Year 7 Maths Home Learning – Transformations Unit 10

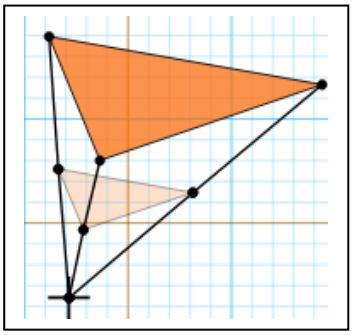
10.1 Enlargements and Scale Factors

Remember from the previous Teaching Sheet: a **transformation** is the movement of a 2-D shape around the coordinate grid – Enlargements, Reflections, Rotations, Translations.

Recap:
Reflections, rotations, translations involve **congruent shapes**.
Enlargements involve **similar shapes**.

Enlargement means making something bigger.
(or smaller, but we're focusing on the bigger for now)

Have a look at the triangles to the right.



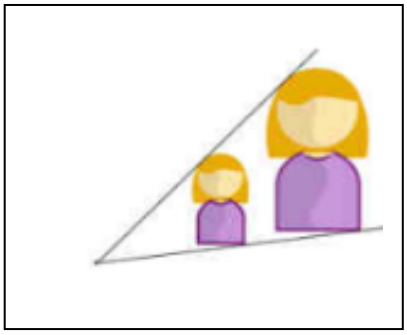
- Are you able to see that the triangles are **similar?**
- They are almost the same, just different sizes.
- The darker orange (bigger) triangle is an **enlargement** of the lighter orange (smaller) triangle.
- The angles of each triangle are exactly the same.
- But the side lengths of each triangle are different.

Congruent or Similar?

When one shape can become another using only turns, flips and/or slides, then the two shapes are **congruent.**

When we need to resize one shape to make it the same as the other, then the two shapes are **similar.** Note that we may also need to turn, flip and/or slide.

Notice how in this picture to the right the two images are **different sizes**, but still look pretty much the same.



- One is an **enlargement** of the other, and they are **similar**.
- All angles stay the same.
- Relative sizes stay the same - they stay in **proportion**.

Enlargements and Scale Factors

Enlargements, or making shapes bigger, can be done using different **scale factors**.
When we enlarge shapes, we multiply all the side lengths by the same number.
The scale factor is the number we multiply each side by.

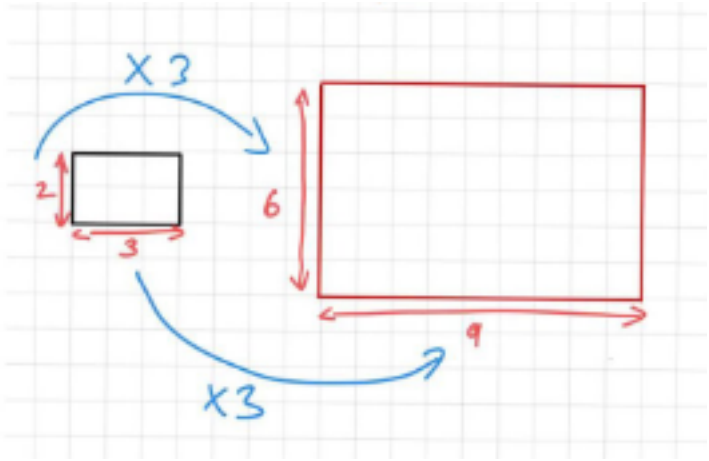
For example, if we enlarge a shape using a **scale factor** of 4, this means we increase each side length x 4. The length of each side is multiplied by 4.
The new shape is 4 times as big as the original shape.
This works the same for any number.

Enlargements Key Terms:

Enlargement – the transformation of a shape that changes the size of the original shape
Scale factor – the number that the sides of the original shape are multiplied by to create the enlarged shape
Object – the original shape that was enlarged
Image – the new enlarged shape

Let's practice!

Q1) Below you can see a small, black rectangle. This is our **object**. We are going to **enlarge** the object using a **scale factor** of 3:



Step One: Count the length of one of the sides of the original shape, the **object**.
We can see that the length of the object (black rectangle) is 3.

Step Two: Multiply this first length by the **scale factor**, in this instance it is 3. 3 x 3 = 9

Step Three: Begin to draw the new **enlarged shape**, the **image**.
In this instance it will be 9 squares long.

Repeat these steps for each side length of the original shape to draw the new shape.

Now you see the larger, red rectangle. This is our **image** – a 6 x 9 rectangle.

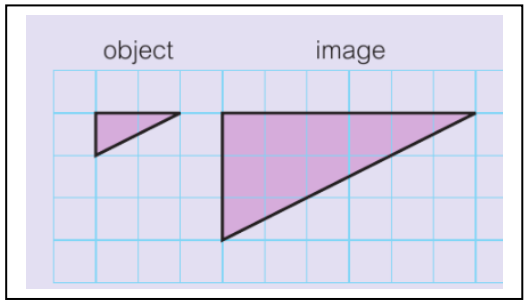
Q2) In a school play, all the props need to be 10 times their real size. A real DVD case is 15mm thick – how thick is the DVD case in the play? Give your answer in mm and cm.

Step One: Figure out what the scale factor is – in this case it is 10 (everything x 10).

Step Two: Multiply the original measurement by the scale factor of 10 – 15mm x 10 = 150mm

Step Three: Convert the answer to cm as well - 150mm = 15cm

Q3) Write the **ratio** of the length of the **object** to the corresponding length in the **image**. Give the ratio in its simplest form.

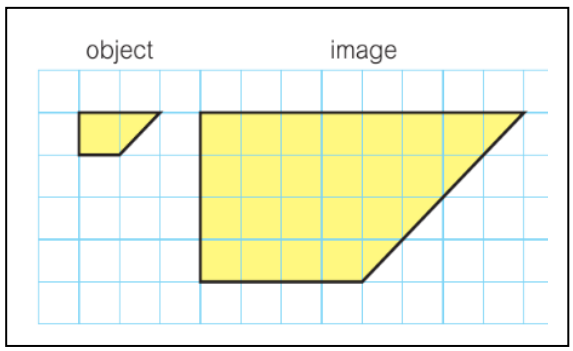


Step One: Count the length of one of the sides in both the **object** and the **image**.
The length of the top side is 2 in the object and 6 in the image.

Step Two: Put this into a ratio of object:image
This would be 2:6

Step Three: Write the ratio in its simplest form, remember it's just like simplifying a fraction. 2:6 we divide each side by 2 and this simplifies to 1:3

Q4) What is the **scale factor** of the **enlargement** shown below?



Getting Started: Now, we are given the **enlargement**, we have to work backward to find the **scale factor**.

Step One: How much bigger is the **image** compared to the **object**? Look at the top length on both shapes.
The **object** is 2 units long, the **image** is 8 units long.

Step Two: Use these two lengths to figure out how much the **object** length has been multiplied by to get the **image** length. 2 x 4 = 8 so it looks like the scale factor is 4. Let's double check by looking at another pair of sides.

Step Three: Let's look at the bottom lengths. The **object** is 1 unit, the **image** is 4 units. This works with a scale factor of 4 because 1 x 4 = 4
Therefore, the object has been enlarged by a scale factor is 4.

Now have a go at Pearson Levelled Homework Questions 10.1 ☺