

Enlargement and similar figures

Year 9 Mathematics
Mainstream

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Learning Objectives

By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- Know how to enlarge a figure using a scale factor
- Understand what enlarging a figure does to sides and angles
- Know what it means to be similar figures
- Know how to find the scale factor enlargement
- Be able to use the scale factor enlargement



RECAP

We have, in the previous lesson looked at the ideas behind congruence. This is where two figures are exactly the same shape and size. They may be rotated or reflected but they are still the same shape.

There were four congruence rules we can use to “prove” they are congruent:

- SSS
- SAS
- ASS
- RHS

But what if you take one shape and then make it bigger?



Congruence and similarity

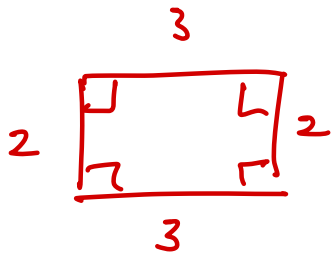
When two figures have the same size and shape, they are said to be **congruent**. This means that the shape has generally been rotated or flipped horizontally or vertically.

When one shape has been **enlarged** by a scale factor where all the sides have been multiplied by the same number, we say that it is **similar**.

It is important to note the following:

- Enlargements can be bigger and smaller than 1.
    - When the number is bigger than one the image will be larger than the original
    - When the number is smaller than one the image will be smaller than the original
- When we enlarge a shape the angles will not change in size.

angles do not change!



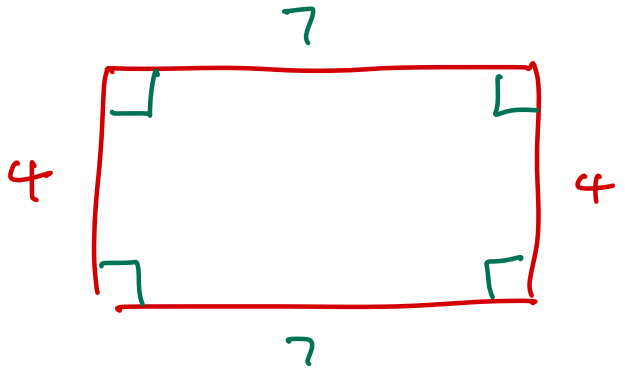


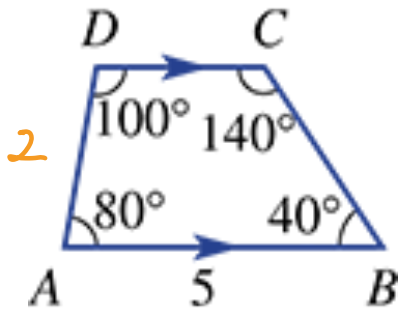


Image and original

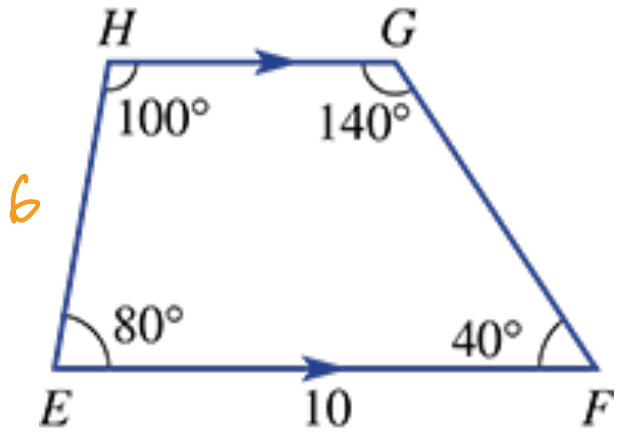
When I look in the mirror I see my **image**. It is the copy of me. It's not me.

So, when we have two shapes which I'm trying to compare in terms of a scale factor enlargement, I need to make sure I know which is the **original** and which is the **image**.

Original



Image





Scale factor

When we enlarge a shape we say it's been subject to a scale factor enlargement (even though the shape might have shrunk).

To find the scale factor enlargement we simply take the length of a side from the image and divide it by the length of the corresponding side on the image.

$$scale\ factor = \frac{image\ length}{original\ length}$$

$= \frac{8}{2} = 4$

orig

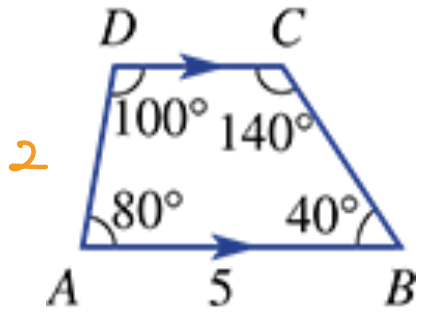
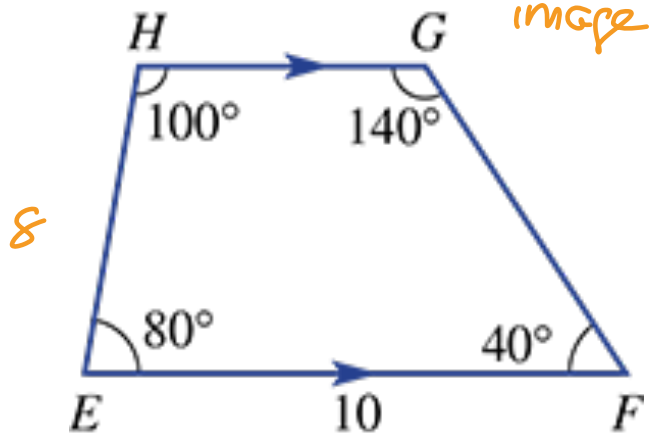


image.





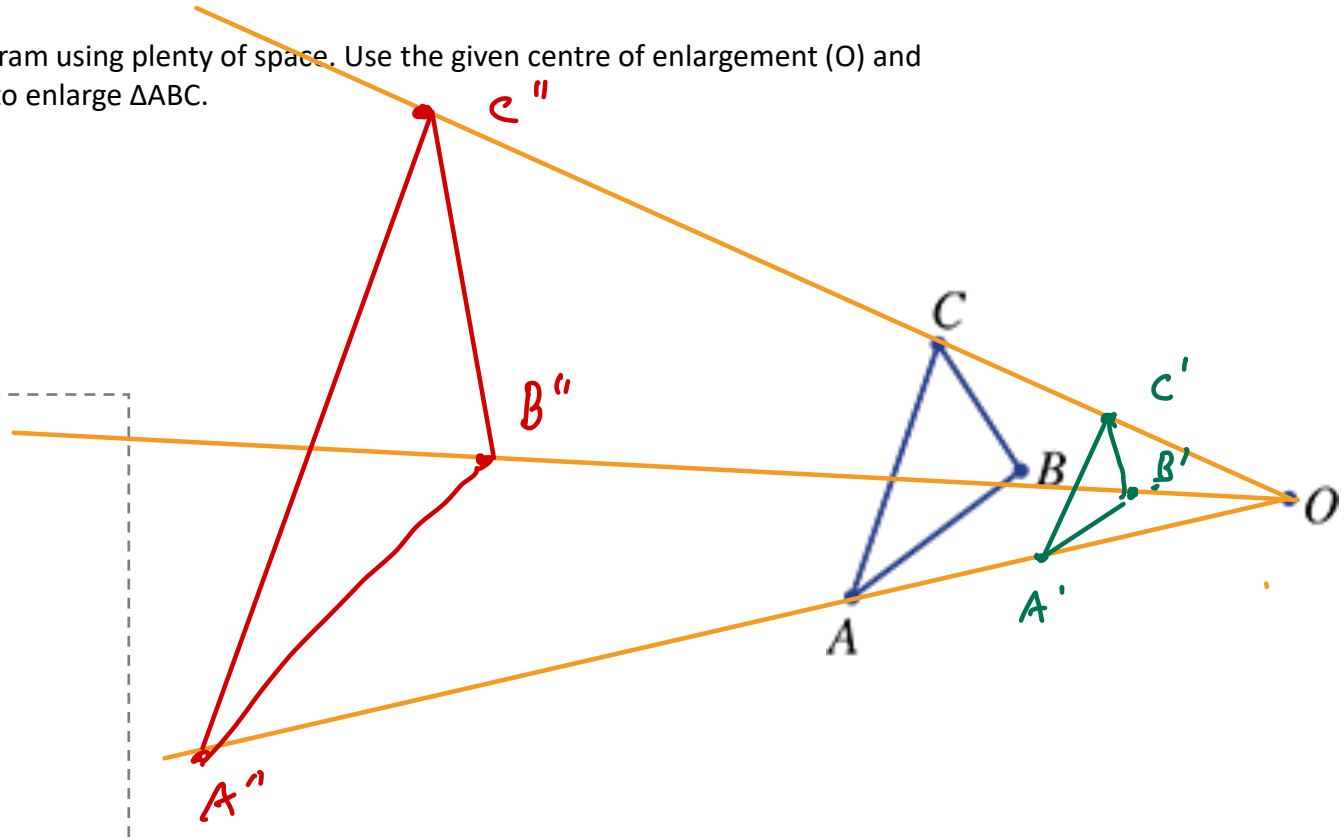
Example: Enlarging figures

There are geometric ways of enlarging figures using a very easy technique. When we enlarge something with respect to a given origin, the distance from the origin to each point on the new shape will be the scale factor times the distance to the original point.

WHAT??

Copy the given diagram using plenty of space. Use the given centre of enlargement (O) and these scale factors to enlarge ΔABC.

- Scale factor $\frac{1}{2}$
- Scale factor 3



sfe = 2

sfe = ½

A'B'C' = sfe ½

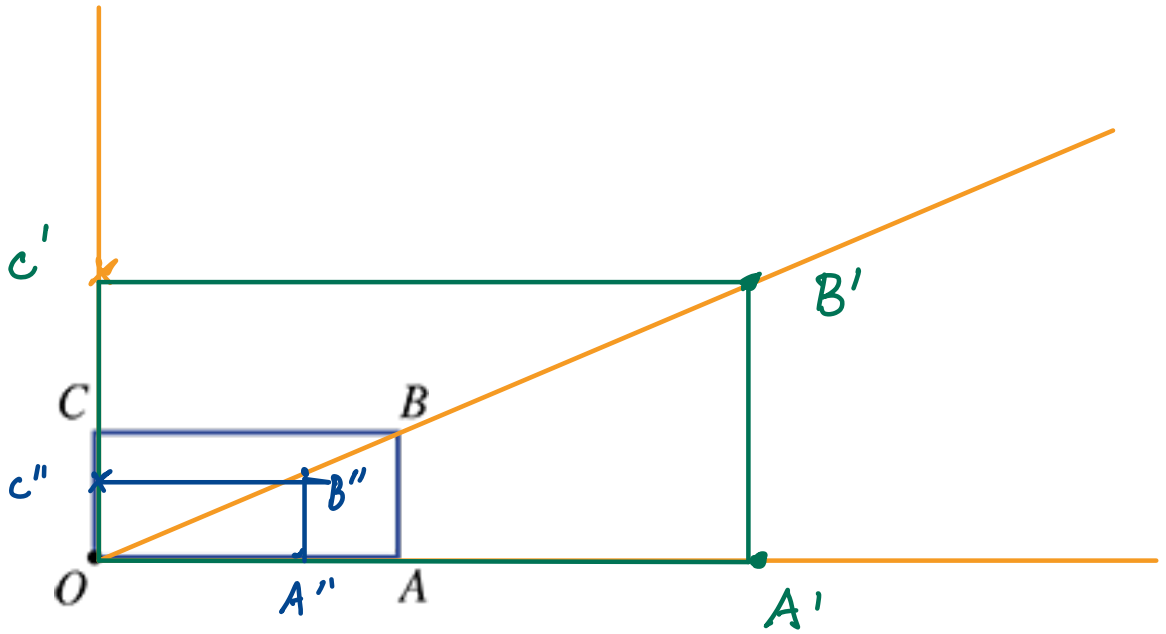
Note: This isn't going to be accurate as I'm using a computer!
You will be able to make it accurate using a ruler!



Example: Enlarging figures

Copy the given diagram using plenty of space. Use the given centre of enlargement (O) and these scale factors to enlarge the shape.

- Scale factor 2
- Scale factor $\frac{2}{3}$



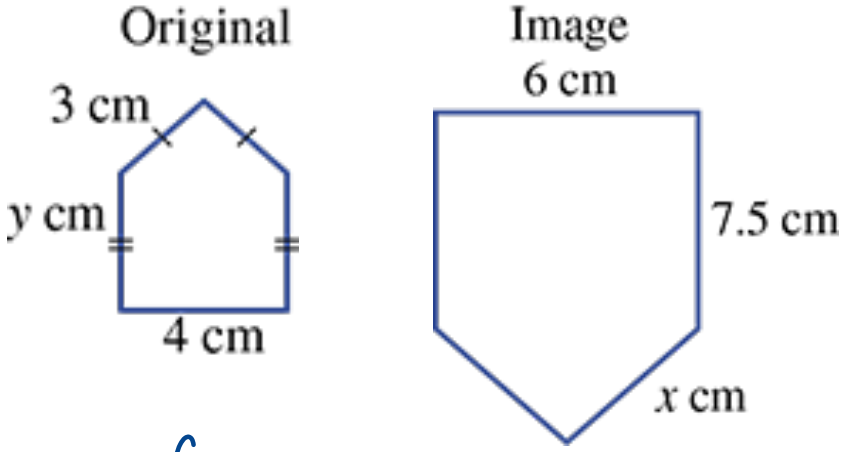


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Example: Using the scale factor

These figures are similar.

- Find a scale factor.
- Find the value of x.
- Find the value of y.



$$\text{sfe} = \frac{\text{image}}{\text{original}} = \frac{6}{4} = 1.5$$

$$y = \frac{7.5}{1.5} = 5\text{ cm}$$

$$x = 3 \times 1.5 = 4.5\text{ cm}$$



Questions to complete:

The questions I would like you to complete for this lesson are:

Exercise 7F Enlargement and similar figures
Questions: 2, 3, 4, 5, 7, 9, 10,

Extension: None





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