4 Similar Triangles

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Math 9
Section 7.4 – Similar Triangles

Date: _____

Learning Outcomes Covered:
7F: I can determine if two triangles are similar.

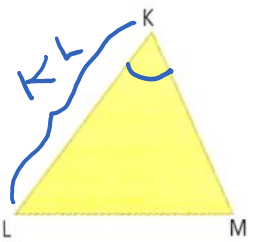
Definition: When one shape is an enlargement or a reduction of another, the shapes are similar. We use the following symbol to indicate **similarity:** ≃

If two triangles are similar then either:

(a) corresponding angles are equal.

(b) corresponding lengths are proportional.

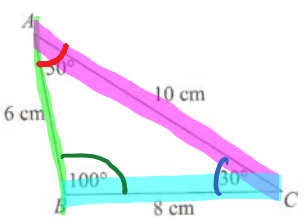
How to name angles and sides:

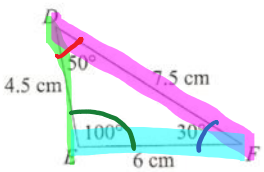


1. That **angles** can be named in two ways: ∠LKM
   - Use 3 capital letters. The middle letter is the vertex of the angle.
   - Use only the middle letter identifying the vertex. ∠K

2. **Sides** are named with the 2 letters that make up that side. (usually alphabetically).

For the following triangles, identify the corresponding side and angles. Write the ratio of corresponding sides in their lowest terms. State whether or not the triangles are similar.





Solution:

1. Identify the corresponding sides:

   AB corresponds to DE

   BC corresponds to EF

   AC corresponds to DF

2. Identify the corresponding angles:

   ∠A corresponds to ∠D

   ∠B corresponds to ∠E

   ∠C corresponds to ∠F

2. Write the ratio of corresponding sides in lowest terms.

When setting up the ratios, start by placing one triangle's corresponding sides in the numerator and the other triangle's corresponding sides in the denominator.

$\frac{\text{first triangle}}{\text{second triangle}} \rightarrow \frac{AB}{DE} = \frac{6}{4.5} = 1.\overline{3}$

$\frac{BC}{EF} = \frac{8}{6} = 1.\overline{3}$

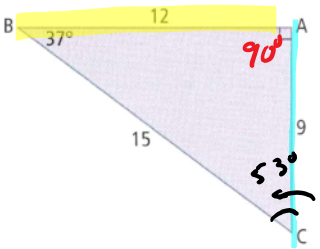
$\frac{AC}{DF} = \frac{10}{7.5} = 1.\overline{3}$

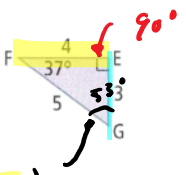
Therefore, $\triangle ABC \overset{\text{"is similar"}}{\approx} \triangle DEF$

because corres ∠'s are equal
corresponding sides are proportional

180°

Example 1: Determine if ΔABC is similar to ΔEFG.





$\angle A = \angle E = 90°$

$\angle B = \angle F = 37°$

$\angle C = \angle G = 53°$

corres. $\angle$'s are equal

$180° - 37° - 90° = 53°$

Therefore $\Delta ABC \sim \Delta EFG$

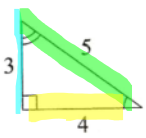
OR $\frac{AB}{EF} = \frac{12}{4} = 3$ $\frac{AC}{EF} = \frac{9}{3} = 3$ $\frac{BC}{FG} = \frac{15}{5} = 3$

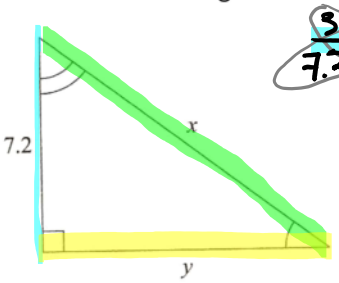
corresponding sides are proportional

$\Delta ABC \sim \Delta EFG$

If you know triangles are similar, you can use the **proportion** of corresponding sides to help determine an unknown dimension.

Example 2: In the **similar triangles** below, solve for the missing sides x and y.





$\frac{3}{7.2} = \frac{5}{x}$

$\frac{3x}{3} = \frac{5(7.2)}{3}$

$x = 12$ units!

Solution:
Identify the corresponding side ratios:

$\frac{3}{7.2} = \frac{4}{y}$

$\frac{3y}{3} = \frac{4(7.2)}{3}$

$y = 9.6$ units

You can now solve for each variable by creating equations with these fractions.

Assignment: Sec 7.4, p. 348, ☆ #1, ☆☆ 4, 5, 6.