

### 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.



## Year 10 higher topic 12 Similarity and congruence

What careers would use these skills?

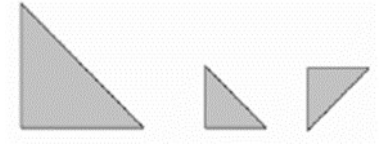
Cartographers, architects, surveying technicians, roofers, construction managers, farmers.

### 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.

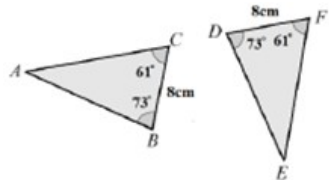


You can calculate a scale factor to find missing lengths.

### 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.

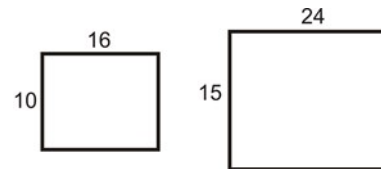
ASS doesn't prove congruency!

### 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 =  $15 \div 10 = 1.5$



### Finding missing lengths in similar shapes

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

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

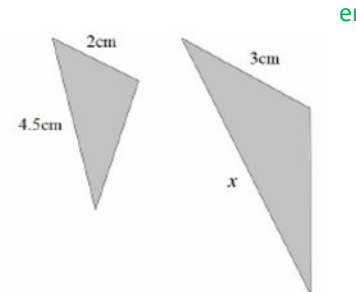
If you are finding a missing length on the small-shape, divide.

Eg.

$$\text{Scale factor} = 3 \div 2 = 1.5$$

$$x = 4.5 \times 1.5$$

$$= 6.75\text{cm}$$

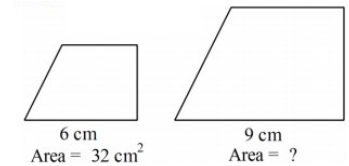


### Area scale factors

If the length scale factor is k, the area scale factor is  $k^2$ .

Eg.

$$\text{Length SF} = 9 \div 6 = 1.5$$

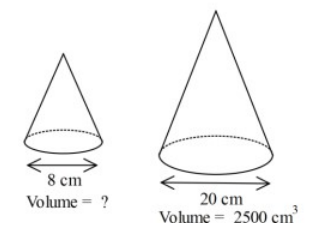


### Volume scale factors

If the length scale factor is k, the area scale factor is  $k^3$ .

Eg.

$$\text{Length SF} = 20 \div 8 = 2.5$$



$$\text{Volume SF} = 2.5^3$$