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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.

2

- 1 (a) Write the number six and a half million in figures.

..... [1]

- (b) Write 6538 correct to the nearest ten.

..... [1]

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

..... [1]

- (d) 9 16 18 29 57 64 87 96

From this list of numbers, write down

- (i) a factor of 48,

..... [1]

- (ii) a cube number,

..... [1]

- (iii) a prime number.

..... [1]

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

..... [1]

- (f) Find the reciprocal of 8.

..... [1]

3

(g) Find the value of 8^0 .

..... [1]

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

..... [2]

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

..... [2]

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

Complete this statement about the value of m .

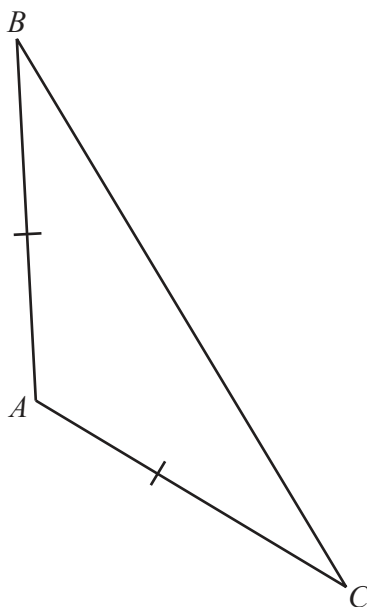
..... $\leq m <$ [2]

4

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

..... [1]

(b)



In triangle ABC , $AB = AC$.

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

..... [1]

- (ii) Measure angle CAB .

Angle $CAB =$ [1]

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

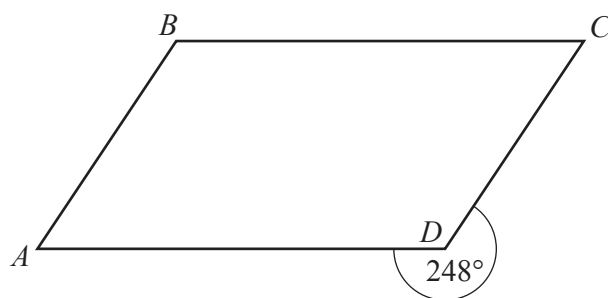
..... [1]

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

[2]

5

(d)

NOT TO
SCALE

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

Find angle DCB .

Angle $DCB = \dots\dots\dots$ [2]

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

Find the size of the largest angle in this triangle.

$\dots\dots\dots$ [3]

6

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

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

Work out the total cost of the tickets.

\$ [2]

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

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 .

Work out the temperature at midnight.

..... $^{\circ}\text{C}$ [1]

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

Find how much he spends on presents.

\$ [1]

7

(e) There are 604 passengers on the holiday.

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

Work out the number of coaches needed.

..... [2]

(ii) 268 of the 604 passengers are women.

Find the percentage of the passengers that are women.

..... % [1]

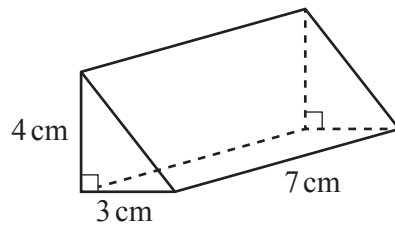
(f) A coach travels at an average speed of 54 km/h.

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

..... h min [3]

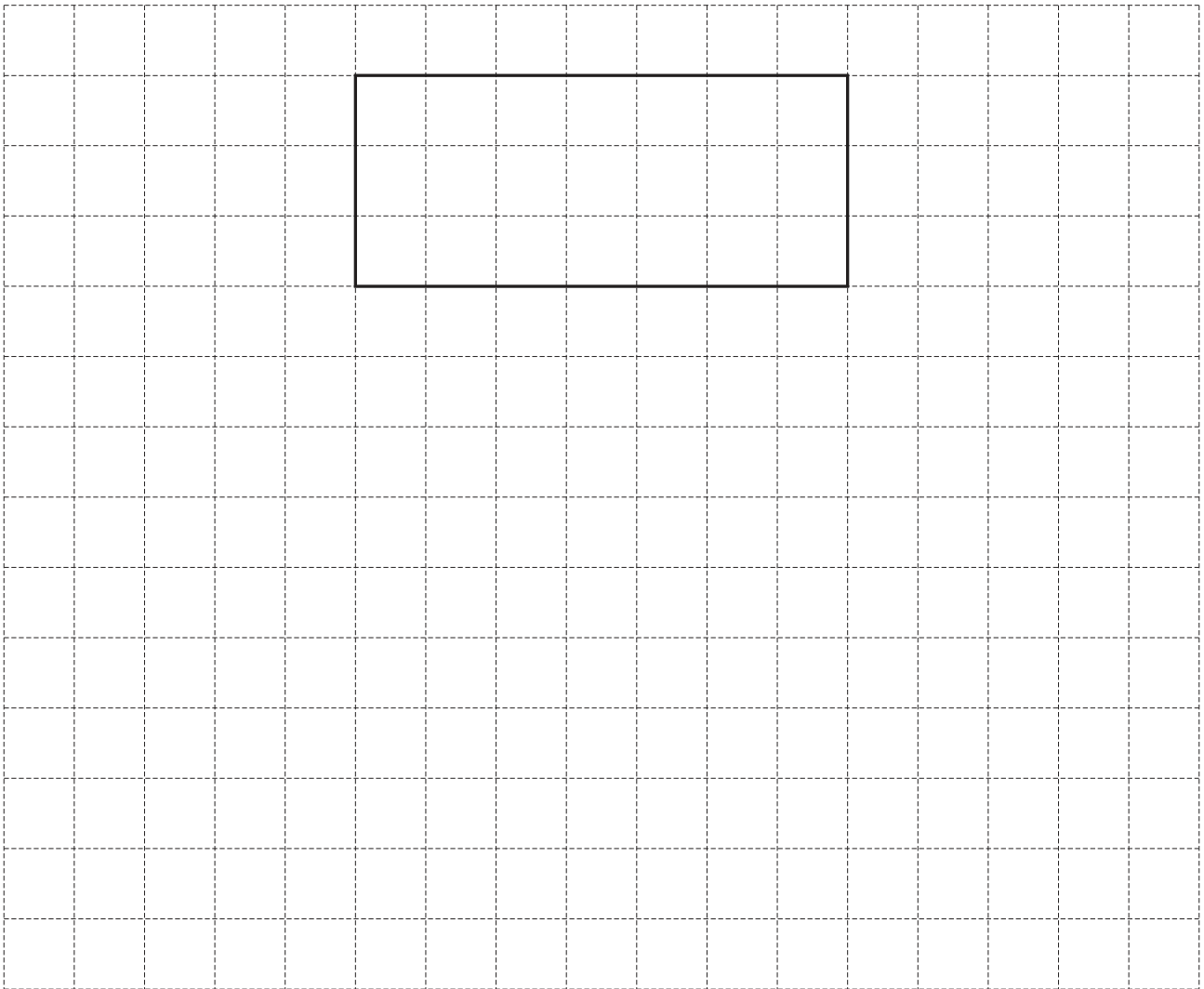
8

4 (a)

NOT TO
SCALE

The diagram shows a right-angled triangular prism.

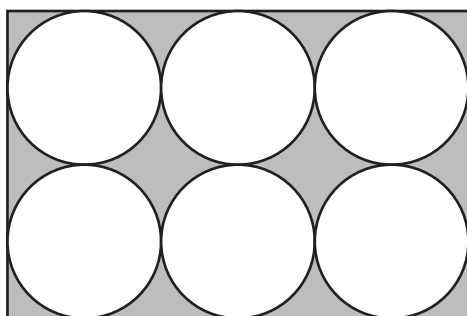
- (i) On the 1 cm^2 grid, complete a net of this prism.
One face has been drawn for you.



[4]

- (ii) Work out the volume of this prism.

..... cm^3 [2]

(b)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]

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

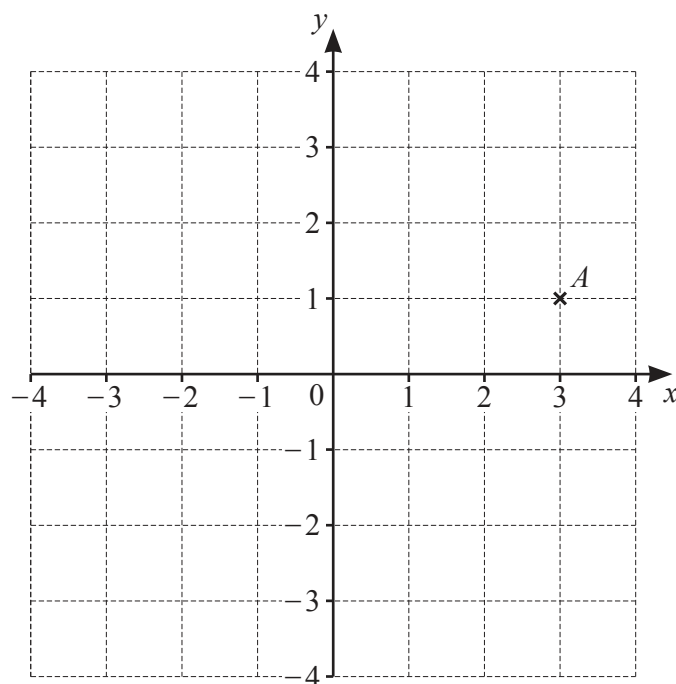
..... [3]

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

..... % [3]

10

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



- (i) Write down the coordinates of point A .

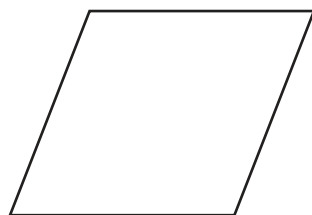
(..... ,) [1]

- (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)



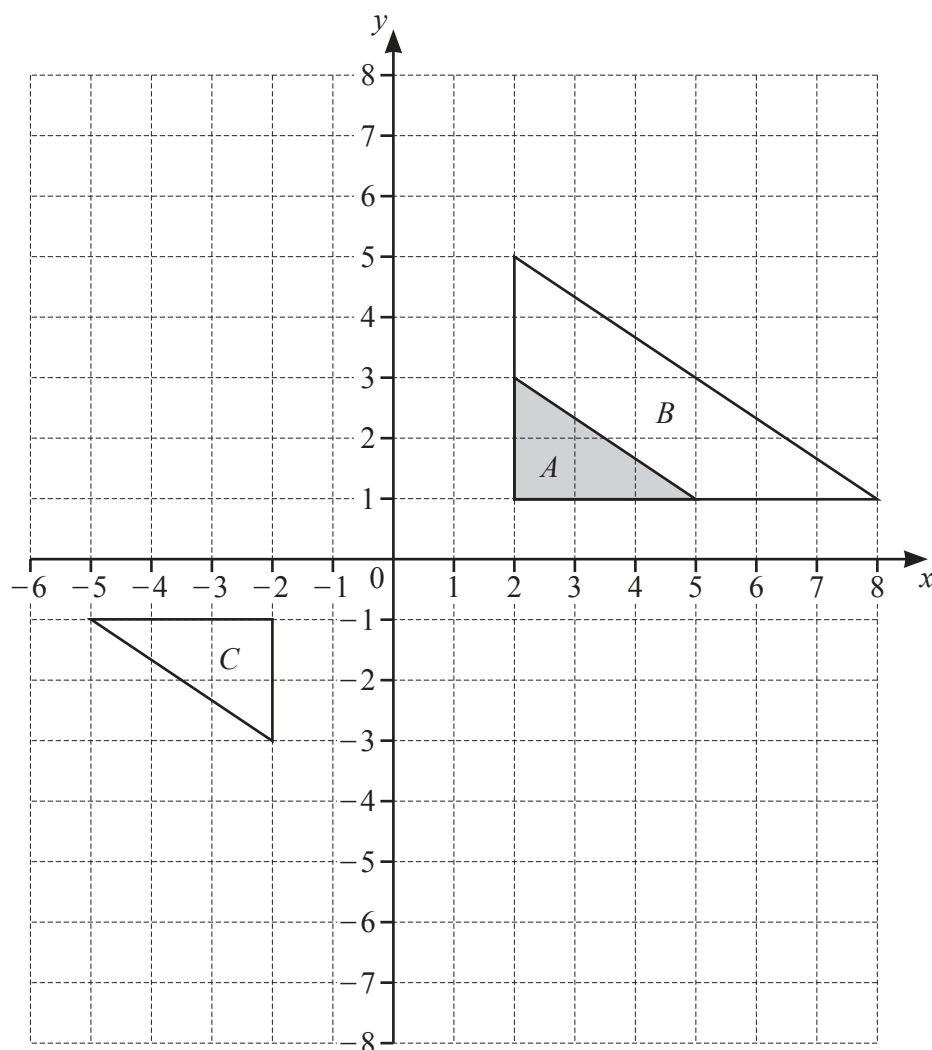
The diagram shows a rhombus.

- (i) Write down the order of rotational symmetry.

..... [1]

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

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



(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 .

.....
 [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]

12

- 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.

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.

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]

13**(c)** Simplify.

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

..... [2]

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

..... [2]

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

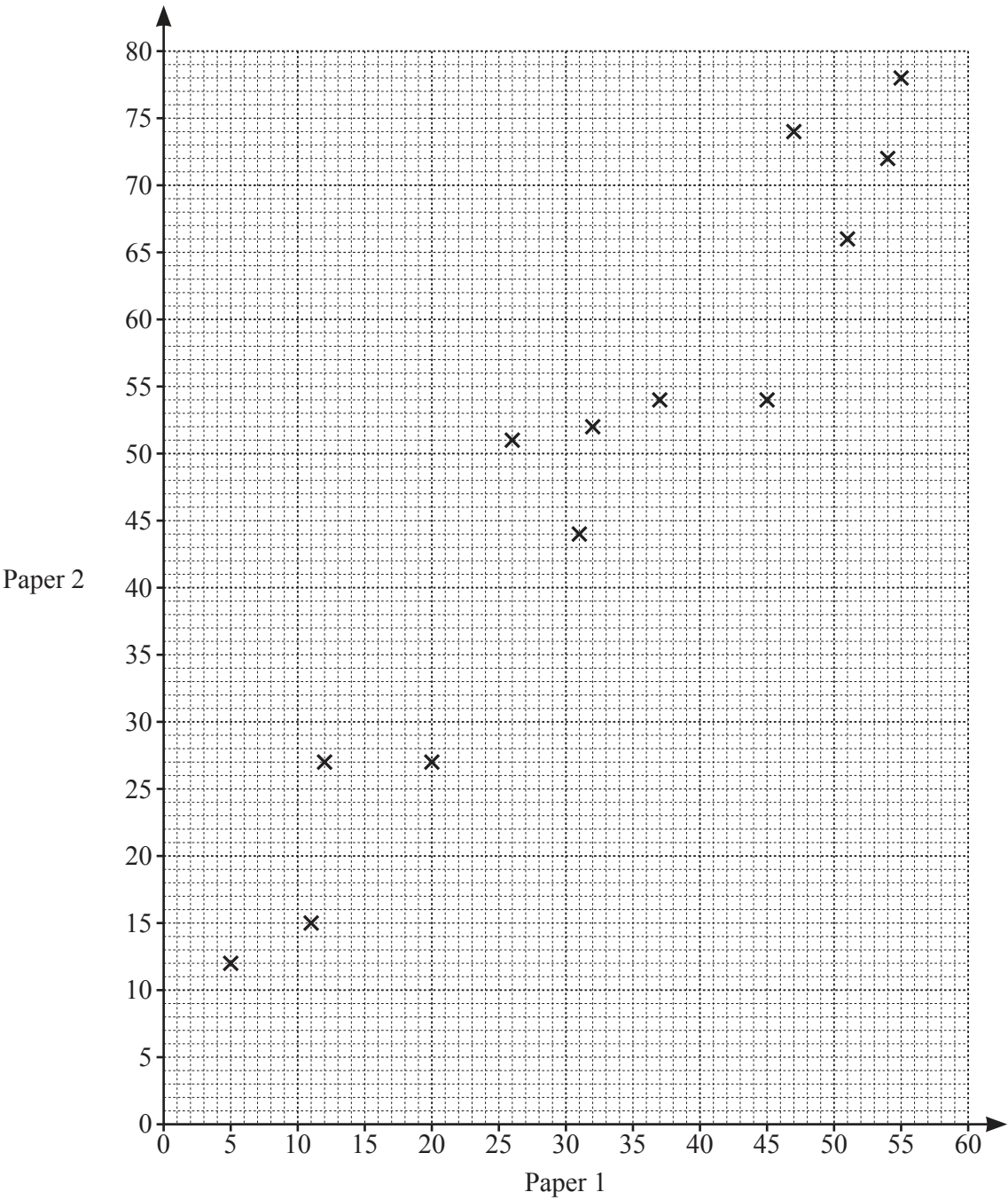
$$\begin{aligned} 3x + 5y &= 11 \\ 2x - 3y &= 20 \end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$ [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



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

[1]

15

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

..... [1]

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

[1]

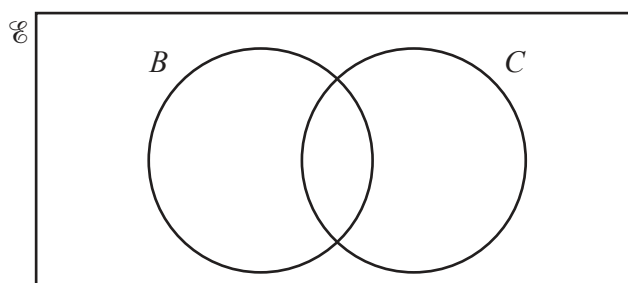
(iv) Another student scores 24 on paper 1.

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.

- 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.

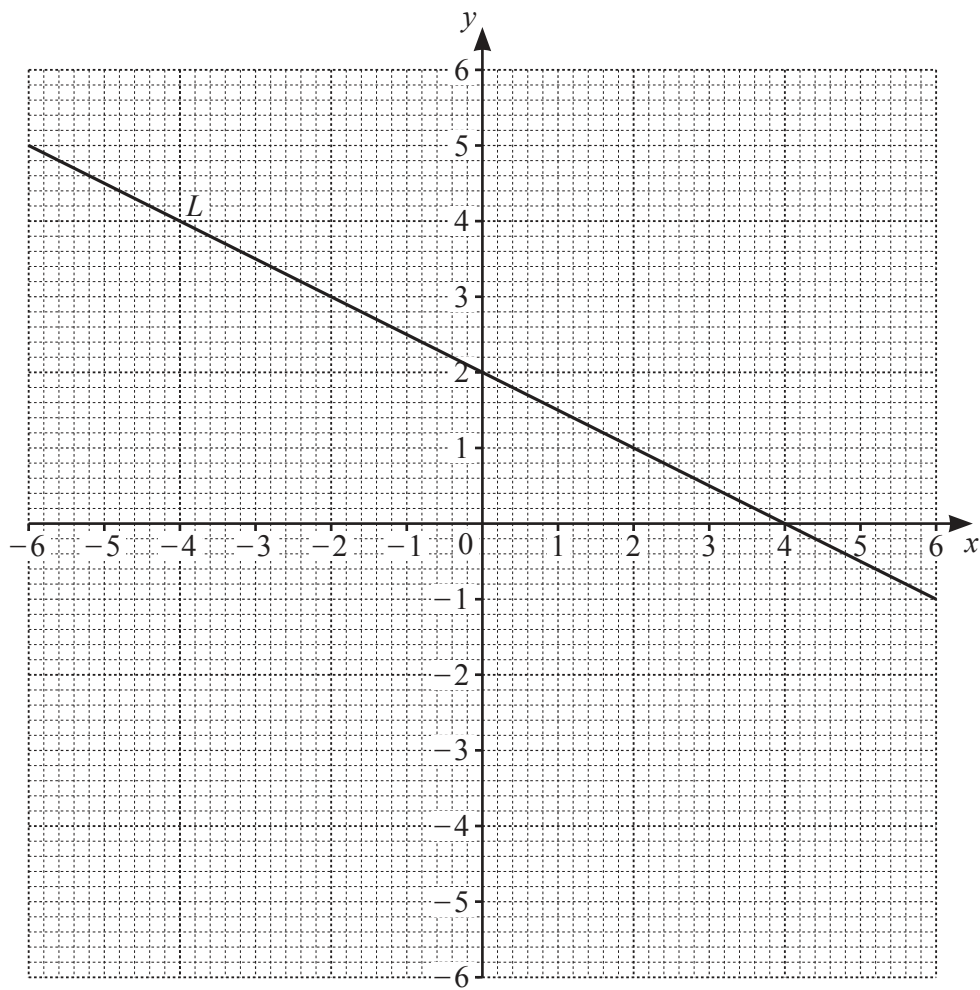
[2]

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

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 $y = mx + c$.

$y =$ [2]

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

x	-5	-3	0
y	-5		5

[1]

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

[1]

17

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

(..... ,) [1]

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

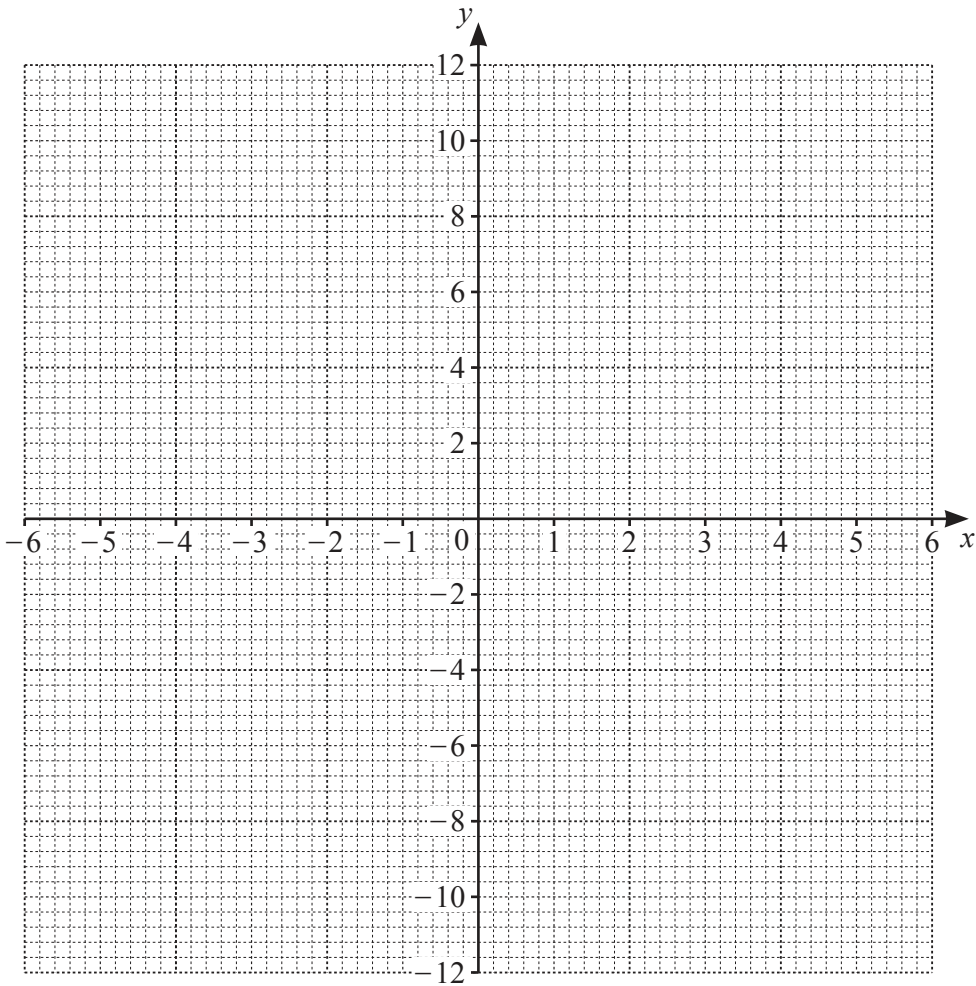
..... [1]

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

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 $-6 \leq x \leq -1$ and $1 \leq x \leq 6$.



[4]

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

[1]

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

$x =$ [1]

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