

CCEA MATHS

M6 – M8



Exam Questions
Booklet

Name:



M6

- 1 a) Convert 13 into binary

Answer: _____

- b) Convert 111101 into a decimal number

Answer: _____

- c) A computer game stores a score using binary.
The binary number shown is 110110
The score increases by 3.
Write down the new score in binary

Answer: _____

- d) Explain the difference between the binary number system and the denary number system.

- 2 Simplify:

a) $x^2 \times x^5 =$

b) $y^7 \div y^3 =$

c) $(x^2)^3 =$

d) $a^4 \times a^2 \div a =$

e) $\frac{x^7}{x^5 \times x} =$



Give your answer to 1 decimal place.

Answer: _____



M6

- 4** Solve the inequalities.
Represent your answer on a number line.

a) $6x < 24$

Answer: _____

b) $2x + 4 \geq 20$

Answer: _____

c) $5(x - 4) < 10$

Answer: _____



M6

5 a) Make x the subject of:

$$y = 4x - 6$$

Answer: _____

b) Make x the subject of:

$$y = \frac{x + 4}{3}$$

Answer: _____

6 a) Find the n th term of:

9, 12, 15, 18, ...

Answer: _____

b) Find the n th term of:

12, 8, 4, 0, ...

Answer: _____



M6

c) Here is a sequence:

7, 12, 17, 22, ...

What is the first term in the sequence greater than 1000?

Answer: _____

7 This map shows the position of Belfast to Cork



a) Measure the bearing of Cork from Belfast.

Answer: _____

b) Measure the bearing of Belfast from Cork.

Answer: _____

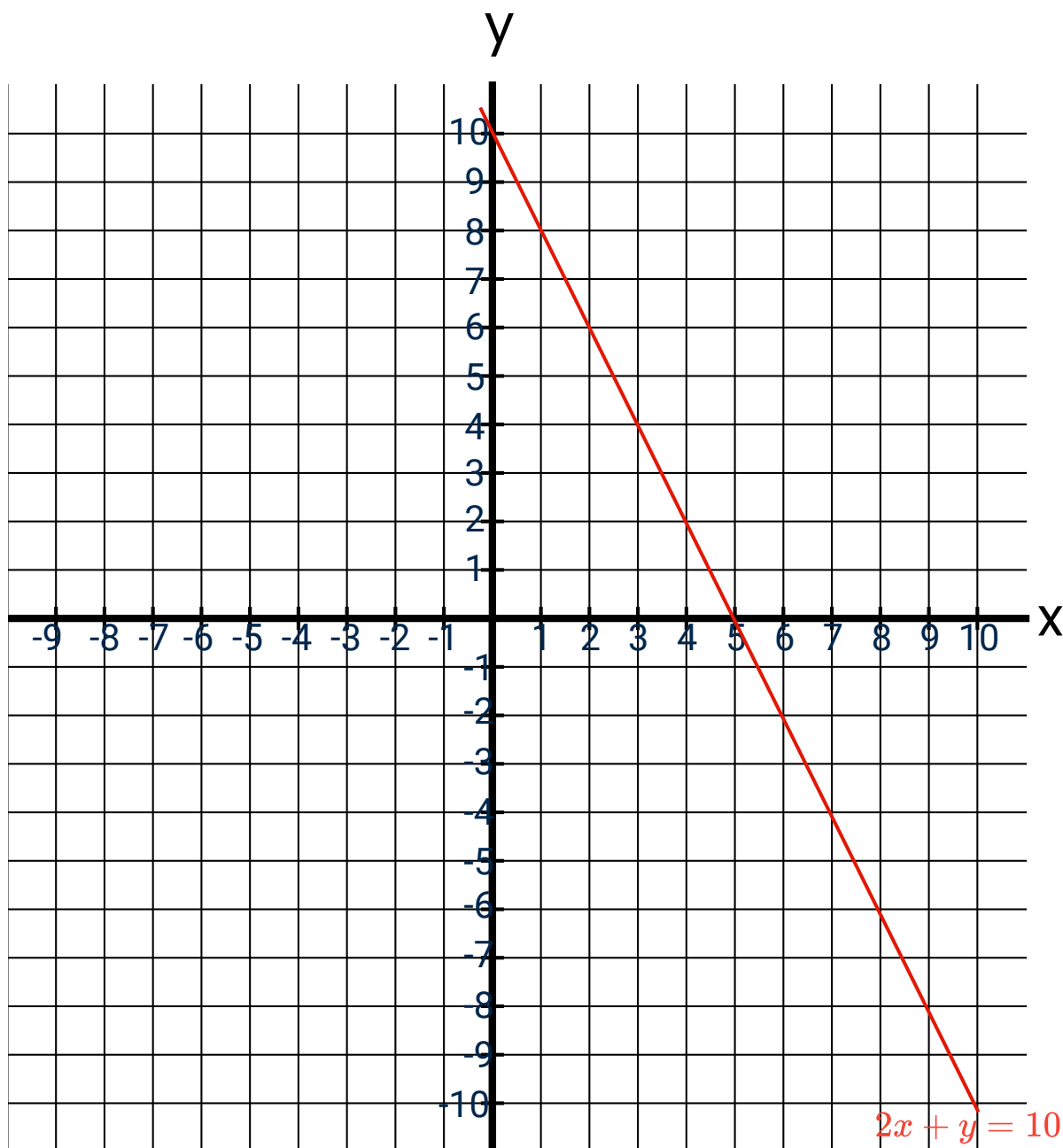


M6

- 8 Use the graph to solve the simultaneous equations.

$$2x + y = 10$$

$$x - y = 2$$

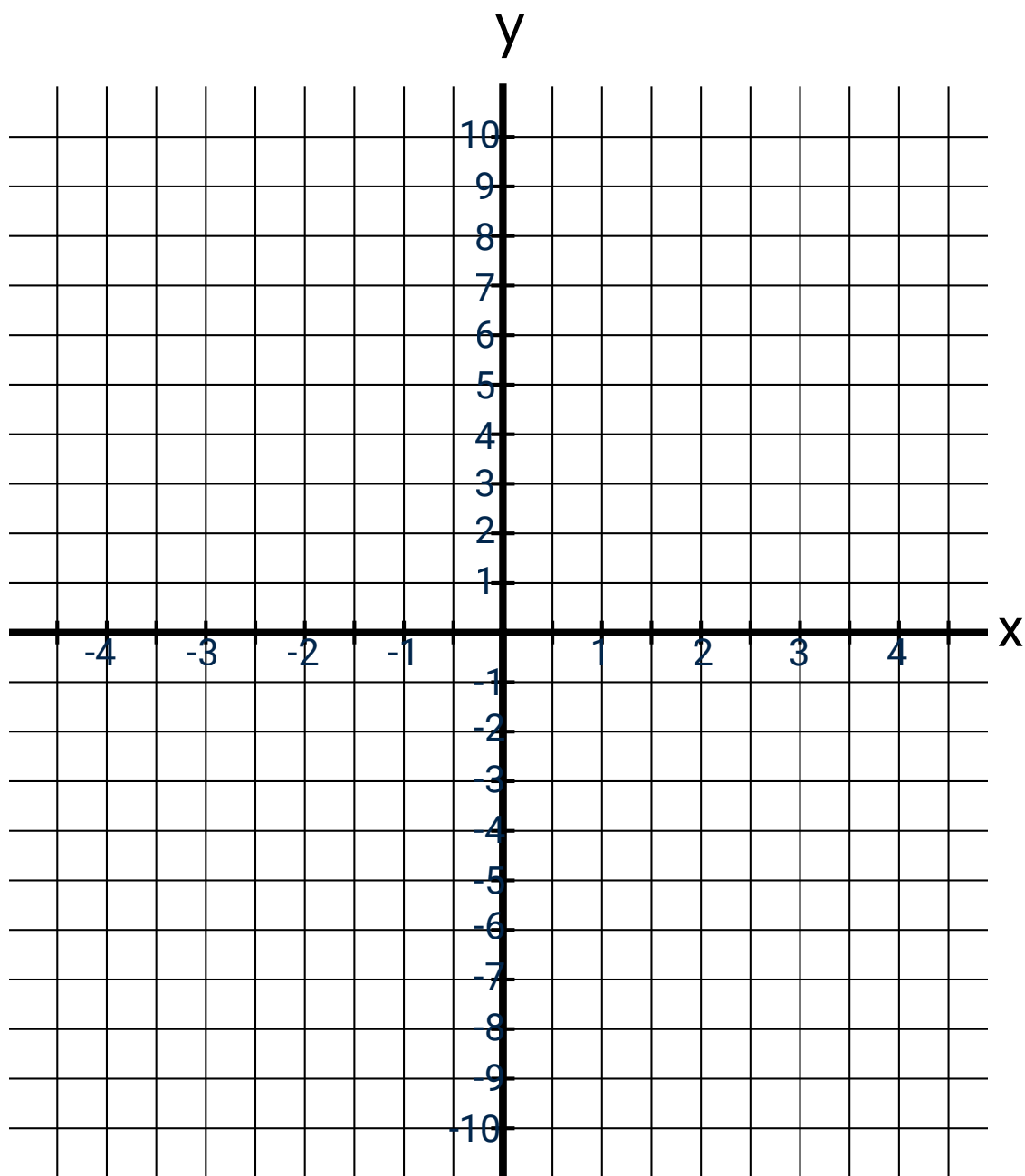


Answer: _____



M6

- 9 a) Plot the graph of: $y = x^2 - 1$
For the values of x from -3 to 3



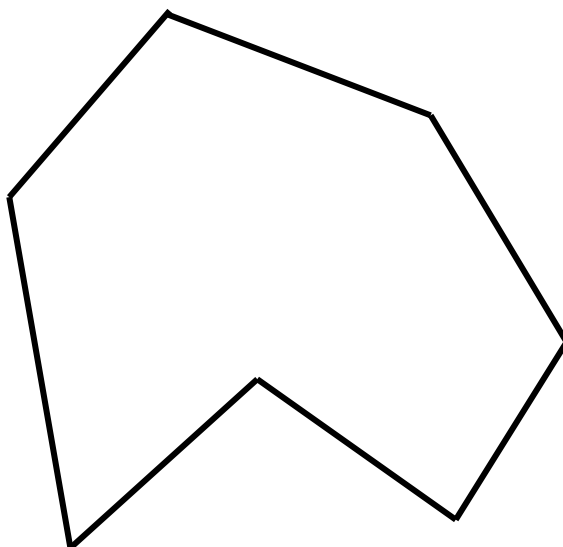
- b) Use your graph to solve $x^2 - 1 = 2$

Answer: _____



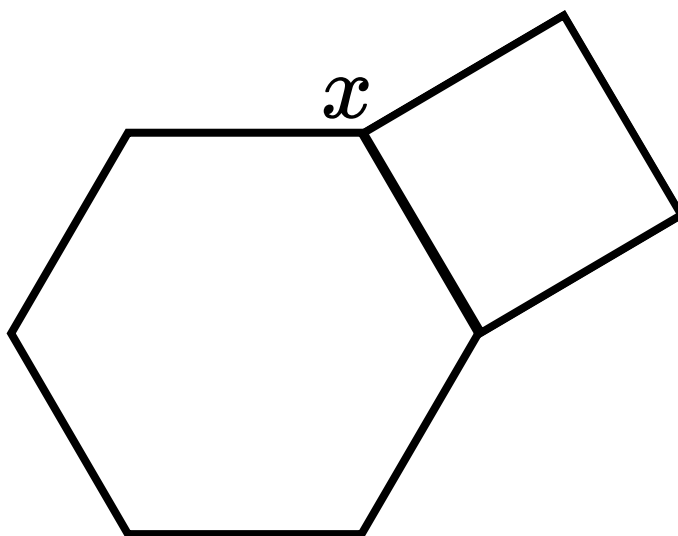
M6

- 10 a)** The diagram shows a heptagon.
Calculate the sum of the interior angles of the heptagon.
You must show all your working.



Answer: _____

- b)** A regular hexagon is joined to a square as shown.
Calculate the size of angle x .



Answer: _____

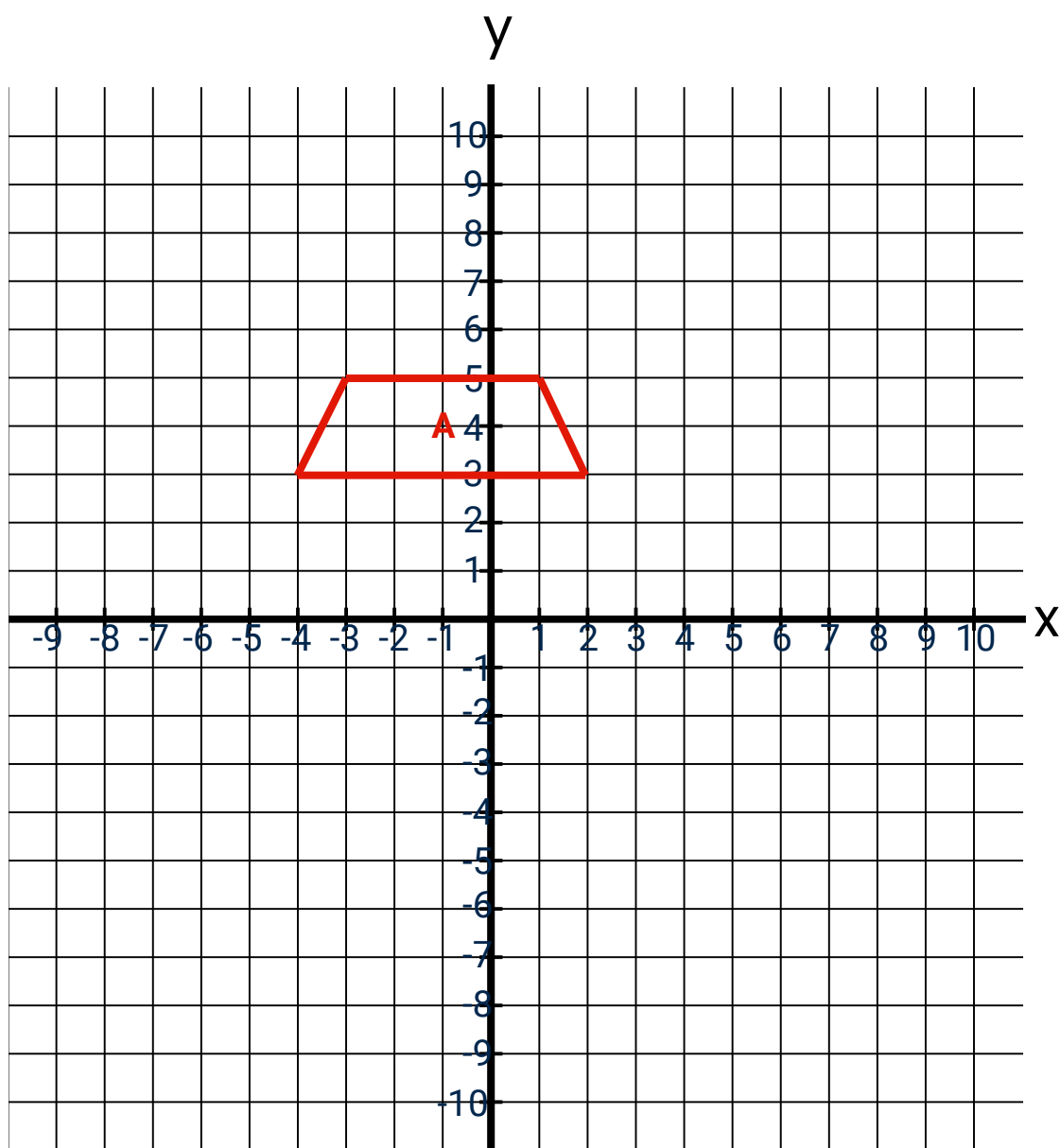


M6

- c) Each interior angle of a regular polygon is 156°
Calculate the number of sides of the polygon.

Answer: _____

- 11 Reflect shape A in the line $x = 2$. Label the reflected shape A'

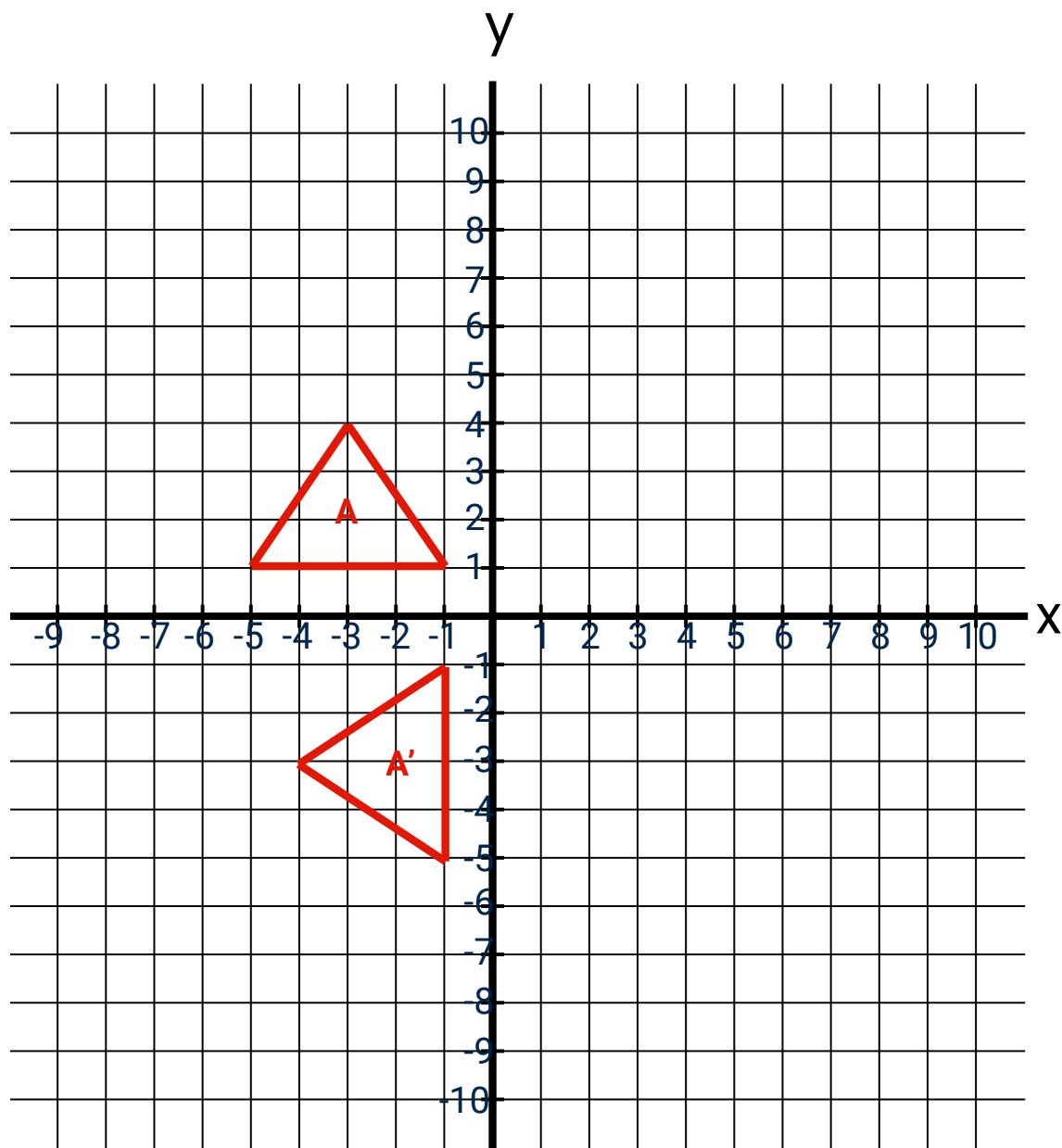




M6

12

Describe fully the single transformation that maps shape A onto shape A'



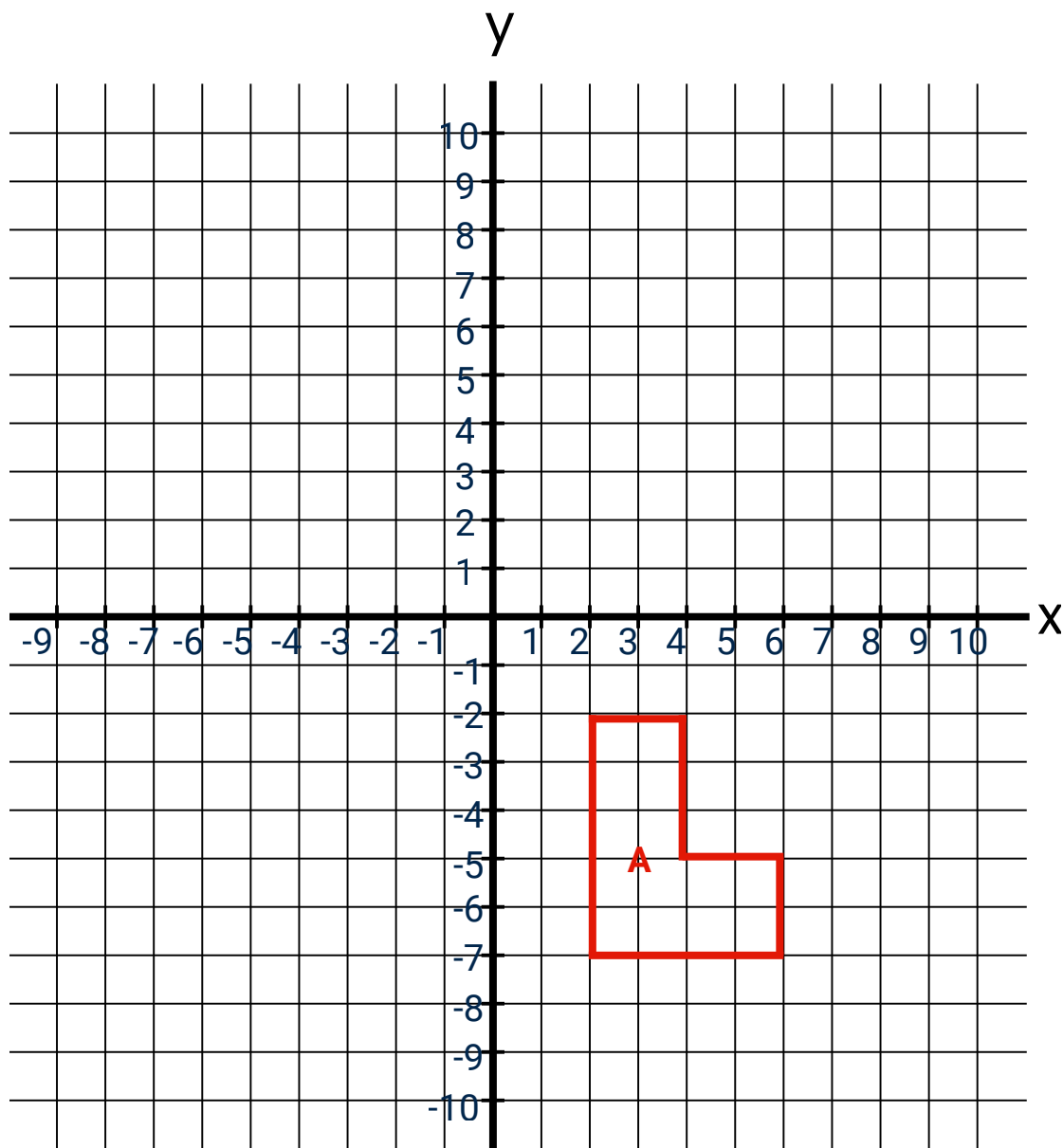
Answer: _____



M6

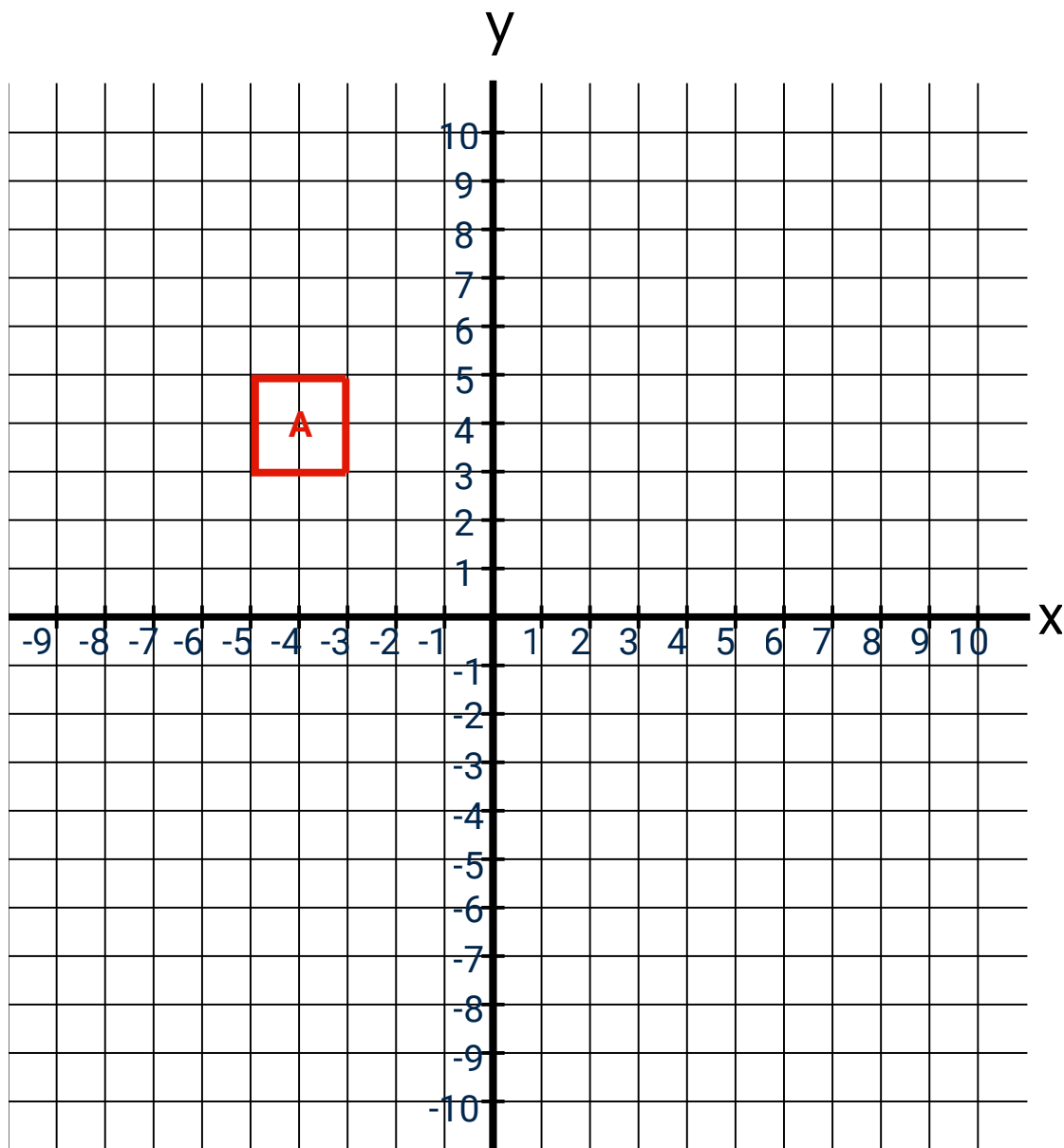
- 13 Translate shape A by the vector $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$

Label the translated shape A'





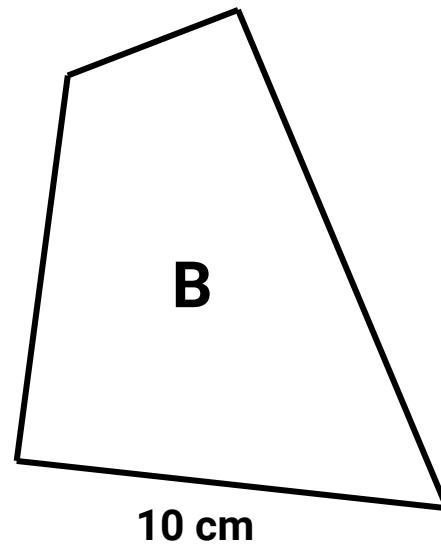
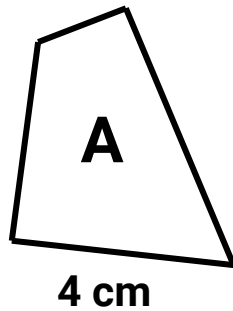
- 14** Enlarge shape A by scale factor 2 with centre of enlargement $(-6, 3)$
Label the enlarged shape A'





M6

- 15 Shape B is an enlargement of Shape A.



The perimeter of shape A is 18cm
The area of shape A is 12 cm^2

- a) Calculate the perimeter of shape B

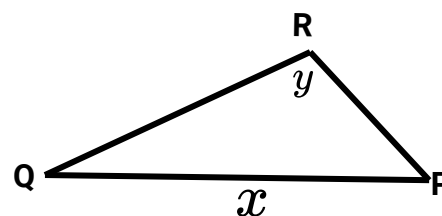
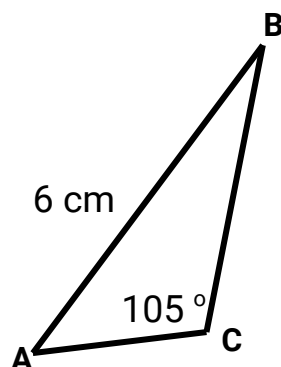
Answer: _____

- b) Calculate the area of shape B

Answer: _____

- 16 The diagram shows two congruent triangles.

Triangle ABC is congruent to triangle PQR.

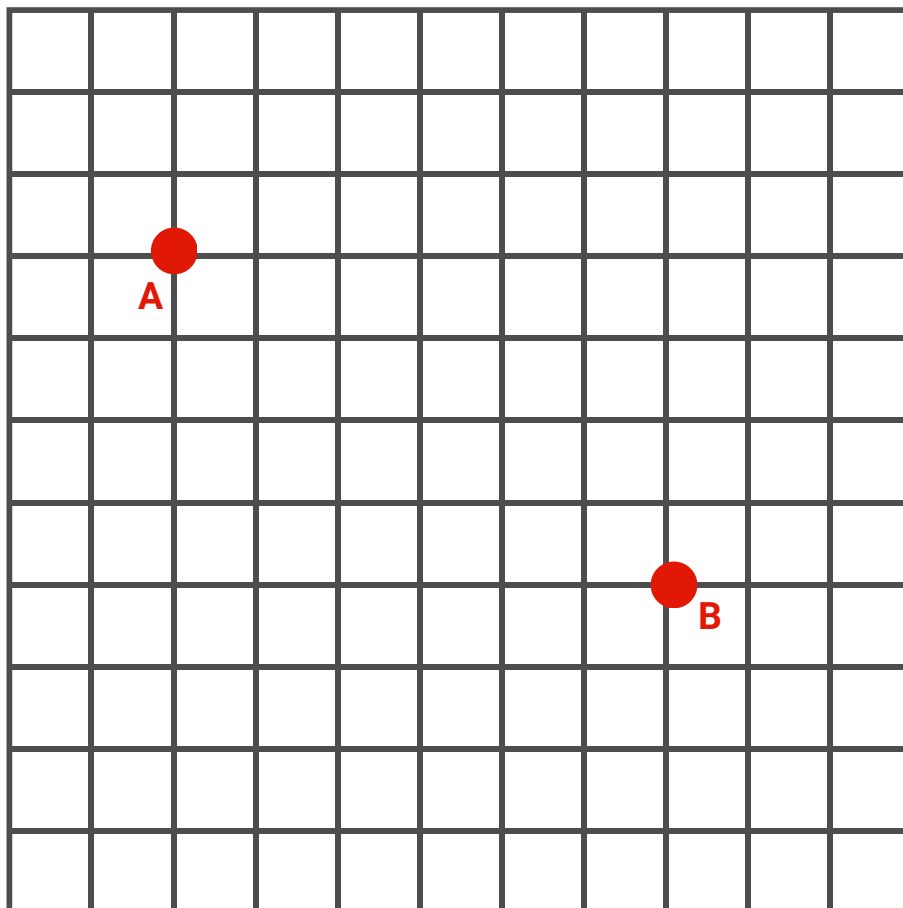


Calculate the size of side x and angle y.

$x =$ _____ $y =$ _____



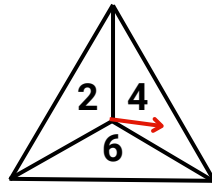
- 17** Draw the locus of points that are equidistant from A and B.



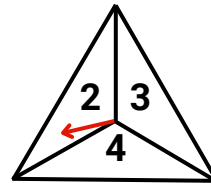


M6

- 18** Patrick plays a game using two fair spinners.



Spinner 1



Spinner 2

Patrick spins both spinners once and adds the scores together.

		<u>Spinner 1</u>		
+		2	4	6
<u>Spinner 2</u>	2			
	3			
	4			

- a) Complete the table of possible outcomes.
- a) Find the probability that Patrick scores a prime number.

Answer: _____



M6

- 19** A cafe records how many customers buy hot chocolate.

The table shows the results.

Number of customers recorded	100	200	300	400	500
Number buying hot chocolate	42	70	_____	145	_____
Relative frequency	0.42	_____	0.37	_____	0.36

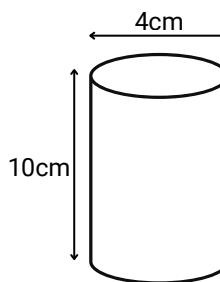
- a) Calculate the missing values in the table.
- b) Estimate how many customers out of 1000 would buy hot chocolate.

Answer: _____



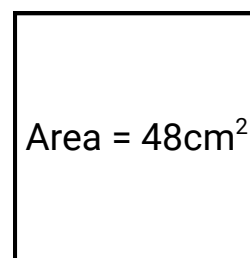
M7

- 1 a) Calculate the volume of the cylinder.
Give your answer in terms of π .



Answer: _____

- b) The area of a square is 48cm^2
Calculate the length of one side of the square.
Give your answer in simplest surd form.



Answer: _____

- 2 Simplify:

a) $x^4 \div x^4 =$

c) $\frac{(x^3)^2}{x^{-2}} =$

b) $x^5 \times x^{-2} =$



M7

3 a) Calculate: $(7 \times 10^4) \times (3 \times 10^3)$

Give your answer in standard form.

Answer: _____

b) Calculate:
$$\frac{(4 \times 10^8)}{(8 \times 10^{-2})}$$

Give your answer in standard form.

Answer: _____

4 Solve the simultaneous equations:

$$\begin{aligned} 5x + 3y &= 29 \\ 3x + 2y &= 18 \end{aligned}$$

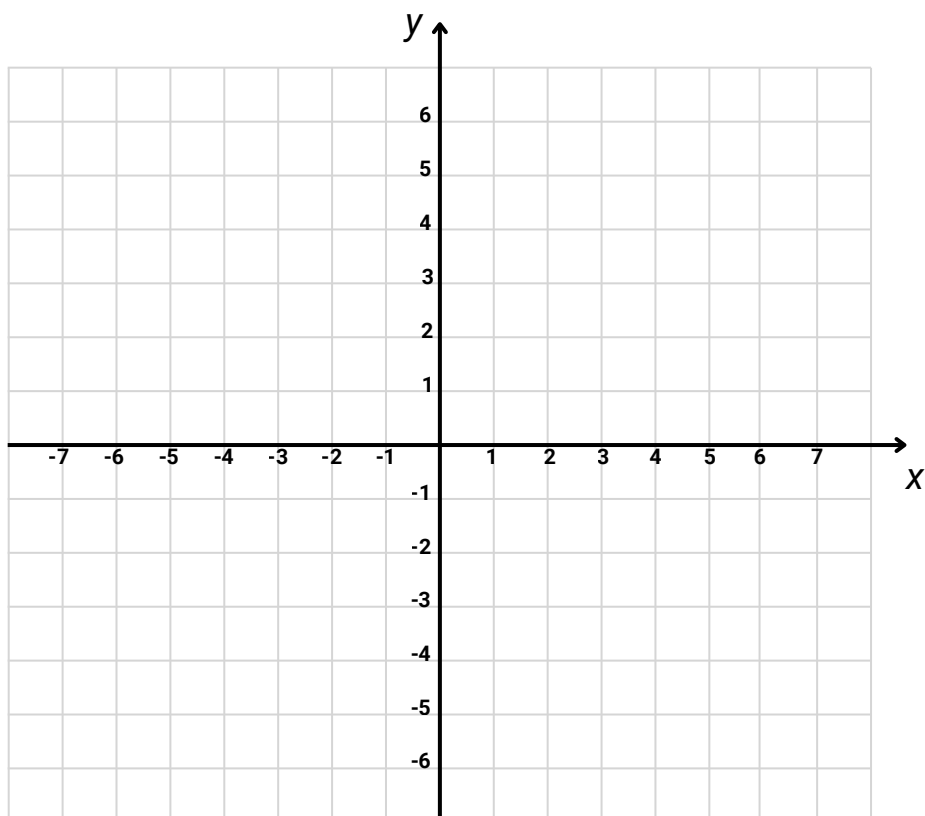
Answer: _____



- 5** On the grid, show the region that satisfies the following inequalities.

$$x \leq 2$$

$$y \geq 2x + 1$$





M7

6 a) Make x the subject of: $y = x^2 + 7$

Answer: _____

b) Make x the subject of: $y + bx = 3ax$

Answer: _____

7 Here is a sequence. 2, 9, 20, 35, 54

Find an expression for the nth term of the sequence.

Answer: _____

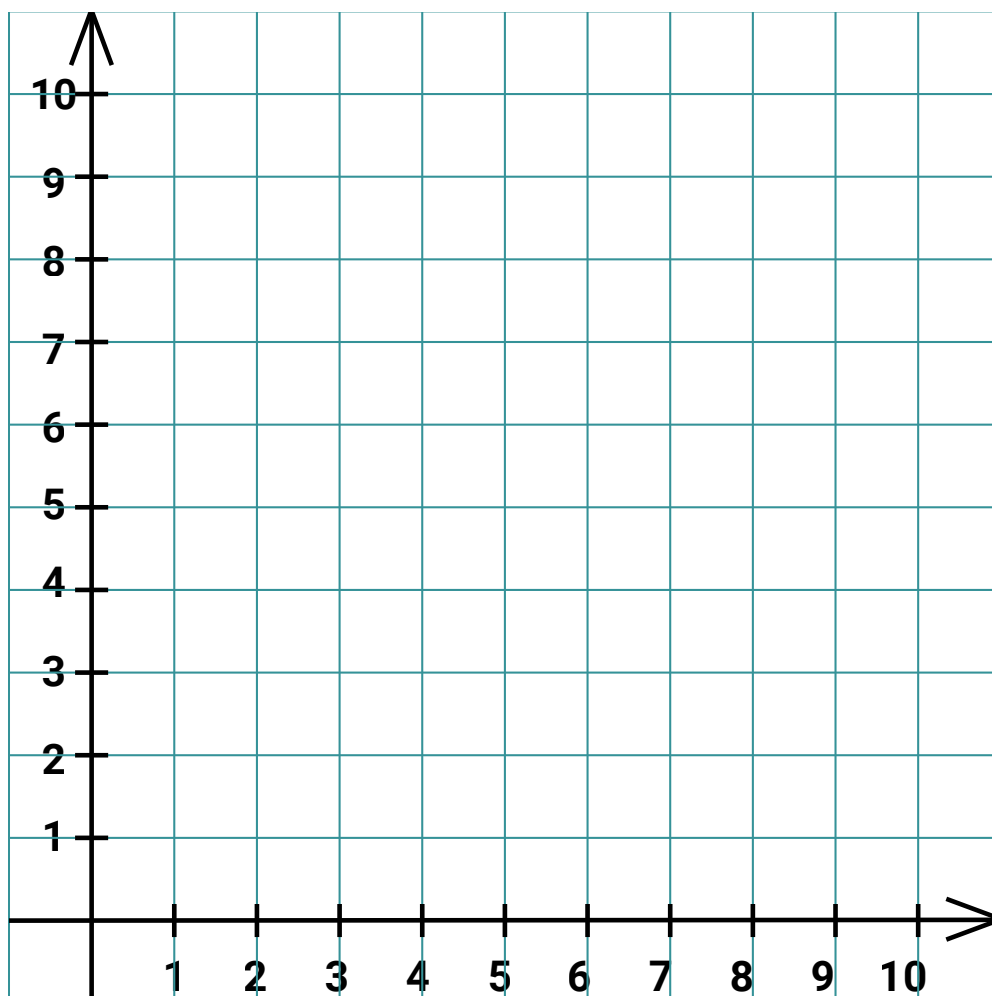


M7

- 8 Complete the table of values for $y = \frac{4}{x}$

x	0.5	1	2	4	8	10
y						

On the grid, draw the graph of $y = \frac{4}{x}$





M7

- 9** a is directly proportional to b
When $a = 28$, $b = 7$

a) Work out an equation connecting a and b .

Answer: _____

b) Work out the value of b when $a = 12$

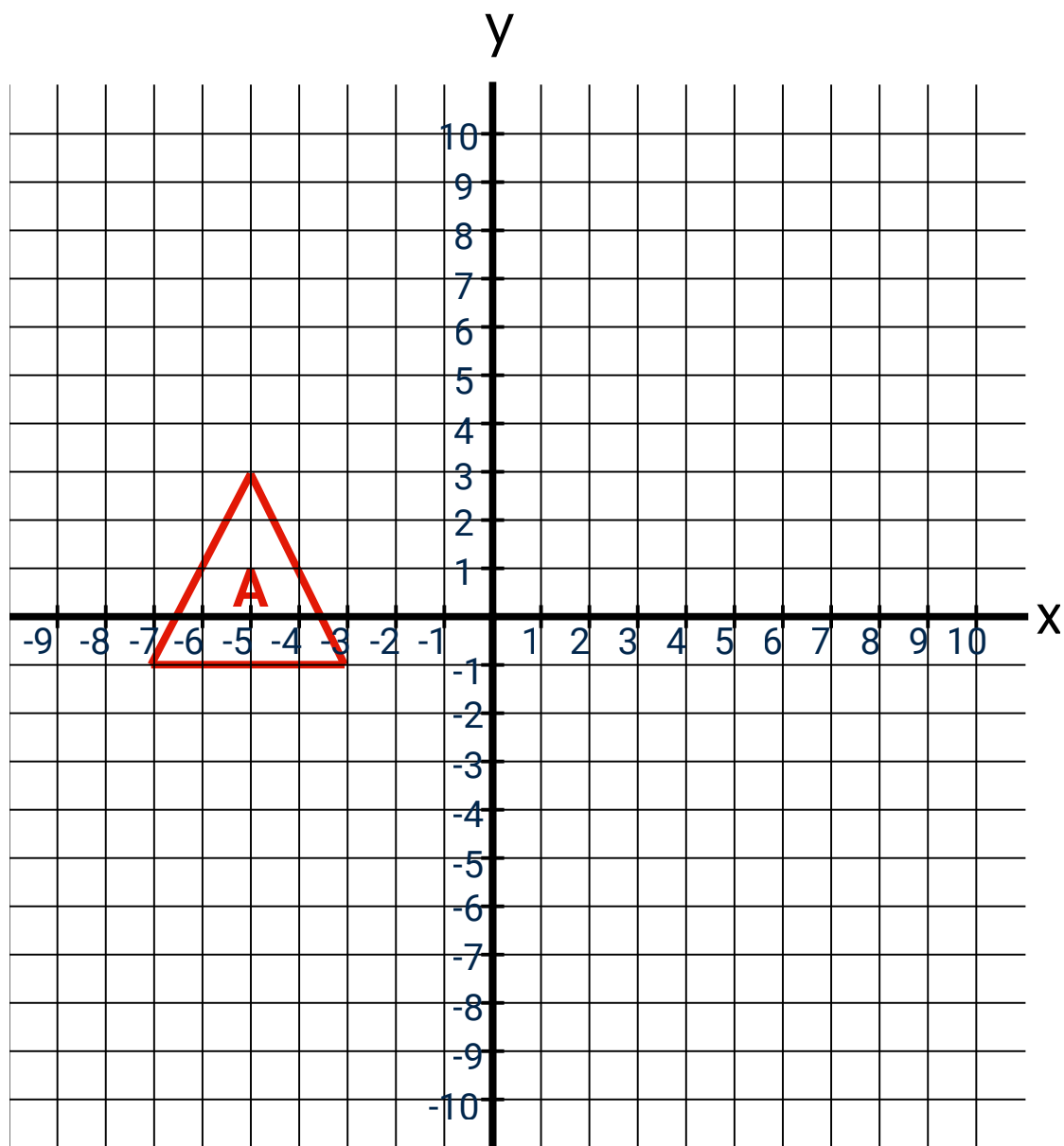
Answer: _____



M7

- 10 Enlarge shape A by scale factor $\frac{1}{2}$ with centre of enlargement (1,-5).

Label the image A'.



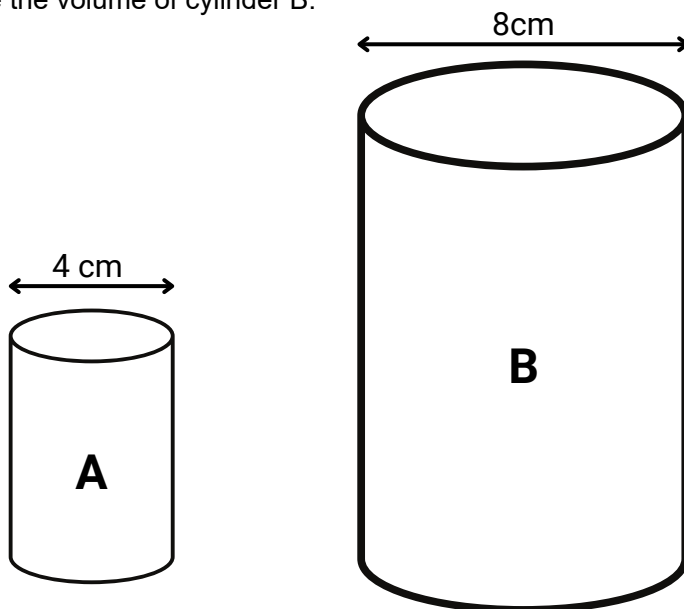


M7

- 11** Cylinder B is mathematically similar to cylinder A.

The volume of cylinder A is 35cm^3

Calculate the volume of cylinder B.



Answer: _____

- 12** Ryan is trying to remember a 3-digit locker code.

He knows that:

- The first digit is a prime number
- The second digit is a factor of 12
- The third digit is an even number.

How many different codes are possible?

Answer: _____



M7

- 13** A tennis player has a probability of 0.7 of winning any match.
- The player takes part in a local league and plays two matches.
- The outcomes of the matches are independent.

a) Complete a tree diagram to show the possible outcomes of the two matches.

b) Calculate the probability that the player wins exactly two matches.

Answer: _____

c) Calculate the probability that the player wins at least one match.

Answer: _____



M8

- 1** Harry says:
"All numbers written as square roots are irrational."

Is Harry correct?
Use examples to justify your answer.

- 2** Convert $1.\overline{27}$

to a fraction in its simplest form.

Answer: _____



M8

3 Evaluate:

a) $81^{\frac{3}{4}}$

Answer: _____

b) $64^{-\frac{1}{2}}$

Answer: _____

c) $\left(\frac{27}{64}\right)^{-\frac{2}{3}}$

Answer: _____

4 Write: 16×8^{3x}

as a power of 2 in terms of x.

Answer: _____



M8

5

Claire invests £800 in an account that pays compound interest.

She wants to have at least £950 in the account after 4 years.

Work out, to 1 decimal place, the minimum annual interest rate she needs.

Answer: _____

6

Rationalise the denominator of $\frac{5}{2\sqrt{3}}$

Give your answer in its simplest form.

Answer: _____



M8

- 7 Solve algebraically the simultaneous equations:
- $$x^2 + y^2 = 50$$
- $$y - 4x = 10$$

Answer: _____

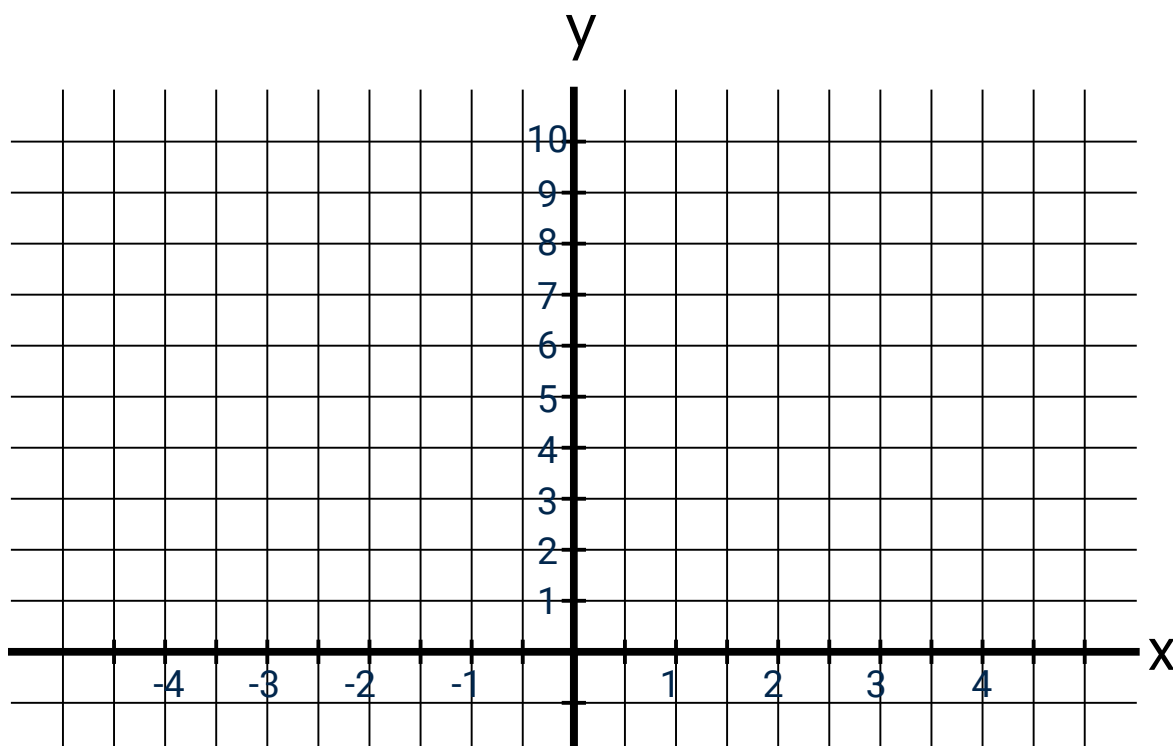


M8

- 8 Complete the table of values for $y = 2^x$

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

Draw the graph of $y = 2^x$ for values of x from -3 to 3



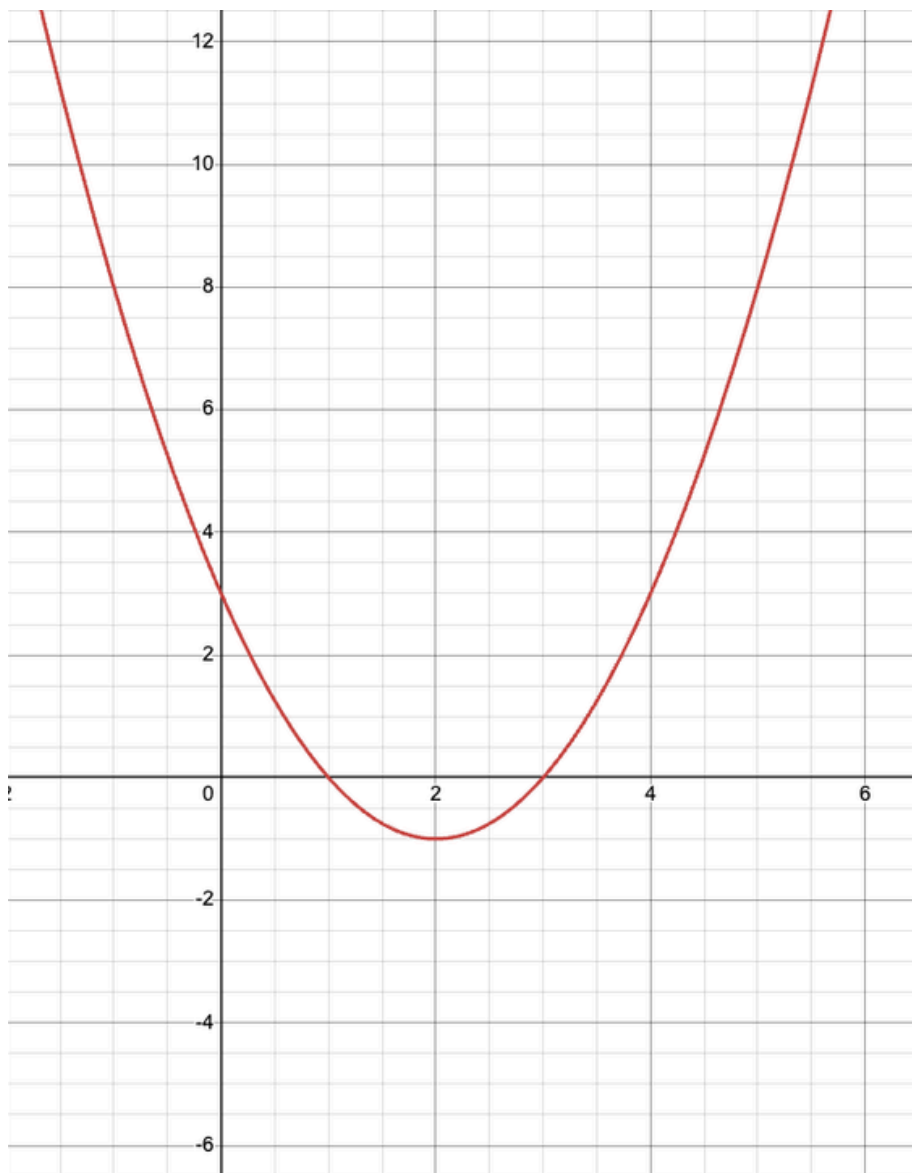


M8

9 The diagram shows part of a graph of $y = x^2 - 4x + 3$

P is a point on the graph of $y = x^2 - 4x + 3$ where $x = 3$

Calculate an estimate for the gradient of the graph at the point P .



Answer: _____



M8

- 10** A circle has equation

$$x^2 + y^2 = 50$$

AB is a chord of the circle.

AB has equation

$$y = 2x + 5$$

- a)** Find the coordinates of A and B.

Answer: _____

- b)** Find the equation of the diameter of the circle which is perpendicular to AB.

Answer: _____



M8

- 11** P is inversely proportional to the square root of Q .
 $P = 12$ when $Q = 25$

- a)** Work out an equation connecting P and Q .

Answer: _____

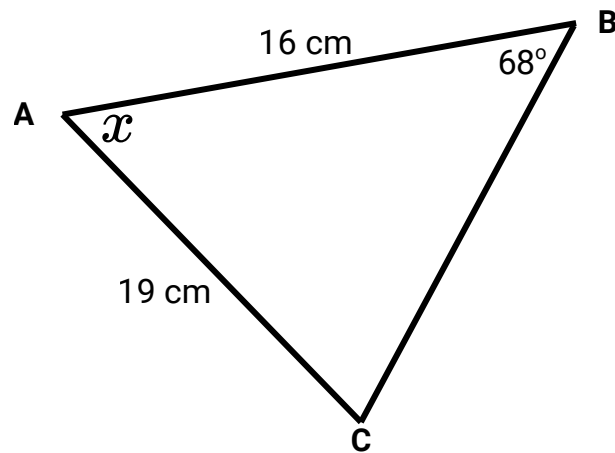
- b)** Work out the value of P when $Q = 144$

Answer: _____

M8



12 Calculate the size of angle x

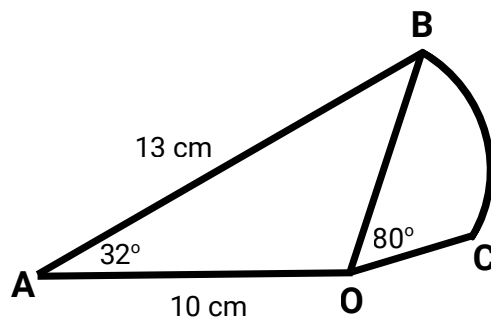


Answer: _____



M8

- 13** OAB is a triangle.
 OBC is a sector of a circle, centre O .



Calculate the area of sector OBC .
Give your answer correct to 3 significant figures.

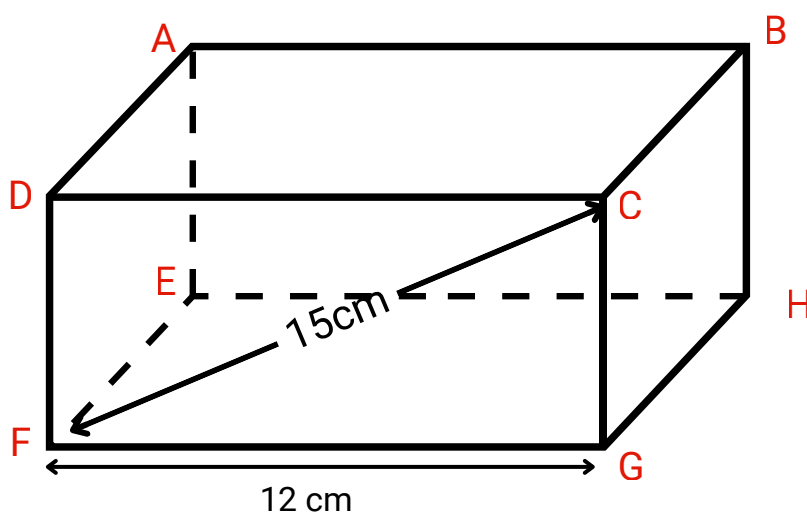
Answer: _____



M8

14 $ABCDEFGH$ is a cuboid.

- $FG = 12\text{cm}$
- $FC = 15\text{cm}$
- Angle $EHF = 53^\circ$



Work out the size of angle FDH .

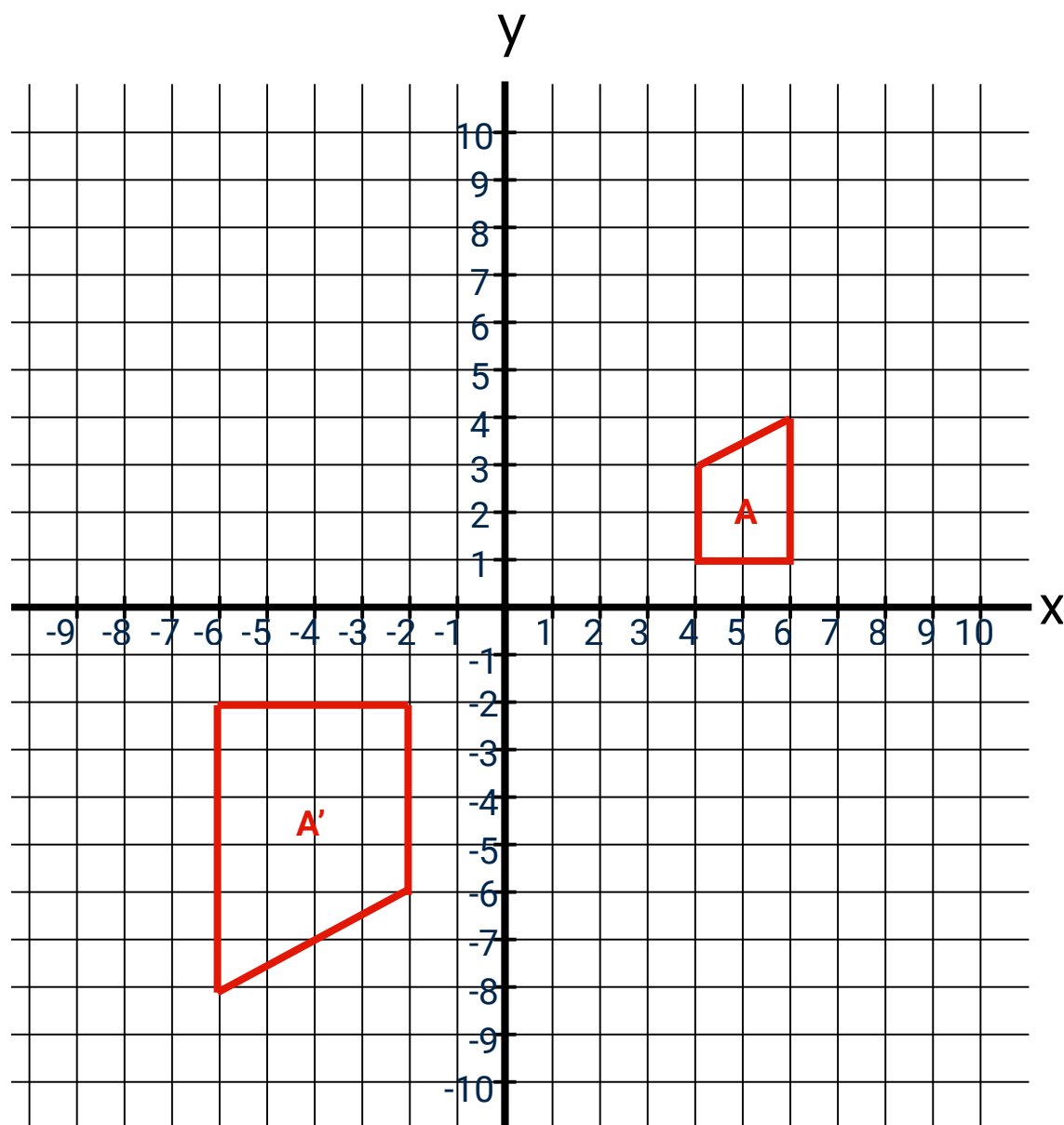
Give your answer correct to the nearest degree.

Answer: _____



M8

- 15 Describe the single transformation from shape A to shape A'.



Answer: _____

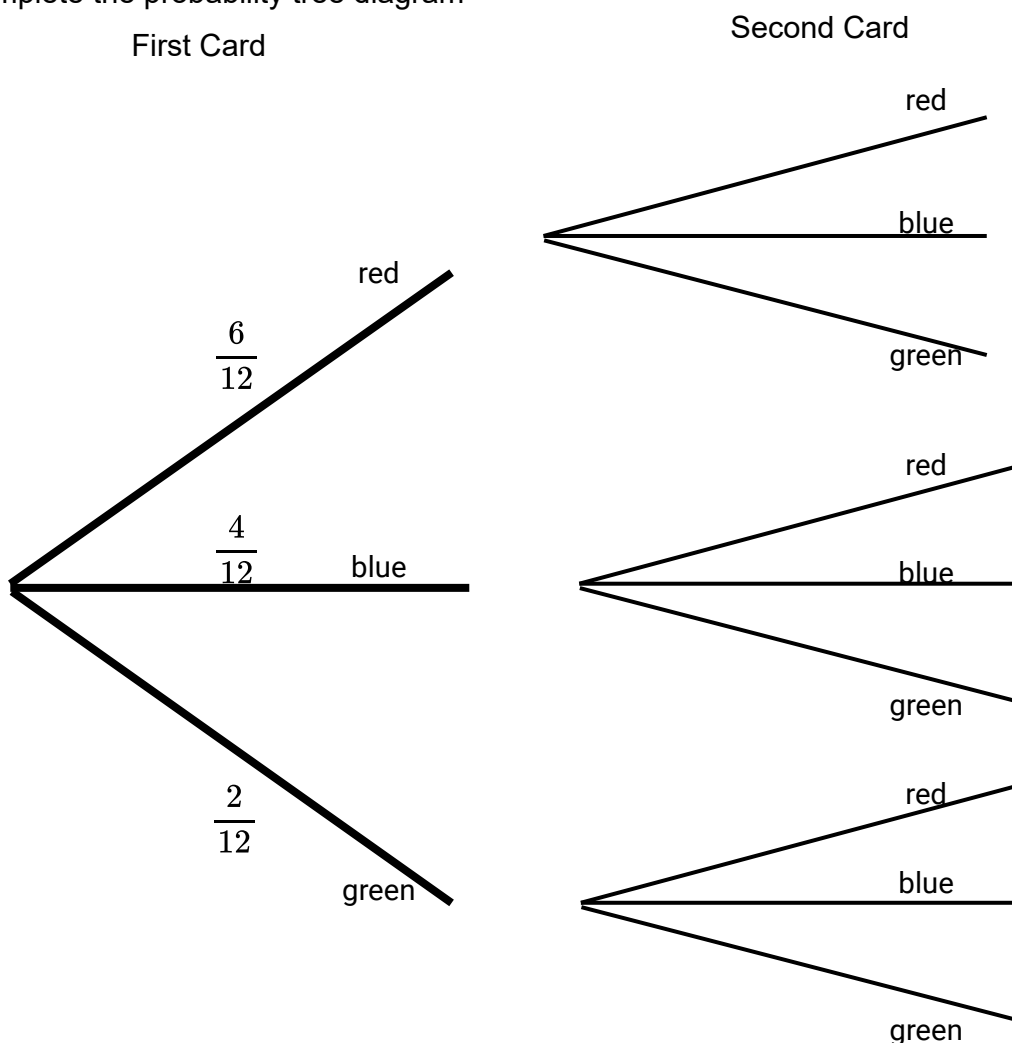


M8

16 Megan has 12 cards.

There are 6 red cards, 4 blue cards, 2 green cards. Megan takes at random one of the cards. She does not replace the card. Megan then takes at random a second card.

a) Complete the probability tree diagram



b) Work out the probability that Megan takes at least one blue card and no green cards.

Answer: _____



**END OF
QUESTIONS**

Answers

