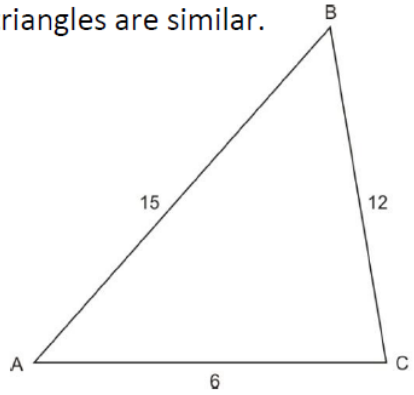
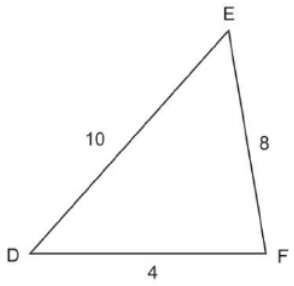
Similar Triangles

Theorem 1 – Side Side Side (SSS)

If the scale factor or ratio between all three corresponding sides is the same, the triangles are similar.





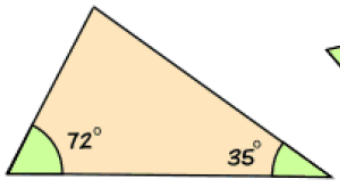
$$K = \frac{DE}{AB} = \frac{10}{15} = \frac{2}{3}$$

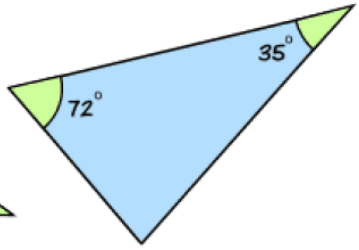
$$K = \frac{EF}{BC} = \frac{8}{12} = \frac{2}{3}$$

$$K = \frac{DF}{AC} = \frac{4}{6} = \frac{2}{3}$$

Theorem 2 – Angle Angle (AA)

If a pair of triangles have two angles in common, they are similar.





*Note – the sum of the interior angles in a triangle must add up to 180°

Therefore if two of the angles are the same, the 3rd is automatically the same

Theorem 3 – Side Angle Side (SAS)

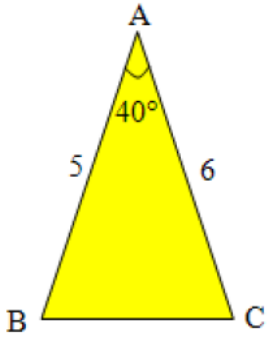
If one of the angles is the same in both triangles, and the ratio or scale factor between the two sides that form the angle (sandwich the angle) is the same, the two triangles are similar.

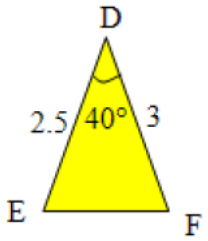
3 Checks:

$$k = \frac{AB}{DE} = \frac{5}{2.5} = 2$$

Angle A = Angle D

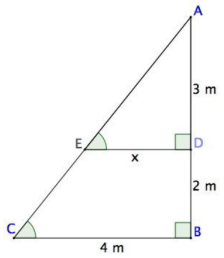
$$k = \frac{AC}{DF} = \frac{6}{3} = 2$$





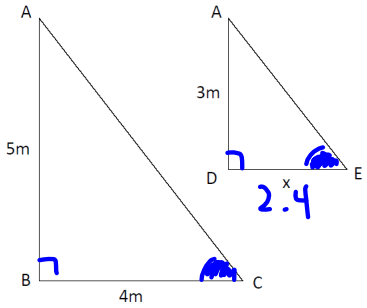
Finding Missing Measurements

Example 1: Solve for x



If the two triangles are inside each other, always start by drawing them separately!

Step 1: Re-Draw



Step 2: Set up a proportion to find x.

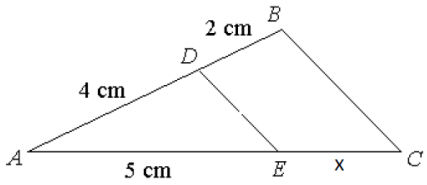
Corresponding sides

$\frac{x}{4} = \frac{3}{5}$

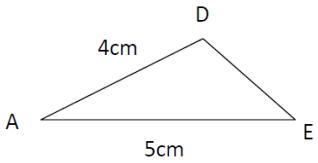
$\frac{5x}{5} = \frac{12}{5}$

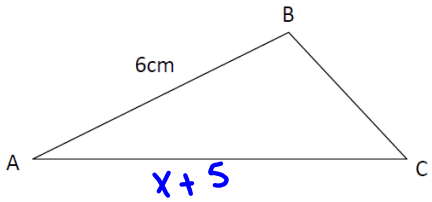
$x = 2.4$

Example 2: Find side EC.



Step 1: Re-draw





Step 2: Now Solve

$\frac{(x+5)}{5} = \frac{6}{4}$

$4(x+5) = 30$

$4x + 20 = 30$

$\frac{4x}{4} = \frac{10}{4}$

$x = 2.5$