



# Cambridge IGCSE™

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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  $\pi$ , 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.

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]

(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.

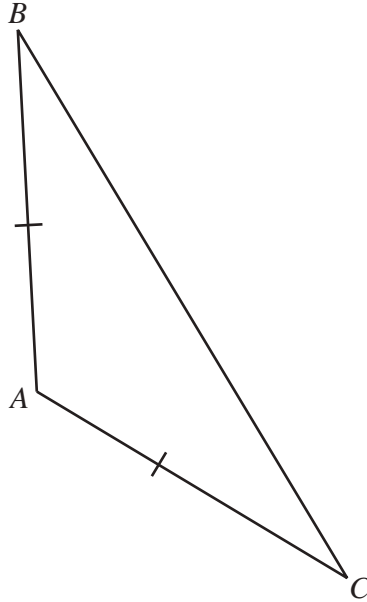
Complete this statement about the value of  $m$ .

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

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]

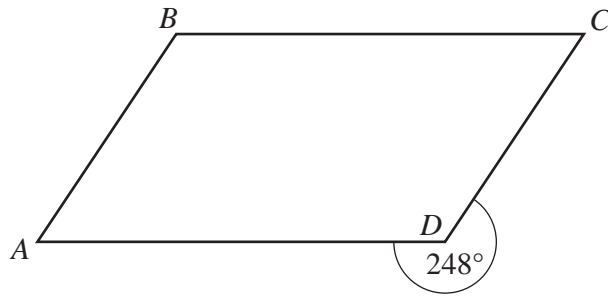
(iii) Write down the mathematical name for angle  $CAB$ .

..... [1]

(c) Show that the interior angle of a regular pentagon is  $108^\circ$ .

[2]

(d)

NOT TO  
SCALE

$ABCD$  is a parallelogram.  
The reflex angle at  $D$  is  $248^\circ$ .

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]

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  $16^{\circ}\text{C}$ .  
At midnight the temperature has fallen by  $23^{\circ}\text{C}$ .

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]

(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.

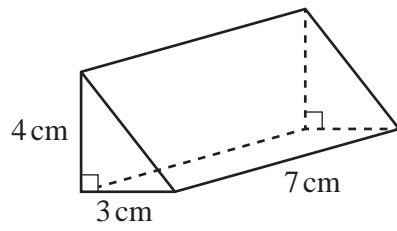
..... % [1]

(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]

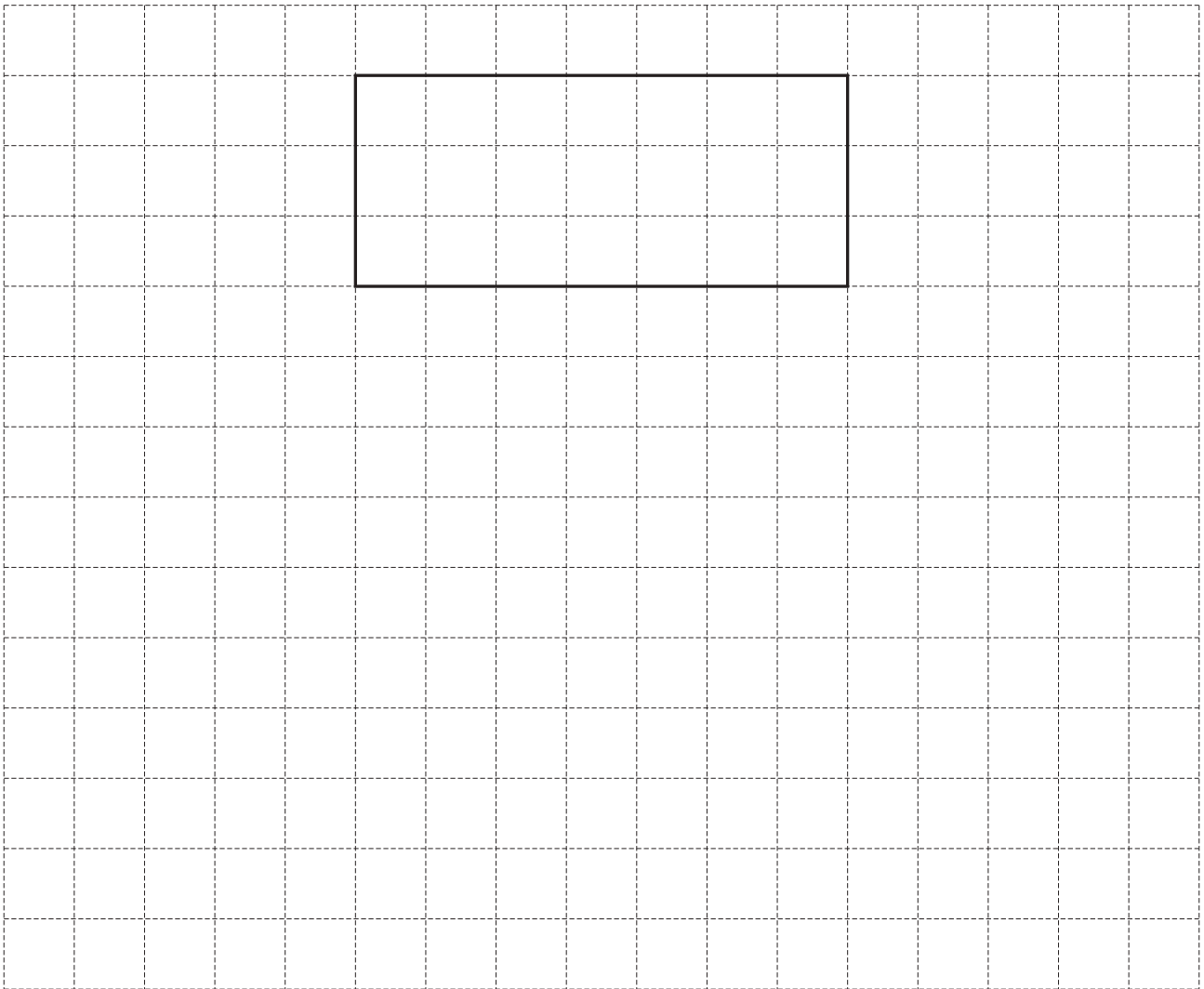
4 (a)



NOT TO SCALE

The diagram shows a right-angled triangular prism.

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



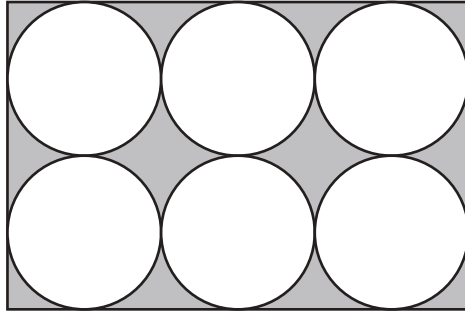
[4]

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

.....  $\text{cm}^3$  [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]

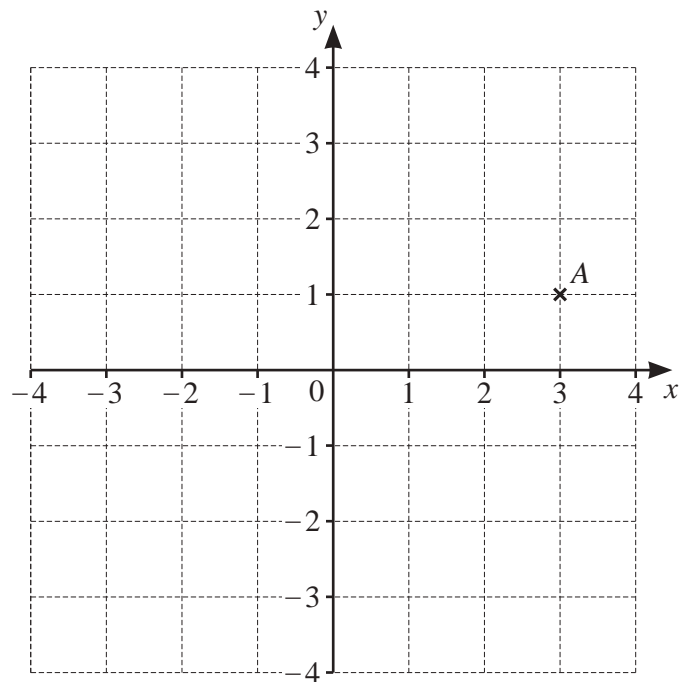
(ii) Find the area of the rectangle.  
Give the units of your answer.

..... [3]

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

..... % [3]

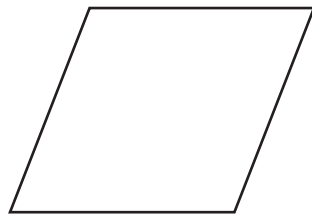
5 (a) The grid shows a point A.



- (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)

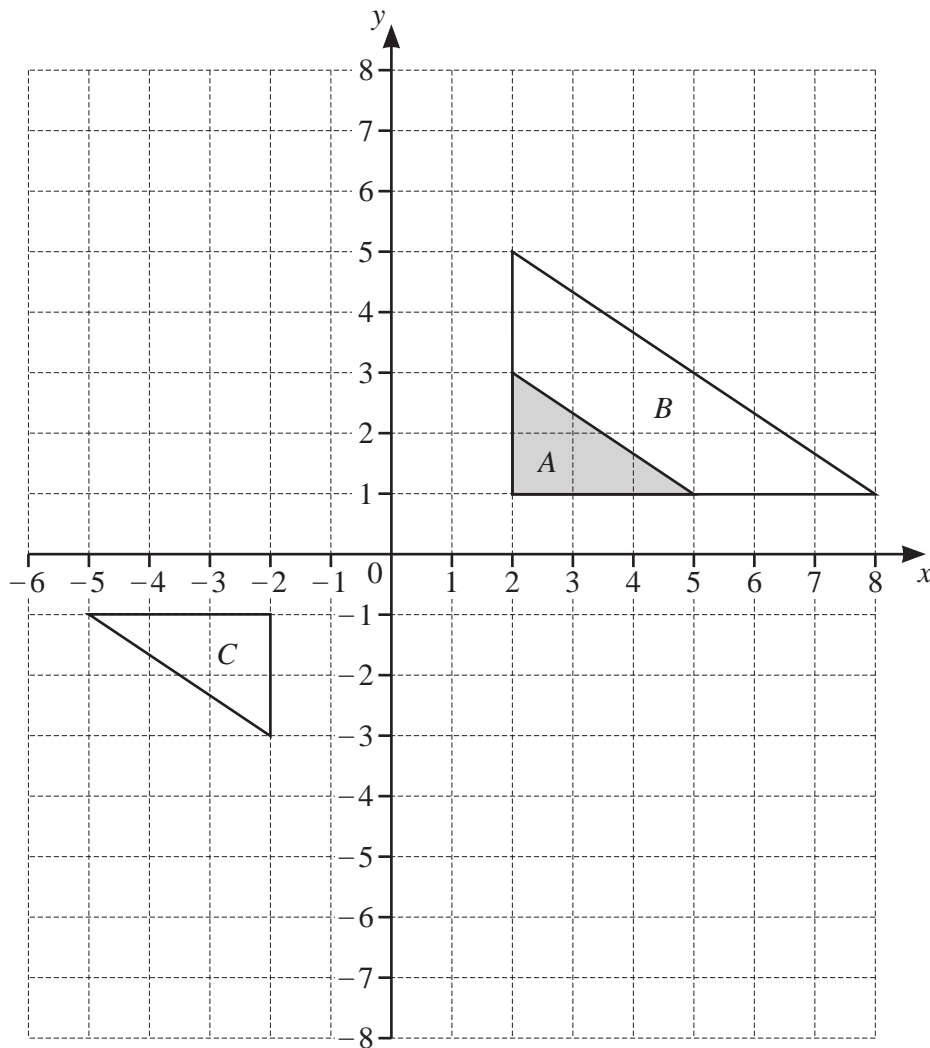


The diagram shows a rhombus.

- (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]

- 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]

(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.

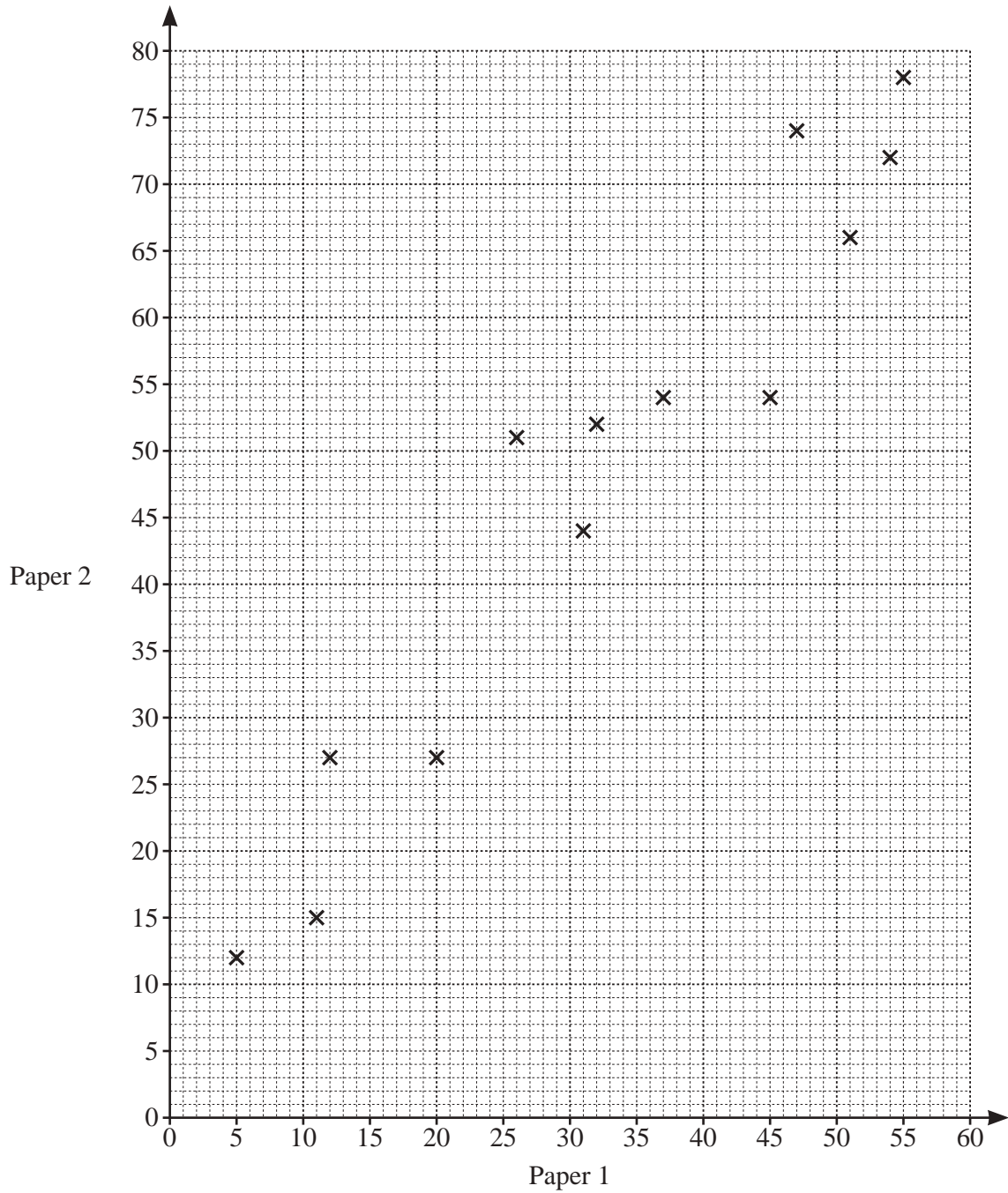
$$\begin{aligned} 3x + 5y &= 11 \\ 2x - 3y &= 20 \end{aligned}$$

$x =$  .....

$y =$  ..... [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



- (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]

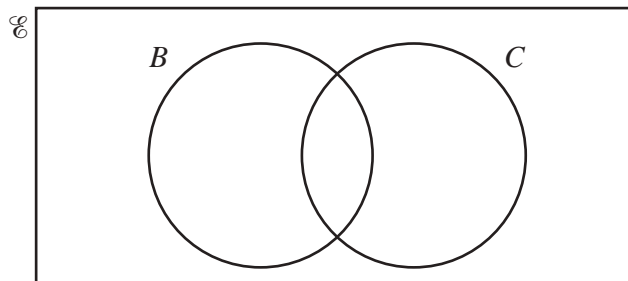
(iv) Another student scores 24 on paper 1.

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.

- 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.

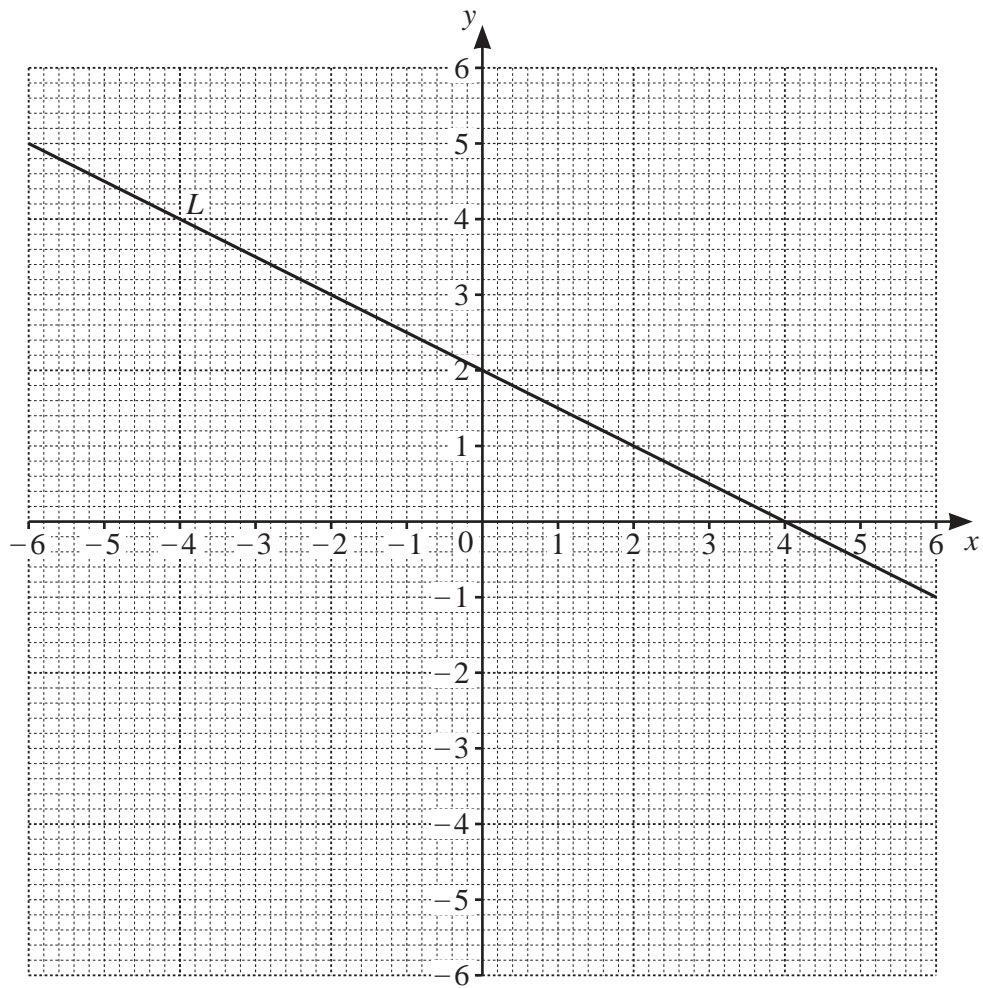
[2]

(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  $y = mx + c$ .

$y = \dots\dots\dots$  [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]



(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  $(0, 18)$ .

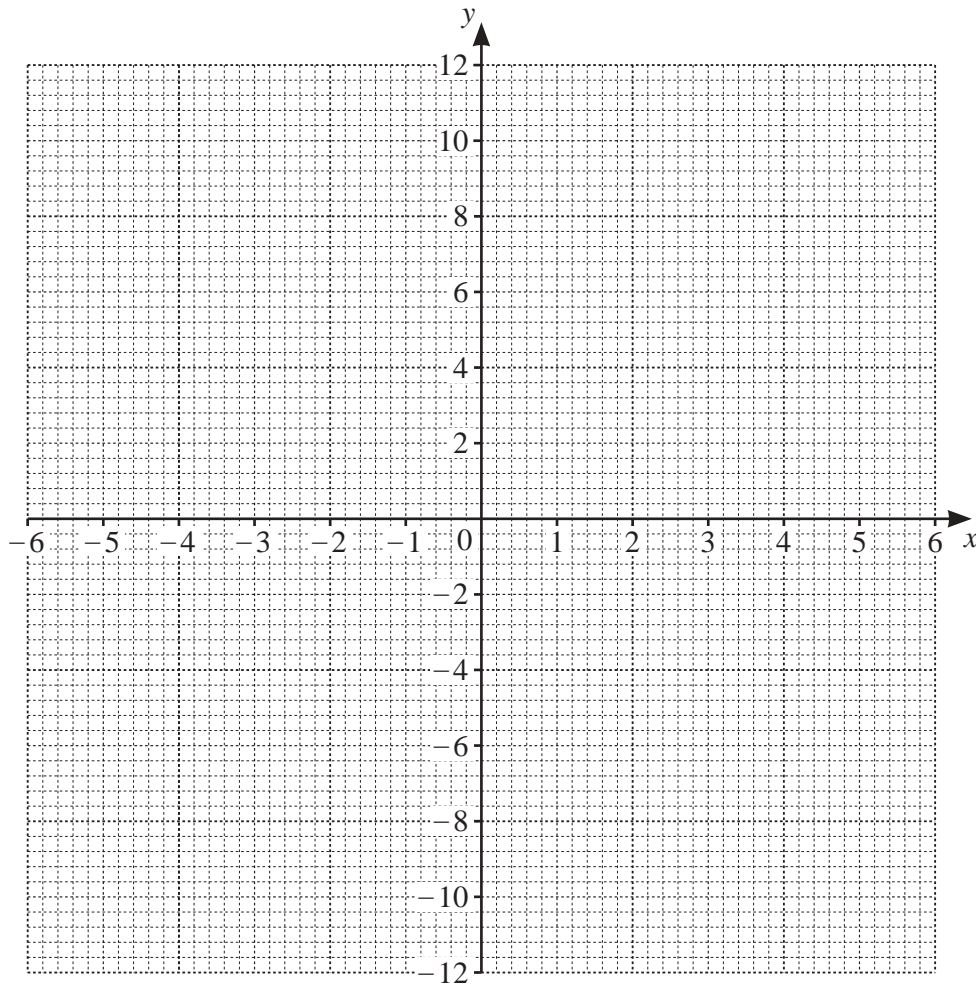
..... [1]

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  $\frac{12}{x} = 5$ .

$x = \dots\dots\dots$  [1]



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