Similar figures

Sunday, 20 October 2019 11:28 am

★ By the end of the lesson I would hope that you have an understanding (and be able to apply to questions) the following concepts:

- Know what it means for two shapes to be similar
- Know how to use the ideas behind similarity to find missing side lengths of shapes

RECAP

This lesson is now going to build on all the work we have done previously on geometry and measurement to lead into some really interesting mathematics! We have already looked at the properties of parallel lines and triangles. We have looked at polygons and Pythagoras' theorem. Now we're going to look at similar figures.

What are similar figures?

Similar figures are, in short, two shapes which are the same - but where one shape has been made bigger (or smaller) using the same ratio.

ratio
/ˈreɪʃɪəʊ/

noun

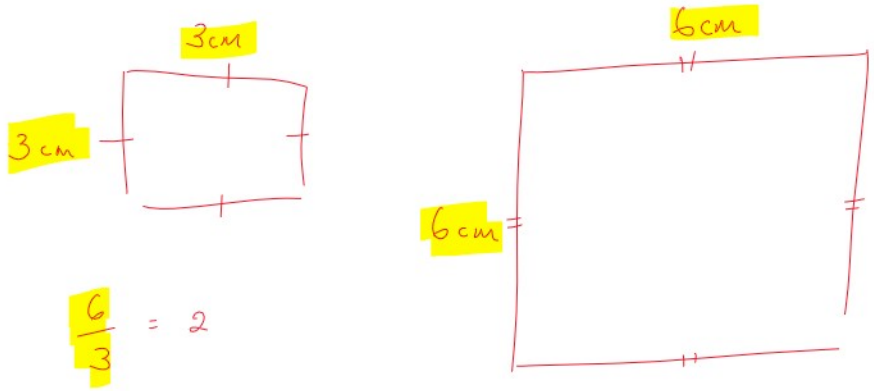
the quantitative relation between two amounts showing the number of times one value contains or is contained within the other.
"the ratio of men's jobs to women's is 8 to 1"

Similar: proportion | comparative number/extent | quantitative relation | correlation

Not the most helpful!

Two squares

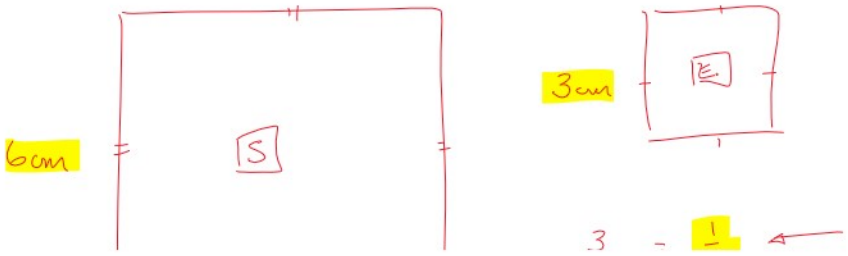
Look at the following two squares.
We can see that one square is twice as big, in terms of side length, at the other.



We can talk about the sides being enlarged (or reduced!) in a certain "ratio".
This means how many times bigger (or smaller) the side is.

Looking above the ratio of enlargement would be 2.

What about if we swap the shapes?





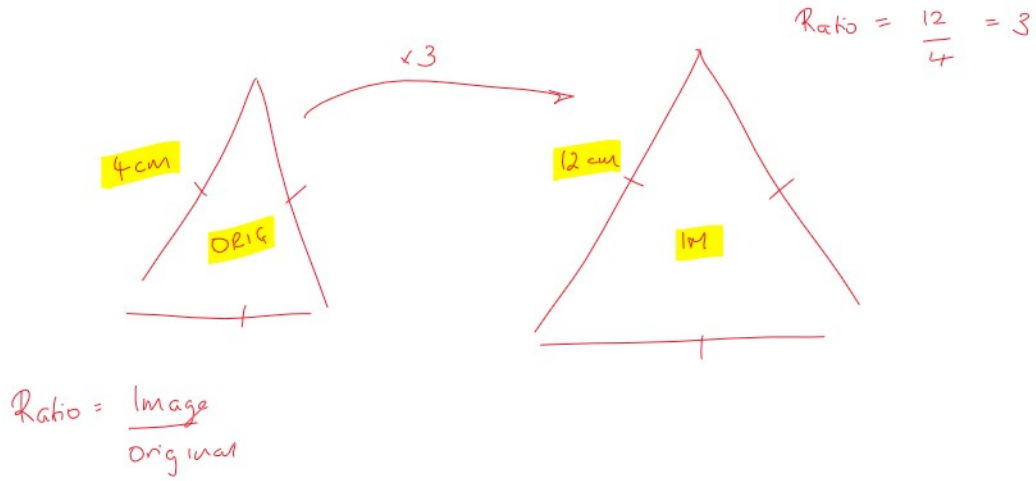
The ratio would now be one half.

Original and Image

It's important, when looking at the scale factor of enlargement to make sure we know which shape is the original (the start shape) and which is the image (the end shape).

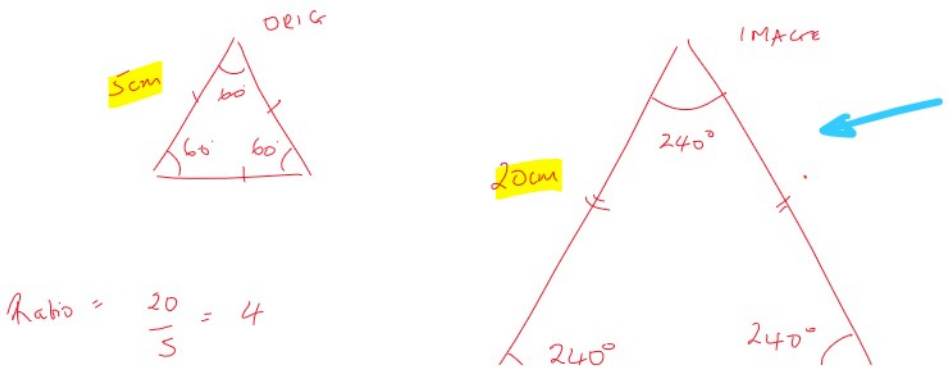
Once we know this, we can make sure we divide the sides into the correct ratios to get the correct scale factor of enlargement.

A ratio is simply one number divided by another.

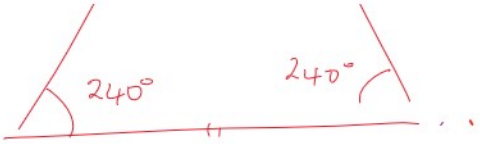


BIG FAT TRICK: The size of the angles in similar shapes

We love tricking you!
The best trick we can play is to ask you about the size of internal angles when we enlarge a shape or reduce a shape ...



Ratio = $\frac{20}{5} = 4$



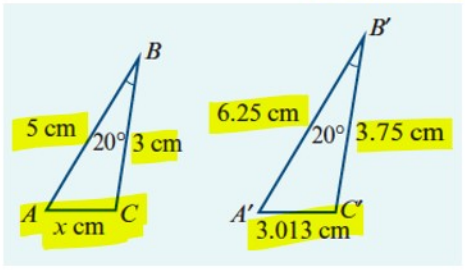
Remember: The internal angles of shape always remain the same size

Examples

The following examples are used, with permission, from the Cambridge Further Mathematics Units 3 and 4 textbook.

Example 1

Find the value of length of side AC in ΔABC, correct to two decimal places.



$\frac{6.25}{5} = \frac{3.75}{3} = \frac{3.013}{x}$

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$x = 2.41$ cm

$\frac{4}{8} = \frac{10}{x}$

$\Rightarrow \frac{3.75}{3} = \frac{3.013}{x}$

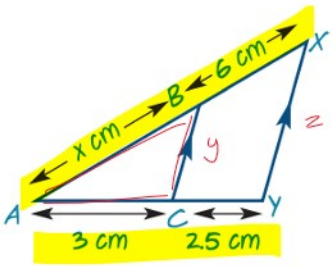
$\frac{x}{3} = \frac{3.013}{3.75}$

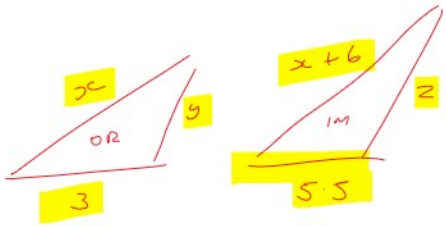
$x = \frac{3.013}{3.75} \times 3$

$=$

Example 2

Find the value of length of side AB in ΔABC.





$$\frac{x+6}{x} = \frac{5.5}{3}$$

$$x = 7.2$$