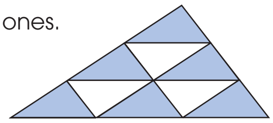
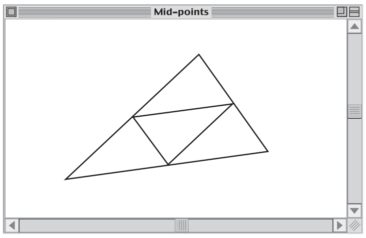
As outcomes, Year 8 pupils should, for example:

Explore some practical activities leading to consideration of enlargement. For example:

- Build triangles into bigger ones.



- Use **dynamic geometry software** to draw a triangle. Join the mid-points of the sides. Observe the effect as the vertices of the original triangle are dragged. Describe the resulting triangles.



From practical work, appreciate that an enlargement has these properties:

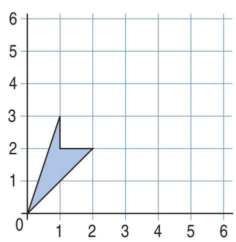
- An enlargement preserves angles but not lengths.
- The centre of enlargement, which can be anywhere inside or outside the figure, is the only point that does not change its position after the enlargement.

Discuss common examples of enlargement, such as photographs, images projected from slide or film, images from binoculars, telescopes or microscopes.

Know that when describing an enlargement the centre of enlargement and the scale factor must be stated.

Enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor. For example:

- Draw a simple shape on a coordinate grid. Take the origin as the centre of enlargement. Enlarge the shape by a whole-number scale factor.



Relate the coordinates of the enlargement to those of the original.

Link to ratio and proportion (pages 78–81).

As outcomes, Year 9 pupils should, for example:

Describe and classify some common examples of reductions, e.g. maps, scale drawings and models (scale factors less than 1).

Recognise how enlargement by a scale factor relates to multiplication:

- Enlargement with scale factor k relates to multiplication by k.
- The inverse transformation has scale factor $\frac{1}{k}$ and relates to multiplication by $\frac{1}{k}$.
- The terms 'multiplication' and 'enlargement' are still used, even when the multiplier or scale factor is less than 1.
- Two successive enlargements with scale factors k_1 and k_2 are equivalent to a single enlargement with scale factor k_1k_2.

Understand that enlargements meet the necessary conditions for two shapes to be mathematically similar, i.e. corresponding angles are equal and corresponding sides are in the same ratio.

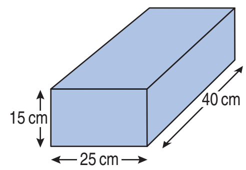
Understand the implications of enlargement for area and volume.
Know that if a shape is enlarged by a scale factor k, then its area (or surface area) is enlarged by scale factor k^2 and its volume by scale factor k^3.

For example:

- Find the area covered by the standard angular person's head (see page 213), and the areas covered by enlargements of it. Tabulate results and compare scale factors for length and for area. Confirm that the scale factor for area is equal to the square of the scale factor for length.

- Start with a unit cube or a simple cuboid, enlarge it by a chosen scale factor and compare with the scale factors for surface area and volume.

- Find the surface area and volume of this cuboid.



  Find the surface area and volume after you have:
  a. doubled its length;
  b. doubled both its length and its width;
  c. doubled each of its length, width and height.

  What are the relationships between the original and the enlarged surface area and volume?

Appreciate some of the practical implications of enlargement, e.g. why a giant would tend to overheat and find standing upright rather painful.

Link to ratio and proportion (pages 78–81), and similarity (pages 192–3).