

Maths Knowledge Organiser

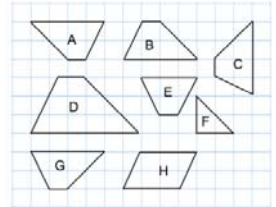
Year 10 (H) Similarity and Congruency



Congruency

Angles are congruent when they are the same size.
Sides are congruent when they are the same length
Shapes are congruent when all angles and sides are the same

All reflection, rotations and translations are congruent
Shape B, C and G are congruent



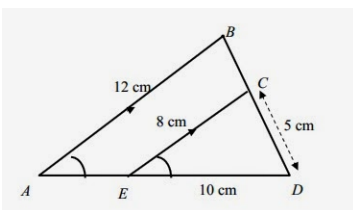
Similarity

Two geometrical objects are called **similar** if they both have the same shape, or one has the same shape as the mirror image of the other. More precisely, one can be obtained from the other by uniformly scaling (enlarging or reducing), possibly with additional translation, rotation and reflection

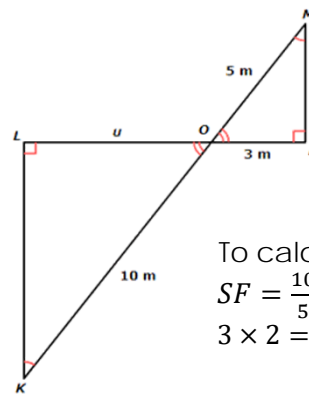
Similar shapes - lengths

Always divide 2 corresponding values to find the scale factor then

- Multiply by it to find a larger value
- Divide by it to find a smaller value



To calculate the length BC
 $SF = \frac{12}{8} = 1.5$
 $5 \times 1.5 = 7.5$
 $7.5 - 5 = 2.5\text{cm}$

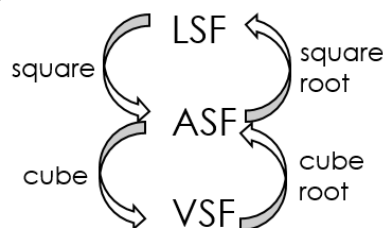


To calculate the length L
 $SF = \frac{10}{5} = 2$
 $3 \times 2 = 6\text{cm}$

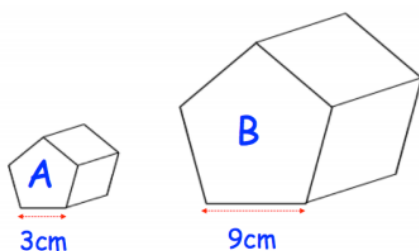
Similar shapes - lengths, area and volumes

When a problem involves length, area and volume you may have to change the scale factor. Divide as before but then change it

LSF = length scale factors
ASF = area scale factors
VSF = volume scale factor



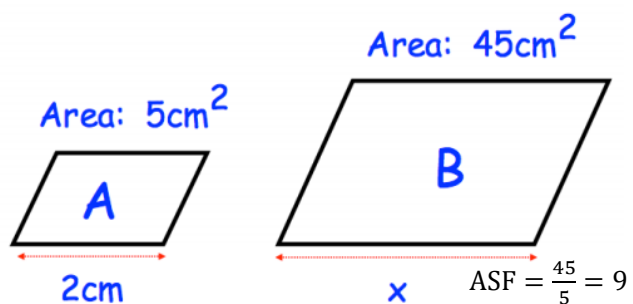
Below are two similar pentagonal prisms.



The volume of prism A is 15cm^3
Work out the volume of prism B.

$$\begin{aligned} \text{LSF} &= \frac{9}{3} = 3 \\ \text{VSF} &= 3^3 = 27 \\ 15 \times 27 &= 405\text{cm}^3 \end{aligned}$$

Shown below are two mathematically similar parallelograms.



Find x

$$\begin{aligned} \text{ASF} &= \frac{45}{5} = 9 \\ \text{LSF} &= \sqrt{9} = 3 \\ 2 \times 3 &= \text{cm} \end{aligned}$$