



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



DESIGN AND TECHNOLOGY

0445/32

Paper 3 Resistant Materials

October/November 2017

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 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.

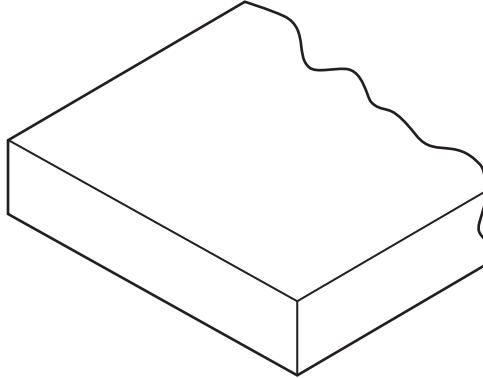
The total of the marks for this paper is 50.

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

Section A

Answer **all** questions in this section.

- 1 Complete the drawing below to show the construction of blockboard.



[2]

- 2 Fig. 1 shows a metalwork vice **A** and a woodwork vice **B**.

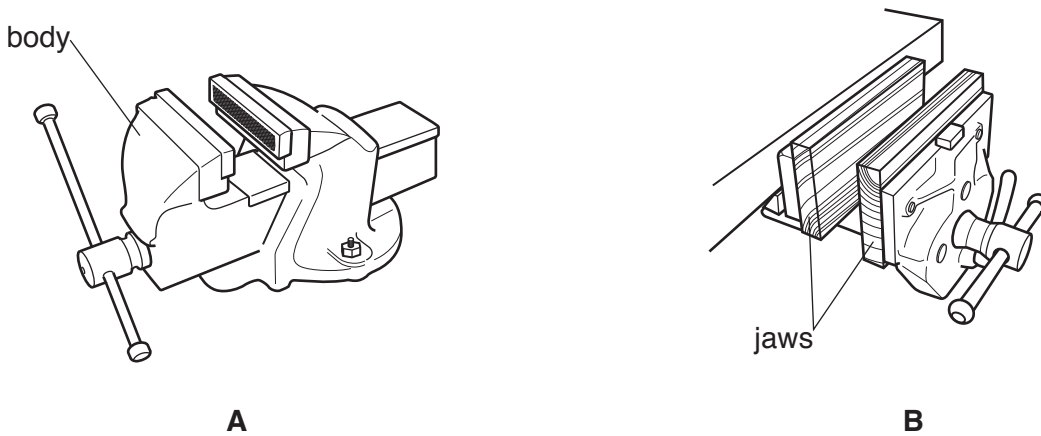


Fig. 1

- (a) Name the metal from which the body of the metalwork vice is made.

.....[1]

- (b) Give **one** property of beech that makes it suitable for the jaws of the woodwork vice.

.....[1]

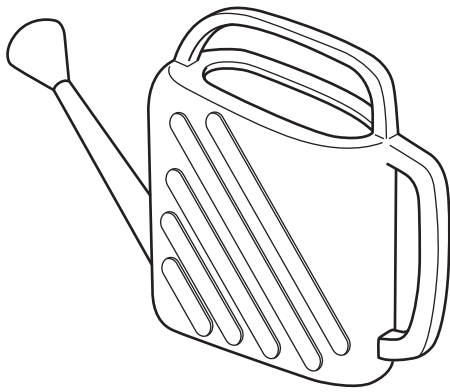
- 3 Thermochromic materials are an example of 'smart' materials.
Complete the statement by adding the correct term from the list below.

weight **temperature** **hardness** **light**

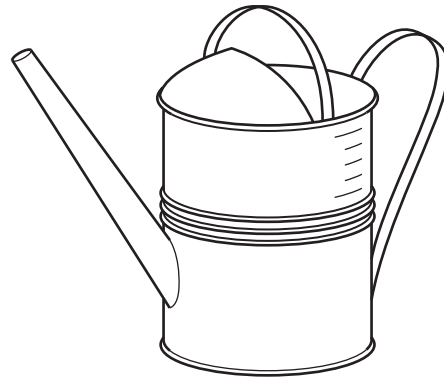
Thermochromic materials change colour with changes in

[1]

4 Fig. 2 shows two watering cans.



watering can **A**
polypropylene



watering can **B**
mild steel

Fig. 2

(a) Name a process used to manufacture the body of watering can **A**.

.....[1]

(b) Explain why watering can **B** would be galvanised.

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

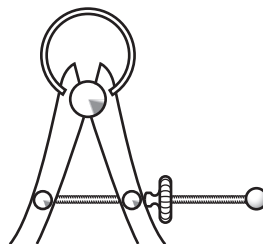
(c) (i) State which of the two watering cans, **A** or **B**, would be cheaper to mass produce.

..... [1]

(ii) Give **one** reason for your choice.

.....[1]

5 Complete the drawing below to show outside calipers.



[2]

- 6 Two workshop processes that could be dangerous are listed in the table below. Complete the table by describing each danger and how it can be prevented.

Process	Danger	How it can be prevented
Joining pieces of acrylic with acrylic cement		
Pouring molten aluminium when casting		

[4]

- 7 Fig. 3 shows a label on a box of screws.

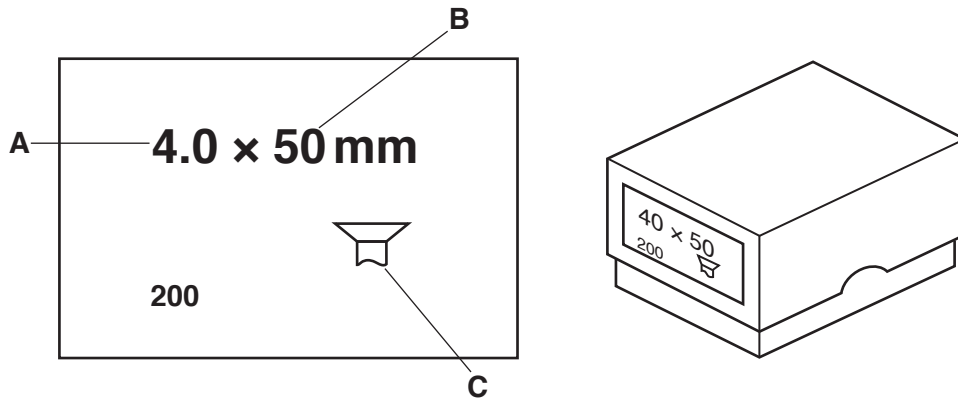


Fig. 3

State what each item of information means.

A.....

B.....

C..... [3]

- 8 Complete the drawing below to show a tongue and groove joint.



[2]

9 Fig. 4 shows solid wood boards being seasoned outdoors in the open air.

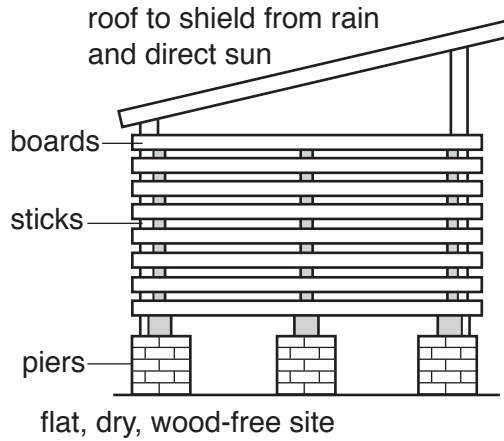


Fig. 4

(a) Give **one** reason why solid wood has to be seasoned.

.....[1]

(b) Name a different method of seasoning solid wood boards.

.....[1]

10 Complete the table by naming the correct plastic from the list below to match each description.

nylon phenol formaldehyde ABS polypropylene melamine formaldehyde

Plastic	Description
	hard, durable, used to make saucepan handles and dark electrical fittings
	self-lubricating, used to make gear wheels, clothing, combs, curtain rails

[2]

Section B

Answer **one** question from this section.

11 Fig. 5 shows a picnic table that can be folded flat to fit in the back of a car.

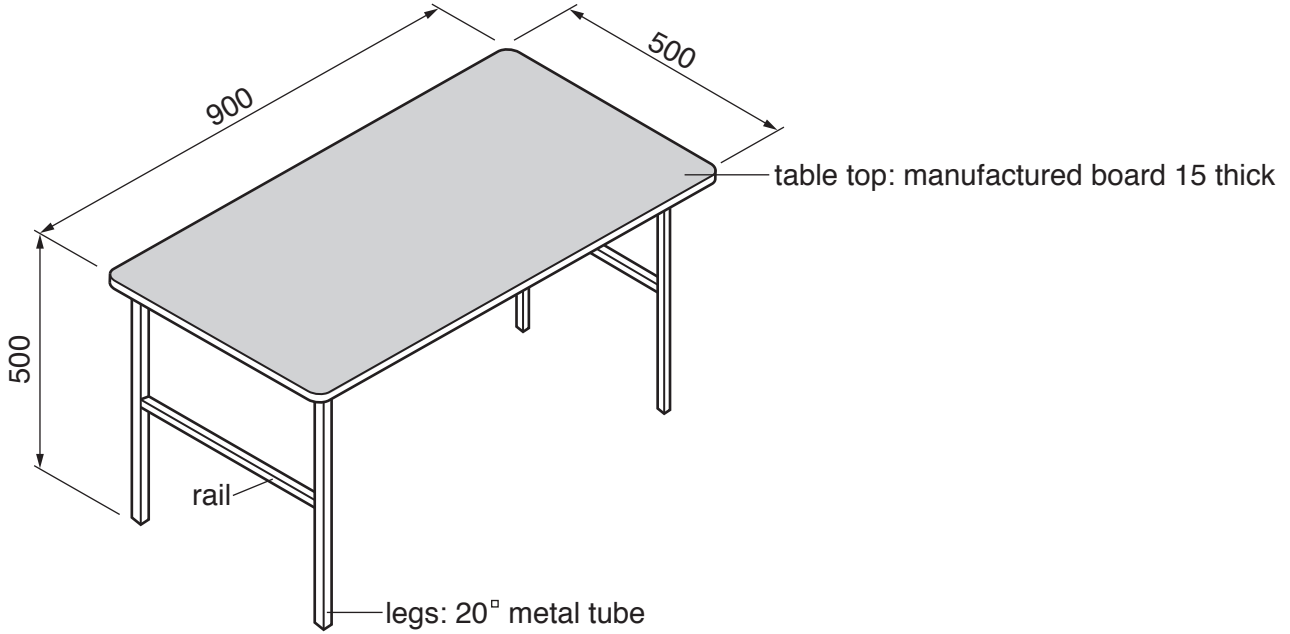


Fig. 5

(a) Give **three** items of research the designer would need to consider when designing the picnic table.

- 1.....[3]
- 2.....
- 3.....

(b) (i) Name a suitable metal for the legs and rails.

.....[1]

(ii) Name **two** heat processes that could be used to join the legs and rails.

- 1.....
- 2.....[2]

(c) Give **two** benefits of covering the table top with a plastic laminate.

1.....

2.....[2]

(d) Fig. 6 shows the underside of the table top and the two end frames.

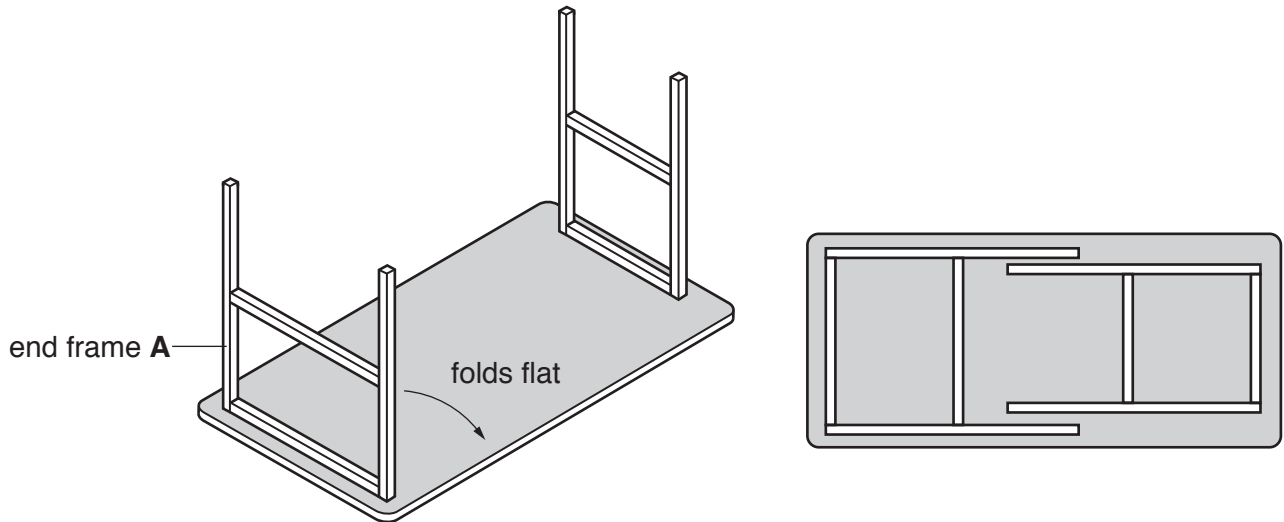


Fig. 6

Include details of materials, fittings and constructions when answering parts (i), (ii) and (iii).

(i) Use sketches and notes to show how end frame **A** could be made to fold against the underside of the table top.

[4]

- (ii) Use sketches and notes to show how both end frames could be held flat against the underside of the table top when carried.

[4]

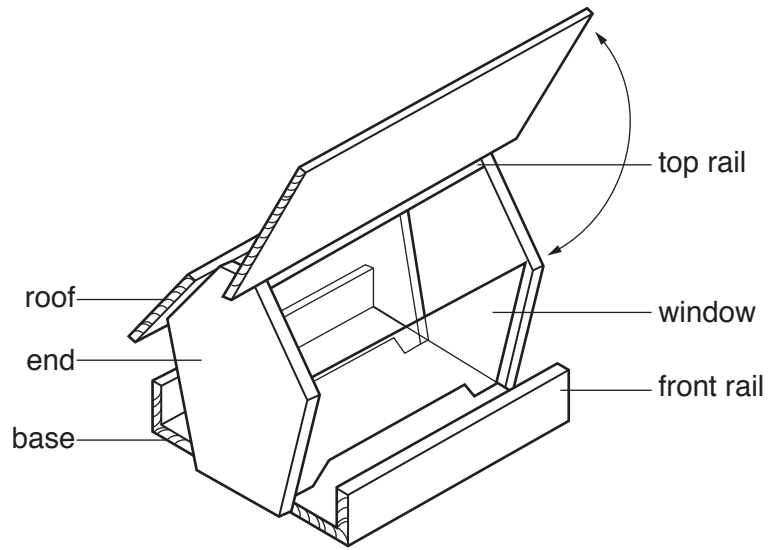
- (iii) Use sketches and notes to show how both end frames could be locked against the table top to prevent them from folding inwards when in use.

[4]

- (e) Use sketches and notes to show a modification to the end frames so that the picnic table could remain level when positioned on uneven ground. Include details of materials, fittings and constructions.

[5]

12 Fig. 7 shows a bird feeder and a parts list.



Part	Number Required	Length × Width × Thickness	Material
end	2	200 × 150 × 12	Pine
roof	2	300 × 140 × 12	Pine
base	1	225 × 200 × 12	Pine
top rail	1	225 × 50 × 12	Pine
front rail	2	225 × 50 × 12	Pine
window	2	235 × 120 × 4	Clear acrylic

Fig. 7

(a) Fig. 8 shows one end of the bird feeder marked out, ready to be cut to shape.

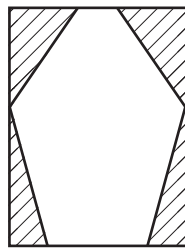


Fig. 8

(i) Use sketches and notes to show how a sliding bevel could be used to mark out the shape.

(ii) Name a saw that could be used to cut out the shape.

.....[1]

(iii) Name a plane that could be used to make the sawn edges flat and smooth.

.....[1]

(b) The ends will be glued and nailed to the base.

(i) Name a specific type of nail that could be used to join the ends to the base.

.....[1]

(ii) Name an adhesive suitable for outdoor use and state approximately how long it takes to set.

Suitable adhesive[1]

Time to set.....[1]

(c) The roof is made in two parts. Each part is hinged to the top rail as shown in Fig. 7. Sketch and name a suitable hinge.

[3]

Name of hinge[1]

(d) Fig. 9 shows details of the 4 thick clear acrylic window.

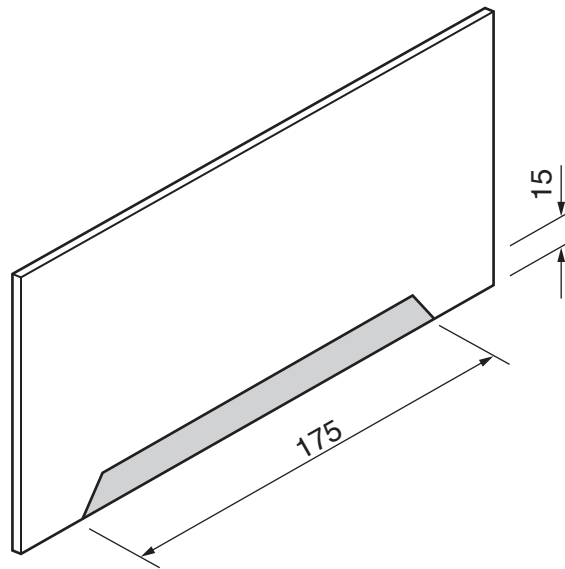


Fig. 9

- (i) Use sketches and notes to show how the shaded area could be removed and the edges made flat and smooth.

[3]

- (ii) Use sketches and notes to show how the 4 thick clear acrylic window could be fitted securely inside the bird feeder. Include all constructional details.

[4]

- (e) Fig. 10 shows a sectional view of part of the bird feeder with a Ø5 aluminium rod that will hook over the branch of a tree.

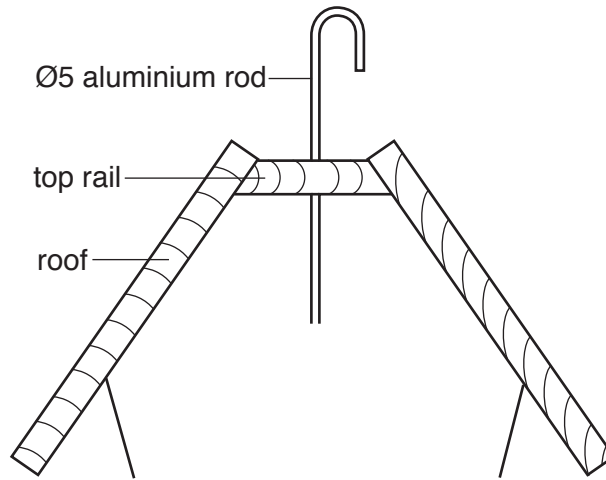


Fig. 10

Add sketches to Fig. 10 to show how the Ø5 aluminium rod could be attached to the top rail of the bird feeder. [3]

- (f) Describe **two** problems that designers face when designing products for outdoor use and how they may be solved.

Problem 1 [1]

Solution..... [1]

Problem 2 [1]

Solution..... [1]

13 Fig. 11 shows views of a shelf unit made from 15 thick MDF in a school workshop. The shelf unit will be made as flat-pack for self-assembly.

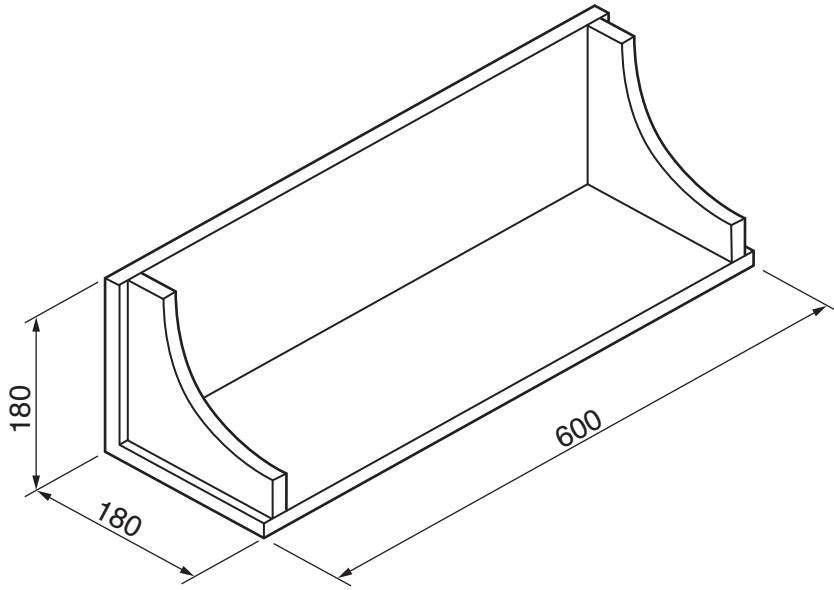


Fig. 11

(a) Give **two** advantages of making the shelf unit from MDF rather than solid wood.

- 1.....[2]
- 2.....[2]

(b) Fig. 12 shows one end of the shelf unit with a template that will be used when drawing the shape onto the MDF.

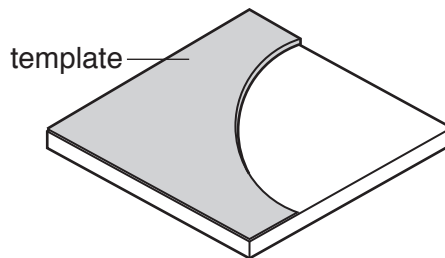


Fig. 12

(i) Give **one** advantage of using a template rather than marking out the shape by hand.

-[1]

(ii) Name **one** saw that could be used to cut out the shape.

-[1]

(iii) Name a tool that could be used to finish the inside curve.

-[1]

- (c) The ends are joined to the shelf and back with dowels.
 Fig. 13 shows one end of the shelf unit ready for the positions of dowels to be marked out.

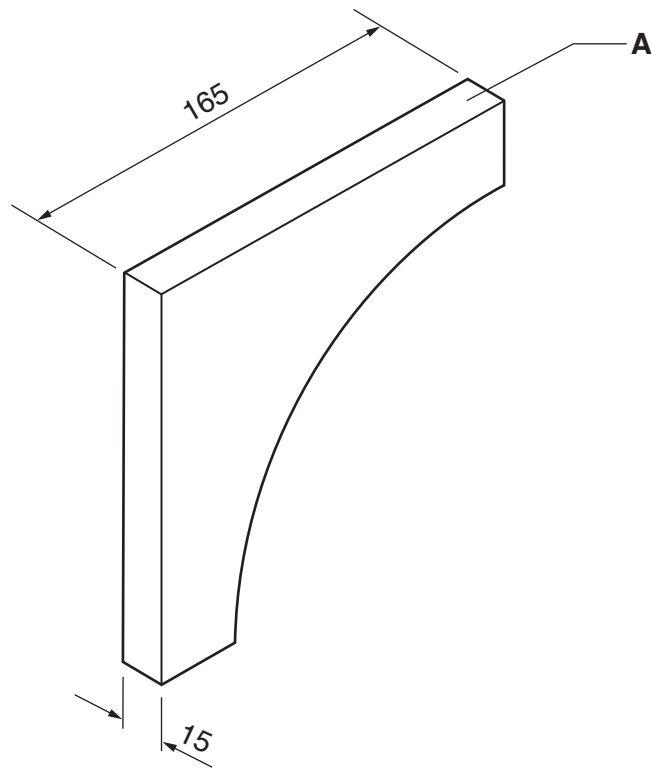


Fig. 13

- (i) Draw accurately on end **A** shown in Fig. 13 the positions for **two** dowels. Show clearly **all** dimensions. [3]

- (ii) Circle the most appropriate diameter of dowel that could be used.

Ø4

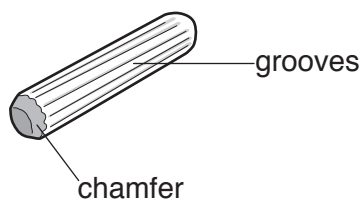
Ø6

Ø9

Ø12

[1]

- (iii) State the purpose of the chamfer and the grooves on the dowel peg shown below.



chamfer

grooves [2]

- (iv) A batch of twenty identical shelf units will be made in a school workshop. Use sketches and notes to show a design for a drilling jig that could be used when drilling the holes for the dowels in the ends of the shelf unit shown in Fig. 13.

[4]

- (v) Explain how the drilling jig you have designed in part (iv) would be used.

.....

.....

.....[2]

(d) Fig. 14 shows the back of the shelf unit.

Two brass plates 1.5 thick are set into the back so that the shelf unit can be fitted to a wall.

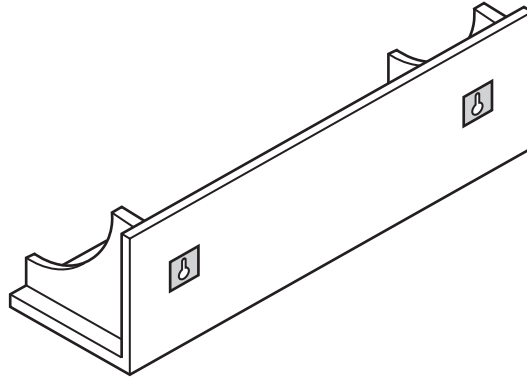


Fig. 14

Fig. 15 shows details of the brass plates.

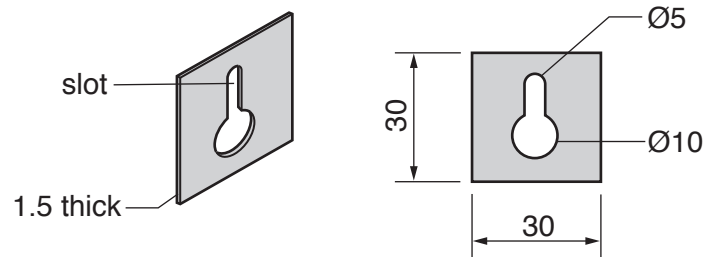


Fig. 15

Use sketches and notes to show how the slot could be cut out in the brass plate. Name all the tools used. Do not include details of marking out.

(e) Give **two** reasons why the shelf unit would be given a painted finish rather than a clear varnished finish.

1.....

2..... [2]

(f) Give **two** reasons why self-assembly products are popular with consumers.

1.....

2..... [2]

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