

### Key Language

1	<b>quadratic expression</b>	An expression with positive integer powers where the highest power is 2 e.g. $8x^2 + 7$ , $x^2 - 5x$ , but not $5x^2 - x^3$ or $3x^2 + x^{-1}$
2	<b>difference of two squares</b>	An expression of the form $a^2 - b^2$ e.g. $x^2 - 25$ , $16 - 4y^2$
3	<b>Parabola</b>	A special 'U-shaped' curve, such as the graph of a quadratic function
4	<b>Root</b>	A value of $x$ that makes the function worth 0. On a graph, the roots are the $x$ -values where the curve crosses the $x$ -axis.
5	<b>turning point or vertex</b>	The point where a curve turns, with gradient 0 (just for a moment) A turning point can be a <b>minimum point</b> or <b>maximum point</b>
6	<b>direct proportion</b>	A relationship between two quantities where as one doubles, the other doubles (etc.)
7	<b>inverse proportion</b>	A relationship between two quantities where as one doubles, the other halves (etc.)
8	<b>constant of proportionality</b>	The multiplier that connects two quantities that are in proportion, often represented by the letter $k$

Know

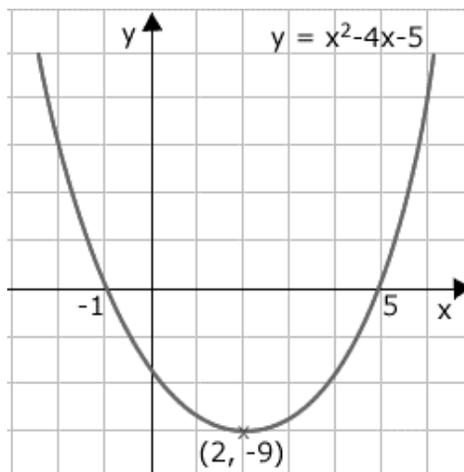
### Features of Quadratic Graphs

You need to be able to identify the roots and turning point of a quadratic graph.

The graph shape is called a **parabola**.

In this example, the **roots** are -1 and 5 (where the graph crosses the  $x$ -axis)

The **turning point** (or **vertex**) is at (2, -9). This one is a **minimum point**, because  $y$  has its minimum value here.



### Difference of two squares

A difference of two squares is an expression of the form  $a^2 - b^2$ .

It is factorised into double-brackets which are identical except for the sign.

e.g.

$$x^2 - 25 = (x + 5)(x - 5)$$

$$4y^2 - 64 = (2y + 8)(2y - 8)$$

$$81 - x^2 = (9 + x)(9 - x)$$



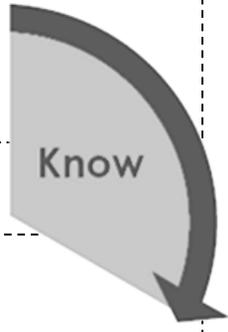
## REVISION: Prime Numbers

Remember that a prime number has *exactly two factors* (1 and itself)

You should learn the prime numbers less than 20. These are:

**2, 3, 5, 7, 11, 13, 17, 19**

1 is not a prime number. 2 is the only even prime number.


 Know

Can you still remember...

### The Sine Rule

For missing side:  $\frac{a}{\sin A} = \frac{b}{\sin B}$

For missing angle:  $\frac{\sin A}{a} = \frac{\sin B}{b}$

### The Cosine Rule

For missing side:  $a^2 = b^2 + c^2 - 2bc \cos A$

For missing angle:  $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

## PRACTICE QUESTIONS

Ten of these questions will be chosen, with very little change, to make the Knowledge Test.

If you can confidently answer all of these, you will pass easily.

Use pages 1 and 2 to research and *learn* anything that you don't know yet.

- Which of these is a *quadratic* expression?  
A:  $10 + x - 5x^2$                       B:  $5x^2 - x^3$                       C:  $x^2 + 5x^{-1} + 6$
- What is another word for *turning point*?
- What type of expression has positive powers of  $x$ , with the highest power 2?
- Which of these is a *difference of two squares*?  
A:  $5x^2 - 25$                       B:  $9x^2 - 25$                       C:  $x^2 + 25$
- What is the gradient of a quadratic graph at its *turning point*?
- Write the Sine Rule in the form that would be most useful for finding a missing side.
- What special type of quadratic expression factorises like this:  $(x + 5)(x - 5)$  ?
- What are the two types of *turning point*?
- Which of these is a *difference of two squares* factorised?  
A:  $(x - 3)^2$                       B:  $(4 - x)(4 + x)$                       C:  $x(x + 25)$


 Do

## PRACTICE QUESTIONS (continued)

10. How would you recognise *roots* on a quadratic graph?
11. Write the Sine Rule in the form that would be most useful for finding a missing angle.
12. A quadratic graph is a special type of curve. What is the name for this type of curve?
13. If two quantities are in direct proportion, and one quantity doubles, what happens to the other quantity?
14. Write down all the *prime numbers* that are less than 20
15. Write the Cosine Rule in the form that would be most useful for finding a missing side.
16. If two quantities are in inverse proportion, and one quantity doubles, what happens to the other quantity?
17. Why is the prime number 2 particularly special?
18. Write the Cosine Rule in the form that would be most useful for finding a missing angle.
19. 1 is a prime number. True or false?



## ANSWERS

1. A:  $10 + x - 5x^2$  (It has positive powers of  $x$ , and the highest power is 2)
2. Vertex
3. A *quadratic* expression
4. B:  $9x^2 - 25$  (Notice that 9 and 25 are square numbers.)
5. The gradient is 0 at a turning point
6.  $\frac{a}{\sin A} = \frac{b}{\sin B}$  (To find a side, put the sides on top)
7. A difference of two squares
8. A minimum point and a maximum point
9. B:  $(4 - x)(4 + x)$  (Identical brackets, apart from the sign)
10. Roots are the  $x$ -values where the graph crosses the  $x$ -axis.
11.  $\frac{\sin A}{a} = \frac{\sin B}{b}$  (To find an angle, put the angles on top)
12. Parabola
13. It doubles
14. 2, 3, 5, 7, 11, 13, 17, 19
15.  $a^2 = b^2 + c^2 - 2bc \cos A$
16. It halves
17. 2 is the only even prime number
18.  $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
19. False (It doesn't have *exactly two factors*)