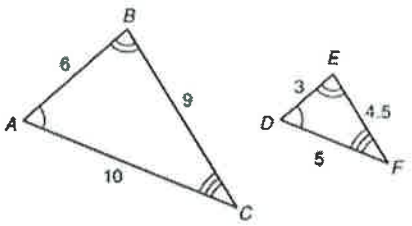
Geometry A
6.3 Notes: Similar Figures

Name: Key
Date: _____ Period: _____

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. $\frac{AB}{DE} = \frac{6}{3} = 2$ $\frac{BC}{EF} = \frac{9}{4.5} = 2$ $\frac{CA}{FD} = \frac{10}{5} = 2$

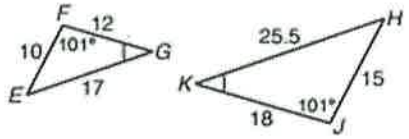
A **similarity ratio**, also called the **scale factor** is the ratio of the lengths of corresponding sides.

→In the diagram above, for the similarity statement $\Delta ABC \sim \Delta DEF$, the similarity ratio is: $\frac{6}{3} = \frac{2}{1}$. $\frac{\Delta ABC}{\Delta DEF}$

→In the diagram above, for the similarity statement $\Delta DEF \sim \Delta ABC$, the similarity ratio is: $\frac{3}{6} = \frac{1}{2}$. $\frac{\Delta DEF}{\Delta ABC}$

Example 1:
Determine whether the polygons are similar. If so, write the scale factor (similarity ratio) and a similarity statement.

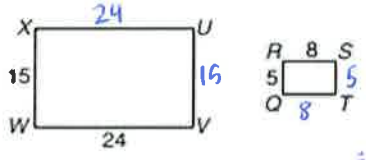
a) ΔEFG and ΔHJK



$\frac{EF}{HJ} = \frac{10}{15} = \frac{2}{3}$ $\frac{FG}{JK} = \frac{12}{18} = \frac{2}{3}$ $\frac{EG}{HK} = \frac{17}{25.5} = \frac{2}{3}$

Yes, $\Delta EFG \sim \Delta HJK$ with a scale factor of $2/3$

b) rectangles $QRST$ and $UVWX$



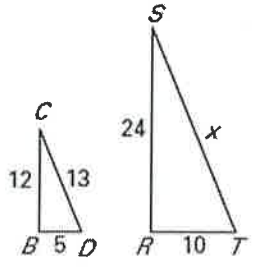
$\frac{QR}{UV}, \frac{RS}{VW}, \frac{SI}{WX}, \frac{QT}{UX}$

$\frac{5}{15}$ $\frac{8}{24}$ $\frac{5}{15}$ $\frac{8}{24}$

$= \frac{1}{3}$ $= \frac{1}{3}$ $= \frac{1}{3}$ $= \frac{1}{3}$

Yes, $QRST \sim UVWX$ with a scale factor of $1/3$

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



$\frac{BC}{RS} = \frac{12}{24}$

$\frac{CD}{ST} = \frac{13}{x}$

$\frac{BD}{RT} = \frac{5}{10}$

pick 2 to set equal; cross multiply

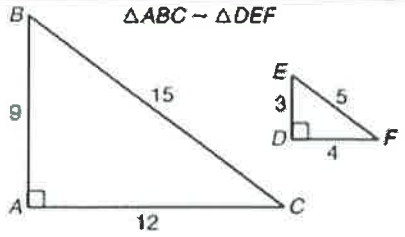
$\frac{12}{24} = \frac{13}{x}$

$12x = 312$

$x = 26$

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 $\frac{a}{b}$.



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

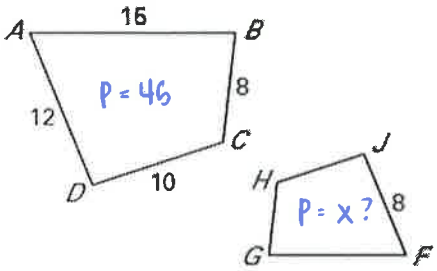
$$\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{36}{12} = \frac{3}{1}$$

Example 3:
In the diagram, *ABCD* : *FGHJ*.

a) Find the scale factor of *FGHJ* to *ABCD*.

$\frac{FGHJ}{ABCD}$: $\frac{FJ}{AD} = \frac{8}{12} = \boxed{\frac{2}{3}}$

b) Find the perimeter of *FGHJ*.



$\frac{FGHJ}{ABCD}$: $\frac{2}{3} = \frac{x}{45}$ (scale, perim) $\Rightarrow$ $3x = 90$, $x = 30$

$\boxed{P = 30 \text{ units}}$

✓ **Checkpoint**

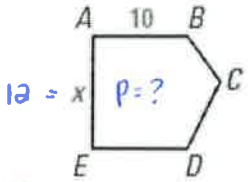
1) In the diagram, *ABCDE* : *FGHJK*.

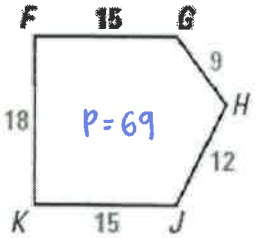
a) Find the scale factor of *FGHJK* to *ABCDE*.

$\frac{FGHJK}{ABCDE}$: $\frac{FG}{AB} = \frac{15}{10} = \boxed{\frac{3}{2}}$

b) Find the value of x.

$\frac{FGHJK}{ABCDE}$: $\frac{3}{2} = \frac{18}{x}$ (scale, unknown) $\Rightarrow$ $3x = 36$, $\boxed{x = 12}$





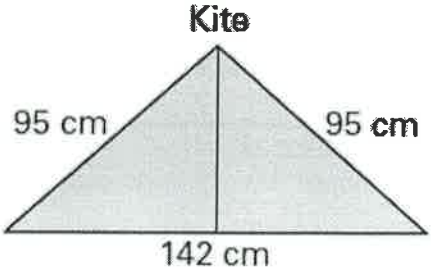
c) Find the perimeter of *ABCDE*.

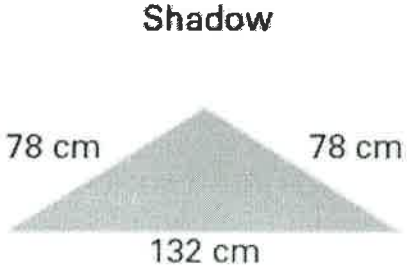
$\frac{FGHJK}{ABCDE}$: $\frac{3}{2} = \frac{69}{x}$ (scale, perim) $3x = 138$, $x = 46$

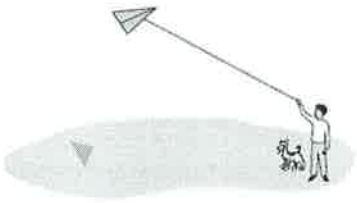
$\boxed{P = 46 \text{ units}}$

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.







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

Check corresponding sides:

$\frac{Kite}{Shadow}$: $\frac{95}{78}$, $\frac{95}{78}$, $\frac{142}{132}$

$= 1.2$ $= 1.2$ $= 1.08$

no, the scale factor is not the same for all 3 sides