

Chapter 7 – Similar Triangles and Trigonometry

7.1 Congruence and Similarity in Triangles

Remember: Triangles are **congruent** if they are exactly the same.

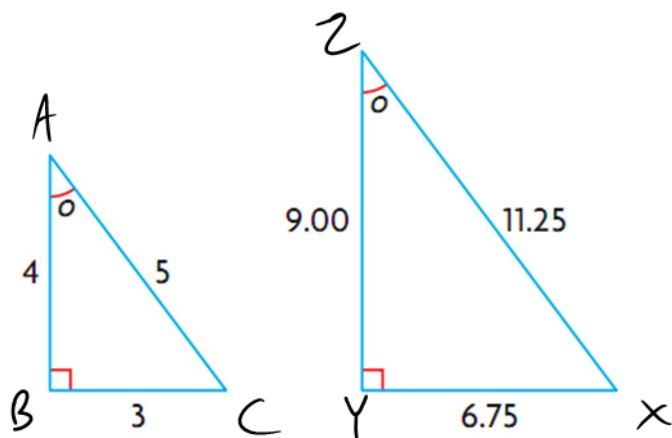
Proof: $SAS \cong$, $SSS \cong$, $ASA \cong$

Triangles are **similar** if they are the ^{same} shape, different size

Proof: $AA \sim$, $SAS \sim$, $SSS \sim$

Example 7.1.1

Show the given triangles are similar, and find the “stretch factor”. (Label the angles on each triangle).



$$\begin{array}{l} \frac{9}{4} = 2.25 \\ \frac{6.75}{3} = 2.25 \\ \frac{11.25}{5} = 2.25 \end{array}$$

Sides are
proportional
 $SSS \sim$

why?

$$\angle A = \angle Z \text{ (given)}$$

$$\angle B = \angle Y \text{ (given)}$$

$$\therefore \triangle ABC \sim \triangle ZYX \text{ (AA)}$$

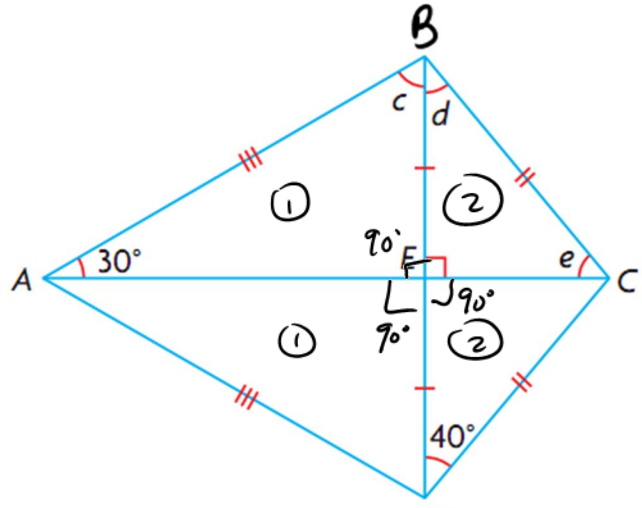
Stretch factor

$$\frac{9}{4} = 2.25$$

So, $\triangle ZYX$ is 2.25 times bigger than $\triangle ABC$

Example 7.1.2

Determine two sets of congruent triangles. Give reasons for congruence! Determine the unknowns. Give reasons!



$$d = 40^\circ (\approx \Delta's)$$

$$\begin{aligned} C &= 60^\circ \rightarrow 180 - 90 - 30 \text{ (ASTT)} \\ e &= 50^\circ \rightarrow 180 - 90 - 40 \text{ (ASTT)} \end{aligned}$$

→ sum of a Δ

- (1) $AB = AD$ (given)
 $BE = DE$ (given)
 $AE = AE$ (same)
 $\triangle ABE \cong \triangle ADE$ (SSS $\cong$)
- (2) $BE = DE$ (given)
 $DC = BC$ (given)
 $EC = EC$ (same)
 $\triangle BEC \cong \triangle DEC$ (SSS $\cong$)

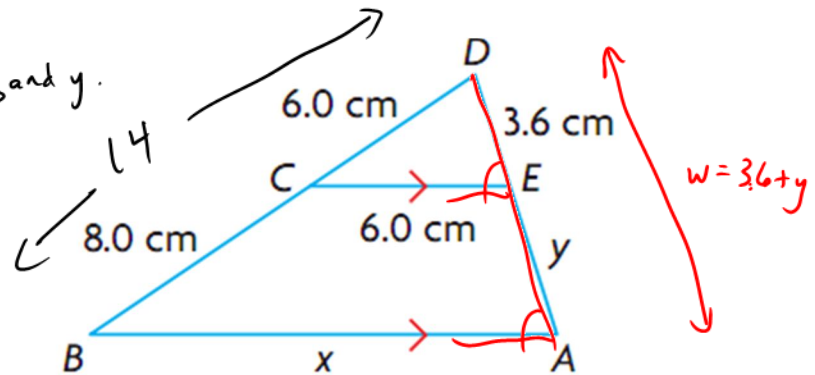
Example 7.1.3

Show $\triangle ABD \sim \triangle ECD$. Solve for x and y .

$$\angle O = \angle O \text{ (same)}$$

$$\angle E = \angle A \text{ (F. pattern)}$$

$$\frac{AA \sim}{\underline{\underline{\quad}}} \quad \frac{6}{x} = \frac{6}{14}$$
$$84 = 6x$$
$$\boxed{14 \text{ cm} = x}$$



$$\frac{3.6}{w} = \frac{6}{14}$$

$$\frac{50.4}{6} = \frac{6w}{6}$$

$$8.4 \text{ cm} = w$$

$$y = 8.4 - 3.6 = \boxed{4.8 \text{ cm}}$$