

Similar Polygons

Lesson Objective

WBAT use similarity ~~and~~ transformations
find corresponding lengths in similar figures.

Recall from Chapter 4 (Chapter 12 in Holt textbook) that two geometric figures are *similar figures* if and only if there is a *similarity transformation* that maps one figure onto the other.

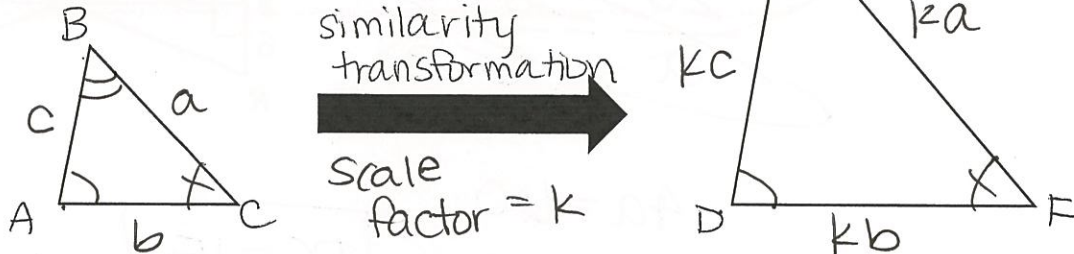
Review of Key Concepts from that unit:

- There is a scale factor, k , that enlarges or reduces the shape.
- If $|k| > 1 \rightarrow$ enlargement
- If $0 < |k| < 1 \rightarrow$ reduction
- A similarity transformation changes the size but NOT the shape of the figure.

$$k = \frac{\text{image}}{\text{preimage}}$$

Corresponding Parts of Similar Polygons

In the diagram below, $\triangle ABC$ is similar to $\triangle DEF$.



Similarity transformations preserve angle measure. So, corresponding angles are congruent.

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

The scale factor, k , that enlarges or reduces the figure, keeps corresponding side lengths proportional.

$$\frac{\text{image}}{\text{preimage}} \rightarrow \frac{EF}{BC} = \frac{DF}{AC} = \frac{ED}{BA} = k$$

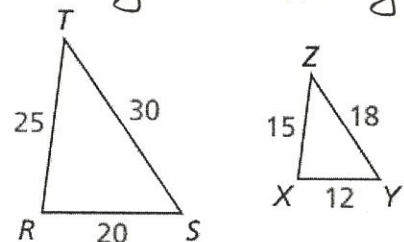
Similarity Statements: You can write " $\triangle ABC$ is similar to $\triangle DEF$ " as $\triangle ABC \sim \triangle DEF$
preimage $\sim$ image

Example:

1. In the diagram, $\triangle RST \sim \triangle XYZ$.

a. List all pairs of corresponding, congruent angles.

$$\begin{aligned} \angle R &\cong \angle X \\ \angle Z &\cong \angle Y \cong \angle T \cong \angle S \\ \angle Z &\cong \angle T \end{aligned}$$



b. Write the ratios of the corresponding side lengths in a statement of proportionality.

$$\frac{ZY}{TS} = \frac{XZ}{RS} = \frac{ZX}{TR}$$

c. Find the scale factor from $\triangle RST$ to $\triangle XYZ$ using the ratios from part (b)

$$\rightarrow \frac{15}{25} = \frac{3}{5} = k$$

Corresponding Lengths in Similar Polygons

If two polygons are similar, then the ratio of ANY two corresponding lengths in the polygons is equal to the scale factor of the similar polygons.

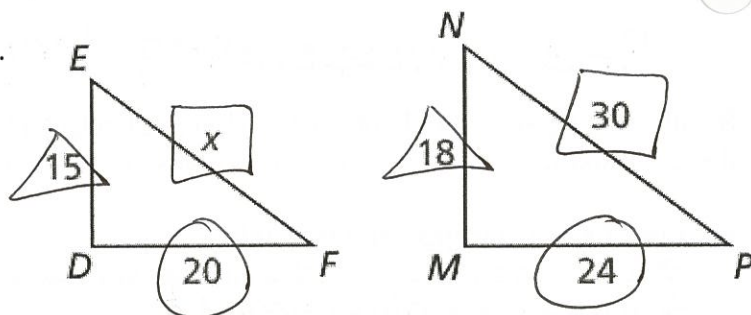
Example:

2. In the diagram, $\triangle DEF \sim \triangle MNP$. Find the value of x .

$$\frac{30}{x} = \frac{18}{15}$$

$$6x = 150$$

$$x = 25$$



3. In the diagram, $\triangle TPR \sim \triangle XPZ$. Find the length of the altitude $\overline{PS}$.

$$\frac{20}{a} = \frac{8}{6}$$

$$4a = 60$$

$$a = 15$$

$$PS = 15$$

