Cambridge Assessment International Education

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MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2020**

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 **16** pages. Blank pages are indicated.

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1 **(a)** **(i)** Write down a fraction equivalent to $\frac{1}{15}$.

View solution

..... [1]

(ii) Find a fraction that is greater than $\frac{1}{15}$ but less than $\frac{2}{15}$.

View solution

..... [1]

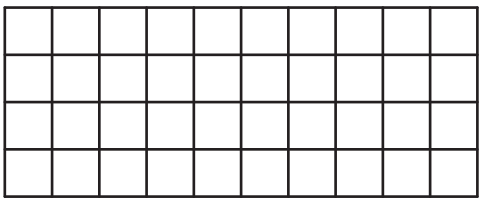
(b) **(i)** Write 15% as a decimal.

View solution

..... [1]

(ii) Shade 15% of this grid.

View solution



[1]

(c) Write down all the factors of 15.

View solution

..... [2]

(d) Find the value of $\sqrt{15}$.
Give your answer correct to 3 decimal places.

View solution

..... [2]

(e) **(i)** Write down the reciprocal of 15.

View solution

..... [1]

(ii) Write down the value of 15^0.

View solution

..... [1]

(iii) Write 0.015 in standard form.

..... [1]

View solution

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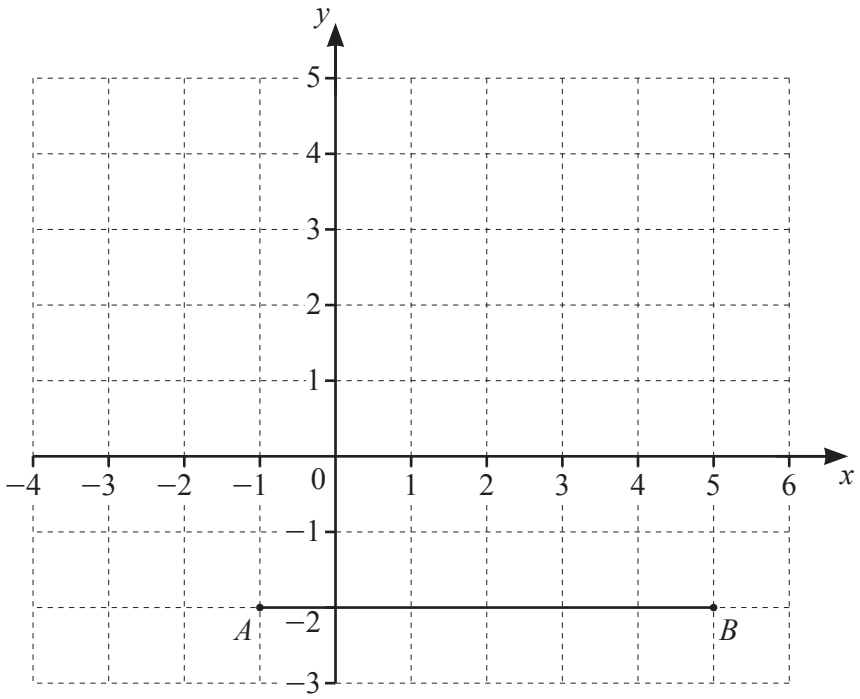
2 The diagram shows a line AB on a $1\,\text{cm}^2$ grid.



(a) Write down the coordinates of point A.

View solution

(..... , ...) [1]

(b) Write down the vector $\overrightarrow{AB}$.

View solution

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

(c) $\overrightarrow{BC} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$

View solution

Mark point C on the grid. [1]

(d) **(i)** Work out $\overrightarrow{AB} + \overrightarrow{BC}$.

$\begin{pmatrix} \\ \end{pmatrix}$ [1]

View solution

(ii) Complete this statement.

$\overrightarrow{AB} + \overrightarrow{BC} =$ ..... [1]

(e) A, B and C are three vertices of a parallelogram, $ABCD$.

View solution

(i) Mark point D on the diagram and draw the parallelogram $ABCD$. [1]

(ii) Work out the area of the parallelogram.
Give the units of your answer.

View solution

.... [2]

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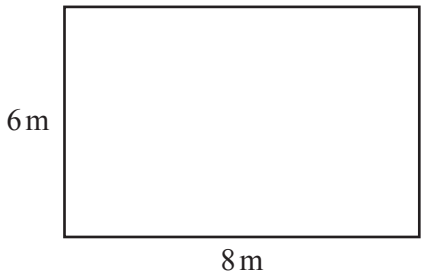
3 (a)

View solution



NOT TO SCALE

The diagram shows a rectangular patio with sides 6 m and 8 m.

(i) Work out the perimeter of the patio.

..... m [1]

View solution

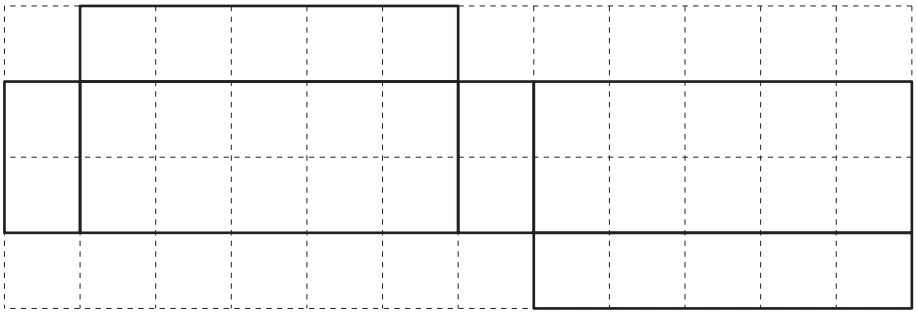
(ii) Henri covers the patio floor with square tiles.
The tiles are 0.5 m by 0.5 m.

Work out the number of tiles he needs.

..... [2]

(b) The diagram shows the net of a solid on a 1 cm^2 grid.

View solution



(i) Write down the mathematical name for the solid.

..... [1]

(ii) Work out the volume of the solid.

View solution

..... cm^3 [2]

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(c) A square has perimeter $12x$.

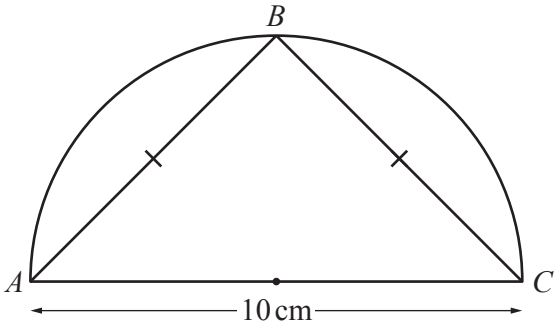
View solution

Find an expression, in terms of x, for the area of the square.
Give your answer in its simplest form.

..... [3]

(d)

View solution



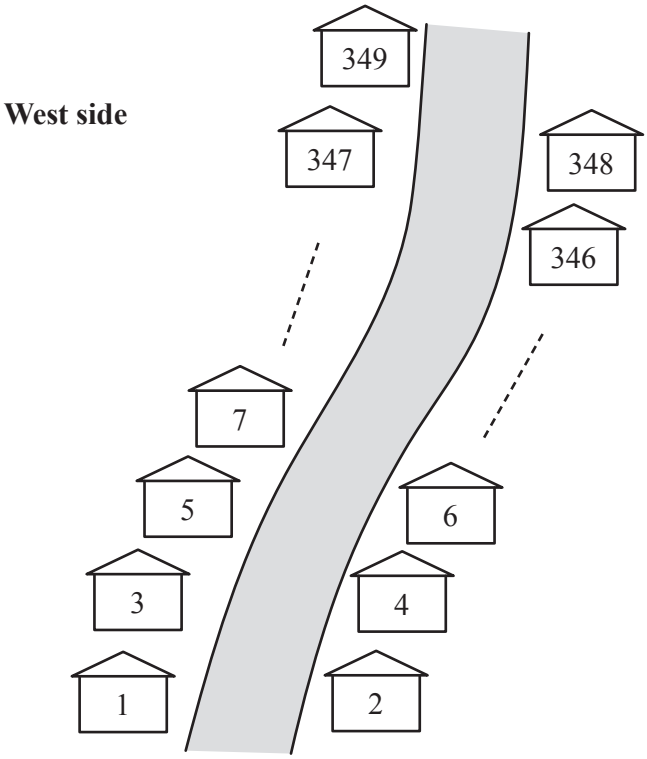
NOT TO SCALE

The diagram shows a semicircle with diameter AC.
B is a point on the circumference and $AB = BC$.

Work out the area of triangle ABC.

..... cm^2 [3]

4



A road has 349 houses on it numbered from 1 to 349.
The diagram shows some of these houses.
The houses on the West side of the road have odd numbers.
The houses on the East side have even numbers.

(a) Put a ring around the numbers in this list that are on the West side.

View solution

25 87 126 178 252 329

[1]

(b) On the East side, how many houses are there **between** the house numbered 168 and the house numbered 184?

View solution

..... [1]

(c) How many houses on the road have a house number that is a multiple of 39?

View solution

..... [2]

(d) Tomaz delivers a leaflet to every house on the West side of the road.
He starts at house number 1 and then delivers to each house in order.

View solution

(i) Find an expression, in terms of n, for the house number of the nth house he delivers to.

..... [2]

(ii) Work out the house number of the 40th house he delivers to.

View solution

..... [1]

(iii) Work out how many houses are on the West side of the road.

View solution

..... [2]

(e) Alicia delivers a leaflet to every house on the East side of the road.
She starts at house number 348 and then delivers to each house in order.

View solution

(i) Find an expression, in terms of n, for the house number of the nth house she delivers to.

..... [2]

(ii) What is the largest value of n that can be used in your expression?
Give a reason for your answer.

View solution

The largest value of n is ..... because .....

..... [2]

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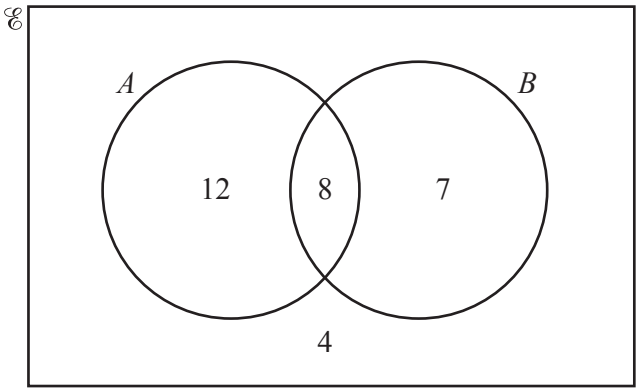
5 **(a)** The Venn diagram shows information about the number of students in a class who like apples (A) and bananas (B).

View solution



(i) Work out the number of students in the class.

..... [1]

(ii) Work out the number of students who like bananas.

View solution

..... [1]

(iii) Work out $n(A \cup B)$.

View solution

..... [1]

(iv) How many more students like apples than like bananas?

View solution

..... [1]

(v) One of the students is chosen at random.

Find the probability that this student does not like apples and does not like bananas.

View solution

..... [1]

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(b) The mass, m grams, of a banana is 115 g, correct to the nearest 5 g.

View solution

Complete the statement about the value of m.

..... $\leqslant m <$ ..... [2]

(c) Six of the students bring an apple to school one day.
The list shows the mass of each apple, correct to the nearest gram.

View solution

82 94 78 103 88 82

(i) Find

(a) the mode,

..... g [1]

(b) the range,

..... g [1]

(c) the median.

..... g [2]

(ii) Another student, Toni, also brings an apple to school.
The mean mass of the 7 apples is 89 g.

View solution

Work out the mass of Toni's apple.

..... g [3]

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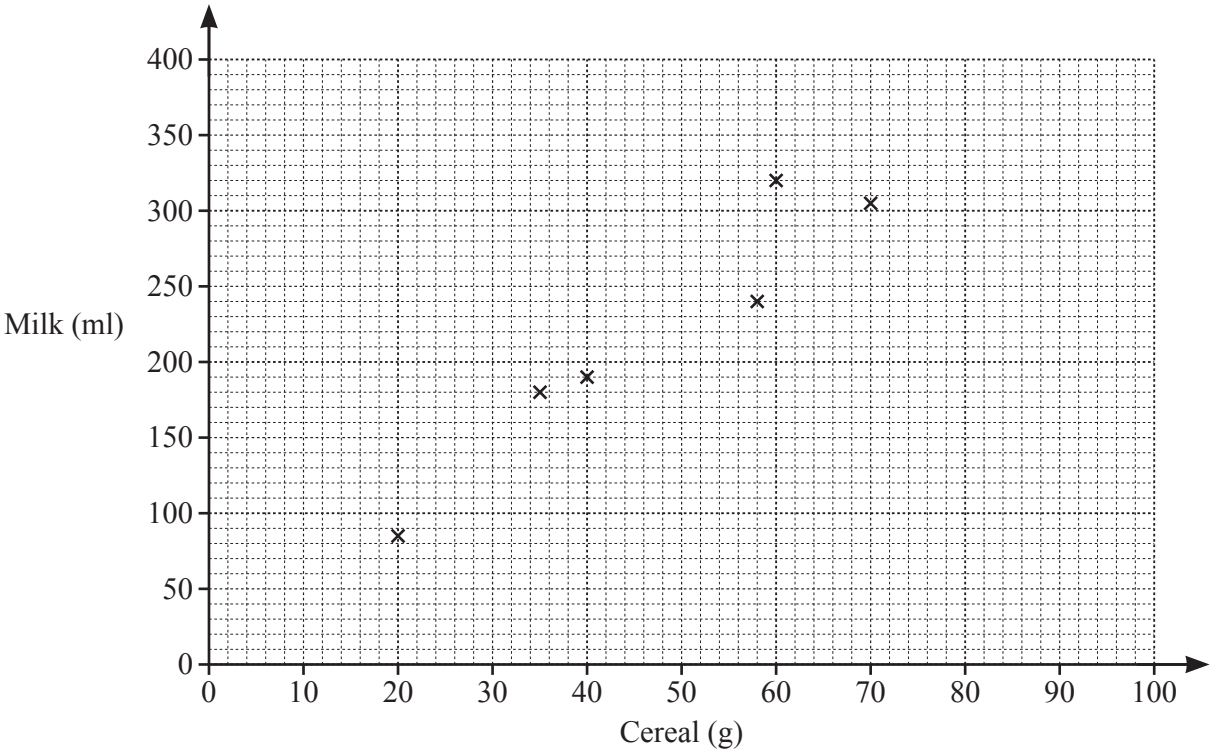
6 **(a)** Ten students eat cereal with milk for breakfast.
The amounts are shown in the table.

View solution

Cereal (g)	40	20	58	70	60	35	28	40	55	46
Milk (ml)	190	85	240	305	320	180	150	230	340	220



(i) Complete the scatter diagram.
The first six points have been plotted for you. [2]

(ii) For these students, describe the relationship between the amount of cereal and the amount of milk.

..... [1]

(iii) On the grid, draw a line of best fit. [1]

(iv) Another student has 280 ml of milk with her cereal.

Use your line of best fit to estimate an amount of cereal this student has.

..... g [1]

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(v) Explain why this scatter diagram should not be used to estimate the amount of milk for a student who has more than 70 g of cereal.

..... [1]

View solution

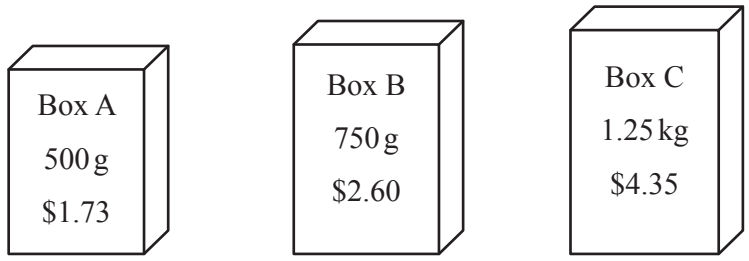
(b) 100 g of cereal contains 360 kilocalories.
100 ml of milk contains 45 kilocalories.
For breakfast Sasha has 35 g of cereal with 180 ml of milk.

Work out the number of kilocalories Sasha has for breakfast.

..... kcal [3]

View solution

(c) A shop sells cereal in boxes A, B and C.



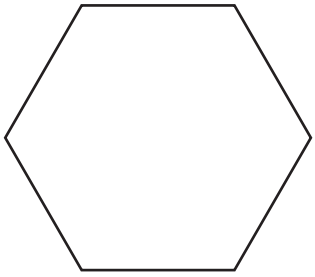
NOT TO SCALE

Work out which box is the best value.
You must show all your working.

Box ..... [3]

7 **(a)** The diagram shows a regular polygon.

View solution



(i) Write down the mathematical name for this shape.

..... [1]

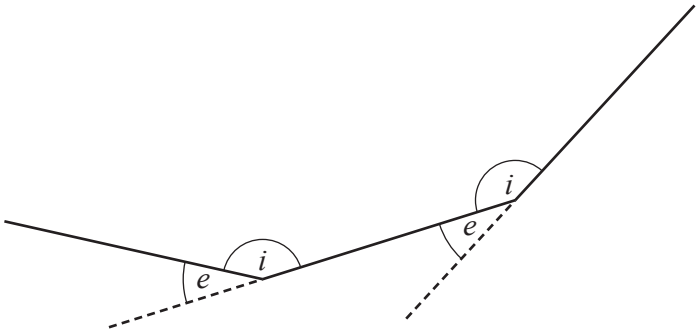
(ii) Write down the order of rotational symmetry of this shape.

View solution

..... [1]

(b) The diagram shows part of a different regular polygon.

View solution



NOT TO SCALE

e is an exterior angle.
i is an interior angle.

The ratio $e : i = 2 : 13$.

(i) Work out angle e.

..... [3]

(ii) Work out the number of sides of this regular polygon.

View solution

..... [1]

(c) **Using a straight edge and compasses only**, construct the equilateral triangle ABC.
Side AB has been drawn for you.

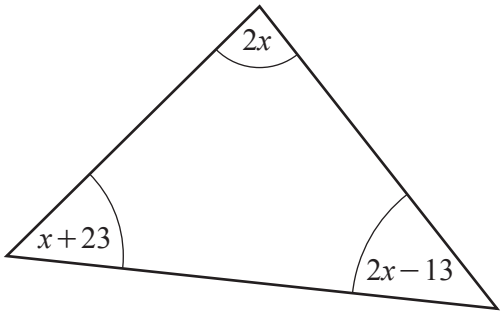
View solution



[2]

(d) In this part, all angles are in degrees.

View solution



NOT TO SCALE

(i) Use the information in the triangle to write down an equation in terms of x.

..... [1]

(ii) Solve this equation to find the value of x.

View solution

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

(iii) Work out the size of the smallest angle in the triangle.

View solution

..... [2]

8 **(a)** Complete the table of values for $y = -x^2 + x + 5$.

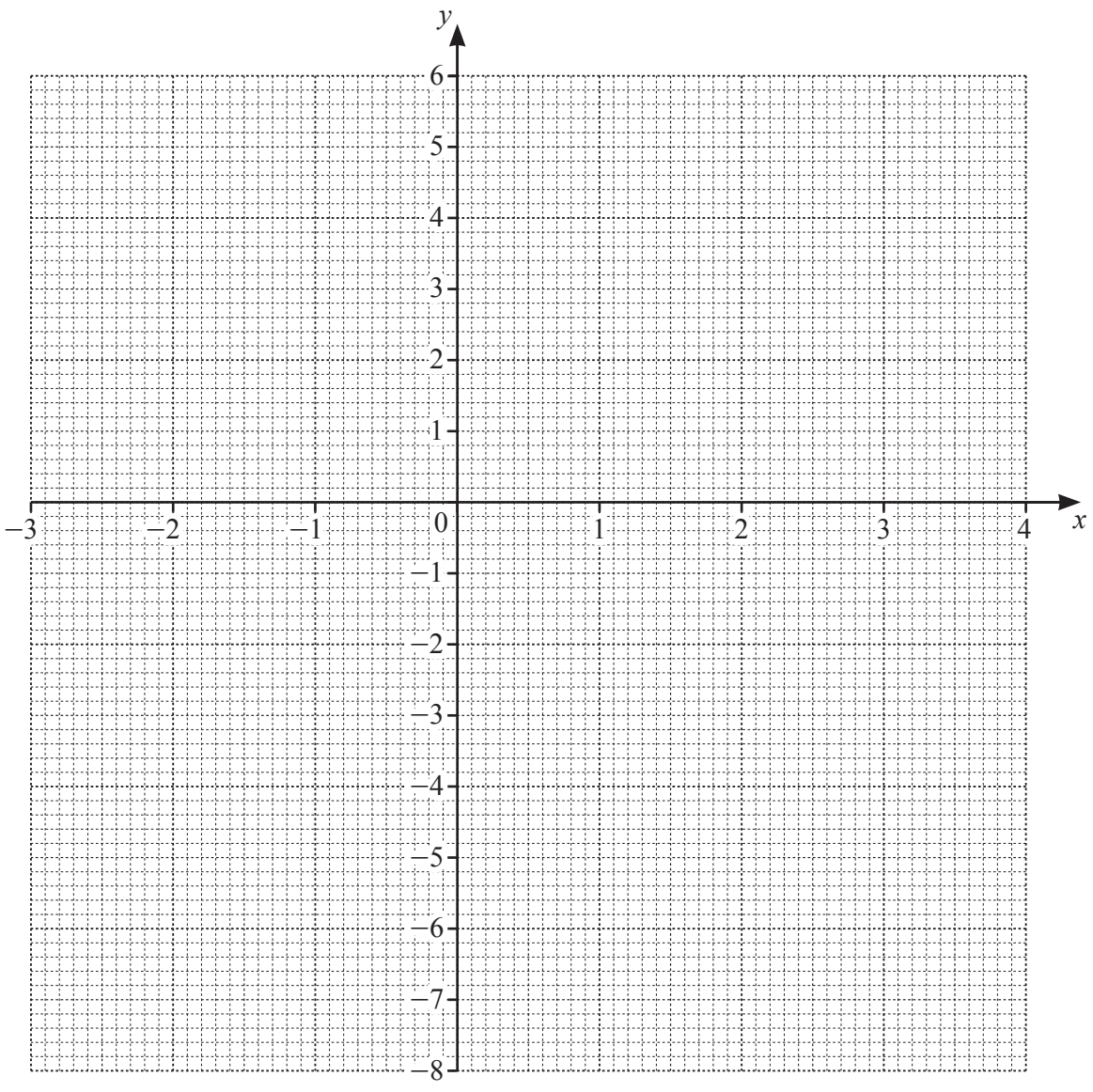
View solution

x	-3	-2	-1	0	1	2	3	4
y		-1	3			3		

[3]

(b) On the grid, draw the graph of $y = -x^2 + x + 5$ for $-3 \leqslant x \leqslant 4$.

View solution



[4]

(c) Write down the coordinates of the highest point of the graph.

View solution

(..... , ...) [1]

(d) Write down the equation of the line of symmetry of the graph.

View solution

..... [1]

(e) **(i)** On the grid, draw the line $y = x$ for $-3 \leqslant x \leqslant 4$. [1]

(ii) Write down the values of x where the line $y = x$ crosses the curve $y = -x^2 + x + 5$.

View solution

$x =$ ..... and $x =$ ..... [2]

Question 9 is printed on the next page.

9 **(a)** A speedboat travels at 84 kilometres per hour.

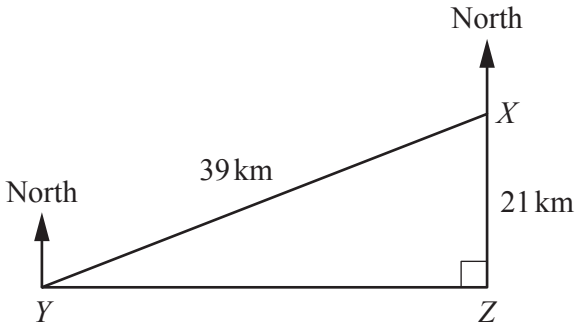
Change this speed into metres per minute.

View solution

..... m/min [2]

(b)

View solution



NOT TO SCALE

The speedboat starts at X and travels to Y, then to Z and then back to X.
Z is due south of X and Y is due west of Z.
$XY = 39$ km and $XZ = 21$ km.

(i) Calculate YZ.

$YZ =$ ..... km [3]

(ii) Calculate angle YXZ.

View solution

Angle $YXZ =$ ..... [2]

(iii) Find the bearing of Y from X.

View solution

..... [1]

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