handle could be joined using the M8 screw.

[2]

(d) Use sketches and notes to show how the handle could be made more comfortable to hold when carrying the rack. Include details of materials used.

[2]

(e) Fig. 12.4 shows one of the trays and a block of wood that will be shaped into a former that will be used to vacuum form the trays.
Add sketches and notes to the block of wood to show the shape of a suitable former.

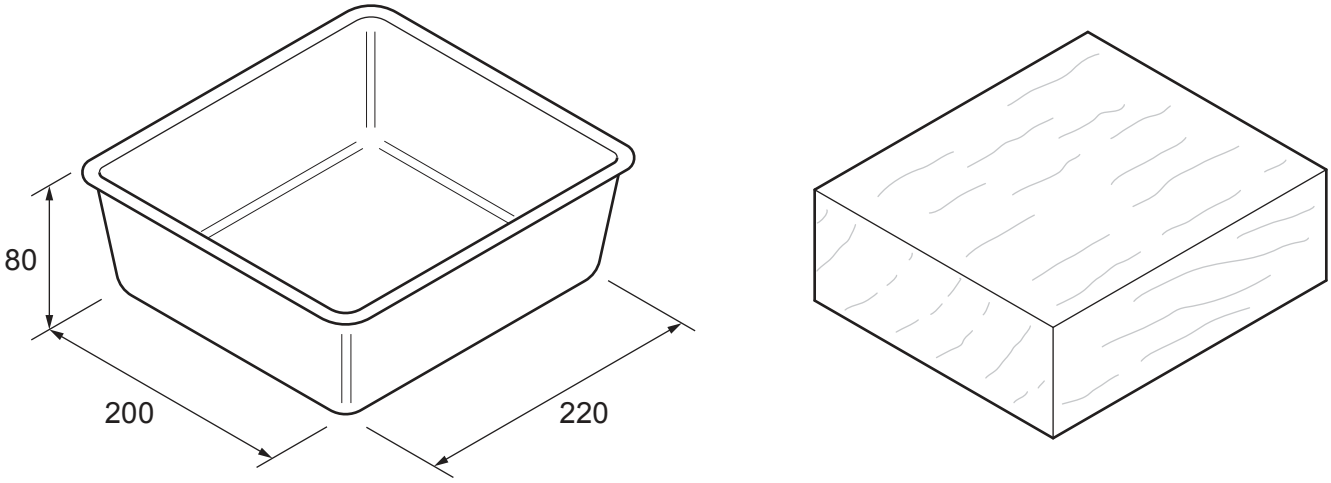


Fig. 12.4

[2]

(f) Give **two** benefits of the vacuum forming process when making a large quantity of products.

1 .....

2 .....

[2]

(g) Use sketches and notes to show modifications to the trays and/or the rack so that each of the three trays could be supported inside the rack and be able to be removed easily.
Include details of materials and constructions used.

[4]

(h) The rack is made from metal and the trays from plastic.
Explain the effects on the environment of using metal and plastic for the product.

.....

.....

.....

.....

.....

..... [4]

13 Fig. 13.1 shows a small table to be made in a school workshop.

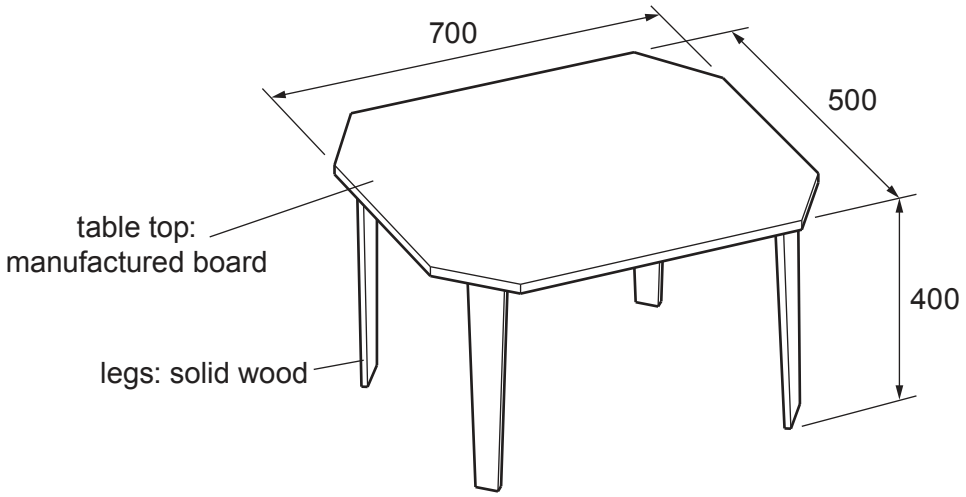


Fig. 13.1

(a) (i) Name a suitable manufactured board for the table top.

..... [1]

(ii) Give **two** reasons for your choice of manufactured board.

1 .....

2 .....
[2]

(b) Give **two** items of research that the designer would need to consider when deciding on the dimensions for the table.

1 .....

2 .....
[2]

(c) The legs are made from solid wood.
Fig. 13.2 shows one leg marked out ready to be shaped.

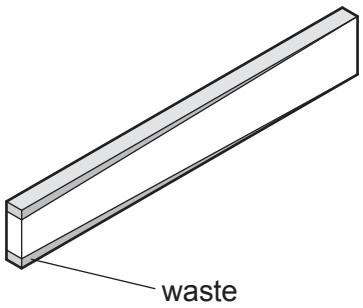


Fig. 13.2

(i) Name a suitable plane that could be used to remove the waste.

..... [1]

(ii) Show how the leg could be held securely while the waste wood is removed.

[2]

(d) Fig. 13.3 shows a palm sander.

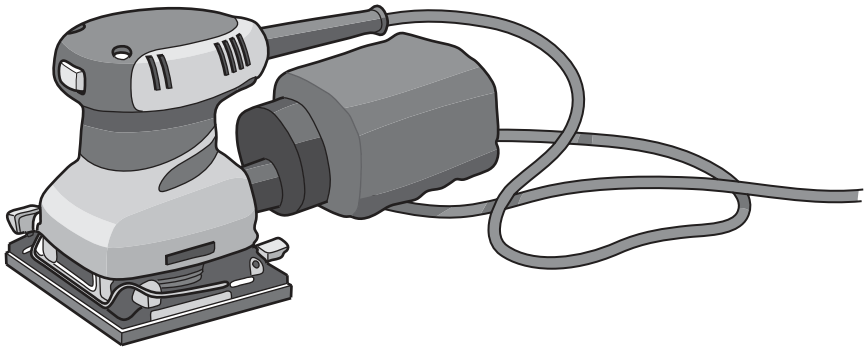


Fig. 13.3

(i) Give **two** benefits of using a palm sander to prepare the table top to take a finish.

1 .....

2 .....
[2]

(ii) Describe **two** safety precautions, other than items of personal protection equipment, that must be considered when using portable power tools.

1 .....

.....

2 .....

.....
[2]

(iii) The table top will be finished with clear lacquer.
Give **two** benefits of applying clear lacquer to the table top.

1 .....

2 .....
[2]

(e) Fig. 13.4 shows one leg in position to be hinged to the underside of the table top.

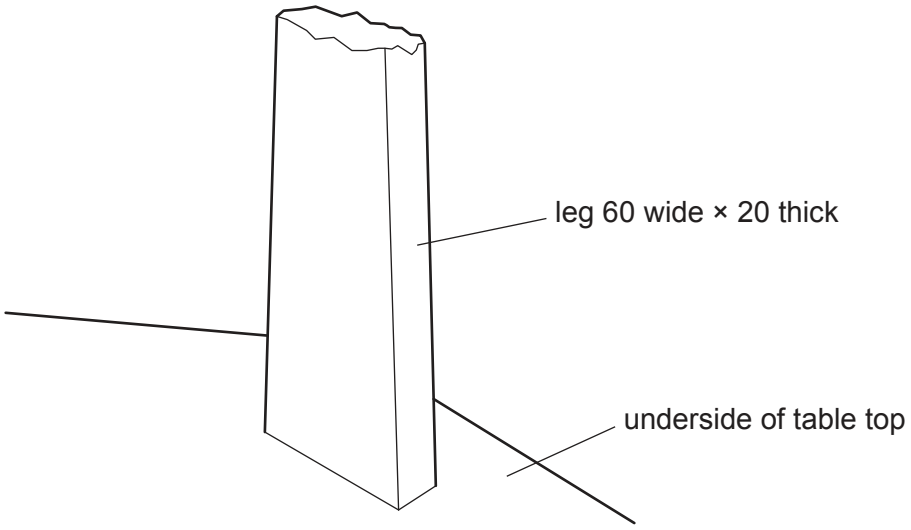


Fig. 13.4

(i) Add sketches and notes to Fig. 13.4 to show a suitable hinge that could be used to join the leg to the table top. [3]

(ii) Name the type of hinge used.

..... [1]

(iii) State the material from which the hinge is made.

..... [1]

(f) Use sketches and notes to show how the legs could be prevented from folding inwards when in use. Include details of materials and fittings used.

[6]

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