LEARNING TARGETS

- I can use proportions to identify similar polygons.
- I can use similar polygons to solve problems.

Similar polygons are polygons that have the same shape but not necessarily the same size.

Similar Polygons	
$\triangle ABC \sim \triangle DEF$	Corresponding angles are congruent. $\angle A \cong \angle D$ $\angle B \cong \angle E$ $\angle C \cong \angle F$ Corresponding sides are proportional. $\dfrac{AB}{DE} = \dfrac{6}{3} = 2$ $\dfrac{BC}{EF} = \dfrac{9}{4.5} = 2$ $\dfrac{CA}{FD} = \dfrac{10}{5} = 2$

A **similarity ratio**, also called the **scale factor** is the ratio of the lengths of corresponding sides.

➔In the diagram above, for the similarity statement $\triangle ABC \sim \triangle DEF$, the similarity ratio is: _____.

➔In the diagram above, for the similarity statement $\triangle DEF \sim \triangle ABC$, the similarity ratio is: _____.
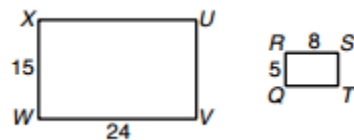
Example 1:
Determine whether the polygons are similar. If so, write the scale factor (similarity ratio) and a similarity statement.

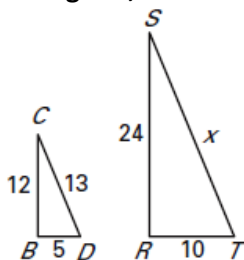a) $\triangle EFG$ and $\triangle HJK$
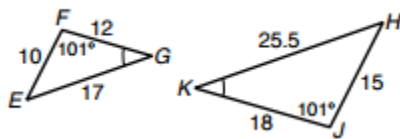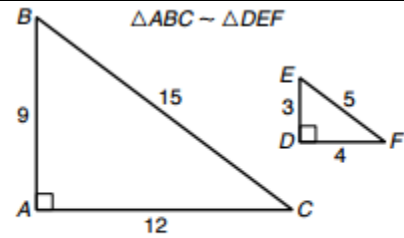

b) rectangles $QRST$ and $UVWX$

Example 2:
In the diagram, $\triangle BCD \sim \triangle RST$. Please solve for x.

Perimeters of Similar Polygons Theorem

If two polygons are similar, and their similarity ratio is $\frac{a}{b}$, then the ratio of their perimeters is $\frac{a}{b}$.

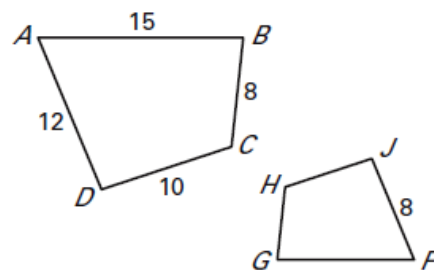$\triangle ABC \sim \triangle DEF$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD} = \frac{3}{1}$$

$$\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{36}{12} = \frac{3}{1}$$
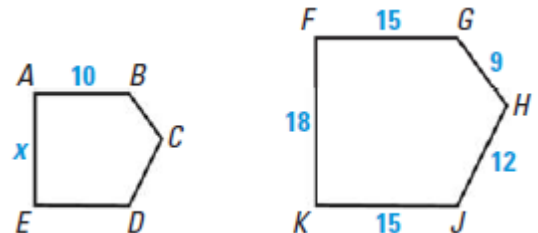
Example 3:
In the diagram, *ABCD* : *FGHJ*.
   a)   Find the scale factor of *FGHJ* to *ABCD*.

   b)   Find the perimeter of *FGHJ*.

✓   **Checkpoint**
   1)   In the diagram, *ABCDE* : *FGHJK*.
      a)   Find the scale factor of *FGHJK* to *ABCDE*.

      b)   Find the value of x.

      c)   Find the perimeter of *ABCDE*.

Example 4: Applications!
   a)   You are flying a kite on a sunny day. The kite has side lengths shown in the figure below at the left. The kite's shadow has the side lengths shown in the figure below at the right.
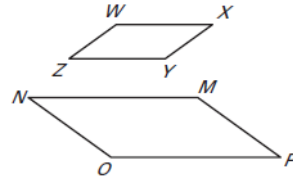
Kite

95 cm   95 cm

142 cm

Shadow

78 cm   78 cm

132 cm
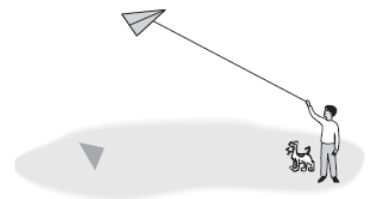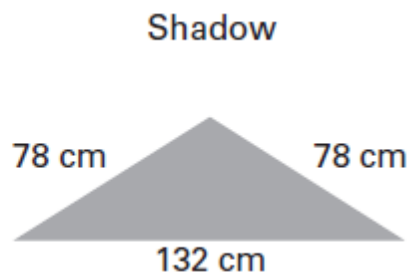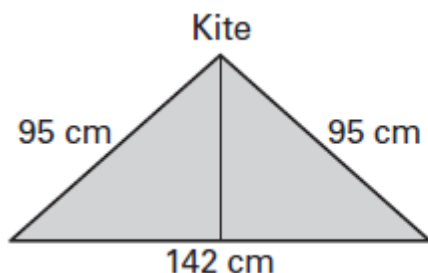
   Is the shadow similar to the kite? *Explain* your reasoning.

List all pairs of congruent angles for the figures. Then write the ratios of the corresponding sides in a statement of proportionality.

1. ΔABC ~ ΔDFE
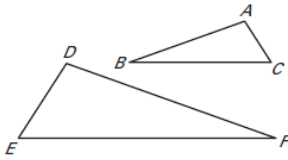
2. WXYZ ~ MNOP

3. **Multiple Choice** Triangles LMN and RST are similar. Which statement is not correct?
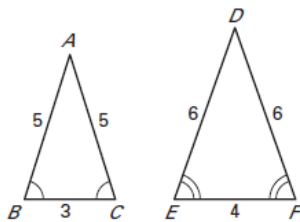
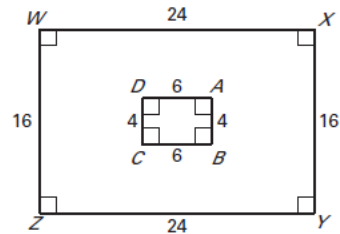a. $\dfrac{LM}{RS} = \dfrac{MN}{ST}$ b. $\dfrac{NL}{TR} = \dfrac{LM}{RS}$ c. $\angle L \cong \angle T$

Determine whether the polygons are similar. If they are, write a similarity statement and find the scale factor.
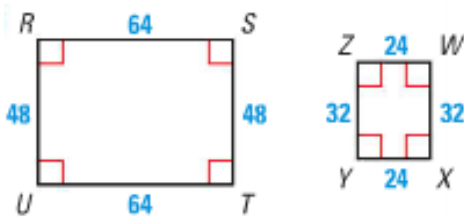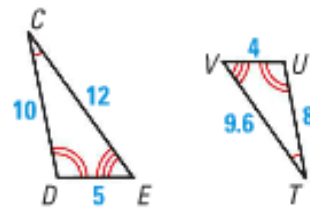
4. $\triangle ABC$ to $\triangle DEF$

5. $WXYZ$ to $DABC$

6. $WXYZ$ to $RSTU$

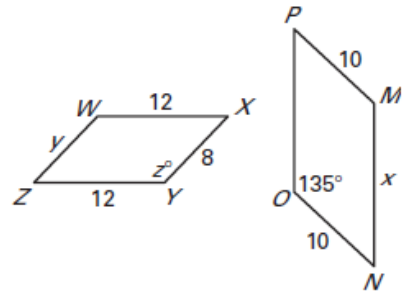7. $\triangle CDE$ to $\triangle TUV$

In the diagram, WXYZ ~ MNOP.

    8. Find the scale factor of WXYZ to MNOP.

    9. Find the values of x, y and z.

    10. Find the perimeter of WXYZ.

    11. Find the perimeter of MNOP.

    12. Find the ratio of the perimeter of WXYZ to the perimeter of MNOP.
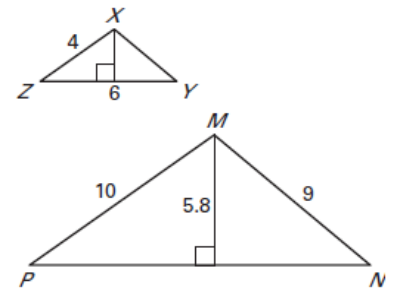
In the diagram, ΔXYZ ~ ΔMNP.

    13. Find the scale factor of ΔXYZ to ΔMNP.

    14. Find the lengths of $\overline{XY}$ and $\overline{PN}$.

    15. Find the length of the altitude shown in ΔXYZ.

In exercises #16 – 18, use the following information.
Swimming Pool The community park has a rectangular swimming pool enclosed by a rectangular fence for sunbathing. The shape of the pool is similar to the shape of the fence. The pool is 30 feet wide. The fence is 50 feet wide and 100 feet long.

    16. What is the scale factor of the pool to the fence?

    17. What is the length of the pool?

    18. Find the area reserved strictly for sunbathing.

Answer Key :

1. $\angle A \cong \angle D, \angle B \cong \angle F, \angle C \cong \angle E$, $\dfrac{AB}{DF} = \dfrac{BC}{FE} = \dfrac{AC}{DE}$

2. $\angle W \cong \angle M, \angle X \cong \angle N, \angle Y \cong \angle O, \angle Z \cong \angle P$, $\dfrac{WX}{MN} = \dfrac{XY}{NO} = \dfrac{YZ}{OP} = \dfrac{WZ}{MP}$

3. C

4. Not similar

5. Yes, $\dfrac{4}{1}$ or 4 : 1

6. Yes, $\dfrac{1}{2}$ or 1 : 2

7. Yes, $\dfrac{5}{4}$ or 5 : 4

8. $\dfrac{4}{5}$ or 4 : 5

9. x=15, y=8, z=135

10. 40 units

11. 50 units

12. $\dfrac{4}{5}$ or 4 : 5

13. $\dfrac{2}{5}$ or 2 : 5

14. XY = 3.6, PN=15

15. Altitude = 2.32

16. $\dfrac{3}{5}$ or 3 : 5

17. 60 feet

18. 3,200 square feet