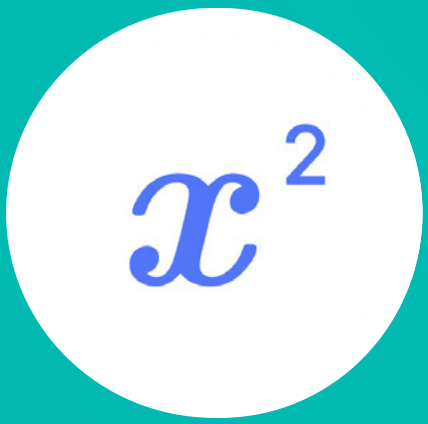
Sparx Maths

Crossover Workbook 2

Algebra



In this series of six workbooks, there are a range of questions from key crossover topics that appear in both the GCSE Foundation and Higher tier papers.

Each workbook will focus on a particular strand of maths.

Workbook 2 will cover **Algebra** topics.

The contents of Workbooks 1-6 are shown below.

1 Number

- Fractions
- Factors, multiples and primes
- Percentage change
- Standard form
- Error intervals

2 Algebra

- Solving linear equations
- Linear inequalities
- Index laws
- Linear simultaneous equations
- Linear graphs and coordinates
- Quadratic graphs and equations

3 Ratio & Proportion

- Ratio
- Speed
- Density and pressure
- Proportion

4 Geometry

- Area
- Volume
- Angles
- Pythagoras' theorem
- Trigonometry
- Transformations

5 Probability

- Calculating probabilities
- Expected outcomes
- Tree diagrams
- Set notation

6 Statistics

- Averages
- Averages with grouped data
- Sampling
- Scatter graphs
- Frequency polygons

This workbook is split into two sections:

- **Introduce** questions are fluency questions on each topic to practise the key concepts.
- **Deepen** mixed topic questions are more challenging reasoning and problem solving questions.

Use the list below to keep track of your progress in each topic. If you use Sparx Maths you can find even more questions by searching for the Sparx topic codes in Independent Learning.

	Sparx topic codes	Teacher comment
Solving linear equations	U325 U870 U599	
Linear inequalities	U759 U738 U145 U337	
Index laws	U662	
Linear simultaneous equations	U760 U757 U836 U137	
Linear graphs and coordinates	U315 U669 U477 U848 U377	
Quadratic graphs and equations	U989 U667 U228 U601	

All questions in this workbook are non-calculator

Q1 Solve $\frac{r + 22}{6} = 9$

Answer: $r =$ .....

Q2 Solve $\frac{y}{4} - 11 = -5$

Answer: $y =$ .....

Q3 Solve $3(2x + 15) = 27$

Answer: $x =$ .....

Q4 Solve $24 - 6h = 4h + 7$

Answer: $h =$ .....

Q5 Solve $2(5x - 7) = 3(4 - x)$

Answer: $x =$ .....

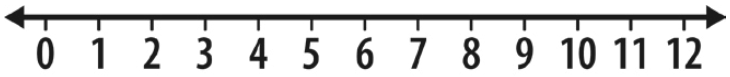
Q1 Solve $4x - 13 > 15$

Answer: .....

Q2 a) Solve $11 > 2x - 5$

Answer: .....

b) Draw your answer to part a) on the number line below



Q3 Solve $5a \geq a + 24$

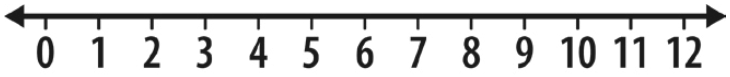
Answer: .....

Q4 List all of the integer values that x could take to satisfy the following inequality:

$2 < 2x \leq 6$

Answer: .....

Q5 On the number line below, show the set of values of x for which $5 < 2x - 1 \leq 7$



Q1 Fully simplify

a) $c^4 \times c^3$

Answer: .....

b) $d^8 \div d^2$

Answer: .....

c) $(f^3)^8$

Answer: .....

Q2 Fully simplify $5n^3p^4 \times n^5p$

Answer: .....

Q3 Fully simplify $10u^8 \div 2u^4$

Answer: .....

Q4 Fully simplify $(7a^9b^{-5})^2$

Answer: .....

Q5 Fully simplify $\frac{2k^5 \times 12k^7}{4k^3}$

Answer: .....

Q1 Solve the simultaneous equations below.

$7x - 3y = 15$

$2x + 3y = 12$

Answer: $x =$ ..... $y =$ .....

Q2 Solve the simultaneous equations below.

$2a + 3b = 22$

$6a + 7b = 54$

Answer: $a =$ ..... $b =$ .....

Q3 Solve the simultaneous equations below.

$10x - 9y = 28$

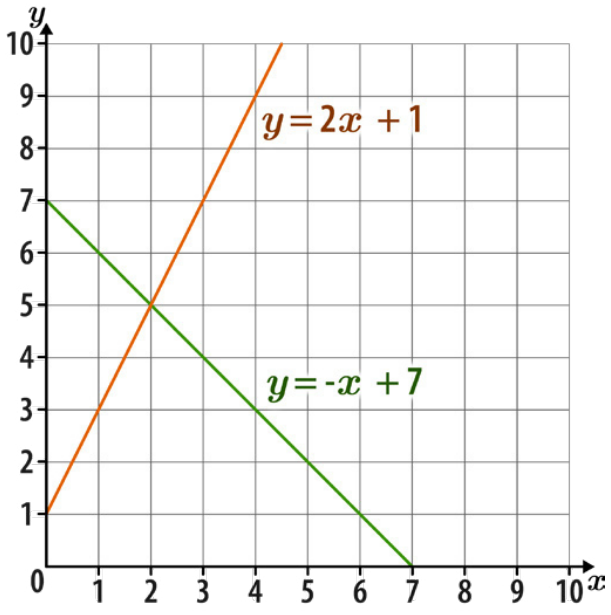
$2x + 5y = -8$

Answer: $x =$ ..... $y =$ .....

Q4 Use the diagram to work out the solution to these simultaneous equations

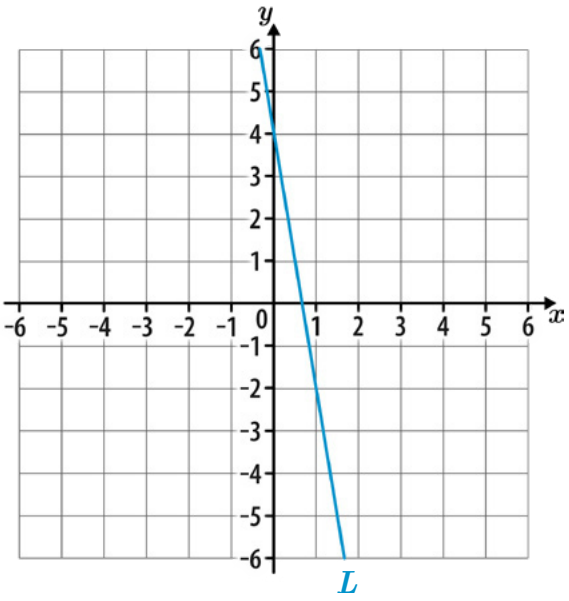
$y = 2x + 1$

$y = -x + 7$



Answer: $x =$ ..... $y =$ .....

Q1 Work out the equation of line L shown below.



Answer: .....

Q2 The equation of a line is $2y = 10x - 16$

a) What is the y-intercept of the line?

Answer: .....

b) What is the gradient of the line?

Answer: .....

Q3 Circle the equations below that represent a line parallel to $y = 8x + 4$

$y = 8x + \frac{2}{5}$	$y = 4x + 8$	$y = 4 - 8x$	$y = 3x + 4$
$y + 8x = 4$	$y = 3 + 8x$	$y = 8 + 4x$	$8x + 5 = y$

Q4 What is the y-intercept of the straight line with a gradient of 2 that passes through the point (7, 15)?

Answer: .....

Q5 Work out the gradient of the straight line that passes through (5, 4) and (9, 18).

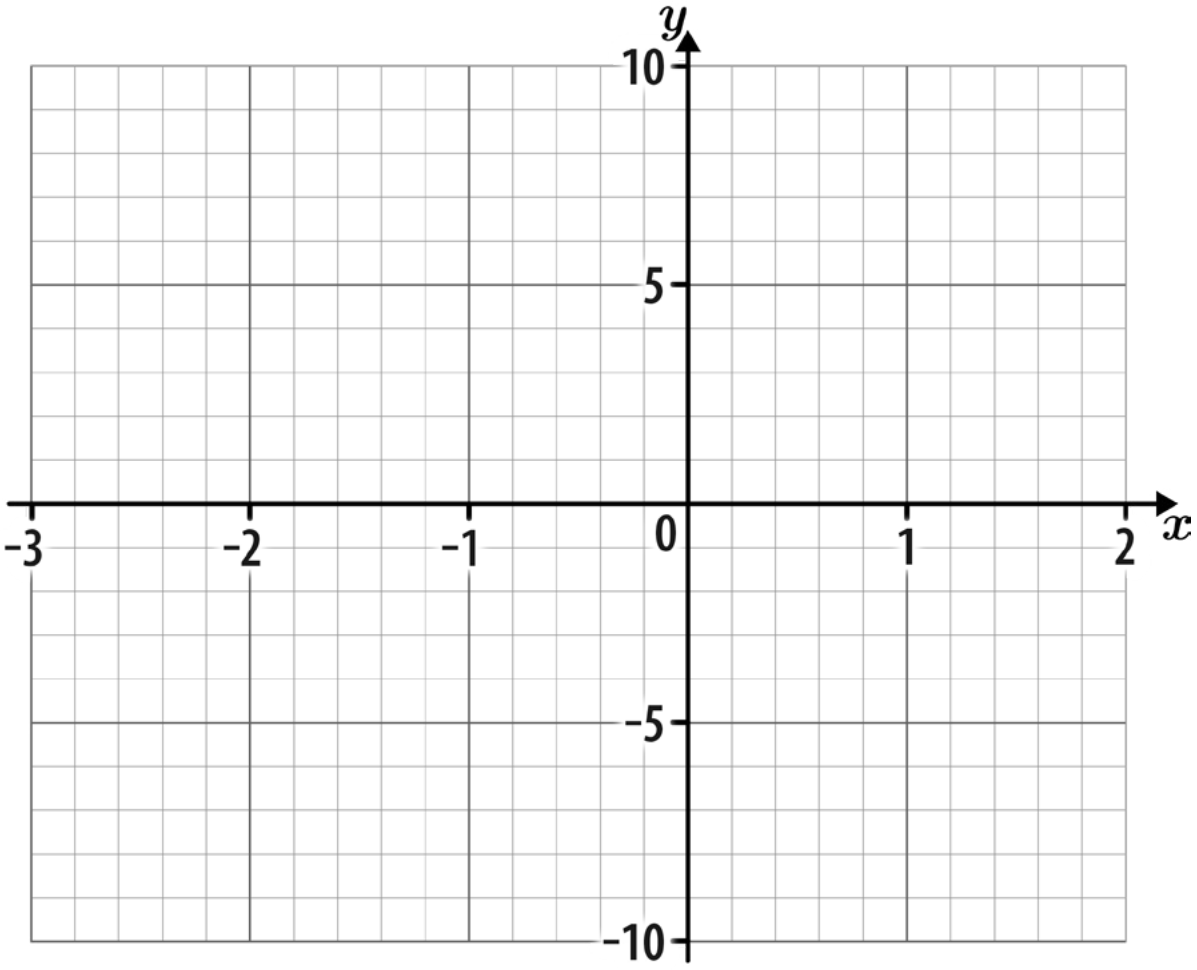
Answer: .....

Q1

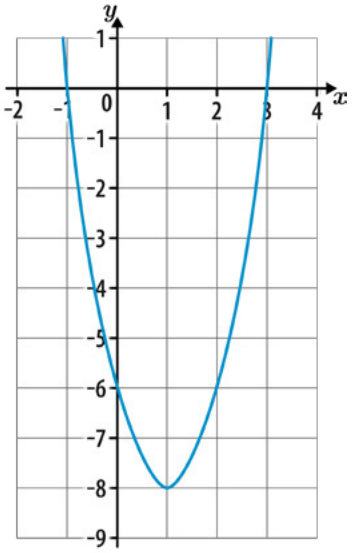
a) Complete the table of values for $y = x^2 + 3x - 2$

x	-3	-2	-1	0	1	2
y		-4	-4			8

b) On the grid, draw the graph of $y = x^2 + 3x - 2$ for $x = -3$ to $x = 2$



Q2 A graph of a quadratic function is shown below.



Write down the coordinates of

a) the y-intercept.

Answer: .....

b) the turning point.

Answer: .....

c) the roots of the function.

Answer: .....

Q3 Solve $t^2 - 8t + 12 = 0$

Answer: .....

Q1 List all of the integer values that x could take to satisfy the inequality:

$-1.8 \leq x < 2$

Answer: .....

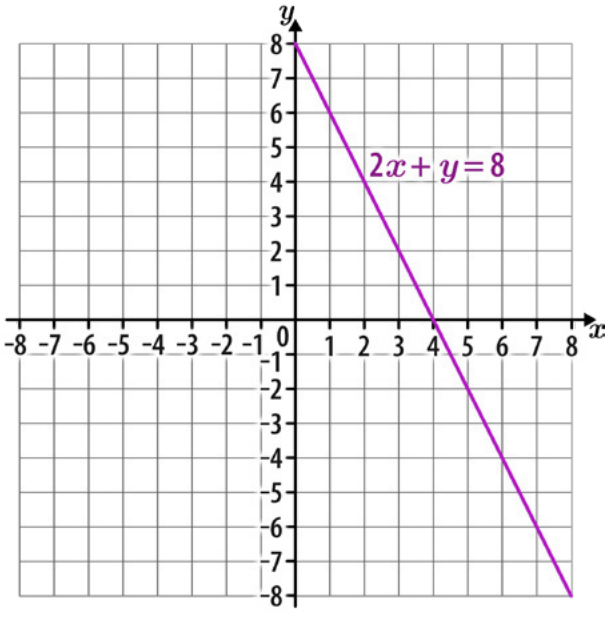
Q2 Work out the value of w.

$\frac{x^{28}}{x^{w}} = x^{7}$

Answer: $w =$ .....

Q3 The graph of $2x + y = 8$ is plotted on the grid below.

Use the graph to find the solution to the simultaneous equations
$2x + y = 8$ and $y = x - 1$



Answer: $x =$ ..... $y =$ .....

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Q4 Work out the values of c and d.

$(x^c y^2)^d = x^{24} y^6$

Answer: $c =$ ..... $d =$ .....

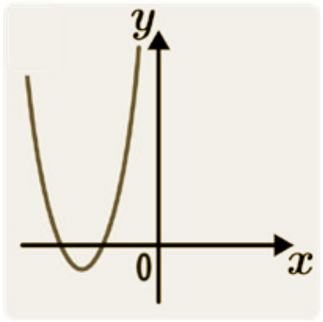
Q5 Work out the values of x and y in the simultaneous equations below.

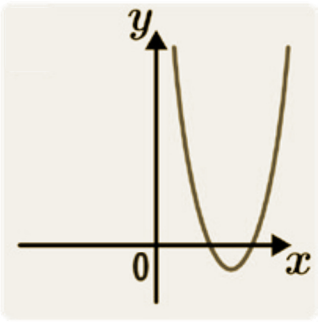
$3x + 5y = 11$

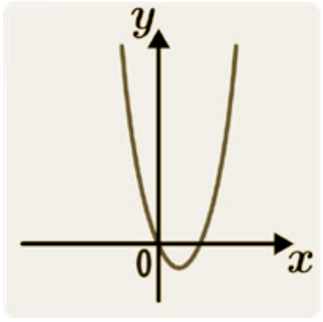
$2x + 3y = 7$

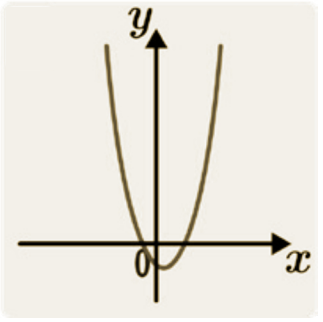
Answer: $x =$ ..... $y =$ .....

Q6 Circle the sketch below that could represent $y = (x - 5)(x + 2)$





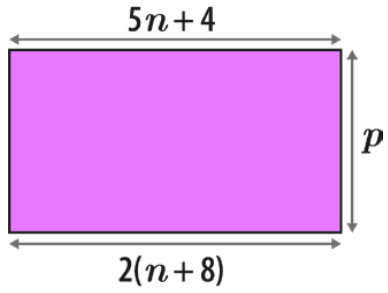




Q7 The rectangle below has an area of 120 cm²

All measurements are given in centimetres.

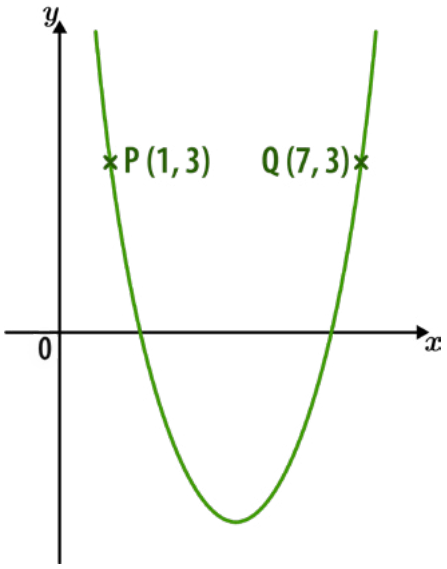
Work out the value of p.



Not drawn accurately

Answer: $p =$ .....

Q8 Points P and Q are on the quadratic curve $y = x^2 - 8x + 10$



a) Calculate the coordinates of the midpoint of the straight line segment PQ.

Answer: .....

b) Hence write down the equation of the line of symmetry for $y = x^2 - 8x + 10$

Answer: .....

Q9 The straight line that passes through the points (-1, 9) and (5, f) has gradient -2

What is the value of f?

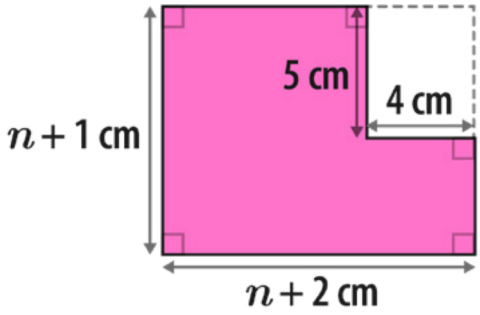
Answer: $f =$ .....

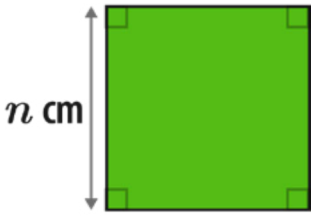
Q10

A compound shape and a square are both shown below.

The area of the compound shape is greater than the area of the square.

Work out the smallest possible integer value of n.





Not drawn accurately

Answer: .....

Q11

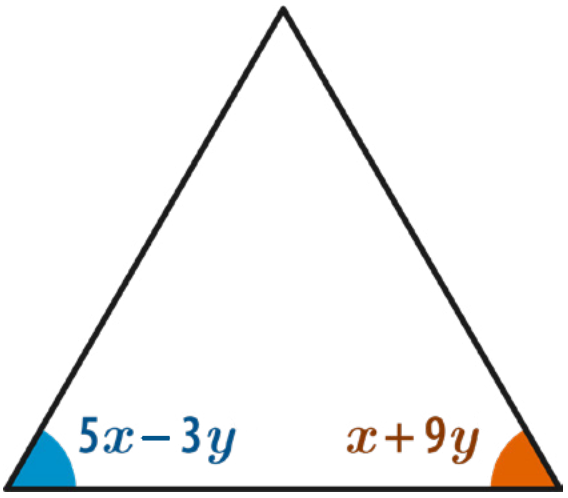
Line A passes through the point (4, 17) and is parallel to the line given by $y = 3x + 9$

What is the equation of the line A?

Answer: .....

Q12 An equilateral triangle is shown below.

Work out the values of x and y.



not drawn accurately

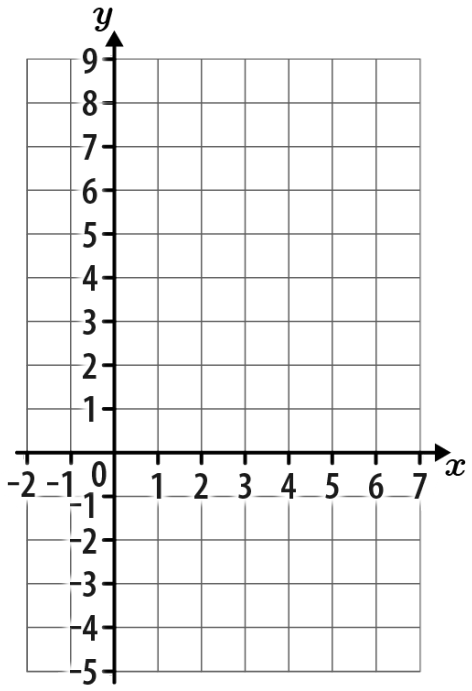
Answer: $x =$ ..... ° $y =$ ..... °

Q13

a) Complete the table of values for $y = x^2 - 5x + 2$

x	-1	0	1	2	3	4	5	6
y			-2		-4		2	8

b) On the grid, draw the graph of $y = x^2 - 5x + 2$ for values of x from -1 to 6.



c) Solve $x^2 - 5x + 2 = 2$

Answer: .....

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