

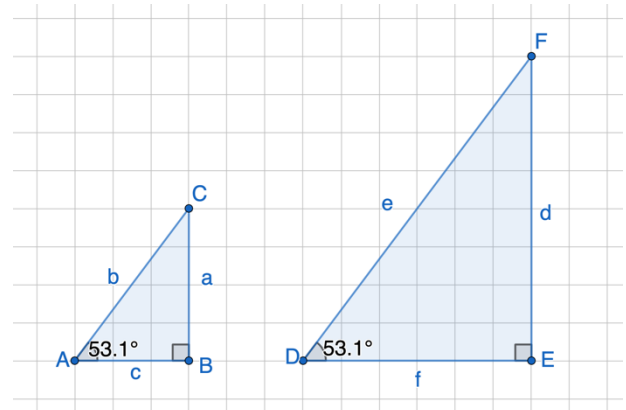
Congruent figures have the exact same shape AND size.

Similar figures have identical shapes, but different sizes.

Part 1: Properties of Similar Triangles

If $\triangle ABC$ is similar to $\triangle DEF$:

- The corresponding angles are equal
 - $\angle A = \angle D, \angle B = \angle E, \angle C = \angle F$
- Ratios of corresponding sides are equal
 - $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$



From the diagram we can verify these properties:

Corresponding angles are equal $\rightarrow 53.1^\circ = 53.1^\circ, 90^\circ = 90^\circ, 36.9^\circ = 36.9^\circ$

Ratios of corresponding sides are equal $\rightarrow \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$

Part 2: Proving Triangles are Similar

There are 3 ways to prove triangles are similar:

- 1) Angle Angle similarity (2 angles are equal)

Note: If 2 pairs of angles are equal, the 3rd pair must be equal as well

- 2) Side Side Side similarity (all ratios of sides are equal)

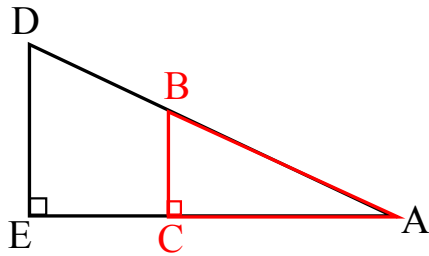
- 3) Side Angle Side similarity (2 ratios of sides and 1 angle are equal)

If you can prove any of those 3 scenarios, it proves the triangles are SIMILAR meaning they are the exact same shape but not necessarily the same size.

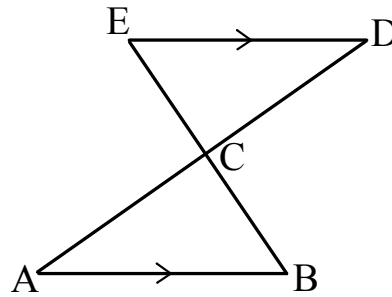
Note: When you write a similarity statement, the order of the vertices must correctly identify pairs of equal angles and pairs of corresponding sides.

Example 1: Prove the following triangles are similar

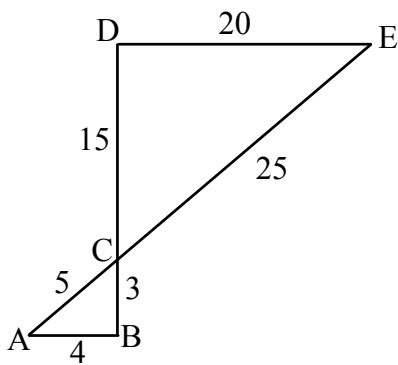
a)



b)

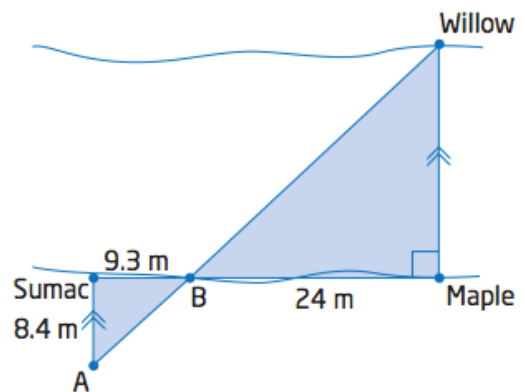


c)

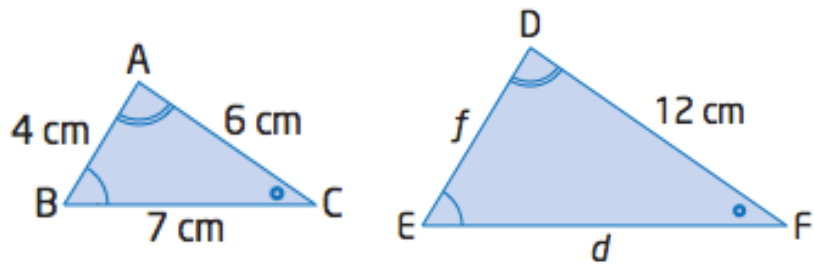


Part 3: Use Similar Triangles to Solve Problems

Example 2: To determine the width of a river, Naomi finds a willow tree and a maple tree that are directly across from each other on opposite shores. Using a third tree on the shoreline, Naomi plants two stakes, A and B, and measures the distances shown. Find the width of the river using the information Naomi found.



Example 3: The following triangles are similar; find the unknown side lengths.



Example 4: Solve for the length of x .

