



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

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DESIGN AND TECHNOLOGY

0445/31

Paper 3 Resistant Materials

October/November 2018

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Section A

Answer **all** questions in this section.

Section B

Answer **one** question in this section.

You may use a calculator.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 50.

This document consists of **17** printed pages and **3** blank pages.

Section A

Answer **all** questions in this section.

1 Name the **two** standard metal sections shown below.



.....

[2]

2 (a) Name the type of tools shown in Fig. 1.

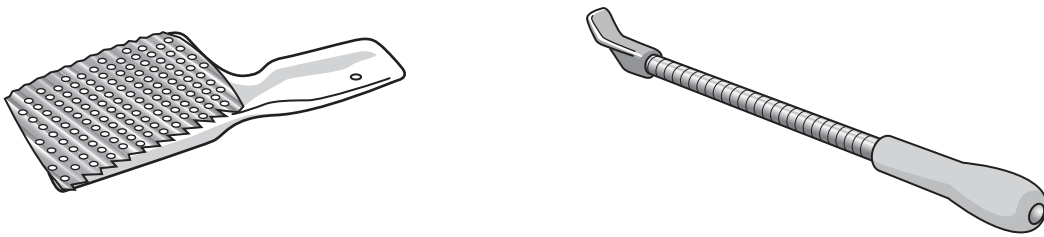


Fig. 1

..... [1]

(b) Give **one** reason why the tools in Fig. 1 can remove wood quickly and efficiently.

..... [1]

3 Fig. 2 shows three different holes drilled before woodscrews can be used to join the two pieces of wood. Each hole has a different purpose.

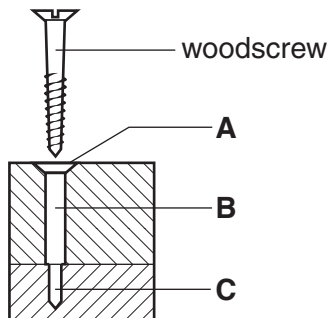


Fig. 2

Name each type of hole, **A**, **B** and **C**.

A

B

C [3]

4 Complete the table below by naming a different material that matches each of the descriptions.

Material	Description
	hard plastic, wide range of colours, used to make car rear light clusters
	manufactured board made by gluing layers together at 90° to each other
	close-grained hardwood used to make mallet heads and children's toys
	an alloy of copper and zinc, metal with corrosion resistance, electrical conductivity

[4]

5 Fig. 3 shows an incomplete drawing of a marking gauge.

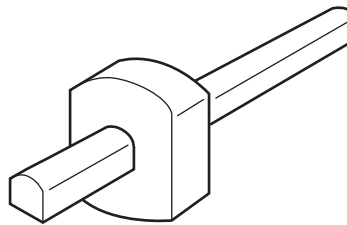


Fig. 3

Complete the drawing of the marking gauge by adding:

- (a) the thumbscrew;
- (b) the pin or spur.

[2]

6 Fig. 4 shows equipment used in a moulding process.

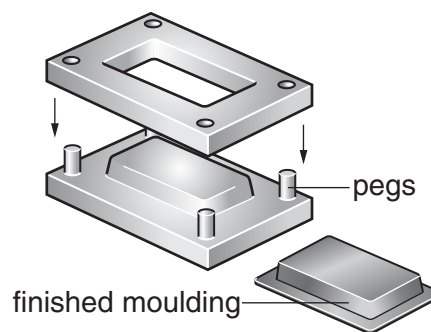


Fig. 4

(a) Name the moulding process shown in Fig. 4.

..... [1]

(b) State the purpose of the pegs in the moulding process.

..... [1]

- 7 Fig. 5 shows two sit-on toys used by children.
Toy **A** is made from wood and toy **B** from plastic.

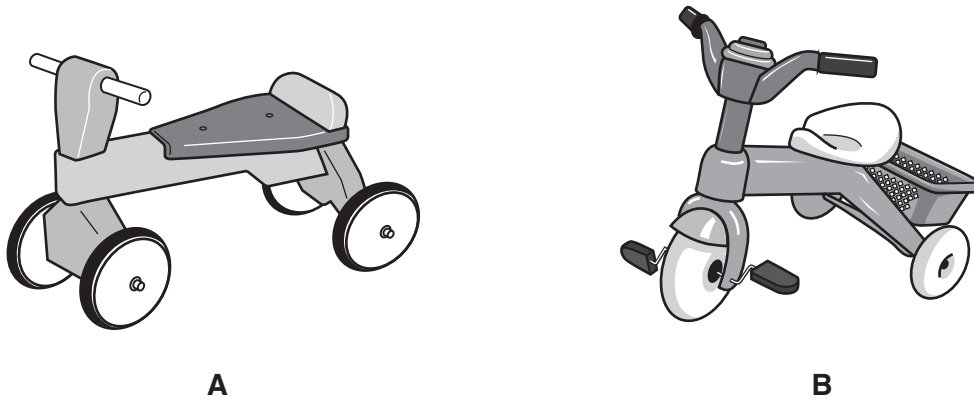


Fig. 5

Describe **one** benefit to the user of making a sit-on toy from:

wood

plastic

[2]

- 8 Fig. 6 shows a wooden frame construction, a hardboard corner plate and a corrugated fastener.

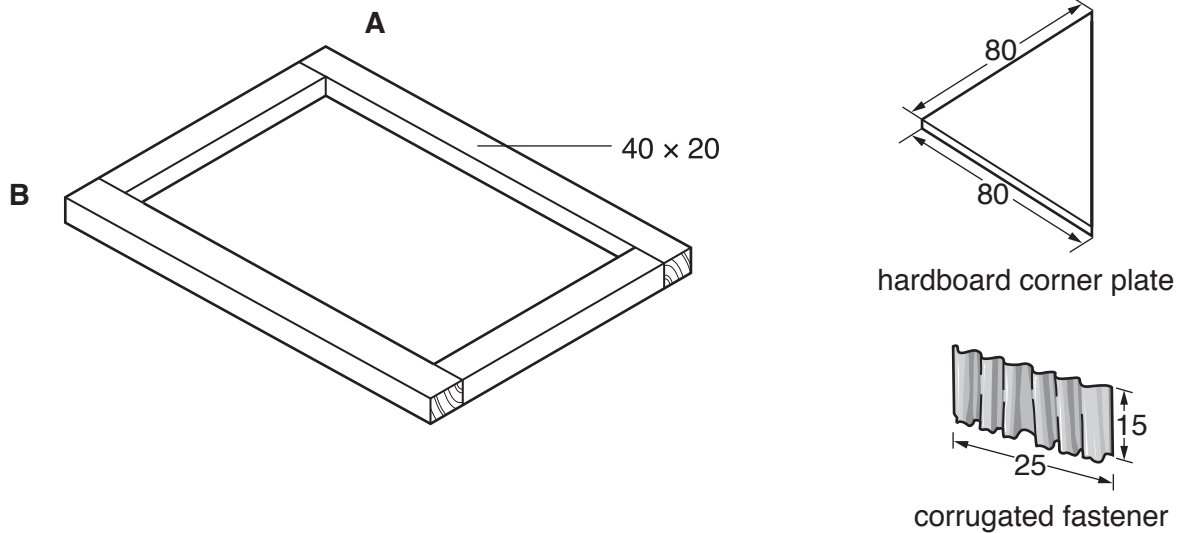


Fig. 6

Draw on Fig. 6 to show how the frame construction could be strengthened by means of:

(a) the hardboard corner plate at **A**; [1]

(b) the corrugated fastener at **B**. [1]

9 Fig. 7 shows a metric micrometer and a close-up view of the sleeve and thimble.

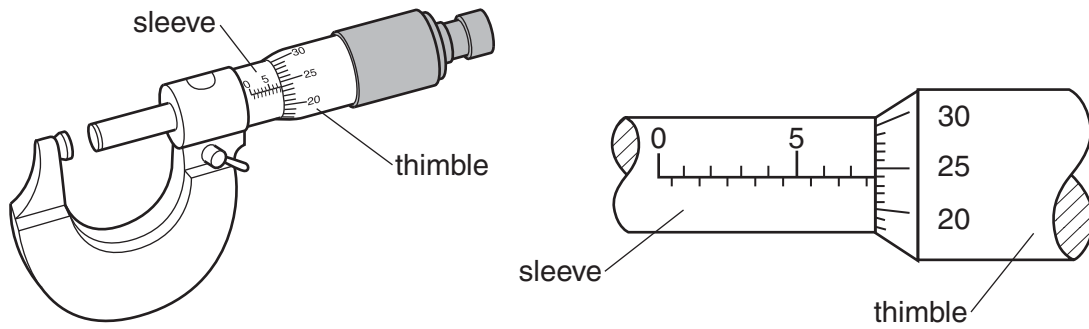


Fig. 7

State the exact reading to one hundredth of a mm (0.01).

..... [3]

10 Fig. 8 shows an item of workshop equipment.

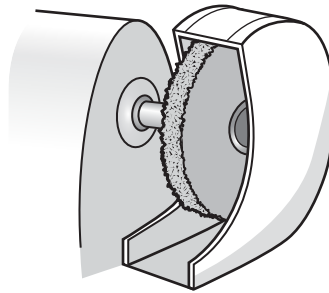


Fig. 8

(a) State **one** specific use for the item of equipment shown in Fig. 8.

..... [1]

(b) Give **two** safety precautions, other than wearing safety glasses, that must be taken when using the item of equipment.

1

2 [2]

Section B

Answer **one** question in this section.

- 11 Fig. 9 shows a storage unit. A printer will be placed on top of the unit, which will be positioned under a desk. The unit has shelves that will be used to store printer paper.

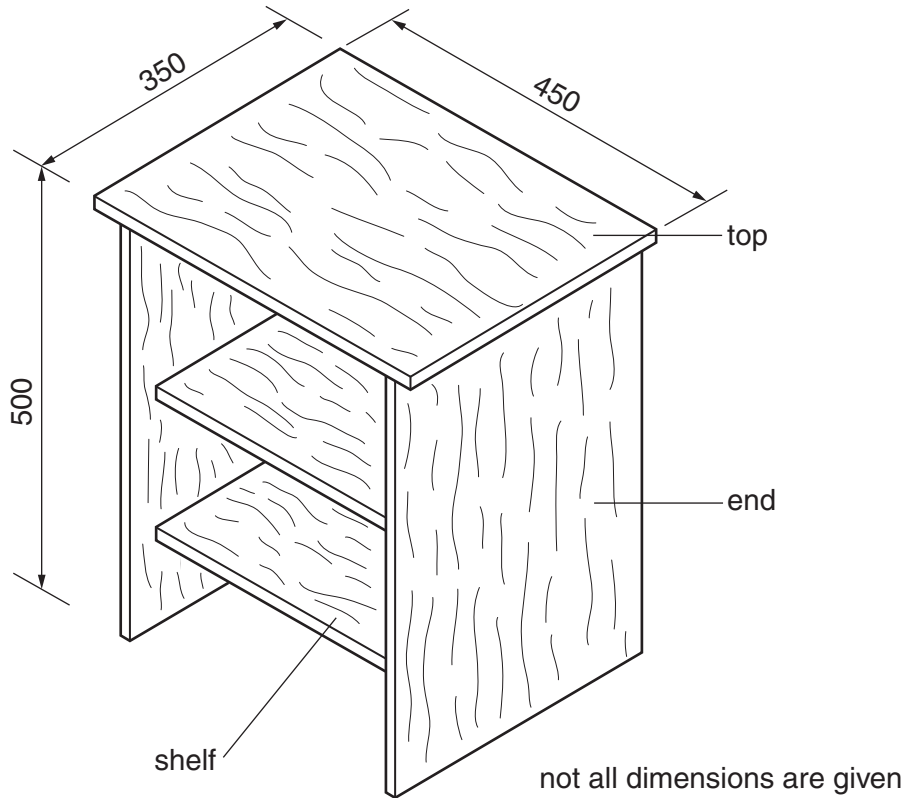


Fig. 9

- (a) An incomplete parts list for the storage unit is shown below. Complete the parts list.

Part	Number required	Length × width × thickness	Material
Top	1	450 × × 19	Veneered chipboard
Shelf	2 × × 19	Veneered chipboard
End	2 × 350 × 19	Veneered chipboard

[4]

- (b) Give **two** advantages of using veneered chipboard rather than solid wood for the storage unit.

1

2 [2]

- (c) Sketch and name a pre-manufactured component that would enable the storage unit to be moved about easily.

[3]

- (d) Use sketches and notes to show how **one** shelf could be joined to **one** end using knock-down (KD) fittings.

[4]

(e) Fig. 10 shows part of the top of the storage unit.

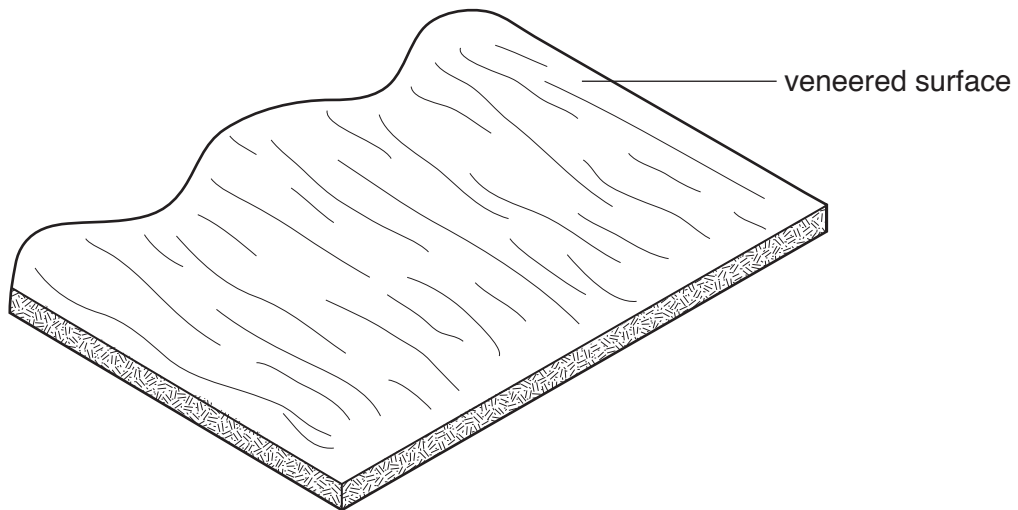


Fig. 10

Use sketches and notes to show how a solid wood lipping could be applied to **one** edge.

[3]

(f) Use sketches and notes to show a modification to the storage unit so that a quantity of paper clips, pens, pencils and a 300 mm plastic rule could be stored safely. Include details of materials, constructions and fittings used.

[5]

- (g) There is a possibility that the paper stored on the shelves could fall through the back of the unit.
Use sketches and notes to show how this could be prevented.
Include details of materials, constructions and fittings used.

[4]

12 Fig. 11 shows a headphone stand made from 5 thick acrylic. The headphone stand has two main parts: a base and a support.

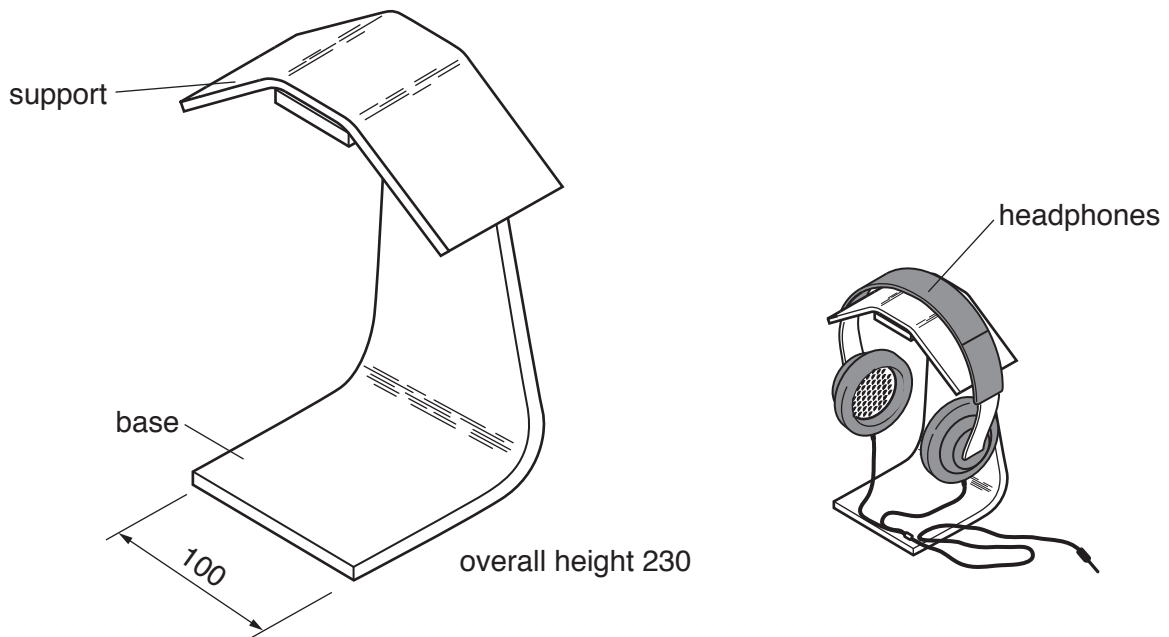


Fig. 11

(a) Give **two** items of research that would need to be considered when designing the headphone stand.

1

2 [2]

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

1

2 [2]

(c) Fig. 12 shows the base of the headphone stand made from acrylic.

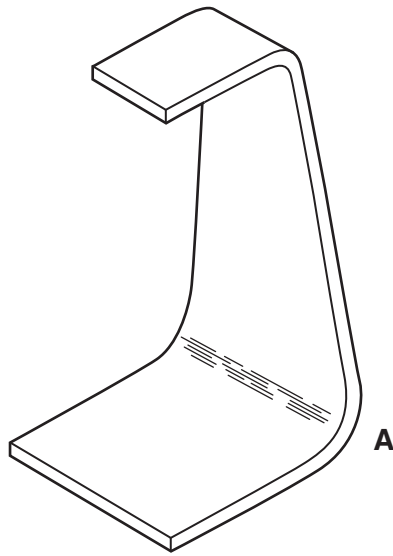


Fig. 12

(i) Use sketches and notes to show how the bend at **A** could be formed.

[4]

(ii) Explain why acrylic can be considered to be a 'smart' material.

.....

.....

..... [2]

(d) (i) Describe how the support could be joined permanently to the base of the headphone stand using acrylic cement.

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

(ii) Give **two** safety precautions that must be taken when using acrylic cement.

1
2 [2]

(e) Fig. 13 shows a different design of headphone stand made from hardwood.

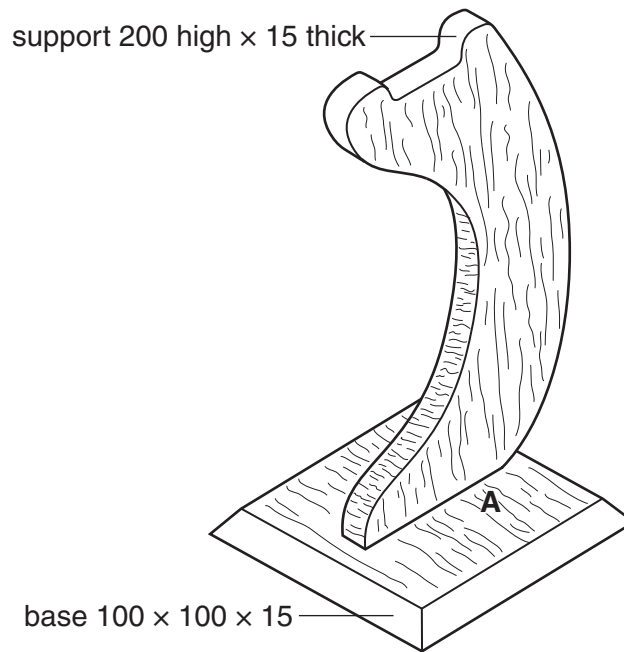


Fig. 13

(i) Sketch and name a suitable joint used to join the support to the base at **A** in Fig. 13.

[4]

- (ii) Fig. 14 shows the shape of the support drawn on paper and glued onto a block of hardwood.

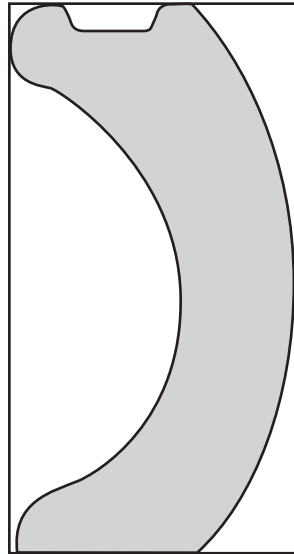


Fig. 14

Give the correct term for the paper shape.

..... [1]

- (iii) Name **two** types of saw that could be used to cut out the shape.

1

2 [2]

- (f) Use sketches and notes to show a modification to **either** the acrylic headphone stand **or** the hardwood headphone stand that would allow the cable to be stored neatly. Include details of materials, sizes and constructions used.

- 13 Fig. 15 shows two designs of shelf units. Both designs are manufactured and sold as self-assembly products.

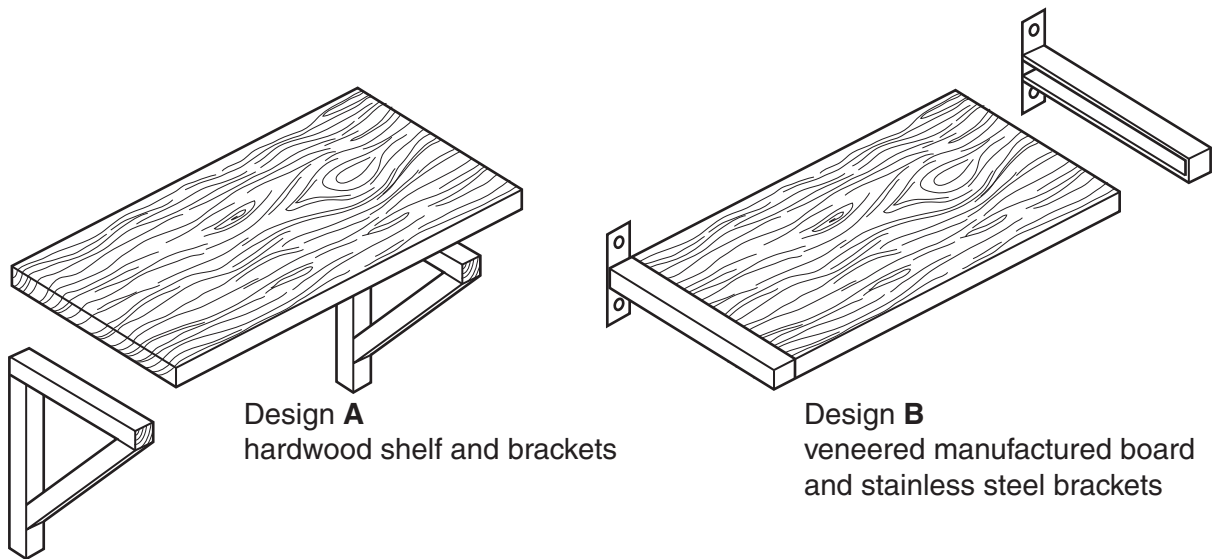


Fig. 15

- (a) Give **one** reason why the parts of Design **A** would have a finish applied **before** they are assembled.

..... [1]

- (b) Give **one** benefit of using stainless steel for the brackets in Design **B**.

..... [1]

- (c) (i) Explain why there is a possibility that the hardwood shelf could split if it was fixed permanently to the bracket in Design **A**.

.....

 [2]

- (ii) Use sketches and notes to show a method of fixing the shelf to the bracket in Design **A** that would prevent it from splitting.

[2]

- (d) Fig. 16 shows details of one bracket used with Design A.
The bracket is made by joining three strips of wood together.

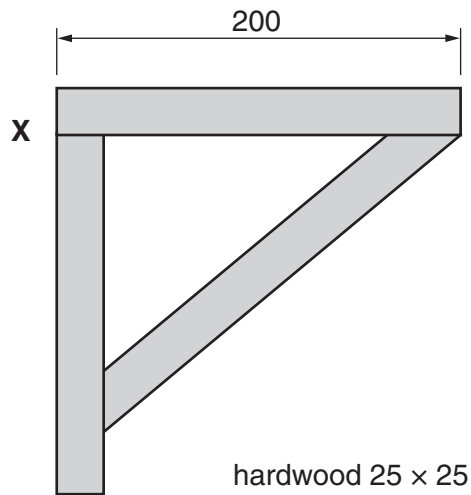


Fig. 16

- (i) Use sketches and notes to show a design for a sawing jig that could be used when sawing 200-long strips from a length of hardwood.

The sawing jig must:

- hold the hardwood securely;
- allow the hardwood to be cut accurately to length.

Include details of materials and fittings used.

[6]

(ii) Sketch and name a suitable joint at **X** in Fig. 16.

[4]

(iii) Name **three** tools used to produce the joint named in (ii).
Do not include marking-out tools.

1

2

3 [3]

(e) Use sketches and notes to show details of **one** functional improvement that could be made to shelf unit Design **A** shown in Fig. 15.

[2]

(f) Explain which of the shelf brackets, Design **A** or Design **B**, could be more expensive to mass-produce.

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

(g) (i) Give **one** benefit to the consumer of buying self-assembly products.

..... [1]

(ii) Give **one** benefit to the manufacturer of making self-assembly products.

..... [1]

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