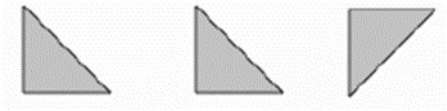
Year 11 foundation topic 19 Similarity, congruence and vectors

Congruent triangles

Shapes are congruent if they are identical - same shape and same size.

Shapes can be rotated or reflected but still be congruent.

Eg.



What careers would use these skills?

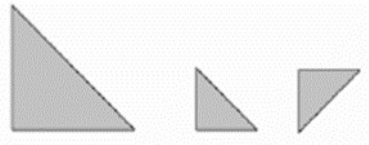
Cartographers, architects, surveying technicians, roofers, construction managers, farmers.

Similar shapes

Shapes are similar if they are the same shape but different sizes.

The proportion of the matching sides must be the same, meaning the ratio of corresponding sides are all equal.

The corresponding angles in similar shapes are the same, one shape is an enlargement of the other.

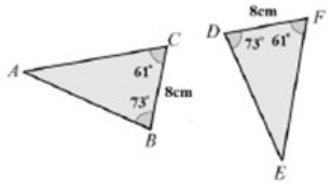


You can calculate a scale factor to find missing lengths.

Conditions for congruent triangles

4 ways of proving that two triangles are congruent:

1. SSS (Side, Side, Side)
2. RHS (Right angle, Hypotenuse, Side)
3. SAS (Side, Angle, Side)
4. ASA (Angle, Side, Angle) or AAS



$BC = DF$

$\angle ABC = \angle EDF$

$\angle ACB = \angle EFD$

$\therefore$ The two triangles are congruent by AAS.

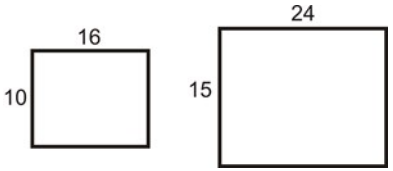
ASS doesn't prove congruency!

Finding the scale factor for similar shapes

The scale factor is the number you multiply the length by to get the corresponding length on the other shape.

To find a scale factor, divide a length on one shape by the corresponding length on a similar shape.

Eg. Scale factor = 15 ÷ 10 = 1.5



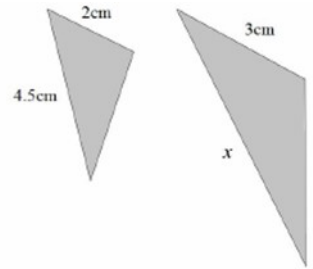
Finding missing lengths in similar shapes

1. Find the scale factor of enlargement
2. 2. Multiply or divide the corresponding side to find a missing length.

If finding a missing length on the larger shape, multiply.

If you are finding a missing length on the smaller shape, divide.

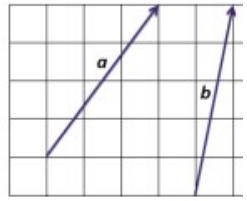
Eg.
Scale factor = 3 ÷ 2
= 1.5
x = 4.5 x 11.5
= 6.75cm



Represent vectors graphically

The top number tells us how far right along in the direction of the x axis

The bottom number tells us how far up in the direction of the y axis



$\boldsymbol{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\boldsymbol{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

$\begin{pmatrix} 3 \\ 4 \end{pmatrix}$ means '3 right, 4 up'

Vector addition

$$\begin{pmatrix} 3 \\ 4 \end{pmatrix} + \begin{pmatrix} 1 \\ 5 \end{pmatrix} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$$

Vector subtraction

$$\begin{pmatrix} 3 \\ 4 \end{pmatrix} - \begin{pmatrix} 1 \\ -2 \end{pmatrix} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$$