



**Algebra**

<p>NC Link</p>	<p>Generate and describe linear number sequences. Express missing number problems algebraically. Use simple formulae. Enumerate possibilities of combinations of two variables. Find pairs of numbers that satisfy an equation with two unknowns.</p>																
<p>Important Vocabulary</p>	<p>Pattern, sequence, formulae, algebra, equation, variables.</p>																
<p>Key facts to memorise</p>	<p><b>A Puzzle</b></p> <p>What is the missing number?</p> $\square - 2 = 4$ <p>OK, the answer is 6, right? Because <math>6 - 2 = 4</math>. Easy stuff.</p> <p>Well, in Algebra we don't use blank boxes, we use a <b>letter</b> (usually an x or y, but any letter is fine). So we write:</p> $x - 2 = 4$ <p>It is really that simple. The letter (in this case an x) just means "we don't know this yet", and is often called the <b>unknown</b> or the <b>variable</b>.</p> <p>And when we solve it we write:</p> $x = 6$	<p>Work out what number the shape represents in each calculation:</p> <p>a) <math>\blacktriangledown \div 3 = 12 \div 2</math>     <math>\blacktriangledown = 18</math></p> <p><b>Writing Algebra</b></p> <p>Write the algebraic expression for each of these explanations:</p> <p>a) p is 4 more than y     <math>p = y + 4</math></p> <p>b) z is twice k     <math>2k = z</math></p> <p>c) d is half of r     <math>d = r \div 2</math></p>															
<p>Strategies</p>	<p><b>How to Solve</b></p> <p>Algebra is just like a puzzle where we start with something like "<math>x - 2 = 4</math>" and we want to end up with something like "<math>x = 6</math>".</p> <p>But instead of saying "<i>obviously</i> <math>x=6</math>", use this neat step-by-step approach:</p> <ul style="list-style-type: none"> <li>• Work out <b>what to remove</b> to get "<math>x = \dots</math>"</li> <li>• Remove it by <b>doing the opposite</b> (adding is the opposite of subtracting)</li> <li>• Do that to <b>both sides</b></li> </ul> <p>Here is an example:</p> <table border="1" data-bbox="436 1284 1075 1468"> <tr> <td>We want to remove the "-2"</td> <td>To remove it, do the opposite, in this case add 2</td> <td>Do it to both sides</td> <td>Which is ...</td> <td>Solved!</td> </tr> <tr> <td><math>x - 2 = 4</math></td> <td><math>x - 2 = 4</math></td> <td><math>x - 2 = 4</math></td> <td><math>x + 0 = 6</math></td> <td><math>x = 6</math></td> </tr> <tr> <td></td> <td><math>\begin{array}{r} +2 \\ -2 \\ \hline 0 \end{array}</math></td> <td><math>\begin{array}{r} +2 \quad +2 \\ -2 \quad -2 \\ \hline 0 \quad 6 \end{array}</math></td> <td></td> <td></td> </tr> </table>	We want to remove the "-2"	To remove it, do the opposite, in this case add 2	Do it to both sides	Which is ...	Solved!	$x - 2 = 4$	$x - 2 = 4$	$x - 2 = 4$	$x + 0 = 6$	$x = 6$		$\begin{array}{r} +2 \\ -2 \\ \hline 0 \end{array}$	$\begin{array}{r} +2 \quad +2 \\ -2 \quad -2 \\ \hline 0 \quad 6 \end{array}$			$x + 5 = 12$ <p>What we want is an answer like "<math>x = \dots</math>", but the +5 is in the way of that!</p> <p>We can cancel out the +5 with a -5 (because <math>5-5=0</math>)</p> <p>So, let us have a go at subtracting 5 from <b>both sides</b>: <math>x + 5 - 5 = 12 - 5</math></p> <p>A little arithmetic (<math>5-5 = 0</math> and <math>12-5 = 7</math>) becomes: <math>x + 0 = 7</math></p> <p>Which is just: <math>x = 7</math></p>
We want to remove the "-2"	To remove it, do the opposite, in this case add 2	Do it to both sides	Which is ...	Solved!													
$x - 2 = 4$	$x - 2 = 4$	$x - 2 = 4$	$x + 0 = 6$	$x = 6$													
	$\begin{array}{r} +2 \\ -2 \\ \hline 0 \end{array}$	$\begin{array}{r} +2 \quad +2 \\ -2 \quad -2 \\ \hline 0 \quad 6 \end{array}$															

**Measurement – Area and Perimeter**


NC Link Calculate the area of parallelograms and triangles. Recognise that shapes with the same areas can have different perimeters and vice versa. Recognise when it is possible to use formulae for area and volume of shapes.

Important Vocabulary Area, perimeter, formula(e), parallelogram, triangle,


Key facts to memorise

**Finding the Area**

The **area** is the total amount of surface a 2D shape covers.

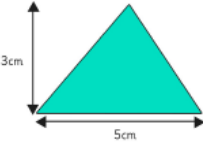


Area is measured in square units:  
 squared centimetres (cm<sup>2</sup>)  
 squared metres (m<sup>2</sup>)  
 squared kilometres (km<sup>2</sup>)




**Finding the Area of a Triangle**

To find the area of a triangle:  
 multiply the base × the height  
 and divide the answer by 2

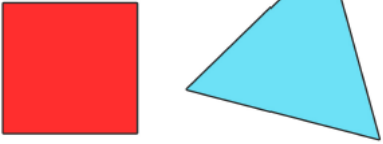


$5\text{cm} \times 3\text{cm} = 15\text{cm}^2$   
 $15\text{cm}^2 \div 2 = 7.5\text{cm}^2$   
 area =  $7.5\text{cm}^2$




**Finding the Perimeter**

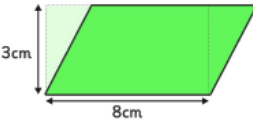
The **perimeter** is the total distance around the outside of a 2D shape.




To find the perimeter of any shape with straight sides, simply add together the length of all the sides.



**Finding the Area of a Parallelogram**

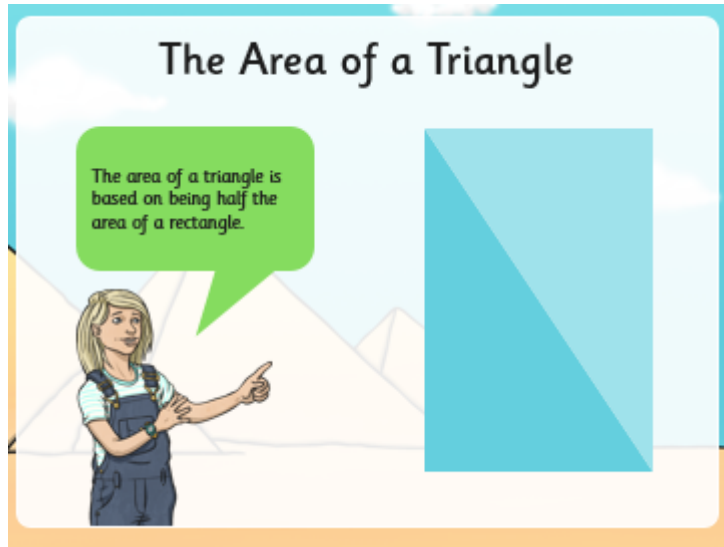


To find the area of a parallelogram:  
 multiply the base by the height  
 $8\text{cm} \times 3\text{cm} = 24\text{cm}^2$   
 See how the parallelogram can be changed into a rectangle.

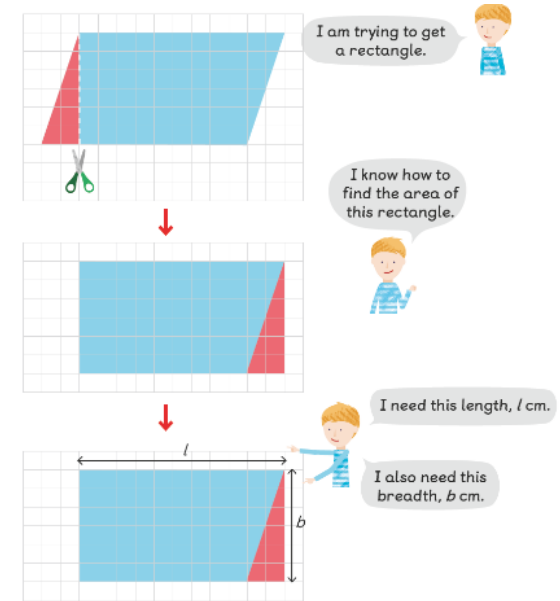


## The Area of a Triangle

The area of a triangle is based on being half the area of a rectangle.



The diagram shows a woman in overalls pointing towards a large blue triangle and a light blue rectangle. The background features a desert landscape with pyramids under a blue sky.



I am trying to get a rectangle.

I know how to find the area of this rectangle.

I need this length,  $l$  cm.

I also need this breadth,  $b$  cm.

The area of the parallelogram is equal to the area of the rectangle.



### Geometry – Properties and Shapes

NC Link  
 Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.  
 Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.

Important Vocabulary  
 Angles, vertically opposite angles, internal angle, polygon, geometry, triangle, quadrilateral


Key facts to memorise

### Angles


*An angle measures the amount of turn*

#### Names of Angles


As the Angle Increases, the Name Changes:




acute




right




obtuse



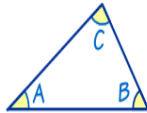
straight



reflex




full rotation

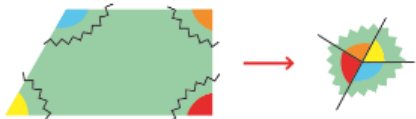


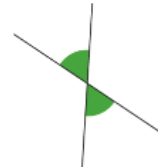
In a triangle, the three interior angles always add to 180°:

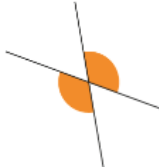
$$A + B + C = 180^\circ$$




The sum of angles in a quadrilateral is always 360°.










These are vertically opposite angles. Each pair of vertically opposite angles is equal.

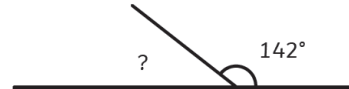
#### Angles on a straight line always add up to 180°



$117^\circ$    ?

$$180^\circ - 117^\circ = 63^\circ$$

The missing angle is 63°.

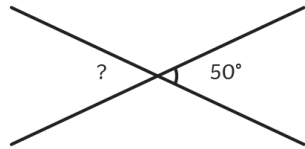


  ?    $142^\circ$

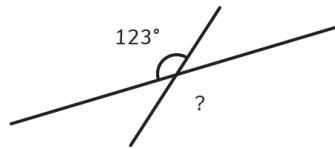
$$180^\circ - 142^\circ = 38^\circ$$

The missing angle is 38°.

Missing Vertically Opposite Angles  
**Opposite angles are equal.**

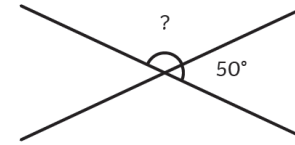


The missing angle is 50°.



The missing angle is 123°.

**Angles around a point total 360°**

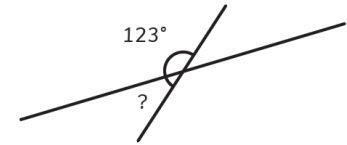


The two known opposite angles total 100°.

$$360^\circ - 100^\circ = 260^\circ$$

$$260^\circ \div 2 = 130^\circ$$

The missing angle is 130°.



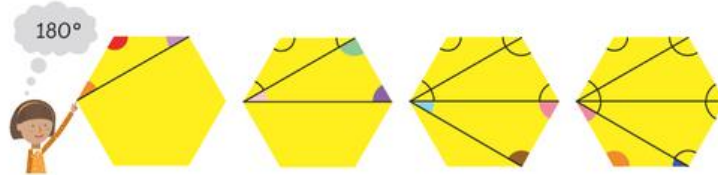
The two known opposite angles total 246°.

$$360^\circ - 246^\circ = 114^\circ$$

$$114^\circ \div 2 = 57^\circ$$

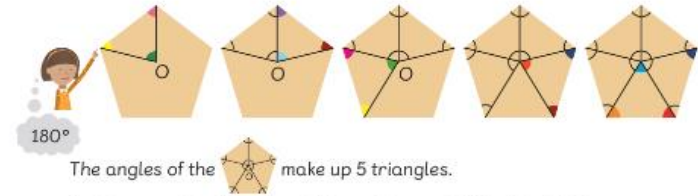
The missing angle is 57°.

Strategies



The 6 angles of the hexagon make up the angles of 4 triangles.

So the sum of these 6 angles is equal to  $4 \times 180^\circ$ .



The angles of the pentagon make up 5 triangles.

So the sum of the 5 angles of the pentagon +  $360^\circ = 5 \times 180^\circ$ .

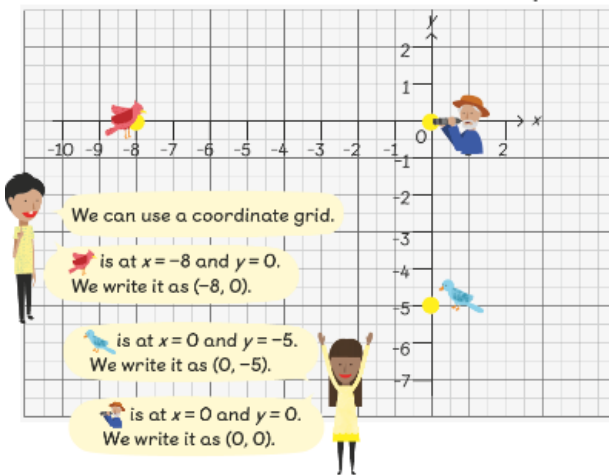
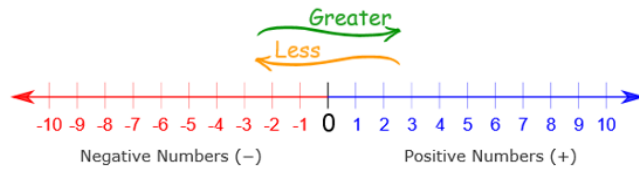


### Geometry – Position and Movement

NC Link Use negative numbers in context, and calculate intervals across zero.  
 Describe positions on the full coordinate grid (all four quadrants).  
 Draw and translate simple shapes on the coordinate plane.  
 Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Important Vocabulary Translation, reflection, coordinate grid, coordinate plane (grid), quadrants

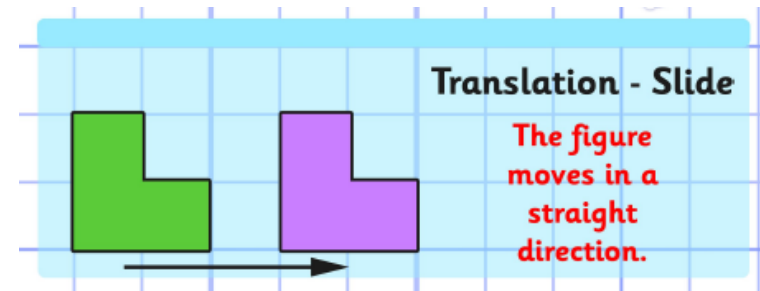
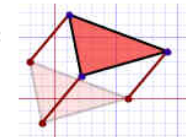
Key facts to memorise



In Geometry, "Translation" simply means **Moving ...**  
**... without rotating, resizing or anything else, just moving.**

To Translate a shape:

- the **same distance**
- in the **same direction**.



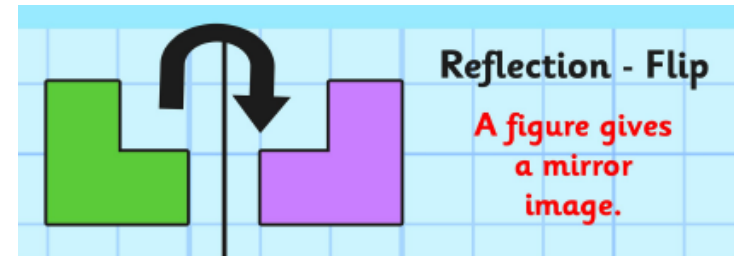
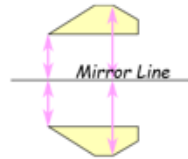
# Reflection

Every point is the **same distance from the central line** !

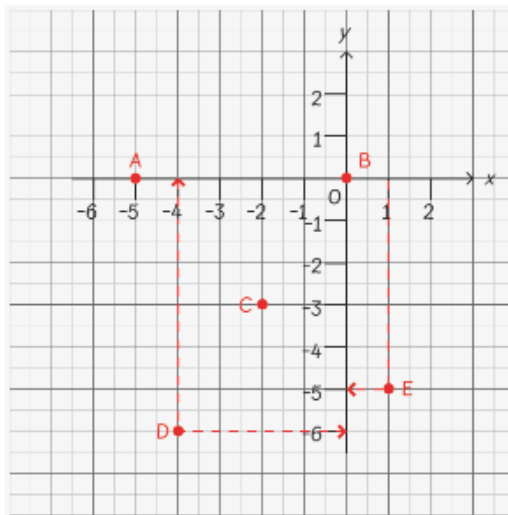
... and ...

The reflection has **the same size** as the original image

The central line is called the **Mirror Line** ...



## Strategies



D is then at  $x = -4$  and  $y = -6$ .

D is at  $(-4, -6)$ .

E is at  $x = 1$  and  $y = -5$ .

E is at  $(1, -5)$ .

