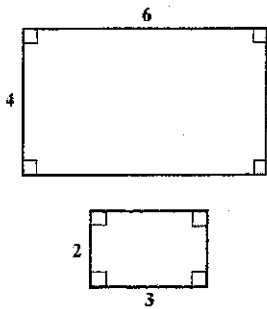


# Honors Geometry Similar Polygon Notes

Two polygons are similar if and only if

- > the corresponding angles are congruent
- > the corresponding sides are proportional

The symbol  $\sim$  is read "is similar to".



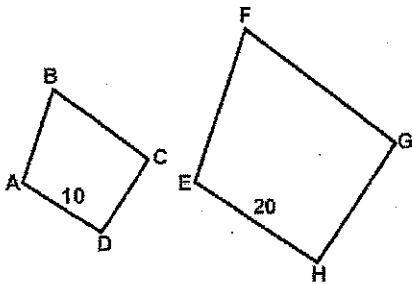
The two rectangles are similar because all corresponding angles measure 90 degrees. All corresponding sides have a ratio of 2/1.

$$\frac{6}{3} = \frac{2}{1}$$

$$\frac{4}{2} = \frac{2}{1}$$

The common ratio of the sides of the similar polygons is the reciprocal of the scale factor.

**ABCD ~ EFGH**



$$\angle A \cong \angle E$$

$$\angle B \cong \angle F$$

$$\angle C \cong \angle G$$

$$\angle D \cong \angle H$$

$$\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{DA}{EH}$$

The scale factor of polygon ABCD to polygon EFGH is  $\frac{1}{2}$  or 1:2.

If quadrilateral ABCD ~ quadrilateral EFGH, find each of the following.

1. Scale factor of ABCD to EFGH  $\frac{8}{2} = \frac{4}{1}$

2. EF  $\frac{4}{1} = \frac{20}{x}$   $4x = 20$   
 $EF = 5$

3. FG  $\frac{4}{1} = \frac{12}{x}$   $4x = 12$   
 $FG = 3$

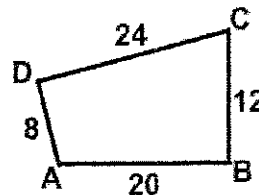
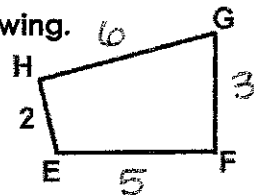
4. GH  $\frac{4}{1} = \frac{24}{x}$   $4x = 24$   
 $GH = 6$

5. Perimeter of ABCD  $P = 20 + 12 + 24 + 8 = 64$

6. Perimeter of EFGH  $P = 5 + 3 + 6 + 2 = 16$

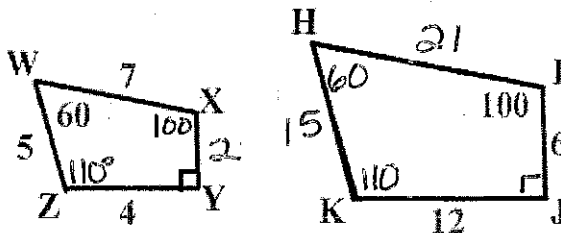
7. Ratio of perimeter of ABCD to perimeter of EFGH

$$\frac{64}{16} = \frac{8}{2} = \frac{4}{1}$$



You try this one!! Given  $WXYZ \sim HIJK$

- $m\angle H = 60^\circ$
- $m\angle J = 90^\circ$
- $m\angle X = 100^\circ$
- If  $m\angle Z = 110^\circ$ , then  $m\angle K = 110^\circ$

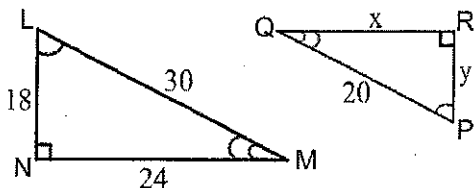


5. The scale factor of quad. WXYZ to quad HIJK is  $\frac{1}{3}$   $\frac{4}{12} = \frac{1}{3}$

- $HK = \frac{15}{5(3)}$
- $XY = \frac{2}{6(\frac{1}{3})}$
- $HI = \frac{21}{7(3)}$

9. What is the ratio of their perimeters?  $\frac{1}{3}$   
 $18 : 54$

$\triangle LMN \sim \triangle PQR$ . Find the values of  $x$  and  $y$ .



$$x = 16$$

$$y = 12$$

$$\frac{y}{18} = \frac{20}{30}$$

$$30y = 360$$

$$y = 12$$

$$\frac{x}{24} = \frac{20}{30}$$

$$30x = 480$$

What is the ratio of their perimeters?  $\frac{72}{48} = \frac{3}{2}$

What is the ratio of their areas?  $\frac{216}{96} = \frac{9}{4}$

$$A_{\triangle LMN} = \frac{1}{2} (18 \cdot 24) = 216$$

$$A_{\triangle PQR} = \frac{1}{2} (12 \cdot 16) = 96$$

If two polygons are similar:

the ratio of their perimeters is the same as the original ratio  $a:b$  or  $\frac{a}{b}$

the ratio of their areas is equal to the square of the original ratio.  $a^2:b^2$  or  $\frac{a^2}{b^2}$