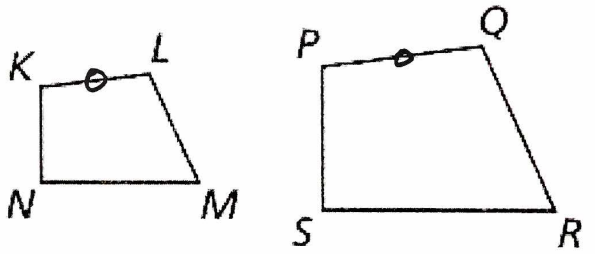
Name: Date: Period: 1

Perimeter and Area of Similar Polygons

Lesson Objective IWBAT find perim/area of ~ polygons using scale factors

Perimeters of Similar Polygons (Theorem)

If two polygons are similar, then the ratio of their perimeters is equal to the ratios of their corresponding side lengths.



If KLMN ~ PQSR ... using scale factor K...

$$\frac{\text{per KLMN}}{\text{per. PQSR}} = \frac{KL}{PQ} \quad \left(\text{or } = \frac{LM}{QR} \text{ or } = \frac{NM}{SR} \text{ or } = \frac{KN}{PS}\right)$$

Example

1. The two gazebos shown are similar pentagons. Find the perimeter of Gazebo A.

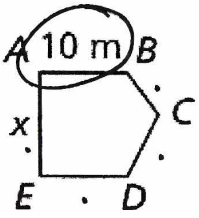
$$\frac{\text{per. A}}{\text{per. B}} = \frac{10}{15} \quad \left(\text{or } \frac{\text{per. B}}{\text{per. A}} = \frac{15}{10}\right)$$

$$\frac{A}{69} = \frac{2}{3}$$

$3A = 138$

$A = 46$

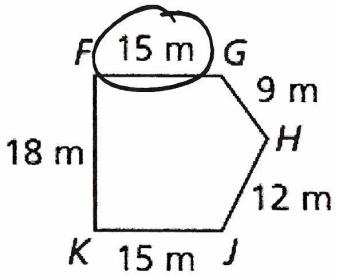
Gazebo A



Per = ?

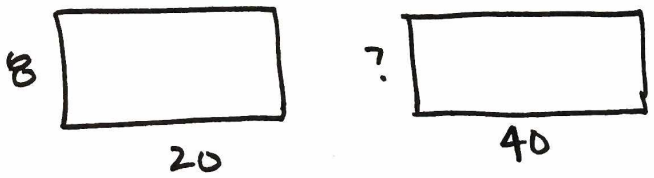
46 m

Gazebo B



Per. = 69 m

2. Rectangle ABCD has a width of 8 yd and a length of 20 yd. Rectangle WXYZ (that is similar to ABCD) has a length of 40 yd. What is the width of rectangle WXYZ?



$$\frac{20}{40} = \frac{8}{x}$$

$x = 16$

16 yd

3. Figure A has a perimeter of 42 ft and has a side length of 15 ft. Figure B has a corresponding side length of 35 ft. What is the perimeter of Figure B?

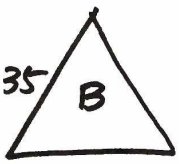
per. ratio = s.f.

$$\frac{\text{perA}}{\text{perB}} = \frac{15 \cdot 3}{35 \cdot 7} \rightarrow \frac{42}{B} = \frac{3}{7}$$

$3B = 294$

$B = 98$

P. = 42

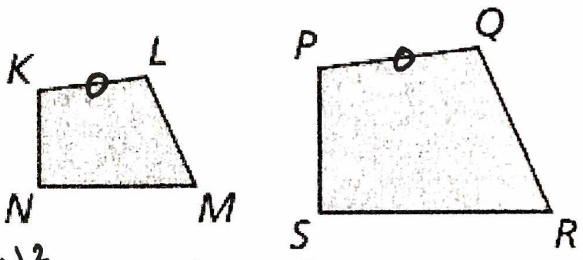


P = ?

Per(B) = 98 ft

Areas of Similar Polygons (Theorem)

If two polygons are similar, then the ratio of their areas is equal to the squares of the ratios of their corresponding sides.

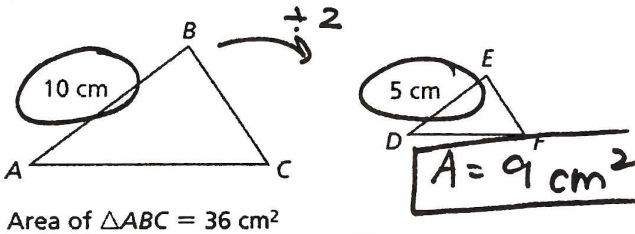


If KLMN ~ PQRS ...

$$\frac{\text{area } KLMN}{\text{area } PQRS} = \left(\frac{KL}{PQ}\right)^2 \quad \left(\text{or} = \left(\frac{LM}{QR}\right)^2 \text{ or } = \left(\frac{NM}{SR}\right)^2 \text{ or } = \left(\frac{KN}{PS}\right)^2\right)$$

Example:

4. In the diagram, $\Delta ABC \sim \Delta DEF$. Find the area of ΔDEF.



Area of $\triangle ABC$ = 36 cm²

÷4 (÷2²)

area ratio = k^2

$$\frac{36}{A} = \left(\frac{10}{5}\right)^2$$

$$\frac{36}{A} = 4 \rightarrow 4A = 36 \rightarrow A = 9$$

5. Figure A has an area of 72 cm² and a side length of 6 cm. Figure B has a corresponding side length of 5 cm. What is the area of Figure B?

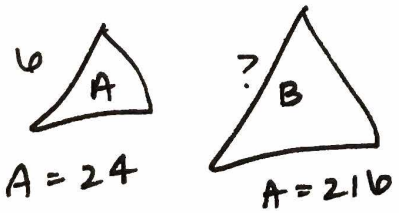
area ratio = k^2

$$\frac{72}{B} = \left(\frac{6}{5}\right)^2$$

$$\frac{72}{B} = \frac{36}{25} \rightarrow 36B = 1800 \rightarrow B = 50$$

50 cm²

6. Figure A has an area of 24 units² and Figure B has an area of 216 units². If Figure A has a side length of 6, what is its corresponding side length in Figure B?



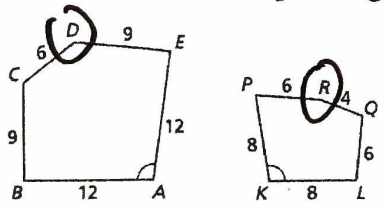
area ratio = k^2

$$\frac{24}{216} = \left(\frac{6}{b}\right)^2$$

$$\sqrt{\frac{1}{9}} = \sqrt{\left(\frac{6}{b}\right)^2} \rightarrow \frac{1}{3} = \frac{6}{b} \rightarrow 18 = b$$

18 units

7. All of the ratios of corresponding sides below are equal, but the polygons are NOT similar. Why is that?



Not all corresp. $\angle$s are $\cong$

($\angle D$ not $\cong \angle R$)