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Cambridge International General Certificate of Secondary Education

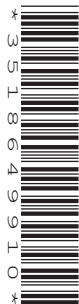
CANDIDATE
NAME

CENTRE
NUMBER

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CANDIDATE
NUMBER

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DESIGN AND TECHNOLOGY

0445/32

Paper 3 Resistant Materials

May/June 2019

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 **18** printed pages and **2** blank pages.

Section A

Answer **all** questions in this section.

1 Fig. 1 shows a kitchen pedal bin.

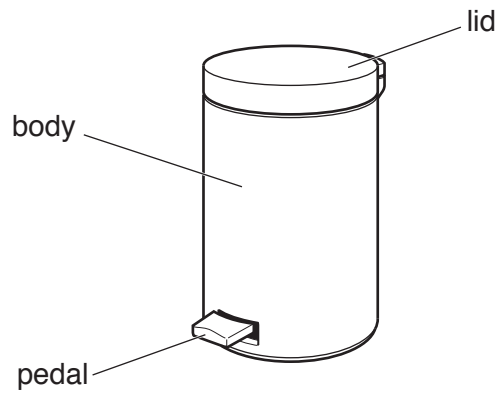


Fig. 1

Complete the list below by adding **two** specification points for the kitchen pedal bin.

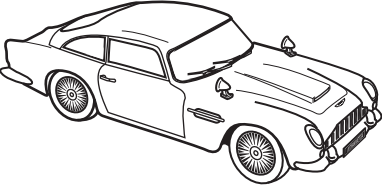
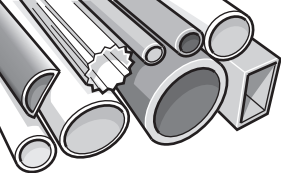

1 The lid must open easily when the pedal is pressed.

2

3

[2]

2 Complete the table by stating the manufacturing process used to make each product.

Product	Manufacturing process
 <p data-bbox="304 504 614 539">metal model toy vehicle</p>	
 <p data-bbox="375 745 539 781">plastic tubes</p>	
 <p data-bbox="338 1048 582 1084">wooden chair legs</p>	

[3]

3 Fig. 2 shows a length of veneered chipboard marked out, ready to be cut into four pieces.

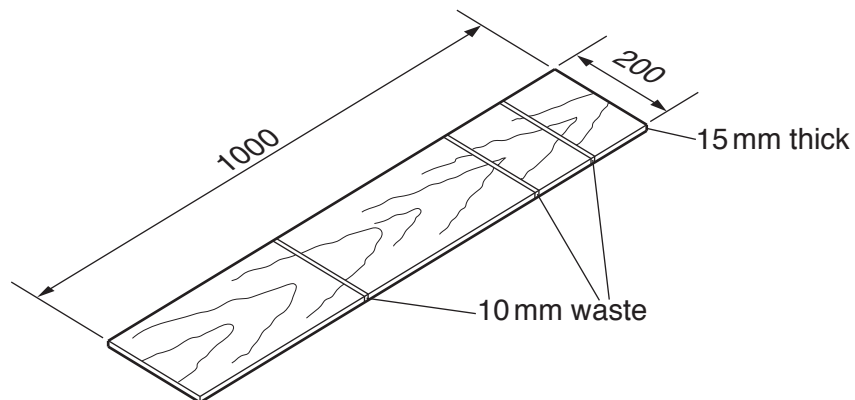


Fig. 2

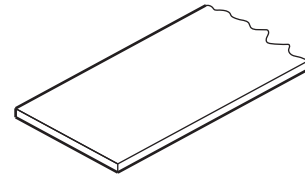
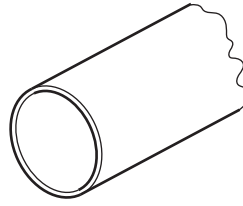
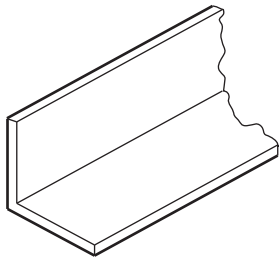
(a) Give **one** reason why the lines would be marked out using a marking knife rather than a pencil.

..... [1]

(b) Give **one** reason why 10 mm waste has been allowed between the marked lengths.

..... [1]

4 Name the **three** standard metal sections shown below.



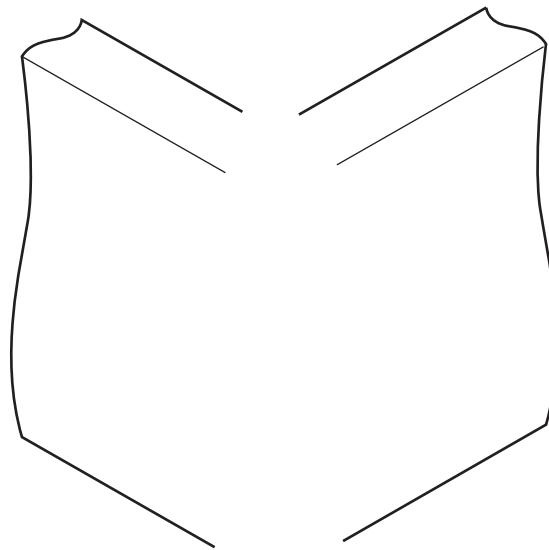
.....

.....

.....

[3]

5 Complete the drawing below to show a finger (comb) joint.



[3]

6 Composite materials are made by combining materials with different properties to make a material with more useful properties.

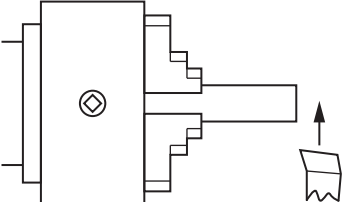
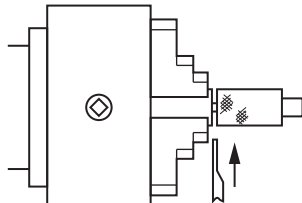
Name **two** composite materials.

1

2

[2]

7 The table shows two different centre lathe processes used when turning round metal bar. Complete the table by naming each process.

Process	Description of process	Name of process
	Cutting across the end of the round bar	
	Cutting off a length of round bar	

[2]

8 Fig. 3 shows hardwood strips being glued together to make a chopping board.

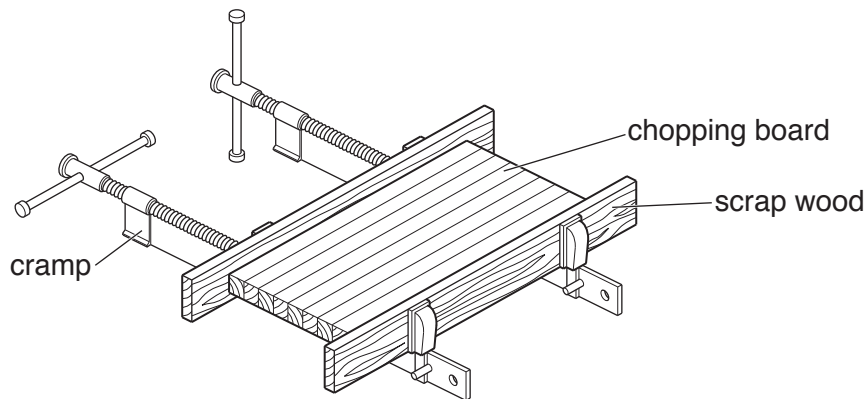


Fig. 3

(a) Name the type of cramps used.

..... [1]

(b) Give **two** reasons why scrap wood is used between the cramps and the chopping board.

1

2

[2]

6

9 Fig. 4 shows a toast rack made from stainless steel.

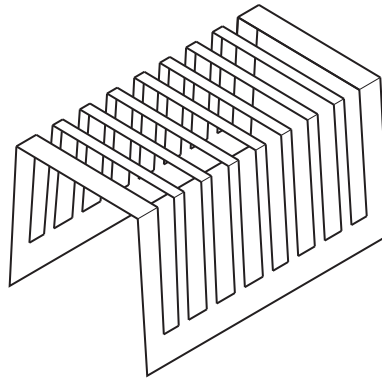


Fig. 4

Give **two** reasons why stainless steel is a suitable material for a toast rack.

1

2

[2]

10 Fig. 5 shows a wooden chair.



Fig. 5

Use sketches and notes to show how the chair could be modified so that it can be linked, side by side, to an identical chair and could be easily separated for stacking.

[3]

Section B

Answer **one** question in this section.

- 11** Fig. 6 shows an incomplete design of a child’s novelty clock.
The clock shape could be made from 5 mm thick manufactured board or 1.5 mm thick non-ferrous metal. The clock will be placed on a shelf.

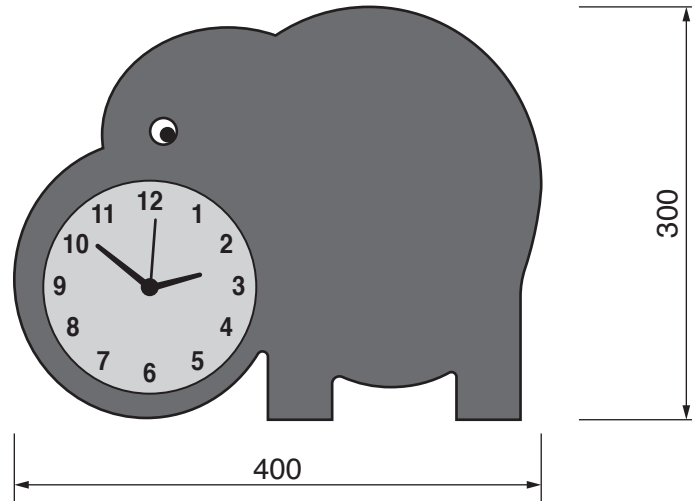


Fig. 6

- (a) (i) Name a suitable manufactured board for the clock shape.
..... [1]
- (ii) Name a suitable non-ferrous metal for the clock shape.
..... [1]

- (b) Fig. 7 shows a template of the shape glued to a sheet of 5 mm thick manufactured board. The centre for a hole to be drilled for the clock mechanism is shown.

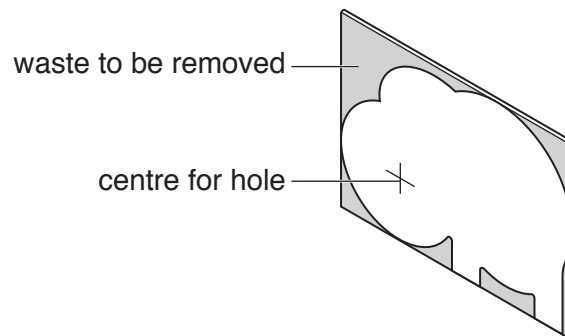


Fig. 7

- (i) Give **two** reasons why the sheet of manufactured board must be clamped down securely when drilling the hole.
- 1
- 2
- [2]

- (ii) Use sketches and notes to show how the shape could be cut out by hand and the edges made smooth.

[3]

- (c) Fig. 8 shows the clock shape made from manufactured board joined to a wooden base.

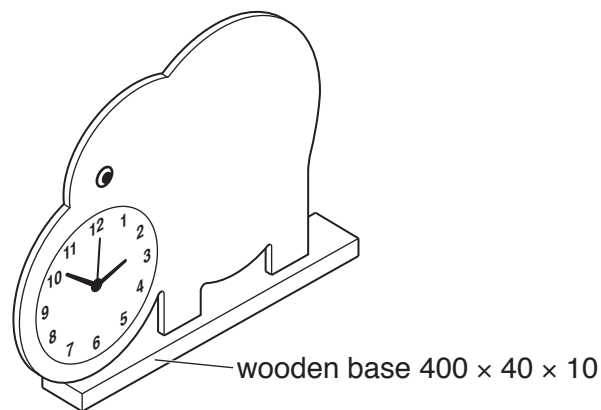


Fig. 8

Use sketches and notes to show how the clock shape could be joined to the base.

[3]

(d) The manufactured board clock shape will be finished with spray paint.
Give **two** advantages of spray paint rather than applying the paint with a brush.

1

2

[2]

(e) Fig. 9 shows the clock shape made from 1.5 mm thick non-ferrous metal.
Legs have been joined to the shape so that it could stand on a shelf.

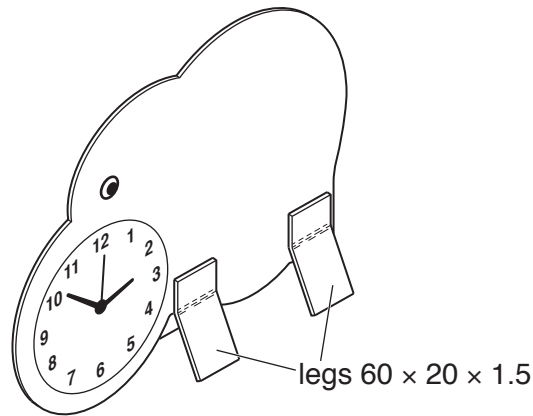


Fig. 9

Use sketches and notes to show how the legs could be made from non-ferrous metal and joined permanently to the clock shape. Name **all** the tools and equipment used.

[5]

(f) When the clock shape is made from non-ferrous metal it could be self-finished.
Explain what is meant by the term 'self-finished'.

.....
.....
.....

[2]

(g) Describe in detail how CAD/CAM could be used to produce the numbers 1 to 12 on the 5 mm thick manufactured board clock face.

.....
.....
.....
.....
.....
..... [4]

(h) State **two** ways, other than shape and colour, by which designers make products used by young children appealing and exciting.

1
2 [2]

12 Fig. 10 shows views of a storage unit designed to hold a tablet, mobile phone and remote control.

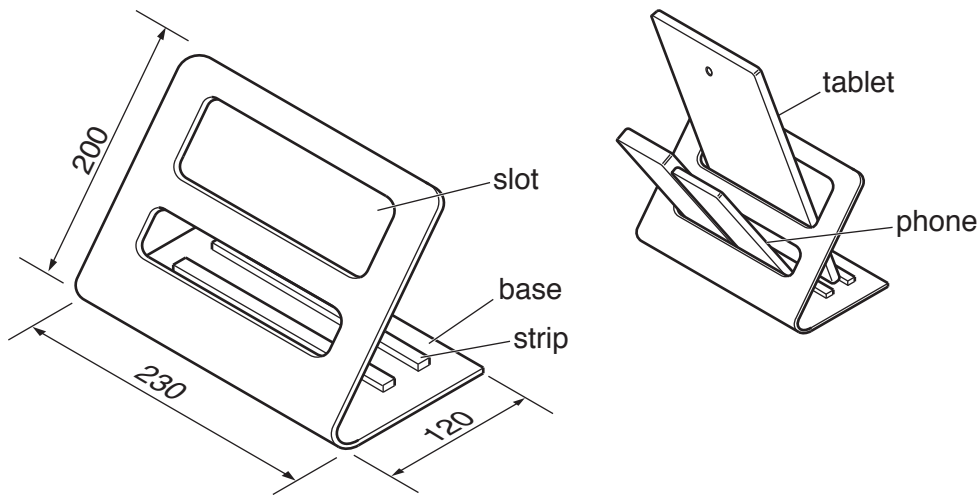


Fig. 10

(a) Give **two** reasons why acrylic would be a suitable material for the storage unit.

1

2

[2]

(b) Fig. 11 shows the development (net) of the storage unit made from 5 mm thick acrylic.

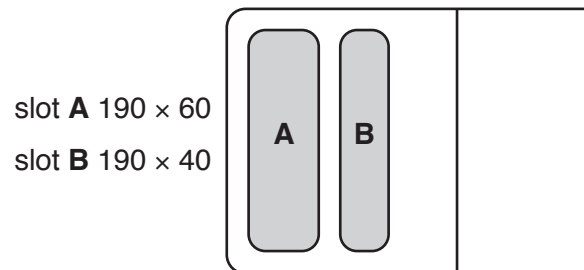


Fig. 11

Use sketches and notes to show how the slots could be cut out by hand and the edges made smooth.

[4]

- (c) The development (net) and slots could be cut out using a CNC machine. Describe the stages involved when using a CNC machine to cut out the development (net) and slots.

.....

.....

.....

.....

.....

.....

..... [4]

- (d) Use sketches and notes to show how the acrylic development (net) could be bent to shape.

[3]

13

- (e) Fig. 12 shows one of the strips that will be joined to the base of the storage unit using acrylic cement.

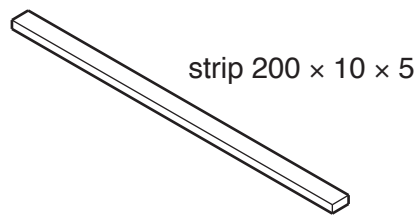


Fig. 12

- (i) Use sketches and notes to show how the strip could be held in place while the acrylic cement sets.

[2]

- (ii) Give **one** reason why each of the following items would be worn when using acrylic cement:

disposable gloves

.....

face mask.

.....

[2]

- (f) The storage unit could also be made by laminating five wood veneers, each 1 mm thick. Use sketches and notes to show how the laminate could be formed to the shape of the storage unit.

(g) Describe how you would evaluate the success of the final product.

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

(h) Explain why consumer demand for storage units of the type shown in Fig. 10 has increased in recent years.

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

15

13 Fig. 13 shows a child's ride-on toy made mainly from wood.

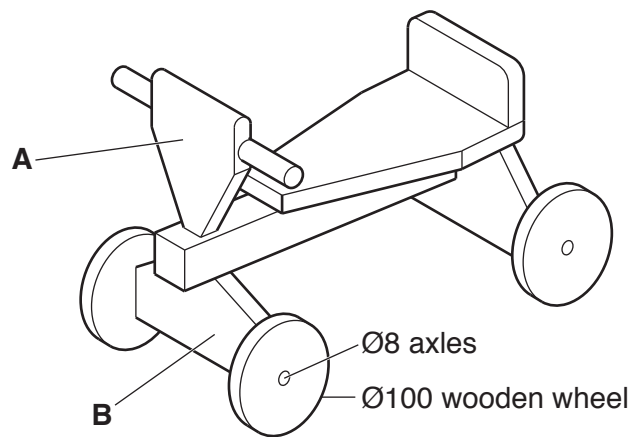


Fig. 13

(a) Fig. 14 shows details of part **A** and the hardwood from which it is made.

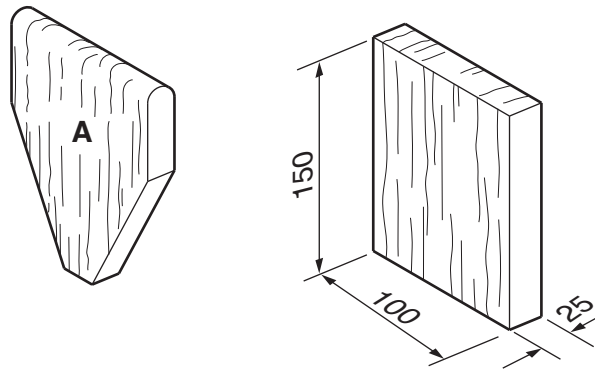


Fig. 14

Use sketches and notes to show how part **A** could be produced from the hardwood shown. Include details of marking out. Name all the tools and equipment used.

[5]

(b) Give **two** features of the ride-on toy that make it safe for children to use.

1

2

[2]

(c) Fig. 15 shows one wheel marked out ready to be shaped on a woodturning lathe.

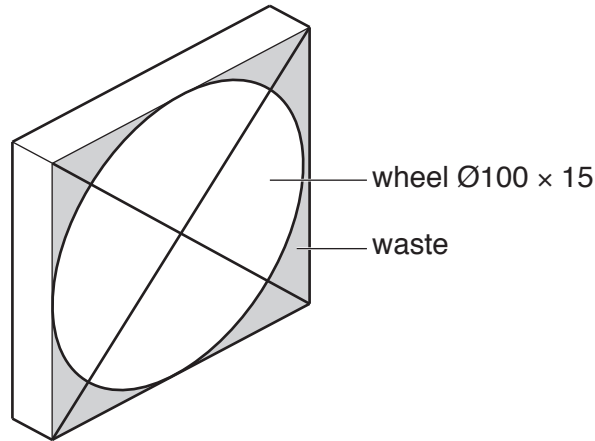


Fig. 15

(i) Explain why the corners would be removed before the wood is set up on the woodturning lathe.

.....

 [2]

(ii) Name **two** tools or items of equipment that could be used when making the wheels on a woodturning lathe.

1

2

[2]

(iii) Give **two** advantages of making the wheels from plywood rather than hardwood.

1

2

[2]

17

(d) Fig. 16 shows details of part **B** of the ride-on toy. Holes will be drilled to take the axles.

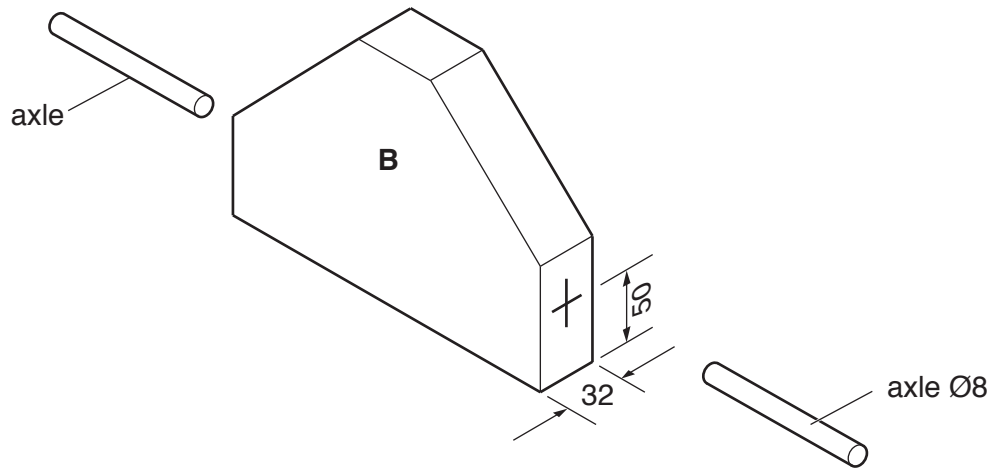


Fig. 16

- (i) Use sketches and notes to show a design for a drilling jig to ensure the holes are drilled accurately. Name the material from which the jig is made.

[5]

- (ii) The axles will be glued into part **B**.
Use sketches and notes to show how **one** wooden wheel, $\text{Ø}100 \times 15$, could be fitted onto an axle and allowed to rotate freely.

[3]

(e) Fig. 17 shows a different design of a child's ride-on toy.

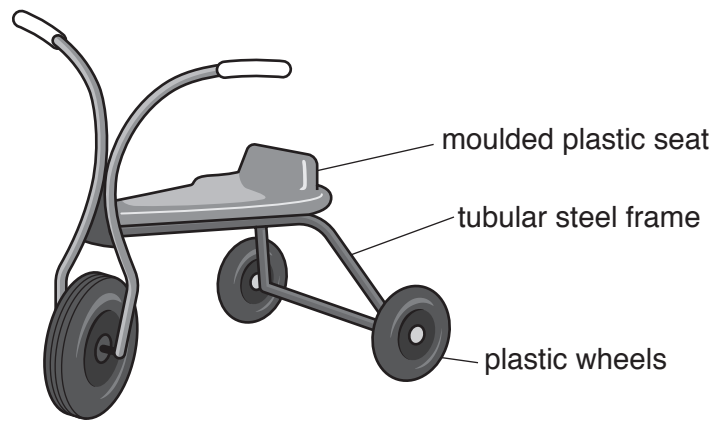


Fig. 17

(i) Name a process that could be used to produce the plastic wheels.

..... [1]

(ii) Give **one** method of joining lengths of steel tube permanently.

..... [1]

(iii) Name **two** types of finish that could be applied to the steel frame of the ride-on toy.

1

2

[2]

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