

# 7-2 Similar Polygons

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Similar polygons: have the same shape but not necessarily the same size.

- Two polygons are similar if and only if their corresponding angles are congruent AND their corresponding side lengths are proportional.
- The symbol that means similar is ~
- As with congruence statements, the order of vertices in a similarity statement like  $ABCD \sim WXYZ$  is important. It identifies the corresponding sides and angles.

Similarity statement: the order of the vertices is important. **Example:**  $ABCD \sim WXYZ$

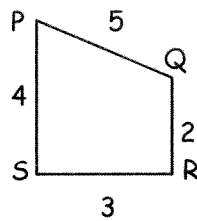
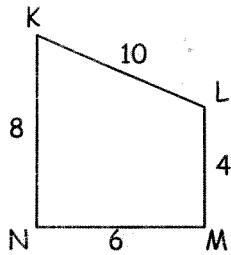
- list all pairs of congruent angles:  $\angle A \cong \angle W, \angle B \cong \angle X, \angle C \cong \angle Y, \angle D \cong \angle Z$
- write a proportion that relates the corresponding sides:  $\frac{AB}{WX} = \frac{BC}{XY} = \frac{CD}{YZ} = \frac{AD}{WZ}$   
*This is called the proportionality statement!*

Scale Factor: The ratio of the lengths of the corresponding sides of two similar polygons

- The scale factor depends on the order of comparison. *It must be reduced completely!*

Perimeter Ratio: In similar polygons, the ratio of corresponding sides (the scale factor) will be equal to the ratio of the perimeters of the two polygons.

Example 1: If  $KLMN \sim PQRS$ , find the value of each.

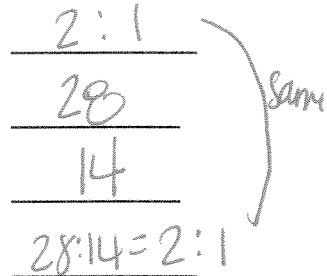


Scale factor of KLMN to PQRS: 2:1

Perimeter of KLMN = 28

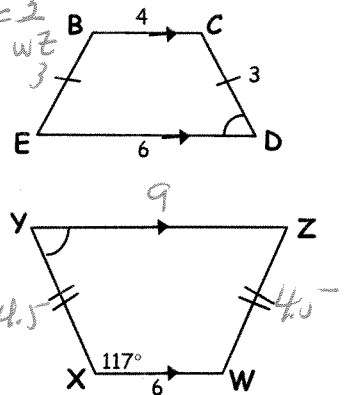
Perimeter of PQRS = 14

Perimeter ratio of KLMN to PQRS: 28:14 = 2:1



Example 2: If  $BCDE \sim WXYZ$ , do the following:

- List all pairs of congruent angles  $\angle B \cong \angle W, \angle C \cong \angle X, \angle D \cong \angle Y, \angle E \cong \angle Z$
- Write the proportionality statement.  $\frac{BC}{WX} = \frac{CD}{XY} = \frac{DE}{YZ} = \frac{BE}{WZ} = \frac{4}{6} = \frac{3}{6} = \frac{6}{6} = \frac{3}{3}$
- Find the scale factor of BCDE to WXYZ. 4:6 = 2:3
- Find the scale factor of WXYZ to BCDE. 3:2
- Find the length of  $\overline{XY}$ .  $4xy = 18 \quad xy = 4.5$
- Find the length of  $\overline{YZ}$ .  $4yz = 36 \quad yz = 9$
- Find the measure of  $\angle D$ .  $180 - 117 = 63^\circ$
- Find the perimeter of WXYZ.  $15 + 9 = 24$
- Find the ratio of the perimeter of WXYZ to the perimeter of BCDE. 3:2



24:16

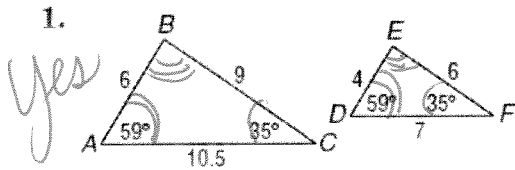
# 7-2 Practice

## Similar Polygons

Name \_\_\_\_\_

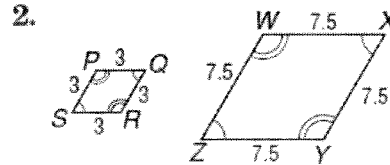
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Determine whether each pair of figures is similar. Justify your answer.



Corr.  $\Delta$ s  $R \cong$

$$\frac{6}{4} = \frac{9}{6} = \frac{10.5}{7} = \frac{3}{2}$$

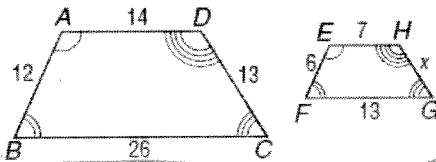


Corr.  $\Delta$ s  $R \cong$

$$\frac{3}{7.5} = S.F$$

Each pair of polygons is similar. Write a similarity statement, and find  $x$ , the measure(s) of the indicated side(s), and the scale factor.

3.  $\overline{GH} = 6.5$

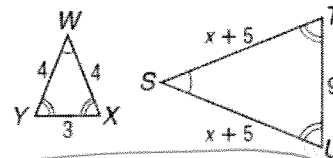


$ABCD \sim EFGH$  SF = 2:1

$$\frac{12}{6} = \frac{13}{x} \quad 12x = 13 \cdot 6$$

$$x = 6.5$$

4.  $\overline{ST}$  and  $\overline{SU}$   $ST = SU = 12$



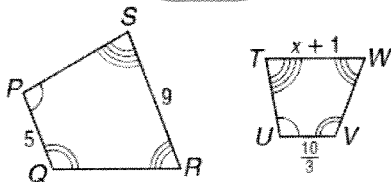
$\Delta WXY \sim \Delta STU$  SF = 1:3

$$\frac{4}{x+5} = \frac{3}{9} \quad 3x+15 = 36$$

$$3x = 21$$

$$x = 7$$

5.  $\overline{WT} = 6$



$PQRS \sim UVWT$

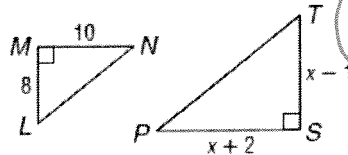
$$\frac{5}{10/3} = \frac{9}{x+1} \quad 9:6 = 3:2 = SF$$

$$5x+5 = 30$$

$$5x = 25$$

$$x = 5$$

6.  $\overline{TS}$  and  $\overline{SP}$



$\Delta MNL \sim \Delta PST$

$$\frac{8}{x-1} = \frac{10}{x+2} \quad \frac{8}{12} = 2:3 = SF$$

$$8x+16 = 10x-10$$

$$26 = 2x$$

$$13 = x$$