

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
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Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Time 1 hour 45 minutes

Paper reference **1DT0/1C**

Design and Technology
COMPONENT 1: Polymers

You must have:
 Calculator, ruler, HB pencil, protractor, compass

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
 – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
 – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Q:1/1/1/1/1

SECTION A

Core

Answer ALL questions. Write your answers in the spaces provided.

- 1 (a) The materials that products are made from are chosen because of their properties.

Figure 1 shows a table of products.

For each of the products shown, give a property of the material it is made from that makes the material suitable for the product.

The first one has been done for you.

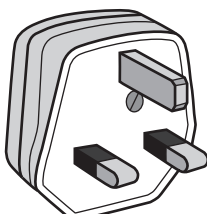
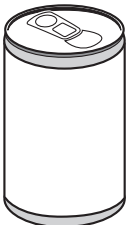
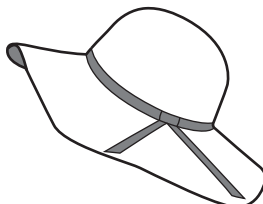

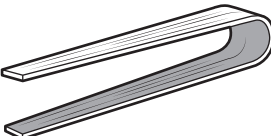
Picture of product	Material and product	Property
	Urea formaldehyde 3-pin plug	Insulator of electricity
	Aluminium drinks can	(1) (i)
	Felted wool fabric hat	(1) (ii)
	Tracing paper	(1) (iii)
	Laminated plywood salad servers	(1) (iv)

Figure 1

(b) Explain **one** disadvantage of using urea formaldehyde for the 3-pin plug.

(2)

The pins of the 3-pin plug are made from brass.

Brass is an alloy of copper and zinc in the ratio of 13:7
(13 parts copper to 7 parts zinc).

(c) Calculate how much copper is required to make 50 kg of brass.

(2)

Answer

kg

(Total for Question 1 = 8 marks)

- 2 Figure 2 shows a wall mounted book holder manufactured from mahogany.

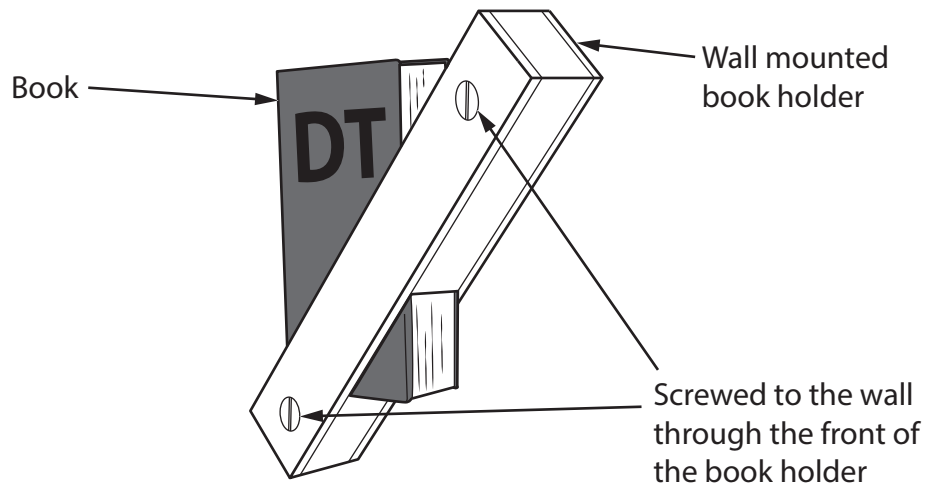


Figure 2

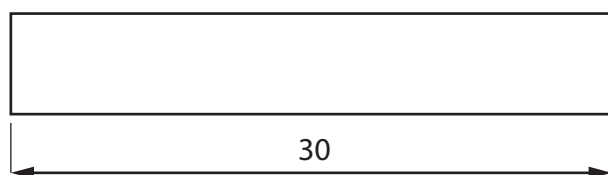
- (a) Name **one** other appropriate hardwood that could be used to make the wall mounted book holder. (1)

- (b) Explain **one** working property of mahogany that makes it an appropriate choice of material for the wall mounted book holder. (2)

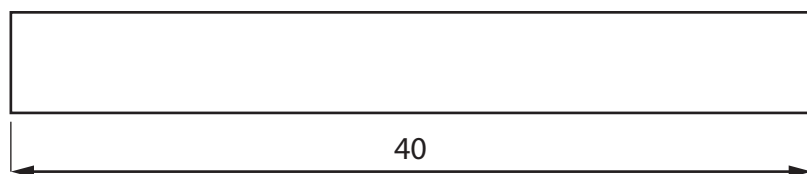
Each wall mounted book holder is made as a one-off.

- (c) Explain **one** advantage for the manufacturer of making each wall mounted book holder as a one-off. (2)

Figure 3 shows the sizes of two pieces of mahogany used to make the wall mounted book holder.



2 required at this length



1 required at this length

Figure 3

The mahogany has a cross sectional area of 5 cm^2

All dimensions in cm

Diagram not to scale

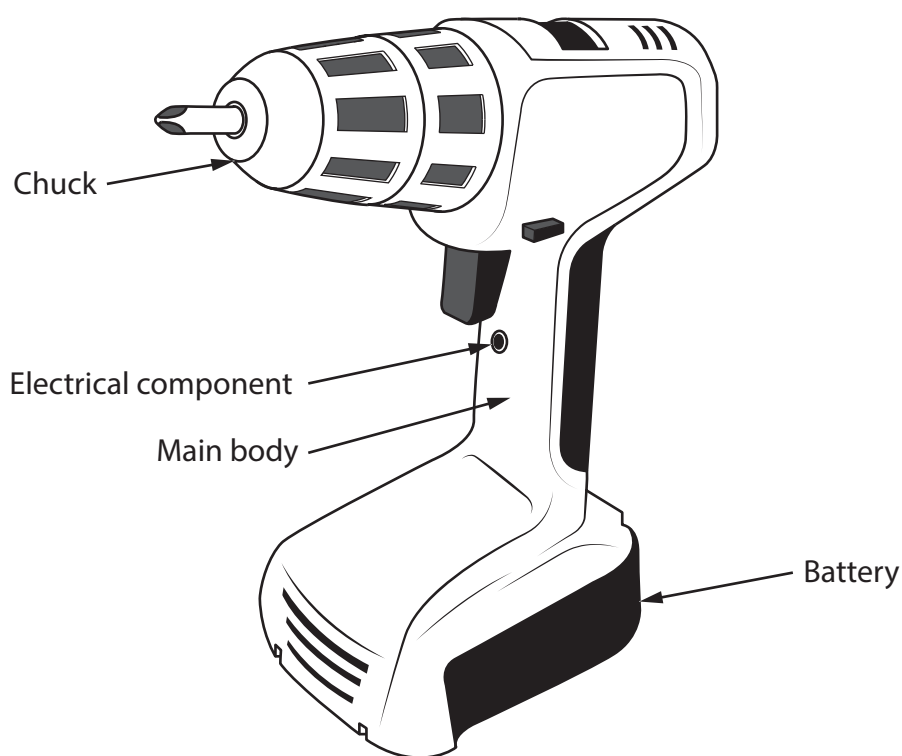
- (d) Calculate the cost of the mahogany required to make one wall mounted book holder if the mahogany costs $\text{£}1,200 \text{ m}^3$.

(4)

Cost £

(Total for Question 2 = 9 marks)

- 3 Figure 4 shows an electrically powered hand drill and the circuit symbol for an electrical component.



Circuit symbol for the electrical component

Figure 4

- (a) Name the type of electrical component from the circuit symbol shown in Figure 4.

(1)

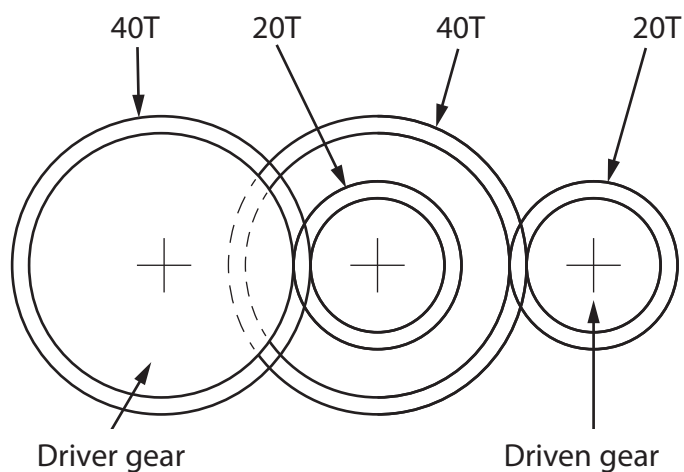
The electrically powered hand drill is being redesigned. The manufacturer is considering using a bevel gear inside.

- (b) Explain **one** reason for using a bevel gear inside the electrically powered hand drill.

(2)

- (c) The electrically powered hand drill also has a compound gear train inside.

Figure 5 shows a schematic diagram of the compound gear train.



T = Teeth

Figure 5

Calculate the revolutions per minute (RPM) of the driven gear if the driver gear rotates at 400 RPM.

(2)

Driven gear

RPM

(d) Explain **one** benefit of using a battery for the electrically powered hand drill.

(2)

The manufacturer of the electrically powered hand drill is considering using carbon fibre for the main body.

(e) Explain **two** benefits of using carbon fibre for the main body of the electrically powered hand drill.

(4)

1

2

(Total for Question 3 = 11 marks)

- 4 A not-for-profit organisation has developed some agro-textiles that can be used by farmers.

(a) Explain **two** ways that agro-textiles can be used by farmers.

(4)

1

2

(b) A farmer requires 420 m^2 of agro-textile to cover their field.

The agro-textile is available in rolls 50 m long measuring 1.2 m wide.

Calculate the number of rolls of agro-textile the farmer needs to cover their field.

(2)

Number of rolls

- (c) Discuss how fair trade products have been used to support farmers and societies in developing countries.

(6)

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(Total for Question 4 = 12 marks)

TOTAL FOR SECTION A = 40 MARKS

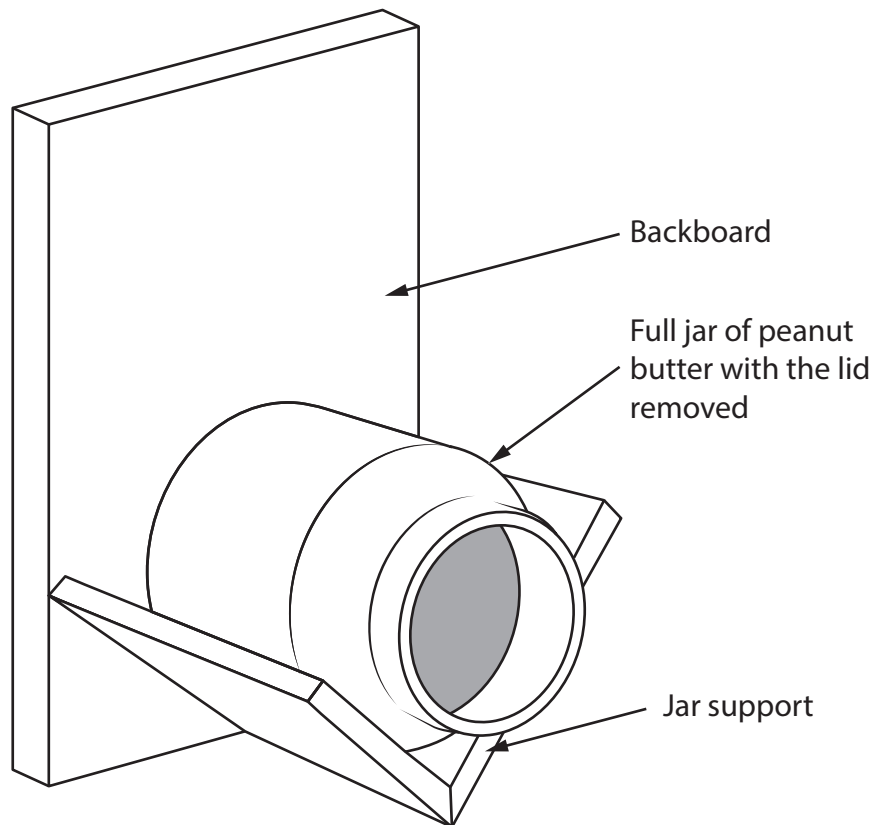


SECTION B

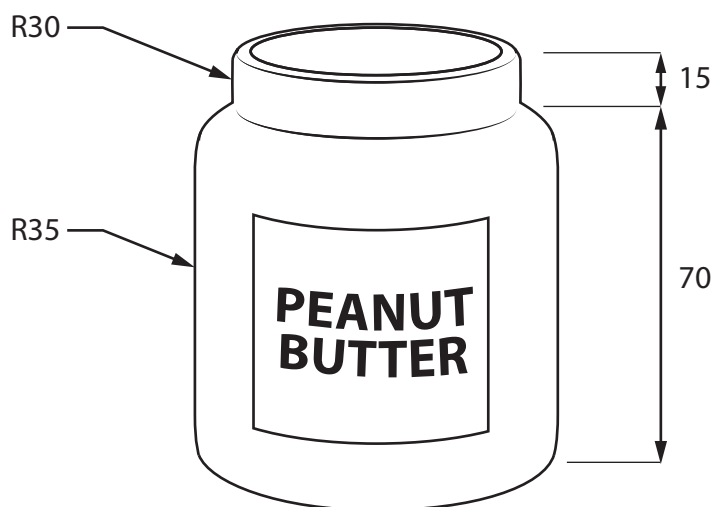
Polymers

Answer ALL questions. Write your answers in the spaces provided.

- 5 Figure 6 shows a design solution for a bird feeder together with some additional information.



Additional information



Dimensions of the jar of peanut butter in mm

Diagram not to scale

Figure 6

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- (a) The bird feeder holds a full jar of peanut butter and needs to be improved to include the following specification points.

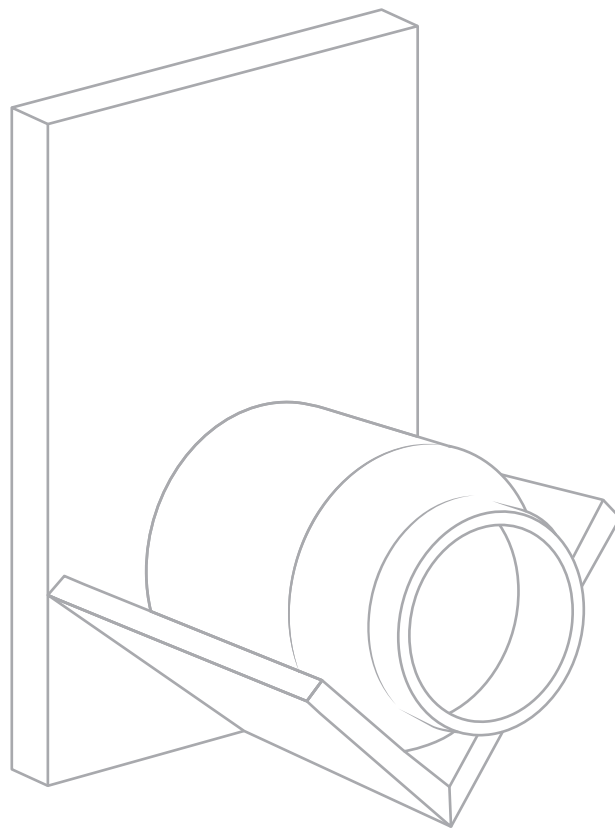
The bird feeder must:

- hold the jar securely and allow an empty jar to be easily replaced
- include a cover that protects the backboard and jar support and keeps the jar dry
- be able to be hung up in a tree and easily moved to another tree.

Use notes and sketches, on the outline below, to show how the bird feeder could be modified to include these three specification points.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(6)



(b) Figure 7 shows a polymer money box in the shape of a tea cup.

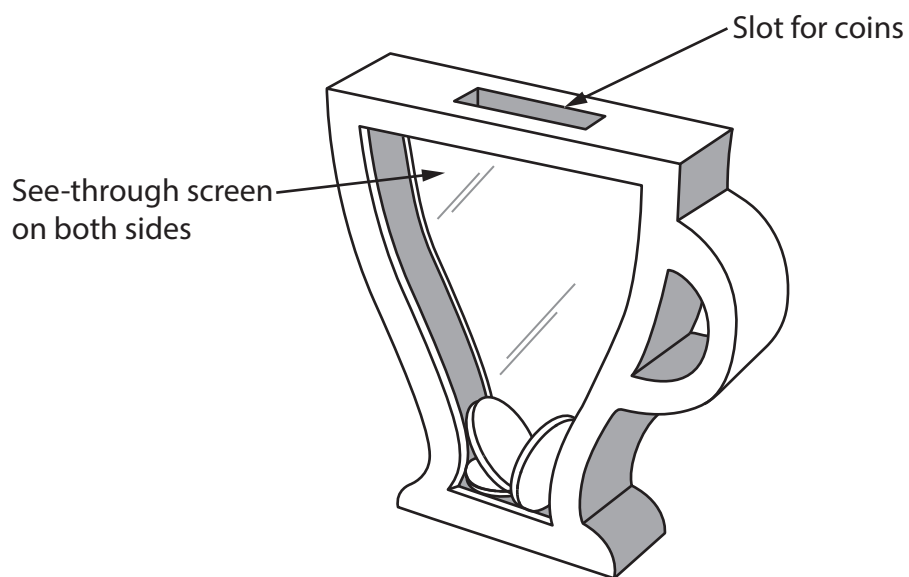


Figure 7

Explain **two** ways that the polymer money box meets, or fails to meet, the criteria of providing a method to encourage young children to save money.

(4)

1

2

(Total for Question 5 = 10 marks)

6 Figure 8 shows a lectern used for school assemblies and a detailed assembly drawing.

The front panel is made from clear acrylic.

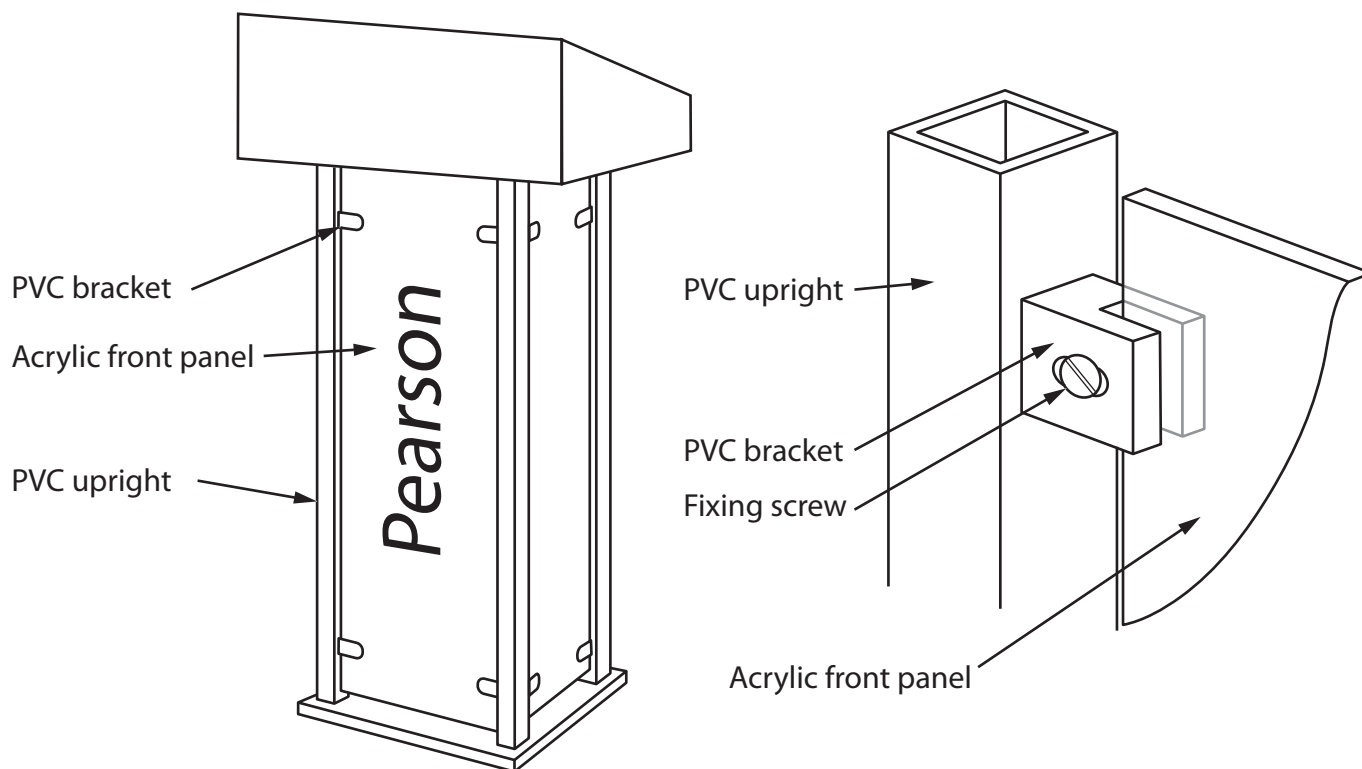


Figure 8

The front panel is manufactured from a standard sheet size.

- (a) Explain **two** advantages for the manufacturer of using a standard sheet size for the front panel.

(4)

1

2

- (b) Figure 9 shows one of the brackets manufactured from an extruded profile of polyvinyl chloride (PVC).

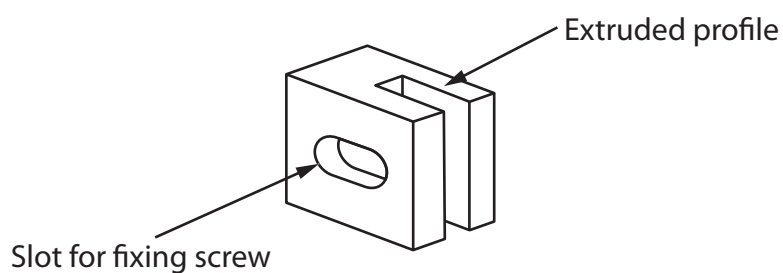


Figure 9

Use notes and sketches, in the space below, to show how the slot for the fixing screw would be created on both sides of the PVC bracket using hand tools.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(4)

- (c) Laser engraving has been used to produce the name on the acrylic front panel.

Explain **one** advantage of using laser engraving to display the name on the acrylic front panel.

(2)

- (d) Give **two** different methods that could be used to join a bracket to an upright on the lectern.

For each method, explain **one** advantage of using that method to join a bracket to an upright on the lectern.

(6)

Method 1

Explanation

Method 2

Explanation

(Total for Question 6 = 16 marks)

7 Figure 10 shows a flower vase made from clear acrylic that holds a test tube.

The main body is cut out from a single piece of clear acrylic and the two side pieces are bent outwards by placing in the top part to form the curves.

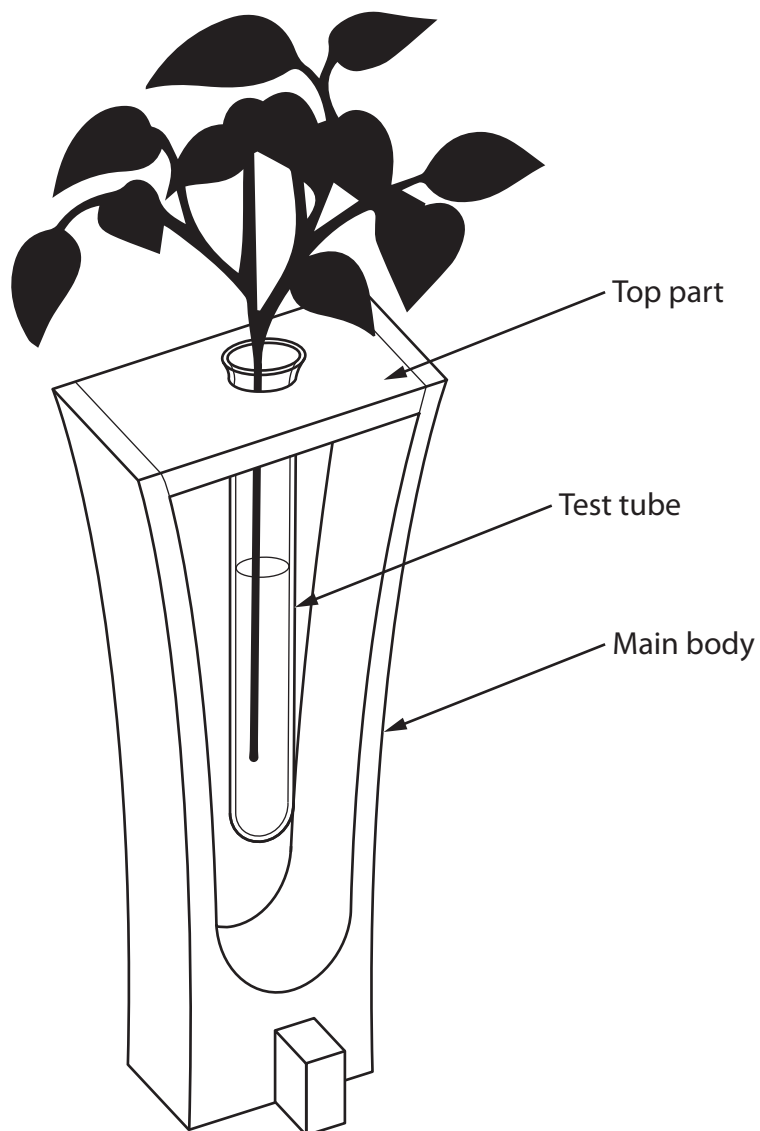


Figure 10

(a) State the type of force the top part is subjected to from the two side pieces of the main body.

(1)

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(b) Explain **two** working properties of clear acrylic that make it an ideal material for the flower vase.

(4)

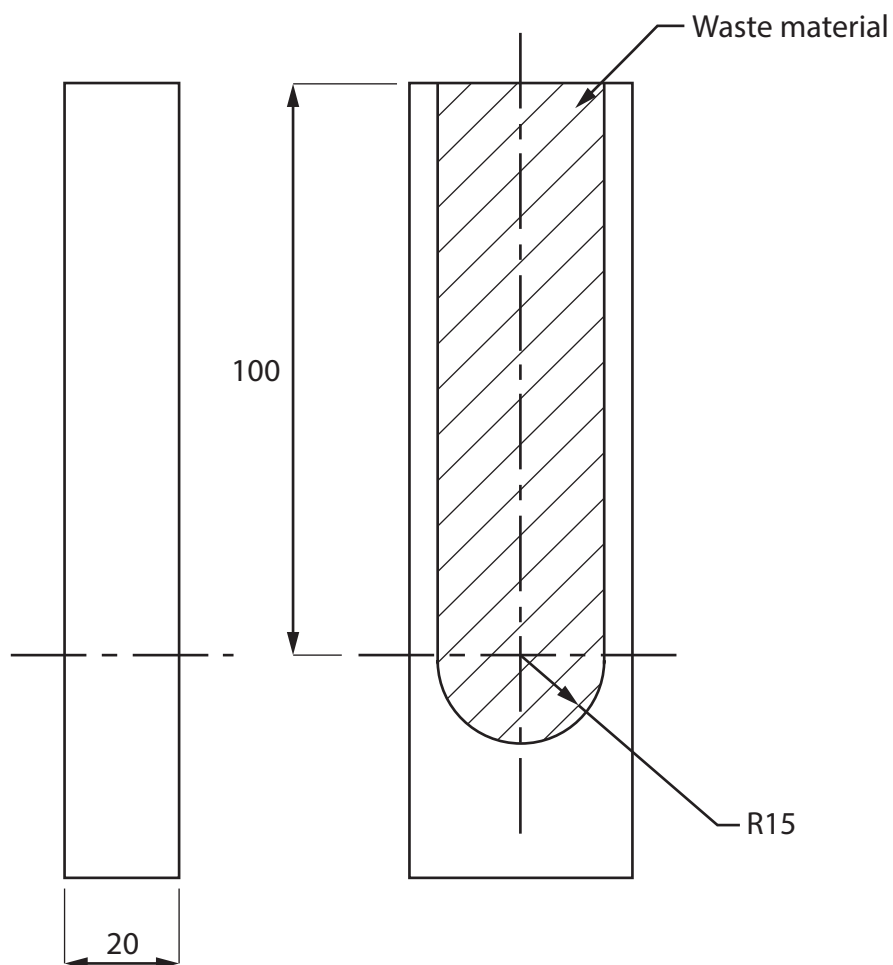
1

2



Figure 11 shows a dimensioned drawing of the main body of the flower vase before the sides are bent.

The main body is manufactured from a single piece of clear acrylic.



All dimensions are in mm

Diagram not to scale

Figure 11

(c) Calculate the volume of waste material produced when making the main body.

Give your answer to the nearest whole cm^3 .

Use $\pi = 3.142$

(5)

Answer

cm^3

The main body of the flower vase could be fabricated from separate pieces of clear acrylic rather than from a single piece.

- (d) Explain **two** reasons for fabricating the main body of the flower vase from separate pieces of clear acrylic rather than manufacturing it from a single piece.

(6)

1

2

(Total for Question 7 = 16 marks)

- 8 Figure 12 shows a takeaway food container manufactured from polyethylene terephthalate (PET).

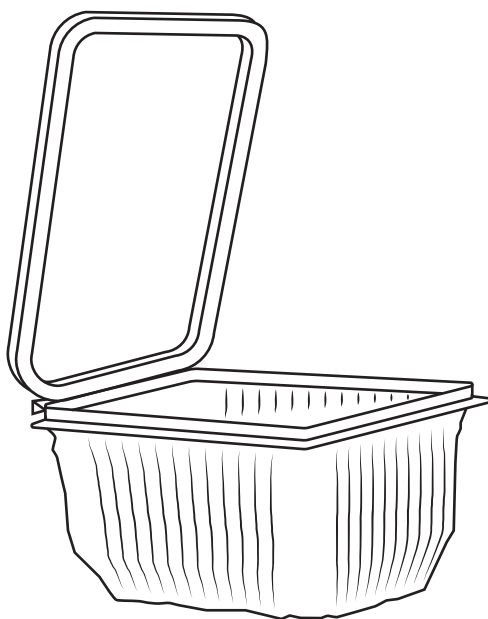


Figure 12

- (a) Explain **one** benefit of manufacturing the takeaway food container from PET.

(2)

The takeaway food containers are subjected to quality control checks during manufacture.

- (b) Explain **one** advantage of carrying out a quality control check on the takeaway food containers during manufacture.

(3)

(c) Explain **two** reasons for using a vacuum forming machine to manufacture the takeaway food containers.

(4)

1

2

(d) The takeaway food container is manufactured from PET.

Figure 13 shows some additional information about the takeaway food container.

Source of oil for PET	UAE
Takeaway food container material	Stock sized 1.5 mm sheet
Potential market	Takeaway food shops, hospitals and school canteens
Scale of production	Continuous

Figure 13

Analyse the information in Figure 13.

Evaluate the takeaway food container with reference to social and availability factors including:

- use for different social groups
- use of specialist material
- effect of global oil supply.

(9)

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(Total for Question 8 = 18 marks)

TOTAL FOR SECTION B = 60 MARKS
TOTAL FOR PAPER = 100 MARKS



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