Cambridge Assessment International Education

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CANDIDATE NAME									
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MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 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 **20** pages. Blank pages are indicated.

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1 Sean is the manager of a museum.

(a) He buys a Chinese pot costing 1200 yuan.
The exchange rate is \$1 = 6.4 yuan.

View solution

Work out the cost of this pot in dollars.

\$ ..... [1]

(b) Sean records the maximum and minimum temperatures, in °C, at the museum.
Some of the results for one week are shown in the table.

View solution

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Maximum temperature (°C)	8	12	15	14	11	7	4
Minimum temperature (°C)	−5	−2	−4	−1	3		

(i) Find the difference between the maximum temperature and the minimum temperature on Wednesday.

..... °C [1]

(ii) The minimum temperature on Saturday was 2 °C higher than the minimum temperature on Monday.

Find the minimum temperature on Saturday.

View solution

..... °C [1]

(iii) In this week the range of temperatures was 23 °C.

Find the minimum temperature on Sunday.

View solution

..... °C [1]

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(c) These are the opening times for the museum.

View solution

Monday to Friday	09 00 to 17 00
Saturday and Sunday	10 00 to 16 00

During opening hours the museum has 4 security guards working.
Each guard works a maximum of 30 hours each week.

Work out the smallest number of guards needed each week.

..... [4]

(d) The entry price to the museum is $18.
This price is increased by 28%.

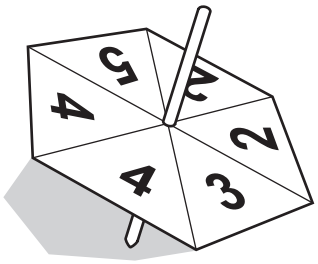
View solution

Find the increased entry price.

$ ..... [2]

2 **(a)** Jian has a fair spinner in the shape of a regular hexagon.
The spinner is numbered 2, 2, 3, 4, 4, 5.

View solution



Jian spins the spinner.

Find the probability that the spinner lands on

(i) an even number,

..... [1]

(ii) a number less than 6,

View solution

..... [1]

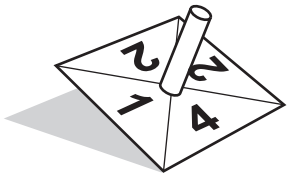
(iii) the number 1.

View solution

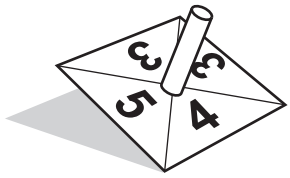
..... [1]

(b) Mei has two fair square spinners, A and B.
Spinner A is numbered 1, 2, 2, 4 and spinner B is numbered 3, 3, 4, 5.

View solution



Spinner A



Spinner B

She spins both spinners and adds the two numbers.

(i) Complete the table to show all the possible outcomes.

A \ B	3	3	4	5
1	4	4		
2	5	5	6	7
2	5	5	6	7
4	7	7		

[2]

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(ii) Use the table to write down the probability that the total is

View solution

(a) 5,

..... [1]

(b) more than 5.

..... [1]

(c) Ning has a spinner numbered 1 to 6.
She spins it 50 times and her results are shown in the table.

View solution

Number on spinner	Frequency
1	15
2	12
3	9
4	5
5	2
6	7

(i) Write down the mode.

..... [1]

(ii) Find the median.

View solution

..... [1]

(iii) Work out the mean.

View solution

..... [3]

3 **(a)**

8 15 18 33 39 41 51 57 60 81

View solution

From this list, write down

(i) a factor of 54,

..... [1]

(ii) a multiple of 19,

View solution

..... [1]

(iii) a prime number.

View solution

..... [1]

(b) Write down the reciprocal of 64.

View solution

..... [1]

(c) **(i)** Write 4.81×10^{-3} as an ordinary number.

View solution

..... [1]

(ii) Write 75 000 in standard form.

View solution

..... [1]

(iii) Calculate $\dfrac{6.3 \times 10^{2}}{7 \times 10^{-3}}$.

Write your answer in standard form.

View solution

..... [2]

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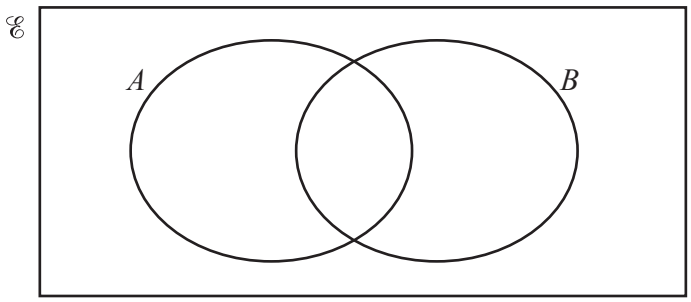
(d) (i)

View solution

$\mathscr{E} = \{2, 4, 8, 16, 32, 64\}$
$A = \{\text{square numbers}\}$
$B = \{\text{cube numbers}\}$

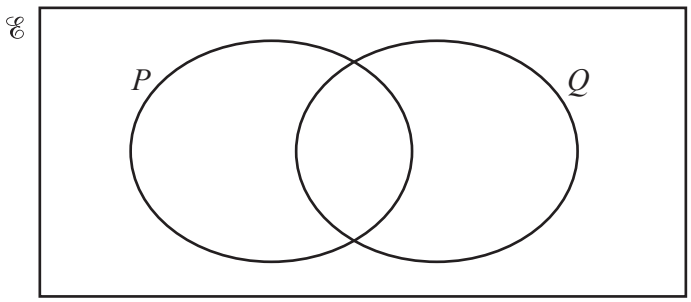
Use this information to complete the Venn diagram.



[2]

(ii) On this Venn diagram, shade the region $P \cup Q$.

View solution



[1]

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4 **(a)** Simplify.

$6a - 3b + 2a - 4b$

View solution

..... [2]

(b) Expand.

$5(x - 3)$

View solution

..... [1]

(c) Solve these equations.

View solution

(i) $\frac{x}{3} = 18$

$x =$ ..... [1]

(ii) $5x + 18 = 8$

View solution

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

(iii) $12x - 3 = 4x + 21$

View solution

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

(d) $6^{10} \times 6^{x} = 6^{2}$

View solution

Find the value of x.

$x =$ ..... [1]

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(e) The Fraser family and the Singh family go to the cinema.
The Fraser family buys 6 adult tickets and 2 child tickets for $124.
The Singh family buys 3 adult tickets and 5 child tickets for $100.

View solution

Find the price of an adult ticket and the price of a child ticket.

Adult ticket $ .....

Child ticket $ ..... [5]

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5 **(a)** Write one hundred and twenty thousand and twenty in figures.

View solution

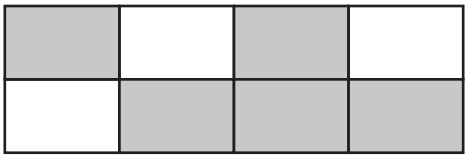
..... [1]

(b) Find the value of $\sqrt{3481}$.

View solution

..... [1]

(c)



View solution

(i) Write down the fraction of the rectangle that is shaded.

..... [1]

(ii) Find the percentage of the rectangle that is **not** shaded.

View solution

.....% [1]

(d) Write these numbers in order, starting with the smallest.

View solution

$$27\% \qquad \frac{5}{17} \qquad 0.268 \qquad \frac{7}{29}$$

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

smallest

(e) Write 0.3728 correct to 1 decimal place.

View solution

..... [1]

(f) Write down the value of 19^0.

View solution

..... [1]

(g) The height, h metres, of a tower is 128 m, correct to the nearest metre.

Complete the statement about the value of h.

View solution

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

(h) Find the highest common factor (HCF) of 126 and 180.

View solution

..... [2]

(i) Write down an irrational number with a value between 6 and 7.

View solution

..... [1]

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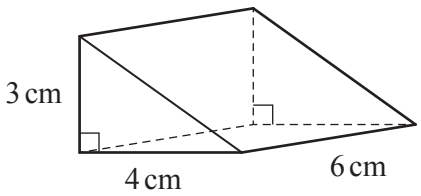
6

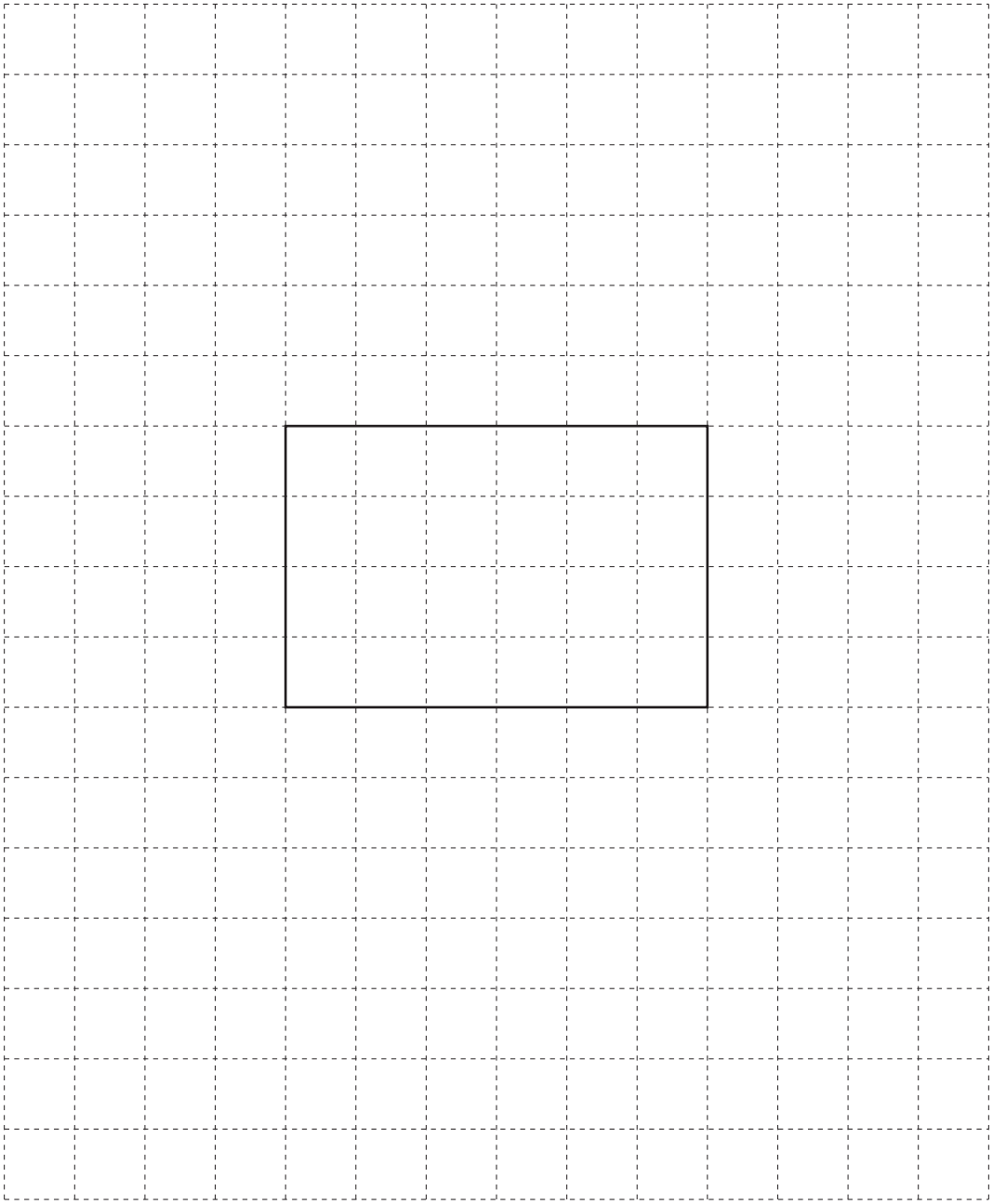


NOT TO SCALE

The diagram shows a right-angled triangular prism.

View solution

(a) On the 1 cm^2 grid, complete the net of the prism.
One face has been drawn for you.



[3]

(b) Work out the surface area of the prism.

View solution

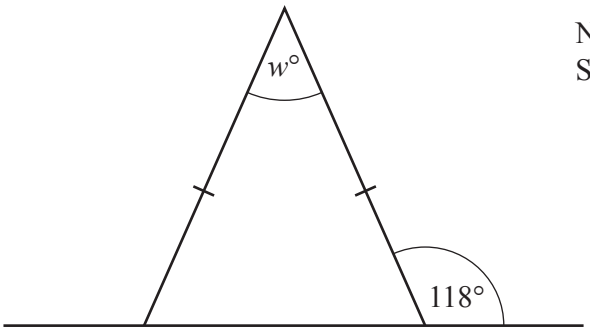
..... cm^2 [3]

(c) Work out the volume of the prism.

View solution

..... cm^3 [2]

7 (a)



NOT TO SCALE

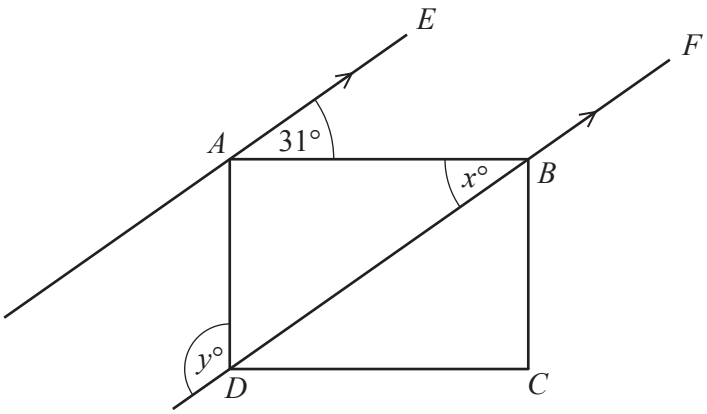
View solution

The diagram shows an isosceles triangle and a straight line.

Work out the value of w.

$w =$ ..... [2]

(b)



NOT TO SCALE

View solution

$ABCD$ is a rectangle.
AE is parallel to DBF.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

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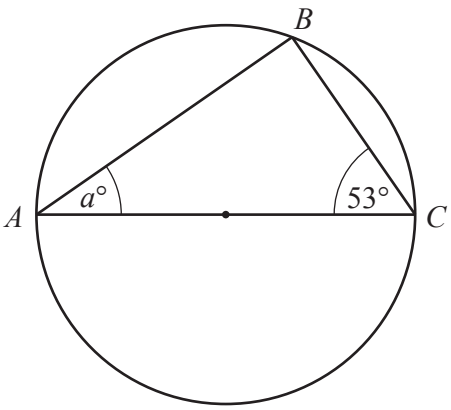
(c)



NOT TO SCALE

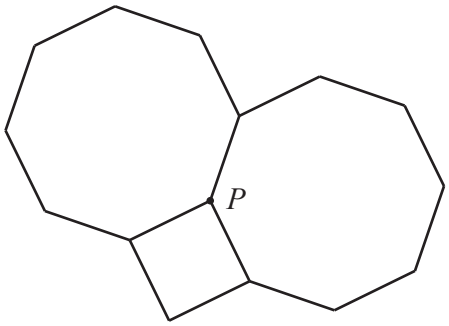
View solution

A, B and C are points on a circle.
AC is a diameter of the circle.

Find the value of a.

$a =$ ..... [2]

(d)



NOT TO SCALE

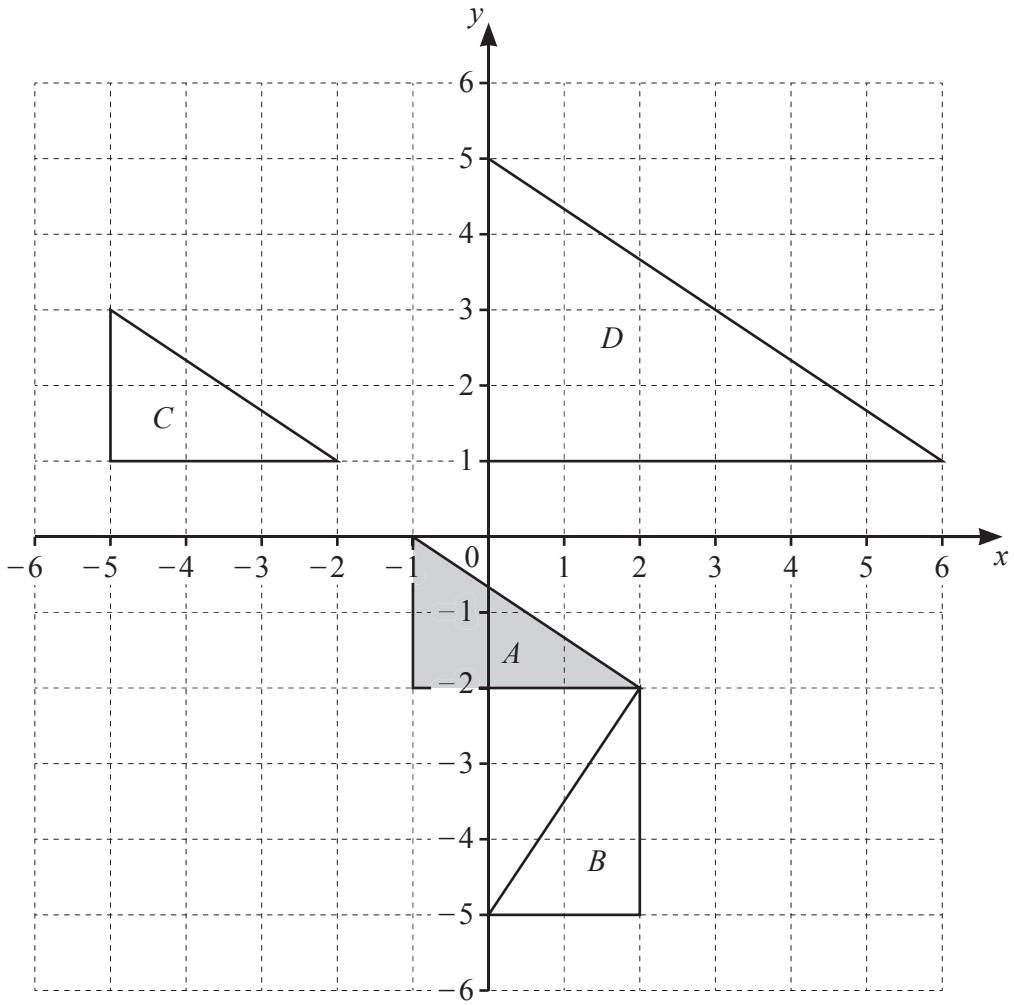
View solution

Two regular octagons and a square meet at point P.

Show, by calculation, that the three interior angles at P add up to 360°.

[3]

8



(a) Describe fully the **single** transformation that maps

(i) triangle A onto triangle B,

.....

..... [3]

(ii) triangle A onto triangle C,

.....

..... [2]

(iii) triangle A onto triangle D.

.....

..... [3]

(b) On the grid, draw the image of triangle A after a reflection in the line $x = -2$. [2]

9 **(a)** Complete the table of values for $y = \frac{15}{x}$.

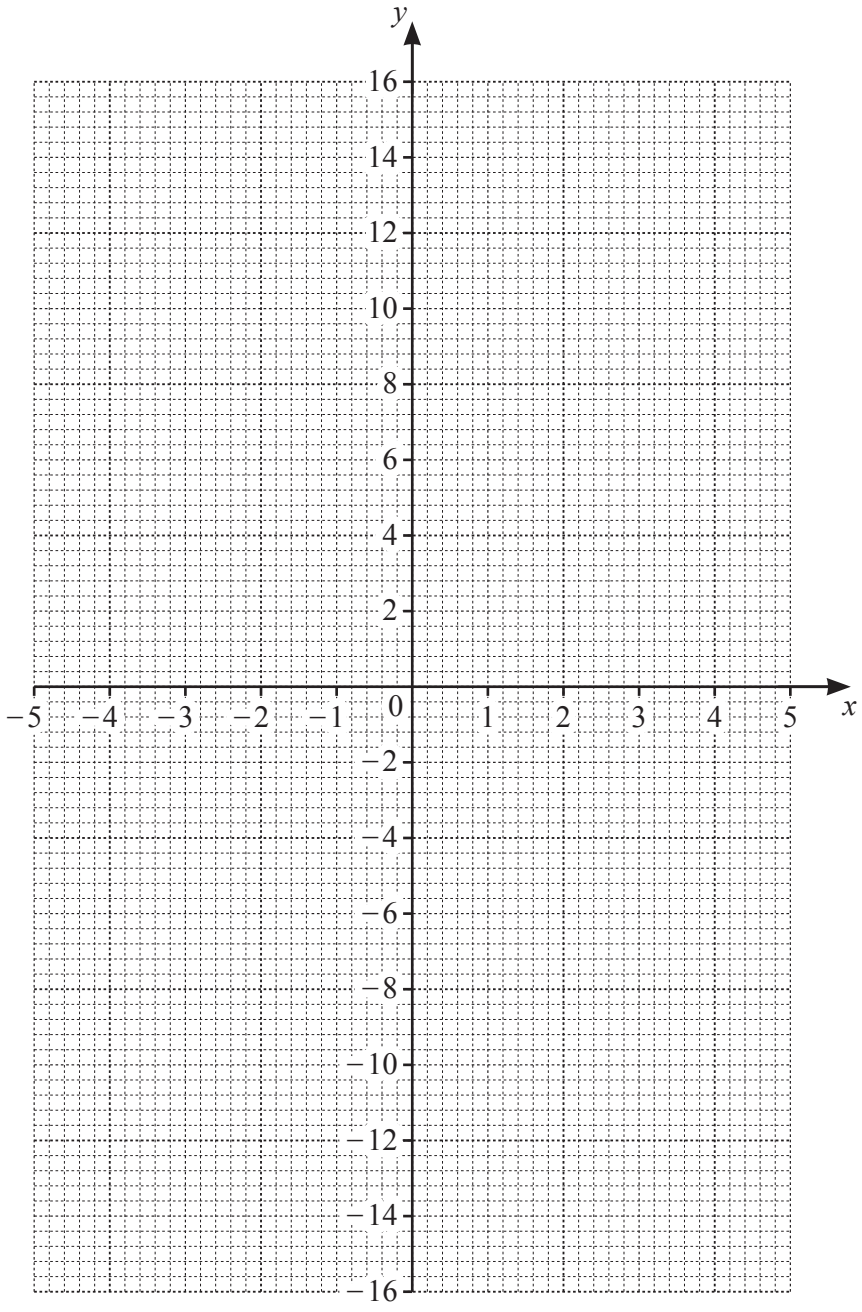
View solution

x	-5	-3	-2	-1		1	2	3	5
y				-15		15			

[3]

(b) On the grid, draw the graph of $y = \frac{15}{x}$ for $-5 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 5$.

View solution



[4]

(c) On the grid, draw the line $y = 6$. [1]

View solution

(d) Use your graph to solve $\frac{15}{x} = 6$.

View solution

$x =$ ..... [1]

10 **(a)** These are the first four terms of a sequence.

View solution

8 15 22 29

(i) Write down the next term.

..... [1]

(ii) Write down the term to term rule for continuing this sequence.

View solution

..... [1]

(iii) Find an expression for the nth term.

View solution

..... [2]

(b) Find the next term in each of these sequences.

View solution

(i) 18, 21, 26, 33, 42, …

..... [1]

(ii) 18, 20, 24, 32, 48, …

View solution

..... [1]

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(c) Find the first three terms of the sequence with nth term $n^2 + 5n$.

View solution

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

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