Similar Figures

Monday, 29 April 2019 12:02 PM

By the end of the lesson I would hope that you have an understanding of the following. I would also hope that you can apply the understanding to a number of different questions and question types:

- What it means for shapes to be similar
- How to work out the scale factor enlargement or reduction between two shapes which are similar

RECAP:

In previous lessons we have been looking at congruence which meant that two shapes were **exactly the same**. This meant that the side lengths and the angles inside the shapes were the same. We looked at general shapes and triangles (where we could use the SSS, AAS, SAS and RHS rules to prove congruence).

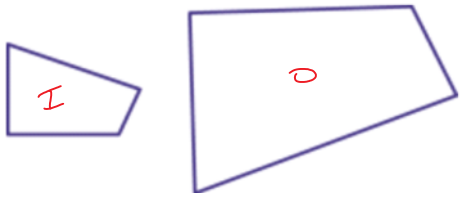
Not everything in life is the same! We know that we can make shapes larger and smaller.

Similar Figures

It is important to know the difference between similar figures and congruent figures.

Similar figures are those where one shape is an enlargement (or reduction) of another.
We call this enlargement or reduction a **scale factor enlargement.**

Look at the following example and ask are they the same shapes but one has been enlarged?

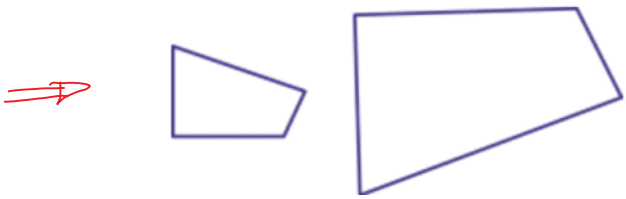


To decide if a shape has been enlarged or not we need to know the following information:

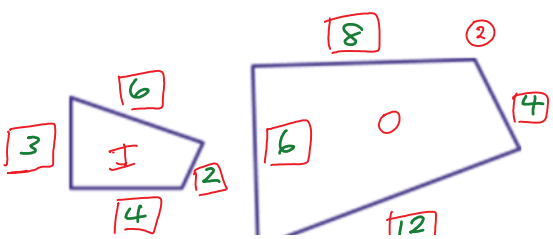
- Which shape is the original and which is the image
- What are the lengths of the sides
- What are the sizes of the angles

Enlarged or reduced?

Look again at the shape below.
Which is the **original** and which is the **image**?

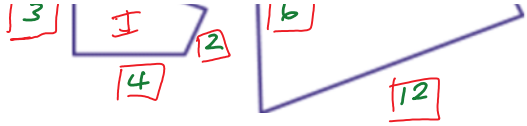


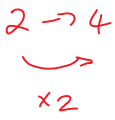
Do we have **side lengths** on the shapes?
If we do … it makes life easier.

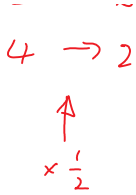


3 → 6
4 → 8
6 → 12
2 → 4

6 → 3
8 → 4
12 → 6
4 → 2

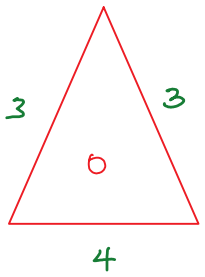


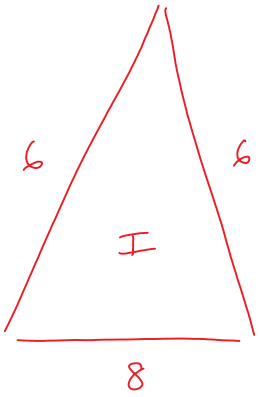




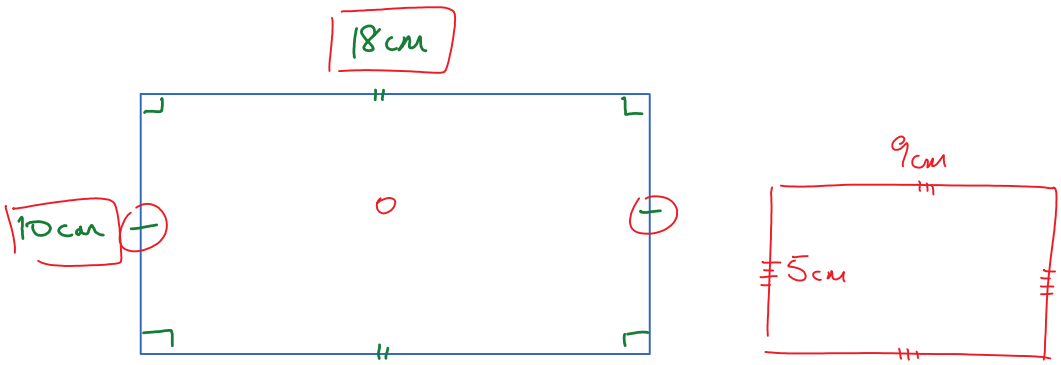
Scale Factor Enlargement

Look at the following example.
Let's enlarge the shape using a scale factor **enlargement** of 2.
This means that we need to make all sides twice as **large**





What happens when we have a scale factor enlargement of $\frac{1}{2}$.
This means that we take the original side lengths and multiply them by $\frac{1}{2}$

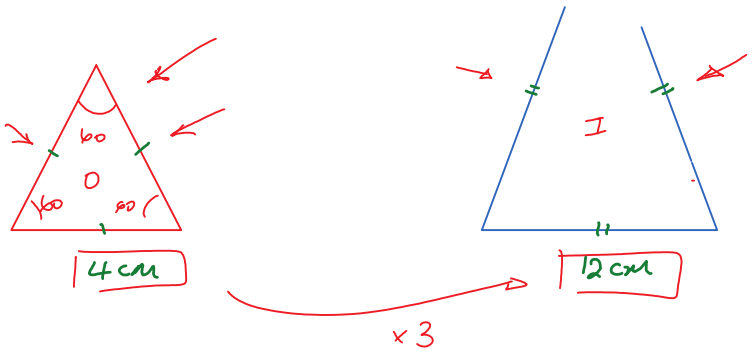


Notice, when we have a scale factor smaller than 1, the shape gets smaller.

Do the angles grow by the scale factor?

Lots of people get tricked with this question!
All we need to do is look at the following two triangles:





What do the angles add up to in Triangle 1 (the original)?

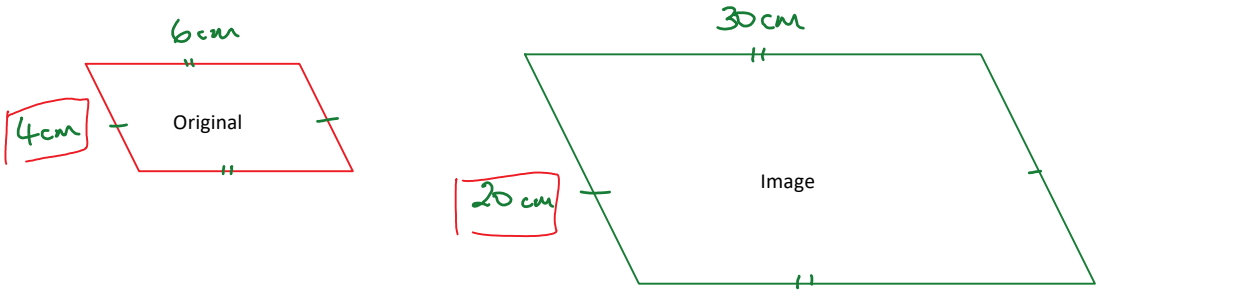
What do the angles add up to in Triangle 2 (the image)?

Note: The sizes of the angles do not change when enlarging or reducing shapes. **So long as the shapes are similar.**

How do I work out the scale factor enlargement?

This is easy!
All you need is two shapes.
You need to know which is the **original** and which is the **image**.
And then you choose two sides; the **same side** on the **image** and the **original**.
This will work with any two sides, so long as they are the same sides. It is important that you check at least two sides of the shape. Checking them all would be better!

Look below:

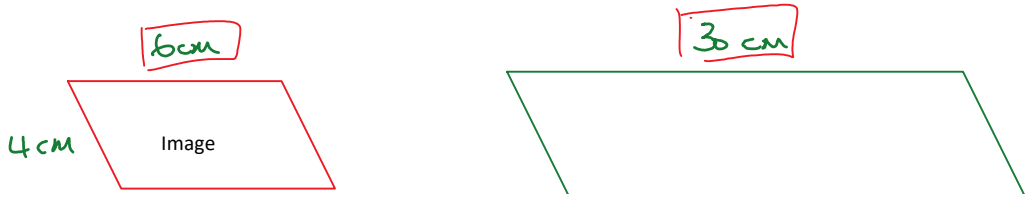


s.f.e = $\frac{20}{4}$ = 5

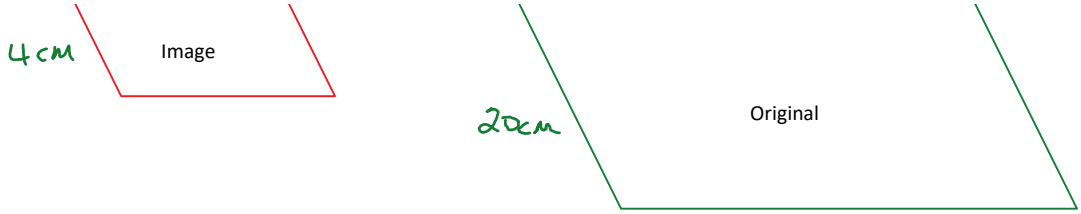
It's important that you know how to label the vertices of the shapes.
You then use the formula:

$$Scale\ Factor\ Enlargement = \frac{Length\ of\ side\ of\ image}{Length\ of\ side\ of\ orginal}$$

This works for reductions too.
Remember, a reduction is just a multiplier which is less than 1.



s.f.e = image / original

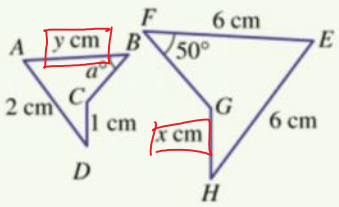


Examples:

The following examples have been taken, with permission, from the *Cambridge Essentials Textbook Series*.

Example 1:

For the following pair of similar figures complete these tasks.



a List the pairs of corresponding sides.

b List the pairs of corresponding angles.

c Find the scale factor.

d Find the values of the pronumerals.

a) $AB = EF$

$BC = FG$

$CD = GH$

$DA = HE$

b) $\angle A = \angle E$

$\angle B = \angle F$

$\angle C = \angle G$

$\angle D = \angle H$

c) $s.f.c = \frac{I}{O} = \frac{6}{2} = 3$

d) $CD = 1\text{ cm}$

$GH = 1 \times 3 = 3\text{ cm}$

$y = 2$

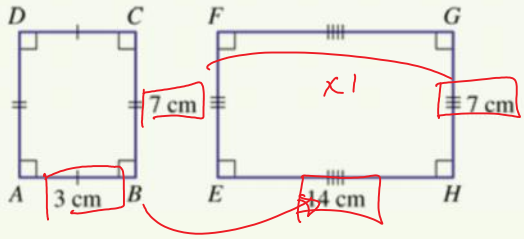
$AB = y\text{ cm}$

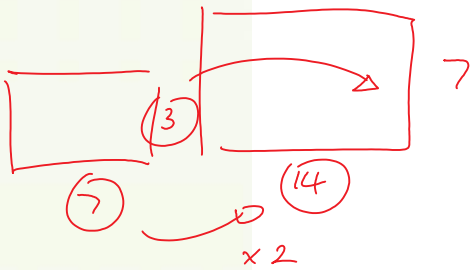
$EF = 6\text{ cm}$ $\times 3$

Example 2:

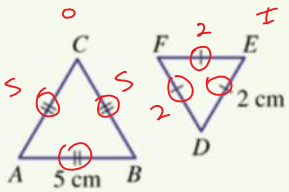
Decide if these shapes are similar by considering corresponding angles and the ratio of sides.

a





b



s.f.c = $\frac{2}{5}$