6.4 Similar and Congruent Figures

Goal: Identify similar and congruent figures.

Vocabulary

Similar figures:

Corresponding parts:

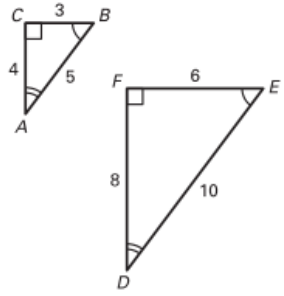
Congruent figures:

When naming similar figures, list the letters of the corresponding vertices in the same order. For the diagram at the right, it is not correct to say $\triangle CBA \sim \triangle EFD$, because $\angle C$ and $\angle E$ are not corresponding angles.

Properties of Similar Figures

$\triangle ABC \sim \triangle DEF$

The symbol $\sim$ indicates that two figures are similar.



1. Corresponding angles of similar figures are congruent.

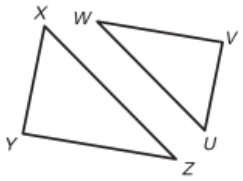
   $\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$

2. The ratios of the lengths of corresponding sides of similar figures are equal.

   $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{1}{2}$

Example 1 *Identifying Corresponding Parts of Similar Figures*

Given $\triangle XYZ \sim \triangle UVW$, name the corresponding angles and the corresponding sides.



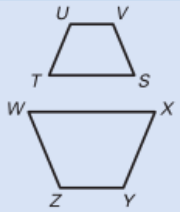
Solution

Corresponding angles:

Corresponding sides:

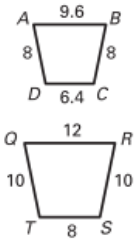
Checkpoint

1. Given $STUV \sim WXYZ$, name the corresponding angles and the corresponding sides.



Example 2 *Finding the Ratio of Corresponding Side Lengths*

Given $ABCD \sim QRST$, find the ratio of the lengths of the corresponding sides of $ABCD$ to $QRST$.



Write a ratio comparing the lengths of a pair of corresponding sides. Then substitute the lengths of the sides and simplify.

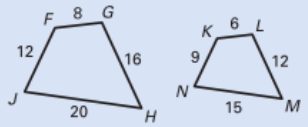
$$\frac{AD}{QT} = \square = \square$$

Answer: The ratio of the lengths of the corresponding sides is $\square$.

Because all the ratios of the lengths of corresponding sides of the figure in Example 2 are equal, you can use any pair of lengths of corresponding sides to write the ratio. To check the solution, choose another pair of lengths of corresponding sides.

Checkpoint

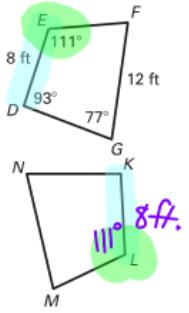
2. Given $FGHJ \sim KLMN$, find the ratio of the lengths of the corresponding sides of $FGHJ$ to $KLMN$.



Example 3 *Finding Measures of Congruent Figures*

Given $DEFG \cong KLMN$, find the indicated measure.

a. KL **b.** $\angle L$



Solution

Because the quadrilaterals are congruent, the corresponding angles are congruent and the corresponding sides are congruent.

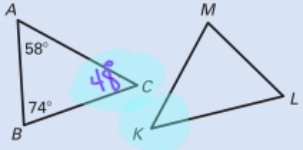
a. $\overline{KL} \cong \overline{DE}$. So, $KL = DE = 8$

b. $\angle L \cong \angle E$. So, $m\angle L = m\angle E = 111°$

measure

Checkpoint

3. Given $\triangle ABC \cong \triangle LMK$, find $m\angle L$.



$\angle L \cong \angle A$

$m\angle L = m\angle A$

$m\angle L = 58°$

$180° - 58° - 74° = 48°$

(4) $m\angle K = 48°$

* the angles of a triangle add up to 180°