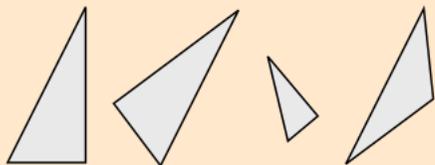


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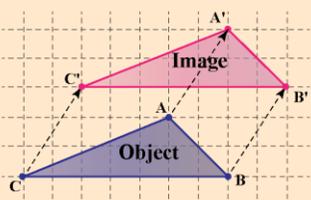
Unit 8: Transforming 2D figures

Isometries

Two shapes are **congruent** if they are exactly the same shape and size.

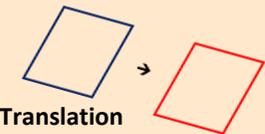


Congruent Not congruent



A shape has been transformed when it has had a change in its size, shape or location. The shape before the change is called the **object**, and after is called the **image**.

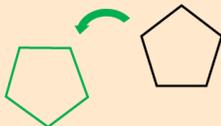
An **isometry** is a special kind of transformation, where the object is congruent to the image. Here are three kinds of isometry:



Translation
Every point on the shape moves in the same direction by the same amount.

Rotation

Every point is rotated by the same angle in the same direction.

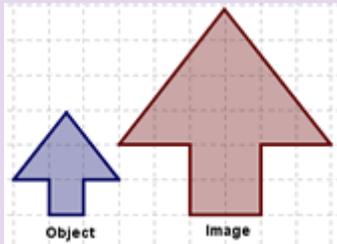


Reflection

The object and the image are the same distance from a line of reflection, but on opposite sides.

Enlargement and similarity

A shape can be **enlarged** to make an image that is the same shape but a different size. We describe the size of the enlargement using a **scale factor**.

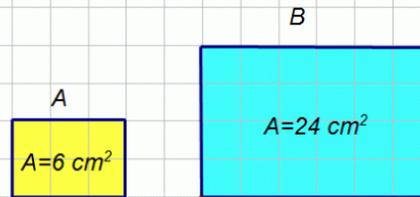


The sides of the image are twice as large as the object, so the scale factor is 2.

The scale factor from the red arrow to the blue arrow is 0.5.

In the UK, we call it an enlargement even if the shape is made smaller.

Enlargement from A to B
Scale factor = 2



The scale factor from A to B is 2, so B has sides that are twice as long.

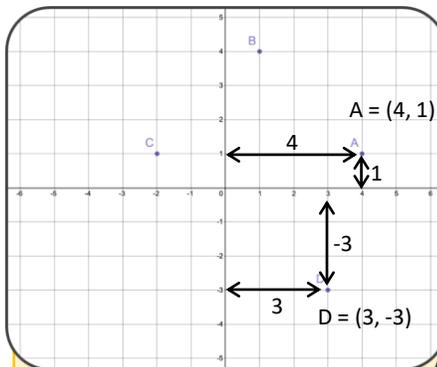
However, the area of B is 4x larger than A. This is because $2^2 = 4$.

Unit 9: Linear graphs

Coordinate grids

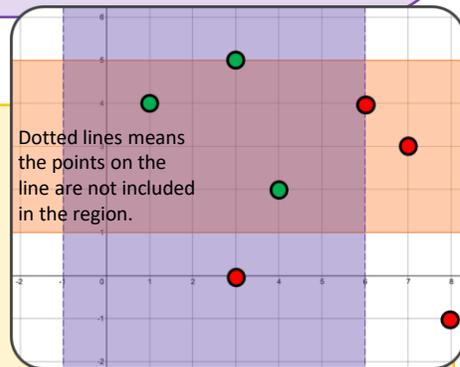
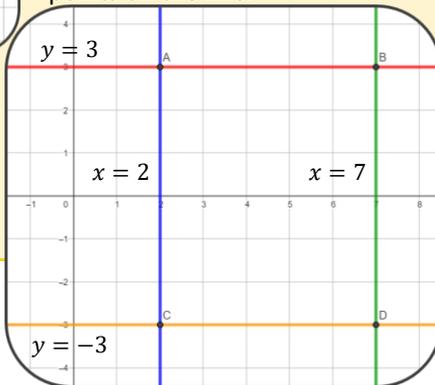
Straight lines are an infinitely long string of points.

We usually describe them using on a rule that describes all the points on the line.



Coordinates are points on a 2D grid, defined by 2 axes.

They are written as an **ordered pair**, e.g. $A = (4, 1)$.



Dotted lines means the points on the line are not included in the region.

We can describe **regions** on a grid using **inequalities**.

Blue: $-1 < x < 6$

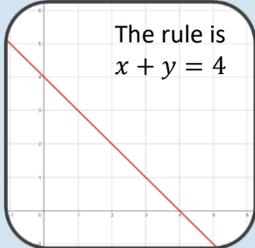
Orange: $1 \leq y \leq 5$

The green points are in both regions.

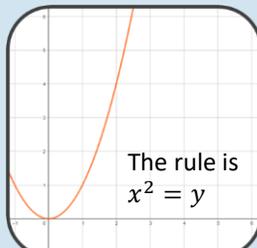
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A graph is a representation of a rule.

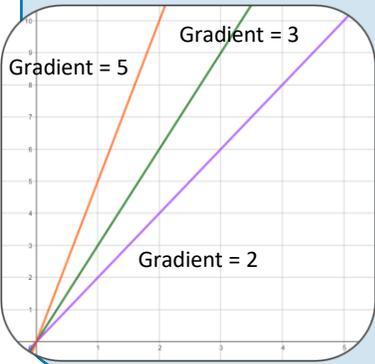
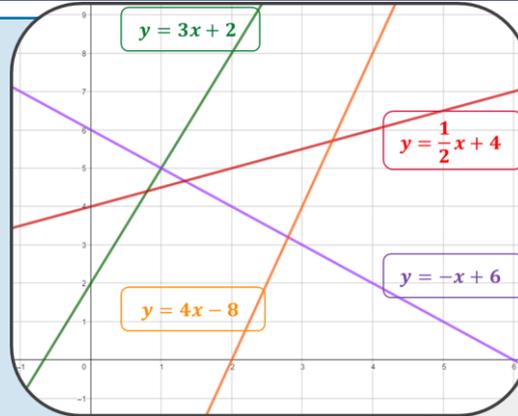
All linear graphs are straight lines.



A linear graph



A non-linear graph



The steepness of a line is called the **gradient**. The gradient is how much the line increases vertically for every 1 across.

The point where a graph crosses an axis is called an **intercept**. E.g. where the a line crosses the y-axis is called the **y-intercept**.

Straight lines can be described using gradient-intercept form, $y = mx + c$.

Unit 10: Ratio (1)

We can describe the relationship between two values using **ratio notation**.

can be described as 5 : 3
 can be described as 2 : 6 or 1 : 3
 can be described as 1 : 3 : 4

The ratio of red cubes to blue cubes is **5 : 10**

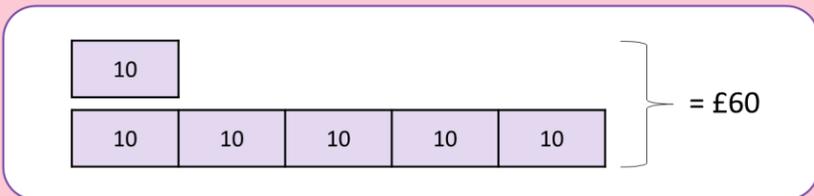
If 2 cubes of each colour cubes are taken away, the ratio of red cubes to blue is **3 : 8**

If 2 red and 4 blue cubes are taken away, the ratio of red cubes to blue cubes is **3 : 6**

Dividing into a ratio

Often when dividing something we split it in half. But is also possible to divide into other ratios, including where the shares are not equal.

We can represent dividing £60 in the ratio 1 : 5 using a bar model.



3 : 8 **is not** in the same ratio as 5 : 10



3 : 6 **is** in the same ratio as 5 : 10 (and so is 2 : 4)!

Here is £60 divided into the ratio 1 : 3 : 6.

