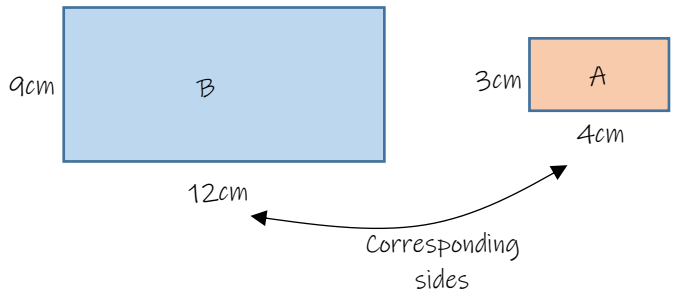
Y10 Maths Knowledge Organiser Higher Tier: Similarity

What must I be able to do?	Key vocabulary	
New content: ☐ Show that two shapes are similar ➢ Mathswatch 144 (GCSE) ☐ Work out the scale factor between similar shapes ➢ Mathswatch 144 (GCSE) ☐ Work out areas and volumes of similar shapes ➢ Mathswatch 200 (GCSE) ☐ Solve problems involving area and volume of similar shapes ➢ Mathswatch 200 (GCSE)	**Similar shapes**	Two shapes which are enlargements of each other. Their angles will be the same size but their sides will share a common scale factor.
	Length Scale factor	How many times larger one side is compared to the same side on a second shape.

Similar shapes

To calculate the length scale factor between 2 similar shapes:

length of one side on a shape ÷ length of the corresponding side on the second shape



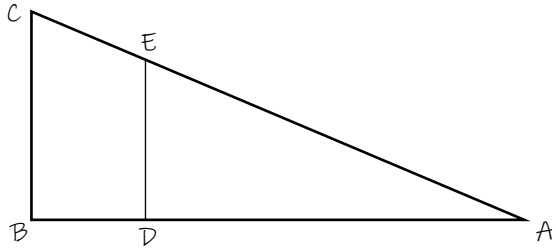
Here are 2 similar rectangles as:

12 ÷ 4 = 3 **and** 9 ÷ 3 = 3

Both sides have the same length scale factor and the corresponding angles are the same in both shapes.

We would say to go from A to B has a length scale factor of 3, or to go from B to A has a length scale factor of $\frac{1}{3}$

Similar shapes can be embedded within other shapes and is often seen with triangles.



Provided that the lines BC and DE are parallel then the two triangles ABC and ADE are similar.

(If parallel then angle ACB = angle AED (corresponding angles) and angle ABC = angle ADE therefore all angles in the 2 triangles are equivalent)

Hint: Questions like these are often easier to solve by redrawing the triangles as 2 separate pictures.

Similar areas and volumes

If two shapes are similar then their areas and volumes are also related.

If the **length** scale factor between the two shapes = k

then the **area** scale factor between the two shapes = k^2

and the **volume** scale factor between the two shapes = k^3

e.g. If the length scale factor was 5, then the area scale factor would be $5^2 = 25$, and the volume scale factor would be $5^3 = 125$.

If starting with a volume scale factor, cube root this to find the length scale factor, then square for the area scale factor.

If starting with the area scale factor, square root to find the length scale factor, then cube for the volume scale factor.