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MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2023**

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- 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.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 **(a)** Tom has a restaurant bill.

View solution

Soup	$.....
Pasta	$ 13.30
Ice cream	$ 4.80
Drinks	$ 3.81
Total cost	$ 25.40

(i) Complete the bill to show the cost of soup.

[2]

(ii) Find the cost of drinks as a percentage of the total cost.

View solution

..... % [1]

(b) **(i)** Work out $\frac{2}{5}$ of $2400.

View solution

$ ..... [1]

(ii) Decrease $3450 by 18%.

View solution

$ ..... [2]

(c) Amelia invests $14 000 at a rate of 1.6% per year compound interest.

View solution

Calculate the value of her investment at the end of 5 years.
Give your answer correct to the nearest dollar.

$ ..... [3]

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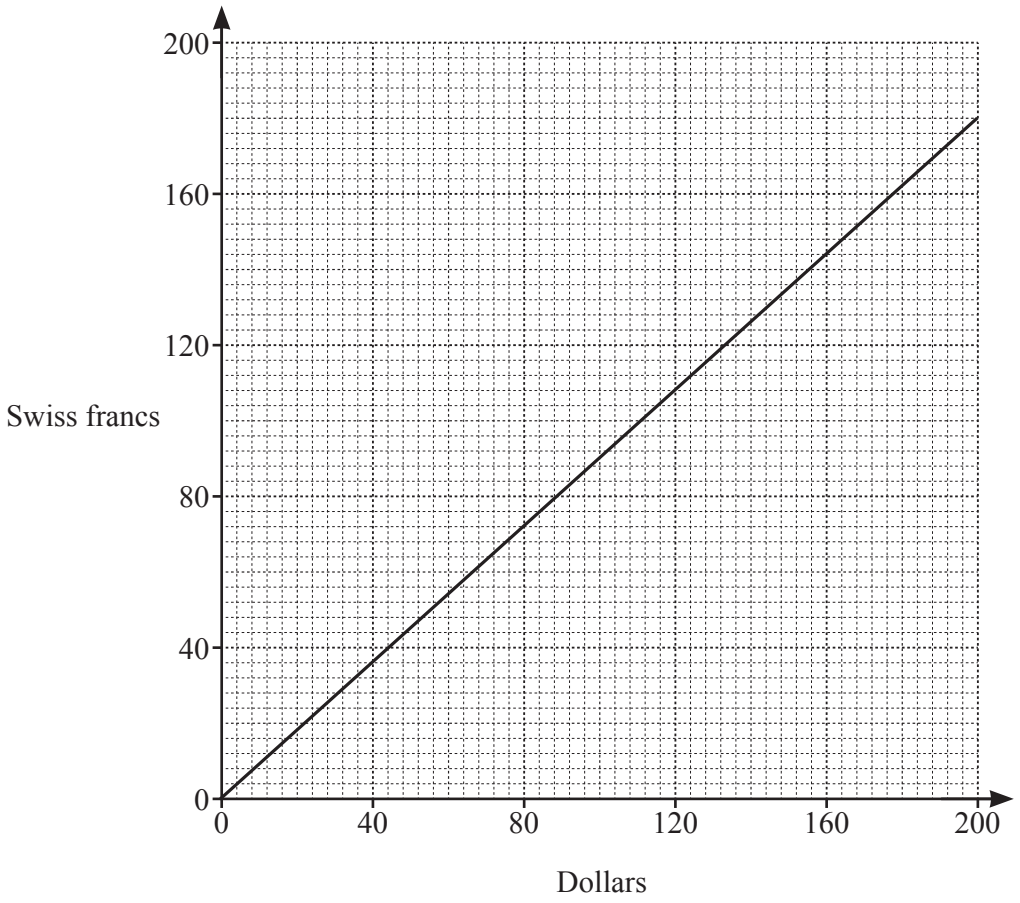
(d) This conversion graph can be used to change between dollars and Swiss francs.

View solution



(i) Use the graph to change

(a) $80 to Swiss francs

..... Swiss francs [1]

(b) 108 Swiss francs to dollars.

$ ..... [1]

(ii) Explain how you can use the graph to change $360 to Swiss francs.

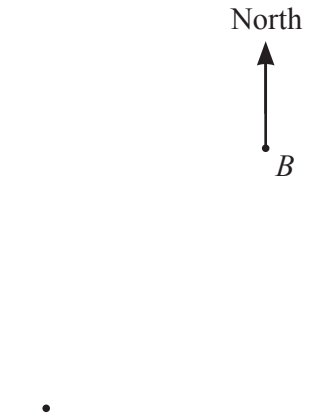
View solution

.....

..... [1]

2 **(a)** Bayside, Millwater and Westbridge are towns beside a lake.
The scale drawing shows the positions of Bayside (B) and Millwater (M).
The scale is 1 centimetre represents 2 kilometres.

View solution



Scale: 1 cm to 2 km

(i) Find the actual distance between Bayside and Millwater.

..... km [2]

(ii) Westbridge (W) is 17 km from Bayside on a bearing of 155°.

On the scale drawing, mark the position of Westbridge.

View solution

[2]

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(b) (i) A boat travels from Bayside to Westbridge.
The table gives some information about its journey.

View solution

Bayside	departs	10 50
Millwater	arrives	11 36
	departs	11 45
Westbridge	arrives	13 07

Work out how long the boat takes to travel from **Millwater** to Westbridge.
Give your answer in hours and minutes.

..... h ..... min [1]

(ii) The boat returns directly to Bayside.
It takes 1 hour 20 minutes to travel the 17 km.

View solution

Work out the average speed of this journey.

..... km/h [2]

(c) Here are the ticket prices for a boat trip from Bayside to Westbridge.

View solution

1 person $9.80	Group of 6 people $57.30	Group of 15 people $138.75

(i) Calculate the cost per person for a group of 15 people.

$ ..... [1]

(ii) A group of 24 people buy tickets for the boat trip from Bayside to Westbridge.

View solution

Calculate the least amount of money the group needs to pay.

$ ..... [2]

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3 **(a)** Aneel has 80 tea bags, $\frac{1}{2}$ kg of sugar and 1 litre of milk.
To make a cup of tea he uses:

View solution

- 1 tea bag
- 8 grams of sugar
- 40 millilitres of milk.

(i) In the morning, Aneel makes 15 cups of tea.

Work out

(a) the fraction of the tea bags he uses, in its simplest form

..... [2]

(b) the mass of sugar, in grams, he has left.

..... g [2]

(ii) During the day, Aneel uses all of the milk to make cups of tea.

View solution

Work out the total number of cups of tea Aneel makes.

..... [1]

(b) Bobby, Carl and Davood share \$6875 in the ratio Bobby : Carl : Davood = 6 : 8 : 11.

View solution

Calculate the amount of money they each receive.

Bobby \$ .....

Carl \$ .....

Davood \$ ..... [3]

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(c) **(i)** Write $\frac{3^2 \times 3^4}{3^6}$ as a power of 3.

View solution

..... [1]

(ii) Write the value of 2^{-4} as a decimal.

View solution

..... [1]

(d) Simplify.

View solution

(i) $(b^5)^3$

..... [1]

(ii) $\left(\frac{4}{m}\right)^{-2}$

View solution

..... [1]

(e) $30 = 2 \times 3 \times 5$ $84 = 2^2 \times 3 \times 7$

View solution

Use this information to find the lowest common multiple (LCM) of 30 and 84.

..... [2]

(f) $\frac{2}{9}$ $\sqrt{7}$ $\frac{5}{4}$ $\sqrt{16}$ 2^3

Put a ring around the irrational number in this list. [1]

View solution

4 **(a)** A company makes glass using silica, soda, lime and magnesia.
The table gives information about the proportions used.

View solution

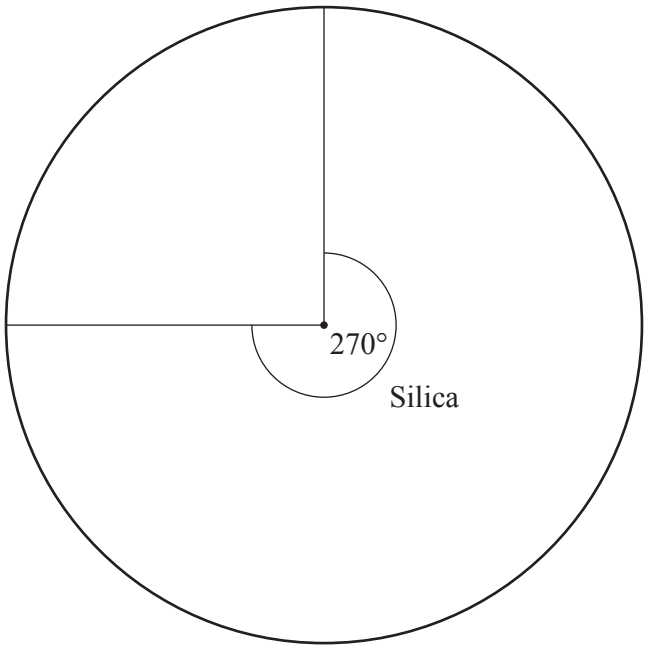
	Percentage of total mass	Pie chart sector angle
Silica	75	270°
Soda	15	
Lime and magnesia	10	

(i) Complete the table.

[2]

(ii) Complete the pie chart to show this information.

View solution



[1]

(iii) The masses of lime and magnesia used are in the ratio lime : magnesia = 3 : 2.

View solution

Find the percentage of the total mass of glass that is magnesia.

..... % [1]

(iv) The company uses 8.25 kg of soda to make some glass.

View solution

Work out how many kilograms of silica they use.

..... kg [2]

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(b) The company uses the formula $M = 2.5 \times A \times T$ to find the mass of a sheet of glass.

View solution

M is the mass in kilograms.
A is the area in square metres.
T is the thickness in millimetres.

Use the formula to calculate the mass of a rectangular sheet of glass that is 1.9 m long, 0.6 m wide and 8 mm thick.

..... kg [2]

(c) In one year, 130 000 000 tonnes of glass were produced worldwide.

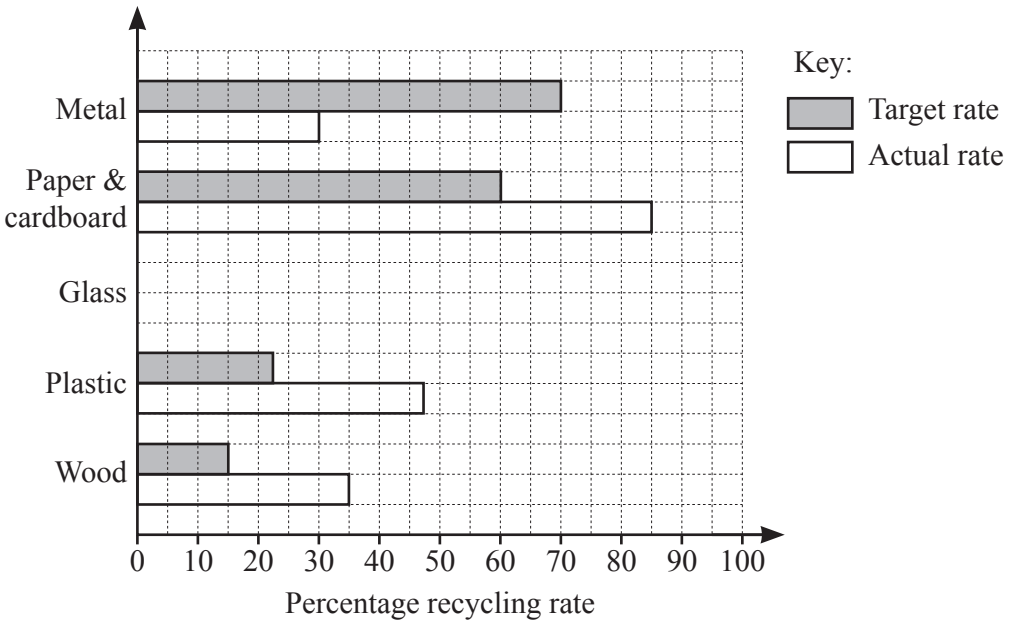
View solution

Write this number in standard form.

..... [1]

(d) The company sets targets to recycle its waste materials.
The bar chart shows the target rate and the actual rate for some of its recycling.

View solution



(i) The target rate for recycling glass was 55%.
The actual rate for recycling glass was 70%.

Complete the bar chart. [2]

(ii) Which materials did the company recycle at more than double their target rate?

View solution

..... [2]

5 **(a)** Zena records the number of letters she posts on each of 12 days.

View solution

3 7 3 8 7 1 0 6 5 1 7 2

(i) Write down the mode.

..... [1]

(ii) Find the median.

View solution

..... [2]

(b) Zena posts 6 parcels.

View solution

- The lightest parcel has a mass of 4.6 kg.
- The heaviest parcel has a mass of 6.2 kg.
- The other 4 parcels have a mean mass of 5.01 kg.

Calculate the mean mass of the 6 parcels.

..... kg [3]

(c) Zena pays 105 euros to post a parcel.
The exchange rate is \$1 = 0.84 euros.

View solution

Work out the cost in dollars to post the parcel.

\$ ..... [1]

(d) The cost to post a box increases from \$22.68 to \$44.

View solution

Work out the percentage increase in the cost.

..... % [2]

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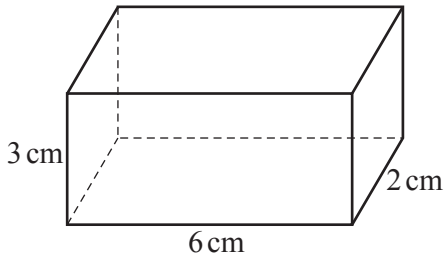
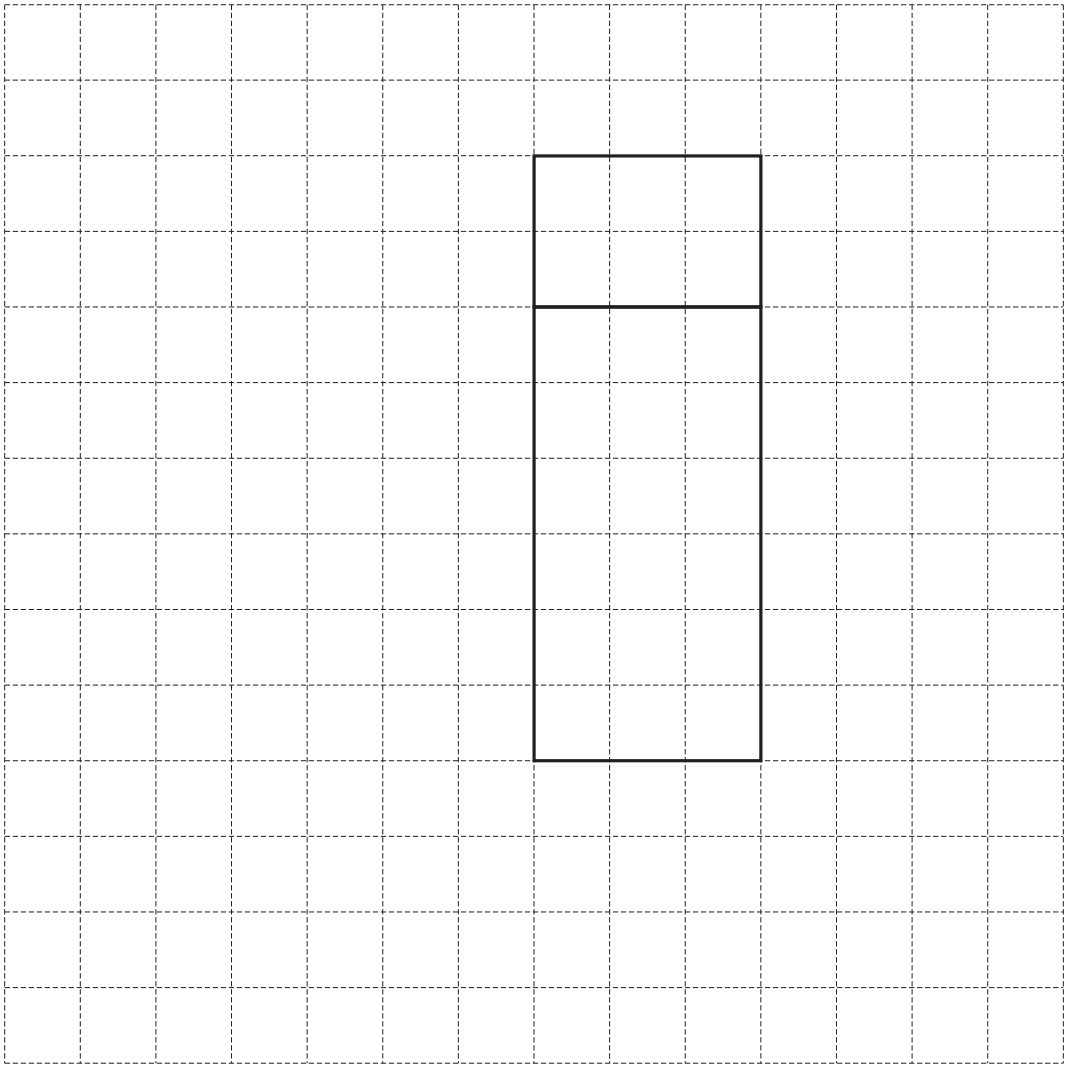
(e) The diagram shows a parcel in the shape of a cuboid.

View solution



NOT TO SCALE

(i) Complete the net of the parcel on the 1 cm^2 grid.
Two faces have been drawn for you.



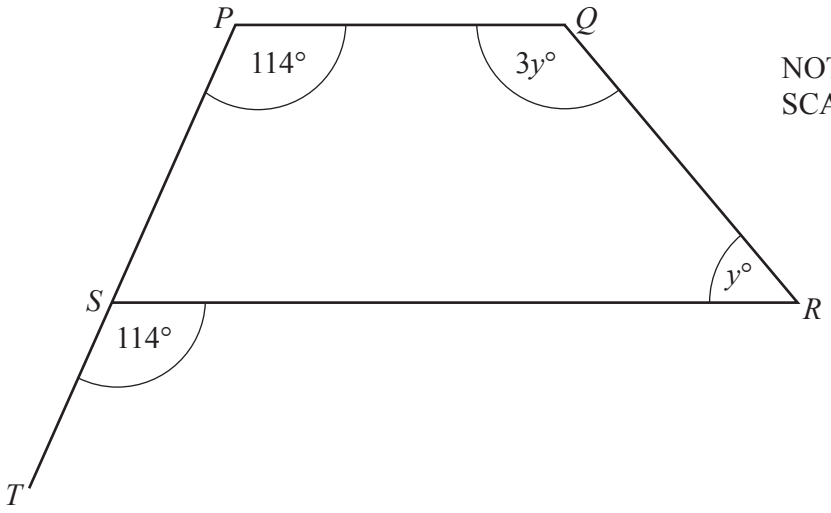
[2]

(ii) Find the volume of the parcel.

View solution

..... cm^3 [1]

6 (a)



In the diagram, *PST* is a straight line.

(i) Give the geometrical reason why the lines *PQ* and *SR* are parallel.

..... [1]

(ii) Write down the mathematical name for the shape *PQRS*.

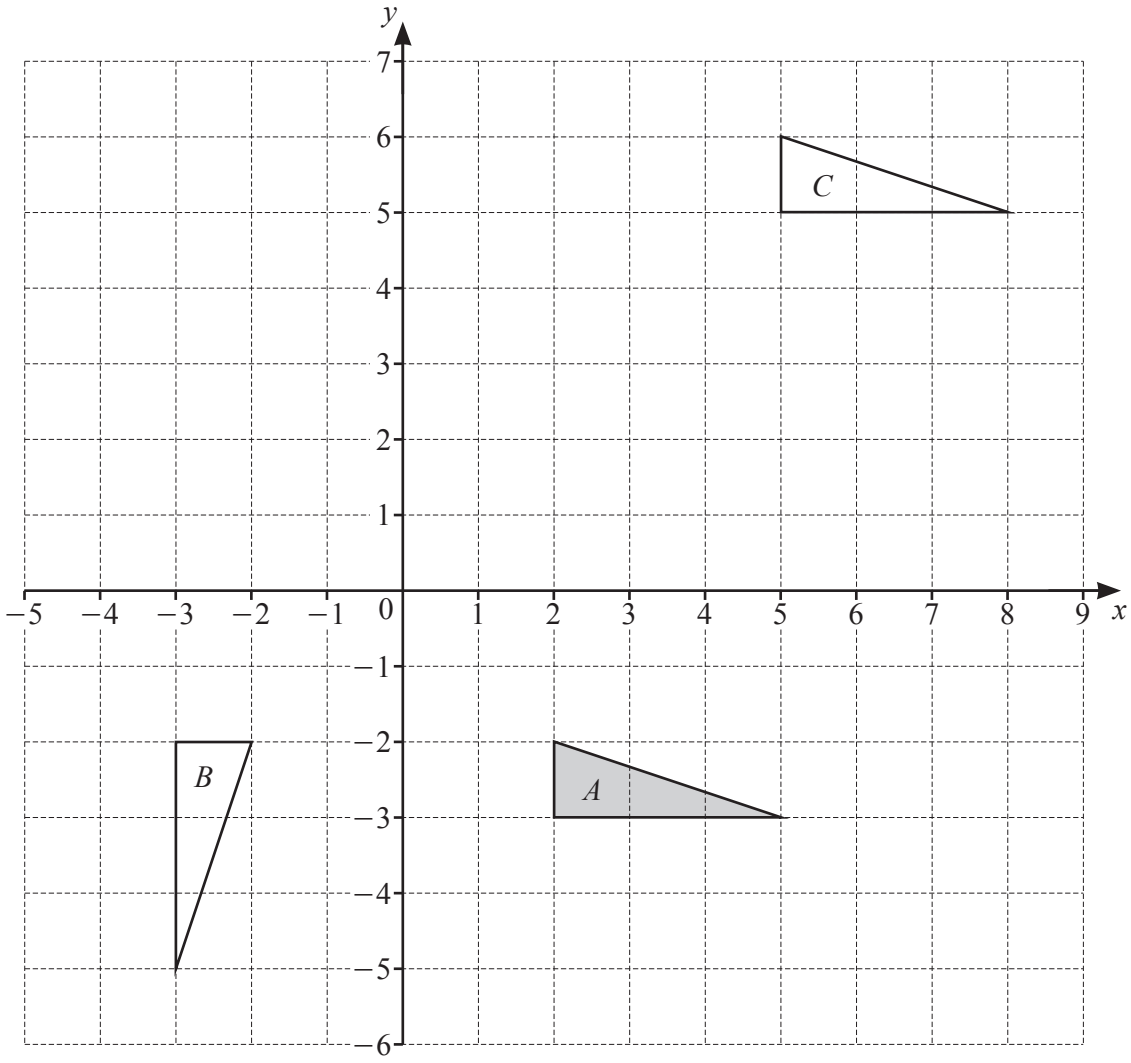
..... [1]

(iii) Find the value of *y*.

y = ... [2]

(b)

View solution



(i) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

.....

..... [3]

(ii) Describe fully the **single** transformation that maps triangle *A* onto triangle *C*.

View solution

.....

..... [2]

(iii) On the grid, enlarge triangle *A* by scale factor 3, centre (4, −5). [2]

View solution

7 These are the first four diagrams in a sequence.
The diagrams are made using dots and lines.

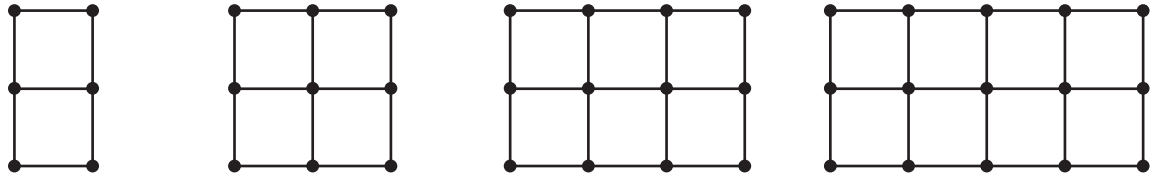


Diagram 1 Diagram 2 Diagram 3 Diagram 4

View solution

(a) Complete the table.

Diagram	1	2	3	4
Number of small squares	2	4	6	
Number of dots	6	9	12	
Number of lines	7	12	17	

[2]

View solution

(b) Complete this statement.

A diagram in this sequence cannot have 51 small squares because .....

..... [1]

View solution

(c) An expression for the number of dots in Diagram n is $3n + 3$.

Which diagram has 249 dots?

..... [2]

View solution

(d) (i) Find an expression, in terms of n, for the number of lines in Diagram n.

..... [2]

View solution

(ii) Find the number of lines in Diagram 41.

..... [1]

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8 **(a)** Expand and simplify.

(i) $4(x+3)+2(x-1)$

View solution

..... [2]

(ii) $(m-6)(m-4)$

View solution

..... [2]

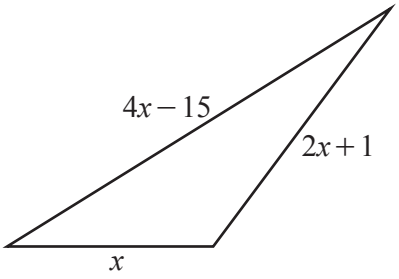
(b) Make t the subject of the formula $p = 4t+3$.

View solution

$t =$ ..... [2]

(c) In this part, all measurements are in centimetres.

View solution



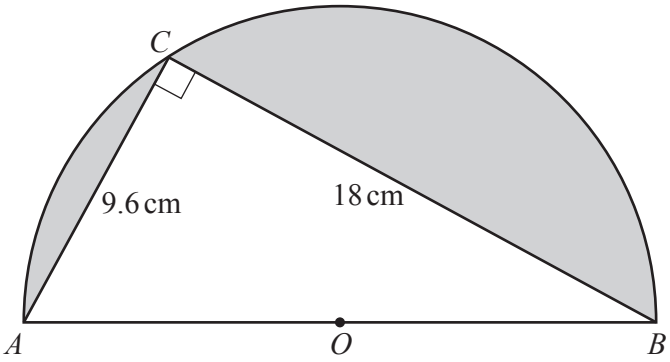
NOT TO SCALE

The perimeter of this triangle is 49 cm.

Work out the value of x.

$x =$ ..... [3]

9 (a)



NOT TO SCALE

The diagram shows a semicircle with diameter AB.
O is the midpoint of AB and C is a point on the circumference.

(i) Calculate the area of triangle ABC.

..... cm^2 [2]

(ii) Show that $AB = 20.4\,cm$.

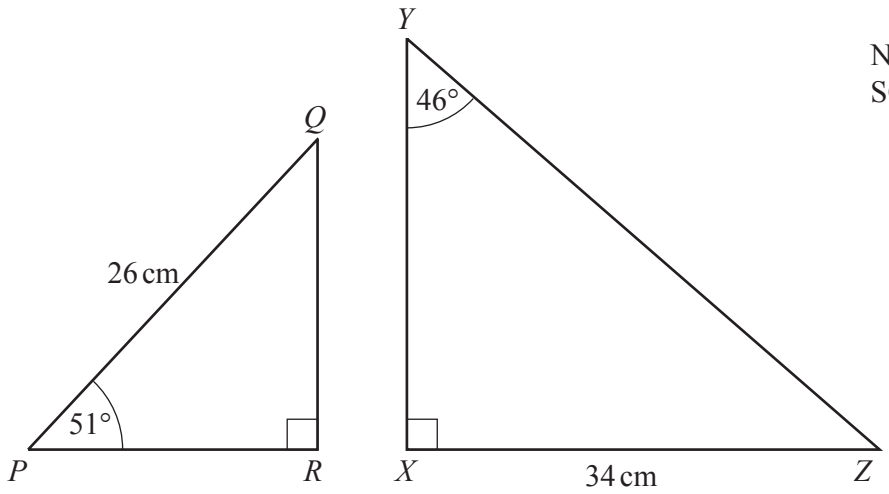
[2]

(iii) Calculate the shaded area.

..... cm^2 [2]

(b) The diagram shows two right-angled triangles, *PQR* and *XYZ*.

View solution

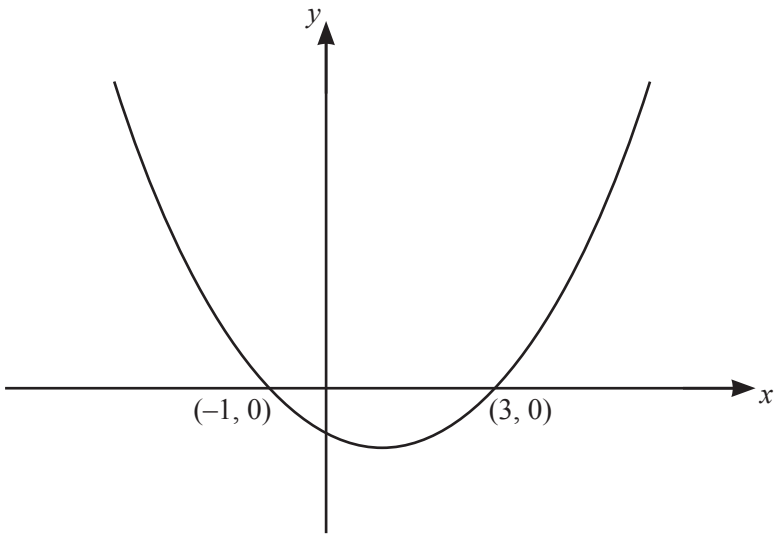


NOT TO SCALE

Calculate the difference in the heights *RQ* and *XY*.

..... cm [4]

10



NOT TO SCALE

The sketch shows the graph of $y = x^2 - 2x - 3$.
The graph crosses the x-axis at $(-1, 0)$ and $(3, 0)$.

(a) Find the equation of the line of symmetry of the graph.

View solution

..... [1]

(b) (i) The point A with coordinates $(6, k)$ lies on the graph.

View solution

Show that the value of k is 21.

[1]

(ii) The point B with coordinates $(p, 21)$ also lies on the graph.

View solution

Find the value of p.

$p =$ ..... [1]

(c) Write down the y-coordinate of the point where the graph crosses the y-axis.

View solution

..... [1]

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