

TOPIC: 11.3 Perimeter and Area of Similar Figures

NAME: KEY

DATE:

ESSENTIAL QUESTION: How is the ratio of the areas of two similar polygons related to the ratio of corresponding sides?

QUESTIONS:

**Vocabulary:**

Regular Polygons

A polygon which is equilateral and equiangular

Similar Polygons

Polygons with congruent corresponding angles and proportional corresponding sides

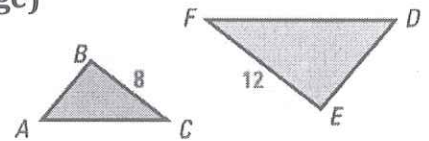
Theorem 11.7: Area of Similar Polygons

If two similar polygons have a ratio of corresponding side lengths of  $a : b$ , then the area ratio would be  $a^2 : b^2$ .

In the diagram,  $\triangle ABC \sim \triangle DEF$ . Find the indicated ratio.

a. Ratio of the perimeters (small to large)

$$\frac{BC}{EF} = \frac{8}{12} = \frac{2}{3}$$

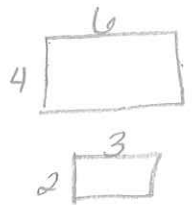


b. Ratio of the areas (large to small)

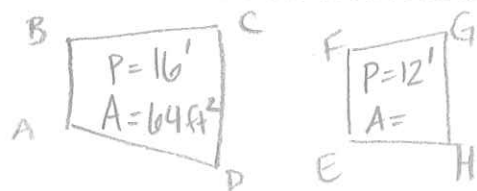
$$\frac{2^2}{3^2} = \frac{4}{9}$$

A1. Sketch and label two similar quadrilaterals with an area ratio of 4 : 1.

$$A_{\text{ratio}} = \frac{4}{1} \Rightarrow \text{Length}_{\text{ratio}} = \frac{\sqrt{4}}{\sqrt{1}} = \frac{2}{1}$$



A2. The perimeter of ABCD is 16 ft and its area is 64 ft<sup>2</sup>. The perimeter of EFGH is 12 ft. If  $ABCD \sim EFGH$ , find the area ratio of ABCD to EFGH and find the area of EFGH.



$$\text{Length Ratio} = \frac{16}{12} = \frac{4}{3}$$

$$\text{Area Ratio} = \frac{4^2}{3^2} = \frac{16}{9}$$

$$\frac{16}{9} = \frac{64}{x}$$

$$x = \frac{(9)(64)}{16} = 36 \text{ ft}^2$$

SUMMARY:

Ratio of Areas =  $\sqrt{\text{ratio of corresponding side}}$

if sides ratio =  $\frac{a}{b}$ , then area ratio =  $\frac{a^2}{b^2}$

QUESTIONS:

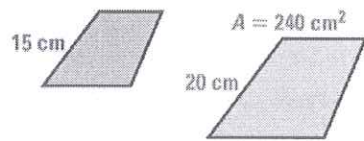
\* perimeters & medians are both length ratios

A3. A ratio of 2 similar figures is given. Write the requested ratio.

- a. Ratio of areas = 49 : 25; corresponding sides ratio  
 $A_{ratio} = \frac{49}{25}$  Sides =  $\frac{\sqrt{49}}{\sqrt{25}} = \frac{7}{5}$
- b. Ratio of sides = 3 : 8; corresponding areas ratio  
 Sides =  $\frac{3}{8}$  Area =  $\frac{3^2}{8^2} = \frac{9}{64}$
- c. Ratio of perimeters = 9 : 25; corresponding medians ratio  
 Perimeter (length) =  $\frac{9}{25}$  Medians (length) =  $\frac{9}{25}$

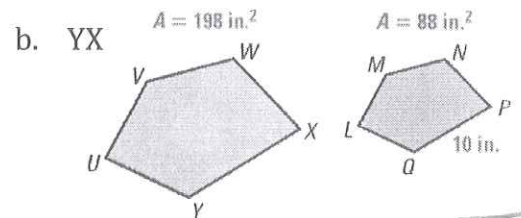
A4. Corresponding measures of similar figures are given. Find the missing measure.

a. Area of the smaller figure.



$$\frac{15}{20} = \frac{3}{4} \rightarrow \text{Area} = \frac{3^2}{4^2} = \frac{9}{16}$$

$$\frac{9}{16} = \frac{X}{240} \quad \boxed{\text{Area} = 135 \text{ cm}^2}$$



$$\frac{A}{\text{ratio}} = \frac{198}{88} \rightarrow \text{Length ratio} = \frac{\sqrt{198}}{\sqrt{88}}$$

$$\frac{\sqrt{198}}{\sqrt{88}} = \frac{XY}{10} \quad \boxed{XY = 15}$$

A5. Rhombuses JOHN and BEAR are similar. The area of BEAR is 28 cm<sup>2</sup>. The diagonals of JOHN are 25 cm and 14 cm. Find the diagonal lengths of BEAR.

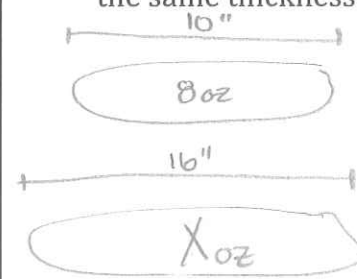
$$\frac{\text{John}}{\text{Bear}} \Rightarrow \text{Area} = \frac{175}{28} \rightarrow \text{Length ratio} = \frac{\sqrt{175}}{\sqrt{28}}$$

$$\text{Area(John)} = \frac{1}{2}(25)(14) = 175$$

$$\frac{\sqrt{175}}{\sqrt{28}} = \frac{14}{d_1} \quad \boxed{d_1 = 5.6 \text{ cm}}$$

$$\frac{\sqrt{175}}{\sqrt{28}} = \frac{25}{d_2} \quad \boxed{d_2 = 10 \text{ cm}}$$

A6. If 8 ounces of dough are needed to make a 10" diameter pizza, how many ounces of dough are needed to make a 16" diameter pizza of the same thickness?



$$\text{Length} = \frac{10}{16} = \frac{5}{8} \rightarrow \text{Area} = \frac{5^2}{8^2} = \frac{25}{64}$$

$$\frac{25}{64} = \frac{8 \text{ oz}}{X}$$

$$8(64) \div 25 = \boxed{20.48 \text{ oz}}$$