

Transformations: An Introduction to Enlargements

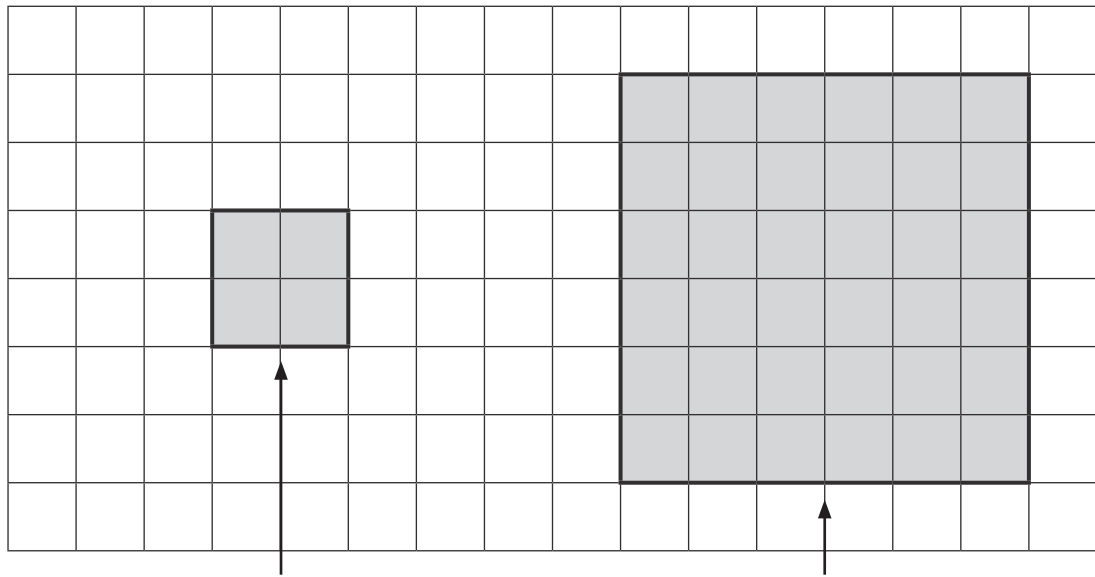
An enlargement alters the size of a shape. The original shape in an enlargement is called the **object** and the enlarged version of the object is called the **image**.

You enlarge an object by multiplying its dimensions by a **scale factor**. The scale factor for an enlargement tells you how many times longer the sides of the image are, compared to the sides of the object. For example, a scale factor of 4 means you multiply each side length by 4. The image will be **4 times** bigger than the object.

The object and the image in an enlargement are **similar**. They are the same shape, but a different size.

Example 1

The larger square below is an enlargement of the smaller one.



The length of each side of the square is 2.

The length of each side of this square is 6.

If we were to divide 6 by 2, we would find the scale factor.

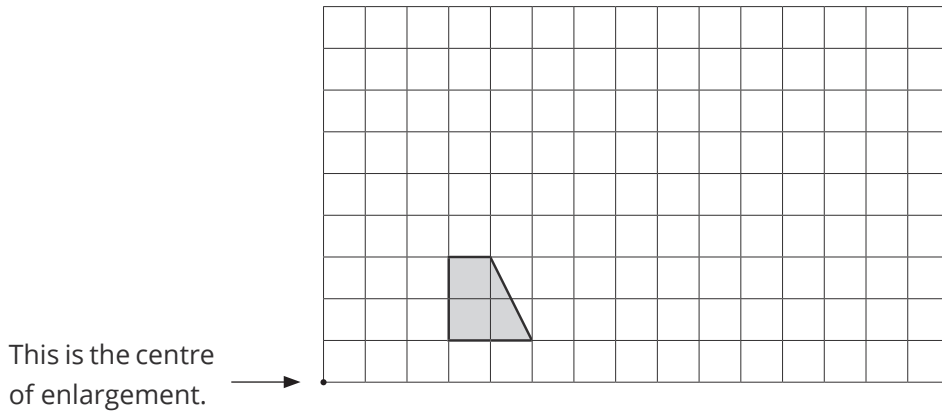
$$6 \div 2 = 3$$

This means the new square is three times larger than the original square, so we would say, 'it is an enlargement with scale factor 3'.

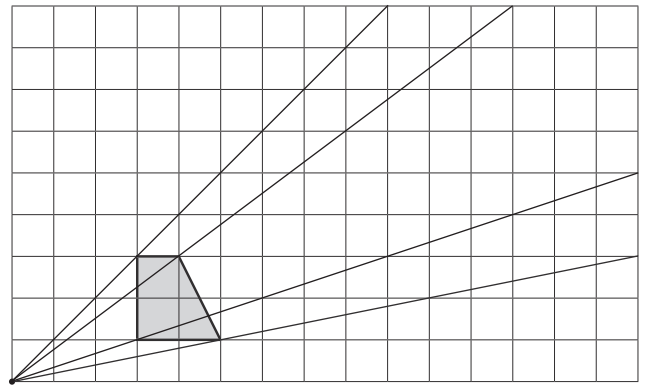
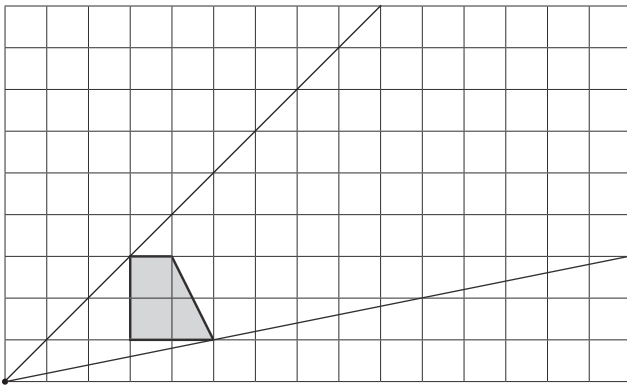
Sometimes, when you enlarge a shape, you will use a **centre of enlargement**. If this is the case, the position of the image is fixed.

Example 2

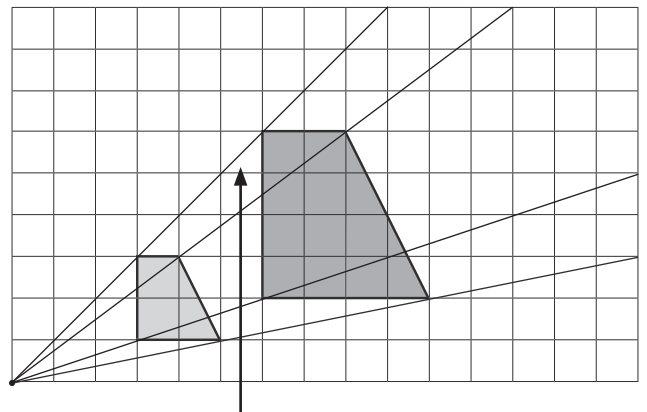
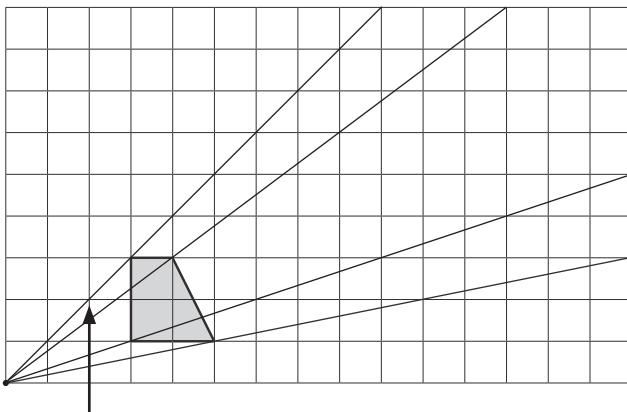
Draw the enlargement of the shape using a scale factor of 2 and the marked centre of enlargement.



To draw the enlargement, begin by drawing rays (lines - using a sharp pencil!) from the centre of enlargement through each corner of the shape.



Measure the distance from the centre to a corner of the object. Multiply this by the scale factor and mark the new corner of the image. You should **always** measure from the centre of enlargement, not the corner of the object.

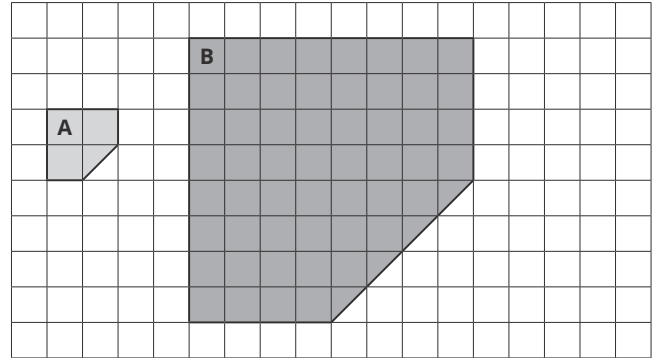
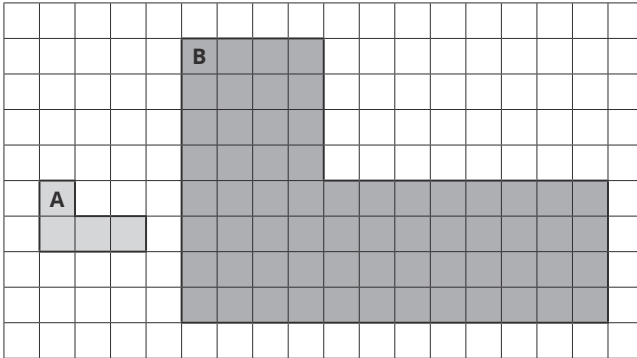
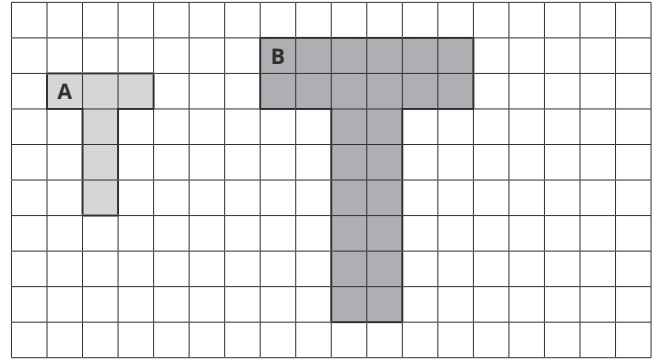
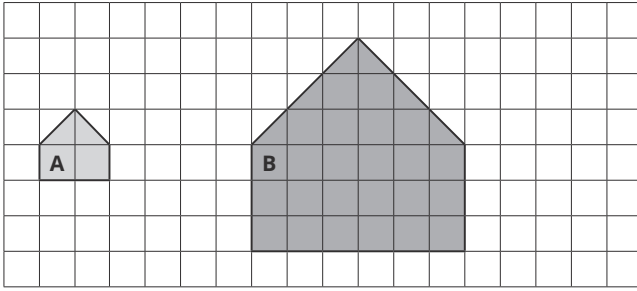
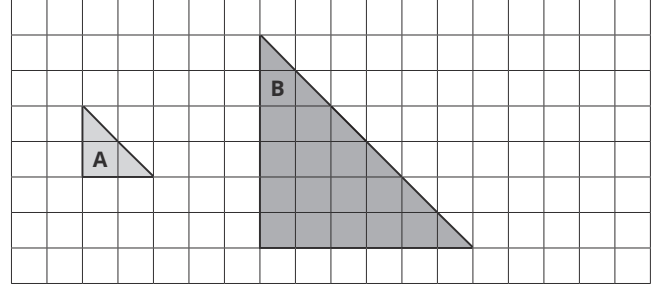
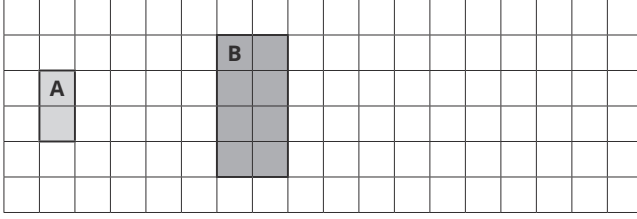


Here, we can see the ray has gone through 3 squares diagonally, from the centre of enlargement to the corner of the object. As we are enlarging by a scale factor of 2, this will be a distance of 6 from the centre of enlargement to the corner of the enlarged image.

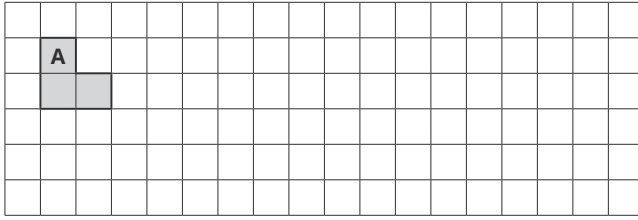
Repeat for each corner and draw in the lines of the new shape using a ruler. Notice how the image is **twice** as big as the object and also **twice** as far away from the centre of enlargement.

Your Turn

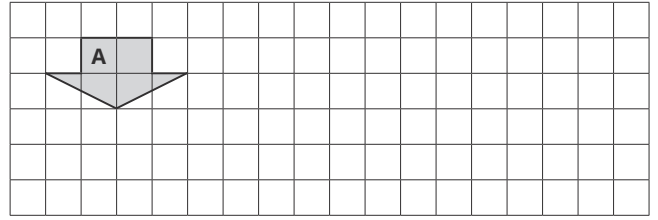
- For each question, identify the scale factor which has been used to enlarge shape A to shape B.



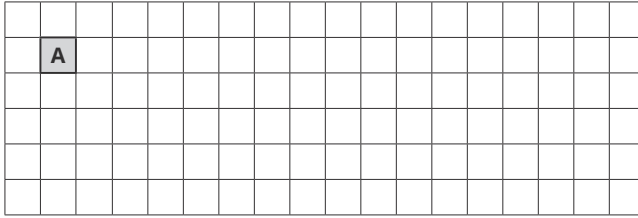
2. Enlarge each shape by the given scale factor.



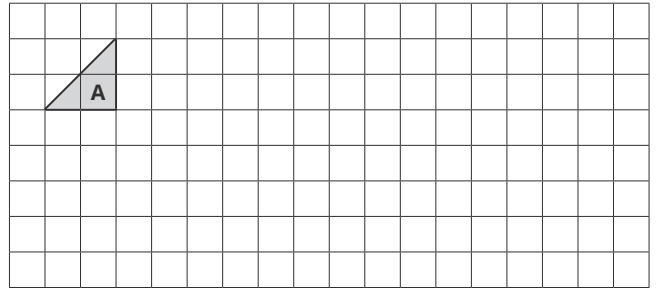
Scale Factor 2



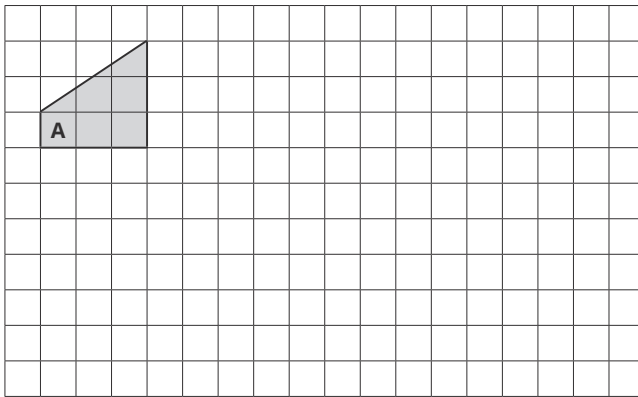
Scale Factor 2



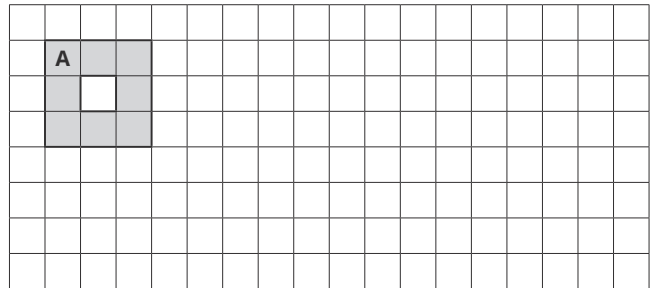
Scale Factor 4



Scale Factor 3

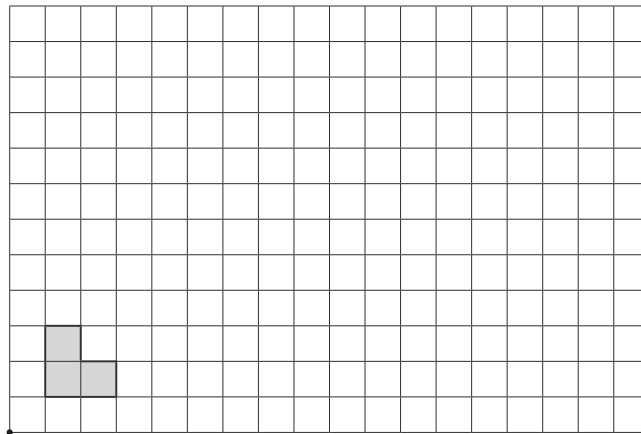


Scale Factor 3

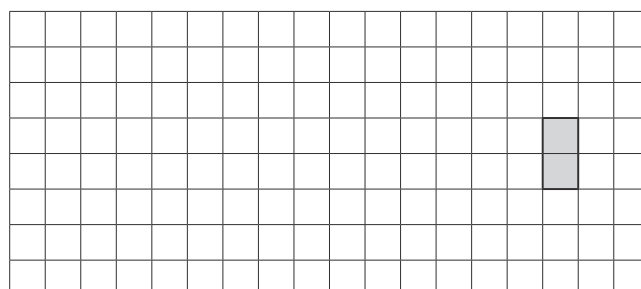


Scale Factor 2

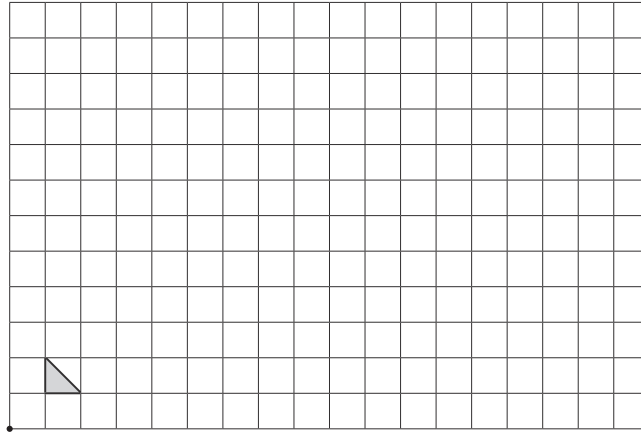
3. Draw the enlargement of the shape using scale factor 3 and the marked centre of enlargement.



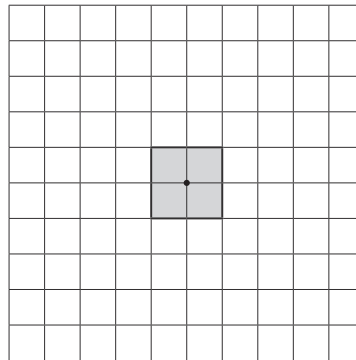
4. Draw the enlargement of the shape using scale factor 2 and the marked centre of enlargement.



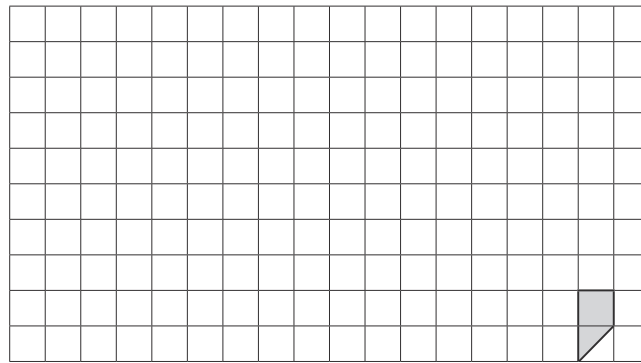
5. Draw the enlargement of the shape using scale factor 3 and the marked centre of enlargement.



6. Draw the enlargement of the shape using scale factor 4 and the marked centre of enlargement.



7. Draw the enlargement of the shape using scale factor 3 and the marked centre of enlargement.



Challenge

Enlarge the rectangle by scale factor 2 using (0, 0) as the centre of enlargement.

