Cambridge Assessment International Education

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MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2022**

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)** Write the number six and a half million in figures.

View solution

..... [1]

(b) Write 6538 correct to the nearest ten.

View solution

..... [1]

(c) Work out $6 \times 5 + 12 \div 3$.

View solution

..... [1]

(d) 9 16 18 29 57 64 87 96

View solution

From this list of numbers, write down

(i) a factor of 48,

..... [1]

(ii) a cube number,

View solution

..... [1]

(iii) a prime number.

View solution

..... [1]

(e) Find the value of $\sqrt{0.001225}$.

View solution

..... [1]

(f) Find the reciprocal of 8.

View solution

..... [1]

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(g) Find the value of 8^0.

View solution

..... [1]

(h) **(i)** Write 180 as a product of its prime factors.

View solution

..... [2]

(ii) Find the lowest common multiple (LCM) of 160 and 180.

View solution

..... [2]

(i) The mass of an aircraft, m tonnes, is 473 tonnes, correct to the nearest tonne.

View solution

Complete this statement about the value of m.

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

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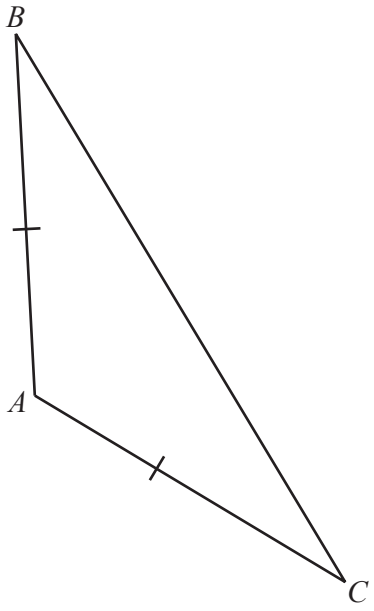
2 **(a)** Write down the number of sides of a hexagon.

View solution

..... [1]

(b)

View solution



In triangle ABC, $AB = AC$.

(i) Write down the mathematical name for this type of triangle.

..... [1]

(ii) Measure angle CAB.

View solution

Angle CAB = ... [1]

(iii) Write down the mathematical name for angle CAB.

View solution

..... [1]

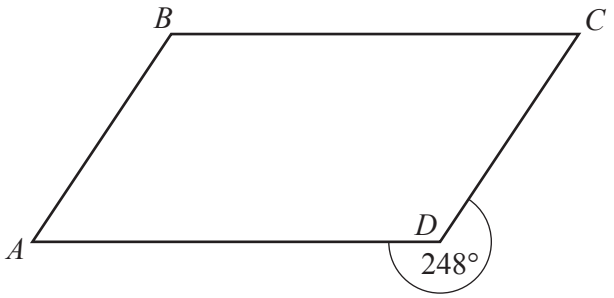
(c) Show that the interior angle of a regular pentagon is 108°.

View solution

[2]

(d)

View solution



NOT TO SCALE

ABCD is a parallelogram.
The reflex angle at *D* is 248°.

Find angle *DCB*.

Angle *DCB* = ... [2]

(e) The angles of a triangle are in the ratio 3 : 5 : 7.

View solution

Find the size of the largest angle in this triangle.

..... [3]

3 Sachin, his wife and three children go on a coach holiday.

(a) Each adult ticket costs \$375 and each child ticket costs \$194.

View solution

Work out the total cost of the tickets.

\$ ..... [2]

(b) A meal costs \$110 plus a service charge of 18%.

View solution

Calculate the total cost of the meal.

\$ ..... [2]

(c) One day, the temperature at midday is 16 °C.
At midnight the temperature has fallen by 23 °C.

View solution

Work out the temperature at midnight.

..... °C [1]

(d) Sachin spends \$768 on holiday.
He spends $\frac{3}{8}$ of this amount on presents.

View solution

Find how much he spends on presents.

\$ ..... [1]

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(e) There are 604 passengers on the holiday.

View solution

(i) The coach company uses coaches which can carry 46 passengers.

Work out the number of coaches needed.

..... [2]

View solution

(ii) 268 of the 604 passengers are women.

Find the percentage of the passengers that are women.

..... % [1]

View solution

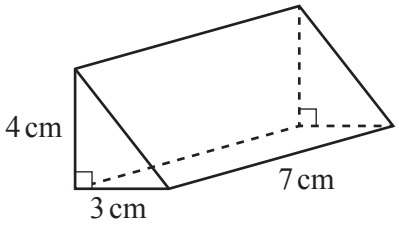
(f) A coach travels at an average speed of 54 km/h.

Find how long, in hours and minutes, this coach takes to travel 126 km.

..... h ..... min [3]

4 (a)

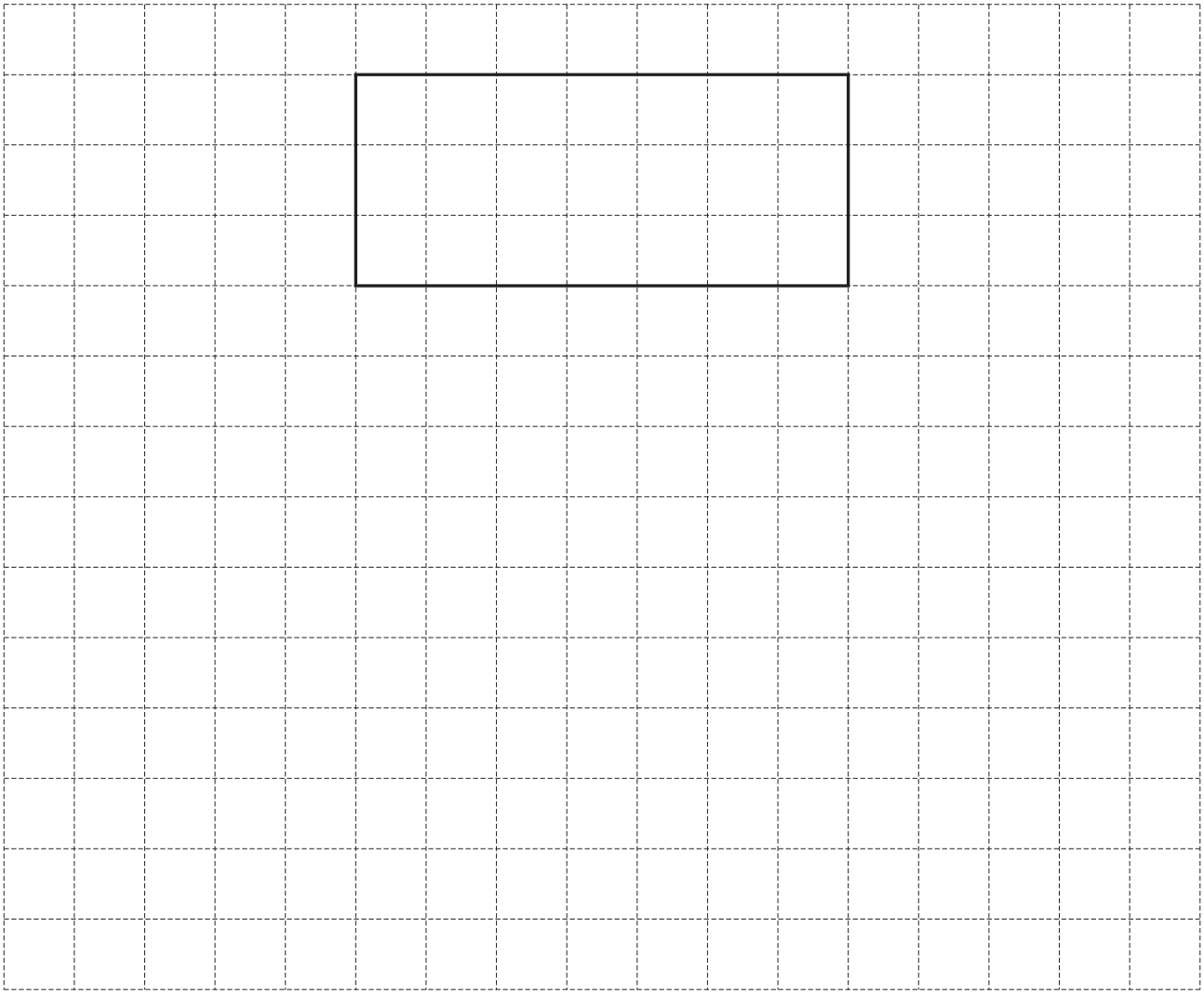
View solution



NOT TO SCALE

The diagram shows a right-angled triangular prism.

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



[4]

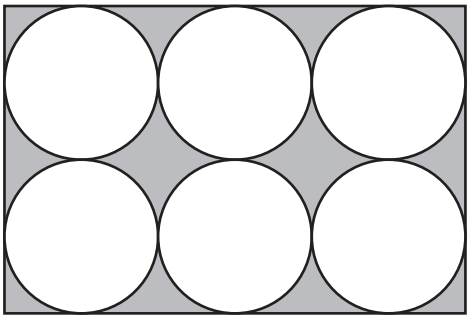
(ii) Work out the volume of this prism.

View solution

..... cm^3 [2]

(b)

View solution



NOT TO SCALE

The diagram shows a rectangle with 6 congruent circles inside.
Each circle touches the adjacent circles and the sides of the rectangle.
The radius of each circle is 8 cm.

(i) Show that the length of the rectangle is 48 cm.

[1]

View solution

(ii) Find the area of the rectangle.
Give the units of your answer.

.... [3]

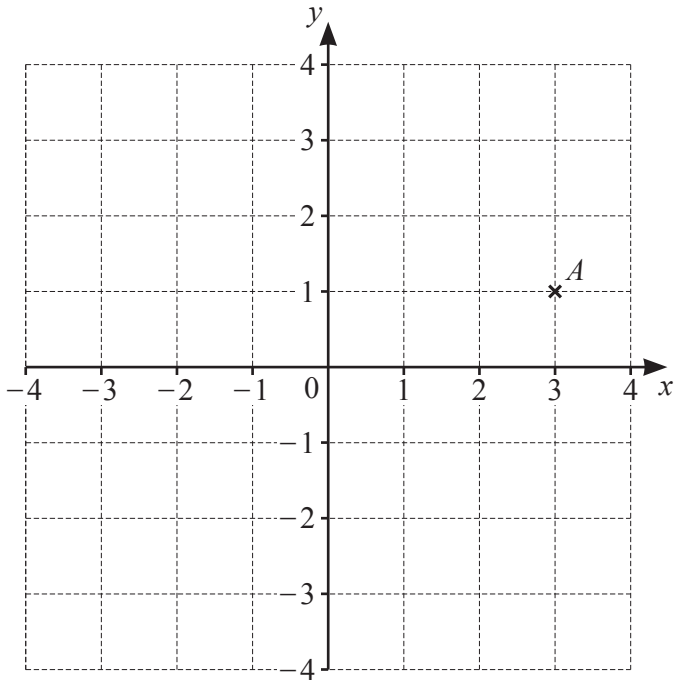
View solution

(iii) Calculate the percentage of the rectangle that is shaded.

..... % [3]

5 **(a)** The grid shows a point A.

View solution



(i) Write down the coordinates of point A.

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

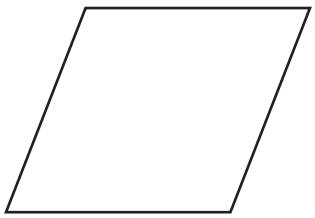
(ii) On the grid, plot the point B at $(-1, 3)$. [1]

(iii) C is a point on the grid whose coordinates are whole numbers.

On the grid, mark a point C so that triangle ABC is isosceles. [1]

(b)

View solution



The diagram shows a rhombus.

(i) Write down the order of rotational symmetry.

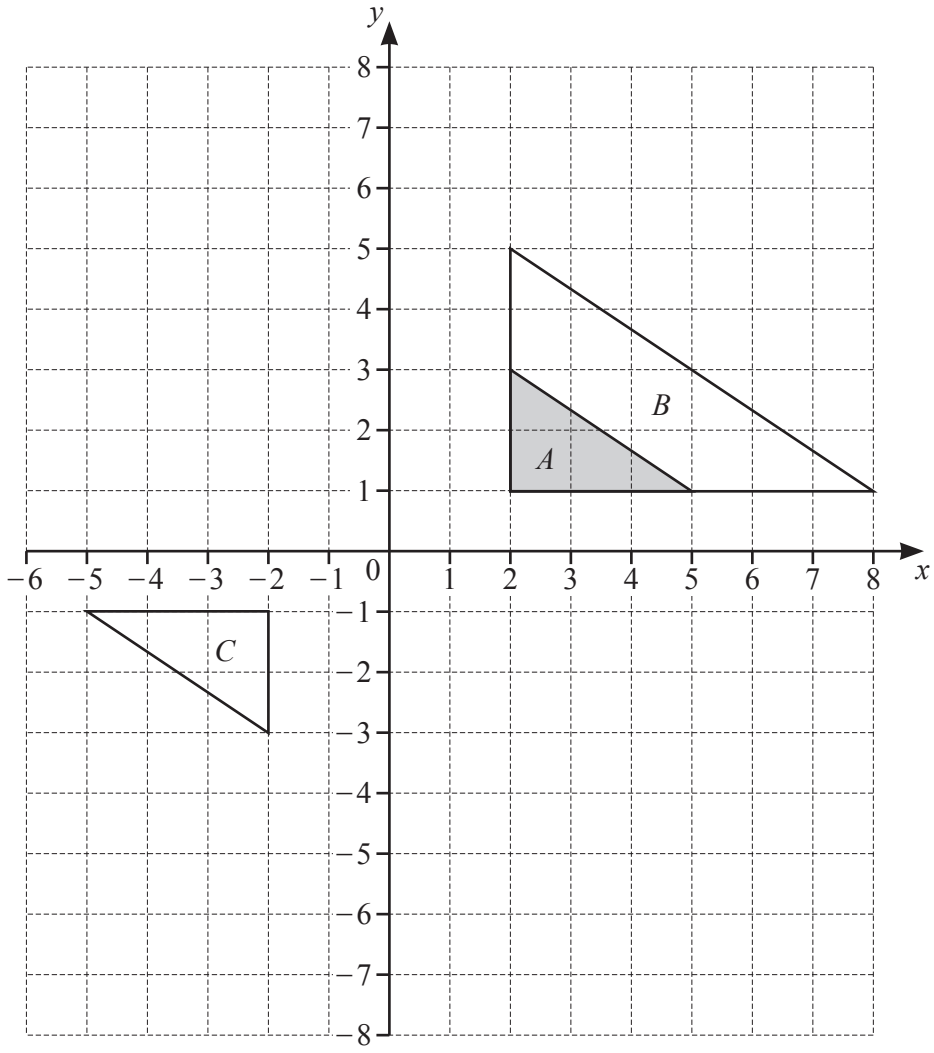
..... [1]

(ii) On the diagram, draw all the lines of symmetry. [2]

View solution

(c) The grid shows triangles A, B and C.

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

.....

..... [3]

(iii) Draw the image of

(a) triangle A after a translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$, [2]

(b) triangle A after a reflection in the line $y = -2$. [2]

View solution

6 **(a)** A football team has w wins and d draws.
The team scores 3 points for each win and 1 point for each draw.

View solution

Write an expression, in terms of w and d, for the total number of points scored by the team.

..... [2]

(b) Athletic, Rovers and United are three football teams.

View solution

Athletic have a point score of x.
Rovers have 12 points more than Athletic's point score.
United have 3 points fewer than twice Athletic's point score.

The total point score of all three teams is 121.

Use this information to write down an equation in terms of x.
Solve your equation to work out the point score for each team.

Athletic ..... points

Rovers ..... points

United ..... points [5]

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(c) Simplify.

(i) $4a - 3b + 5a + 6b$

View solution

..... [2]

(ii) $6(2x + 1) - 5(x - 2)$

View solution

..... [2]

(d) Solve the simultaneous equations.
You must show all your working.

View solution

$3x + 5y = 11$
$2x - 3y = 20$

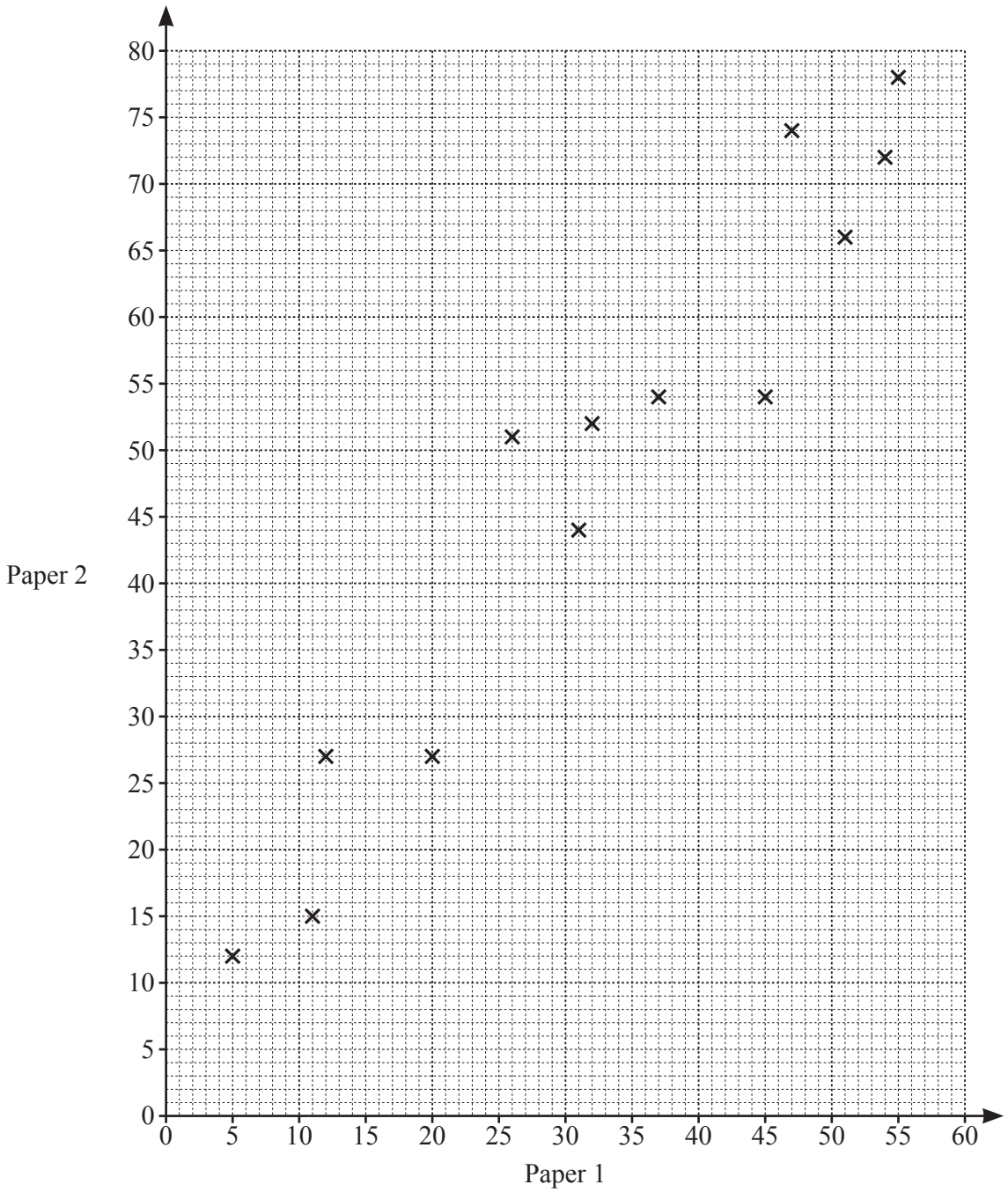
$x =$ .....

$y =$ ..... [4]

7 **(a)** A class of 15 students take two tests in science, paper 1 and paper 2.
The scores for each student are shown in the table.

Paper 1	5	11	12	20	26	31	32	37	45	47	51	54	55	23	42
Paper 2	12	15	27	27	51	44	52	54	54	74	66	72	78	30	58

View solution



(i) Complete the scatter diagram.
The first thirteen points have been plotted for you. [1]

(ii) What type of correlation is shown in the scatter diagram?

..... [1]

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

(iv) Another student scores 24 on paper 1.

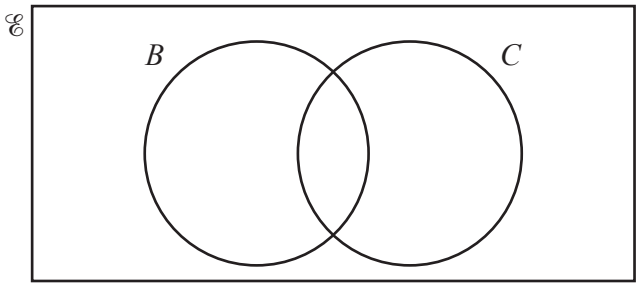
Use your line of best fit to find an estimate for their score on paper 2.

..... [1]

(b) 140 students choose which subjects they want to study.

View solution

- 122 students choose biology (B).
- 55 students choose chemistry (C).
- 2 students do not choose biology and do not choose chemistry.



(i) Complete the Venn diagram.

[2]

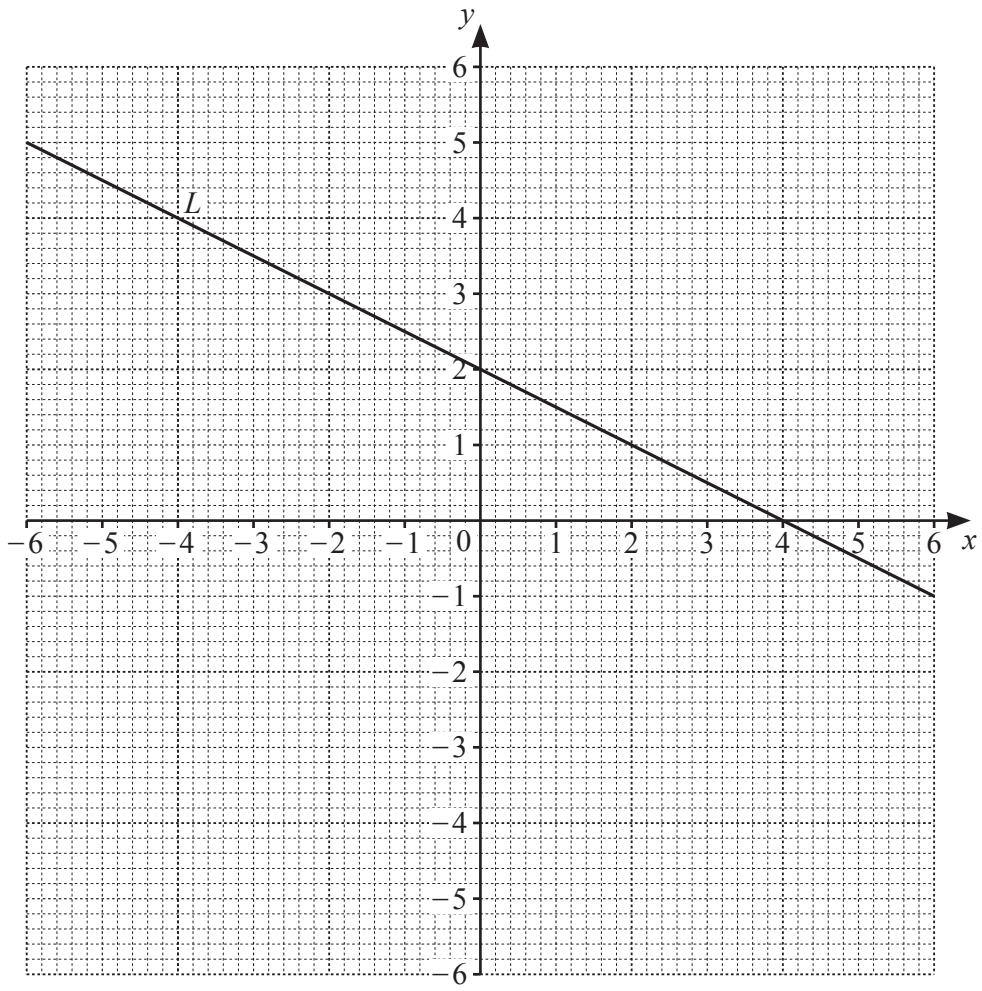
(ii) One of these students is picked at random.

View solution

Find the probability that this student chooses biology and chemistry.

..... [1]

8 The grid shows a line L.



(a) Find the equation of line L.
Give your answer in the form $y = mx + c$.

View solution

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

(b) (i) Complete the table of values for $y = 2x + 5$.

View solution

x	−5	−3	0
y	−5		5

[1]

(ii) On the grid, draw the graph of $y = 2x + 5$. [1]

View solution

(c) Write down the coordinates of the point which lies on both line L and the graph of $y = 2x + 5$.

View solution

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

(d) Write down the equation of the line that is parallel to $y = 2x + 5$ and passes through the point (0, 18).

View solution

..... [1]

9 **(a)** Complete the table of values for $y = \frac{12}{x}$, $x \neq 0$.

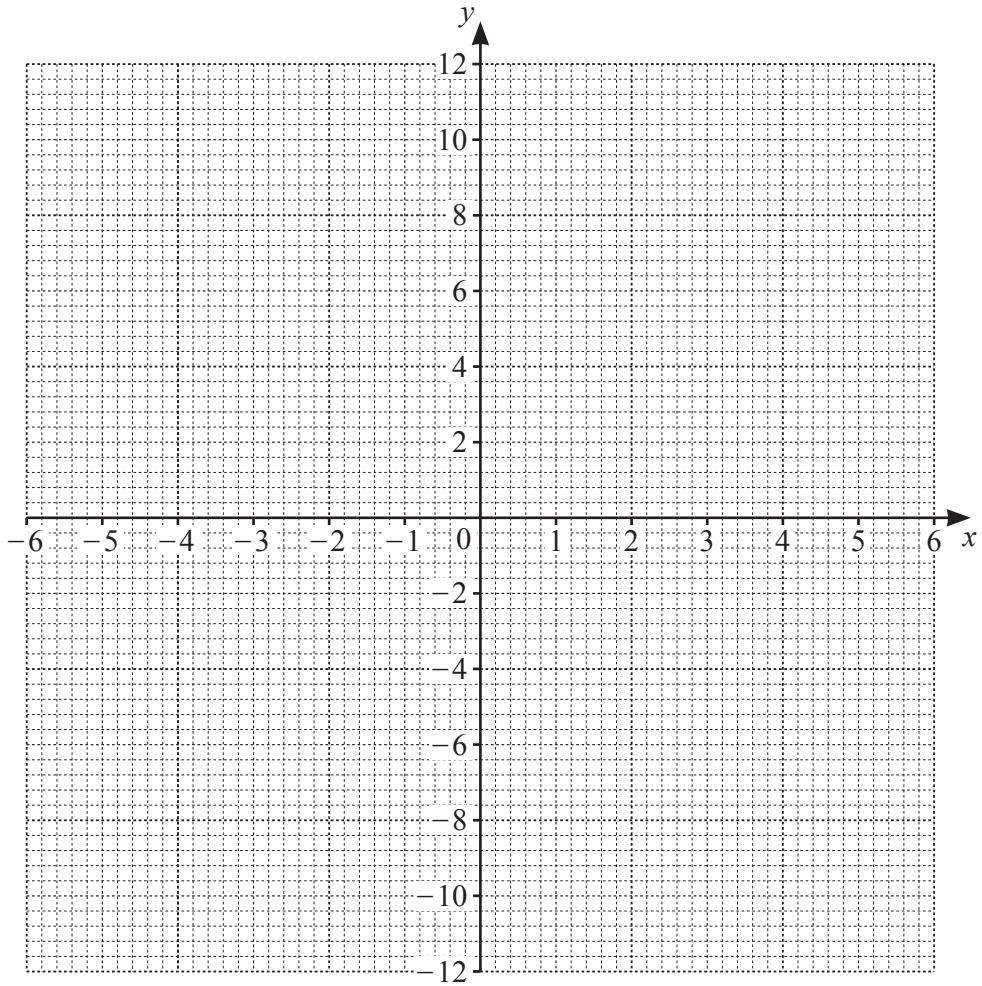
View solution

x	-6	-4	-3	-2	-1		1	2	3	4	6
y		-3		-6				6		3	

[3]

(b) On the grid, draw the graph of $y = \frac{12}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.

View solution



[4]

(c) On the grid, draw the line $y = 5$.

View solution [1]

(d) Use your graph to solve the equation $\frac{12}{x} = 5$.

View solution

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

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