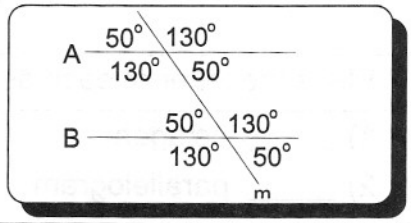
Unit 30 Parallel Lines, Similar Triangles, and Congruent Triangles

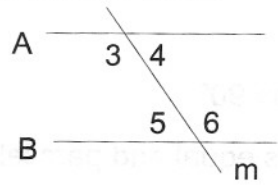
1. Parallel lines are lines that never intersect.

   A. A **transversal** is a line that intersects other lines.

   B. Many pairs of **equal angles** are formed when parallel lines are crossed by a transversal.

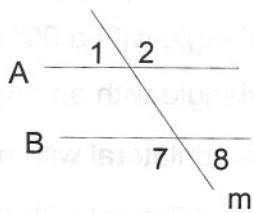


Alternate interior angles are on opposite sides of the transversal and are inside the parallel lines.



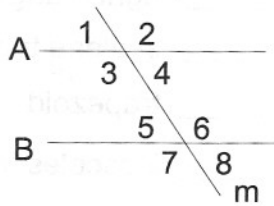
$\angle 3 = \angle 6$ $\angle 4 = \angle 5$

Alternate exterior angles are on opposite sides of the transversal and are outside the parallel lines.



$\angle 1 = \angle 8$ $\angle 2 = \angle 7$

Corresponding angles are on the same side of the transversal with one outside and one inside the parallel lines.



both on left: $\angle 1 = \angle 5$, $\angle 3 = \angle 7$

both on right: $\angle 2 = \angle 6$, $\angle 4 = \angle 8$

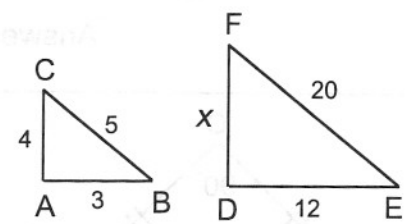
2. **Similar triangles** have the same shape. (symbol: ~)

   A. They have corresponding angles that are equal (**AAA**).

   B. They have corresponding sides that are in proportion.

   C. A proportion may be used to find one unknown side of similar triangles.

   $\Delta ABC \sim \Delta DEF$ and AC and DF are corresponding sides. To find side DF of ΔDEF:



since $\Delta ABC \sim \Delta DEF$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

$$\frac{3}{12} = \frac{4}{DF}$$

$$3(DF) = (12)(4)$$

$$3(DF) = 48$$

$$DF = 16$$

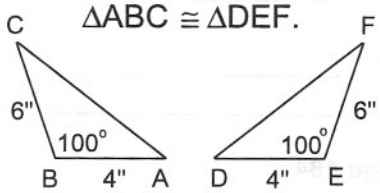
3. **Congruent triangles** have both the same size and the same shape. (symbol ≅)

   A. They have two sides and their included angle **(SAS)** equal.

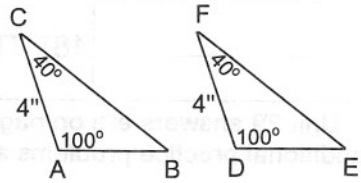
   B. They have two angles and their included side **(ASA)** equal.

   C. They have corresponding sides **(SSS)** equal.

If 2 sides and their included angle are equal (**SAS**) then $\Delta ABC \cong \Delta DEF$.



If 2 angles and their included side are equal **(ASA)** then $\Delta ABC \cong \Delta DEF$.



If 3 sides are equal **(SSS)** then $\Delta ABC \cong \Delta DEF$.