6-2 Similar Polygons

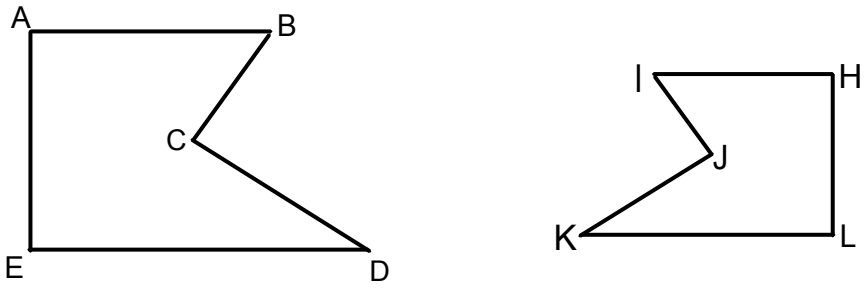
Similar Polygons:

*When polygons have the same shape, but may be different sizes.

*Symbol: ~

*Two polygons will be similar iff their corresponding angles are congruent and the measures of their corresponding sides are proportional.

*The order that the letters are put will indicate what the corresponding parts are.



$ABCDE \sim HIJKL$

$\angle A \cong \angle H$
$\angle B \cong \angle I$
$\angle C \cong \angle J$
$\angle D \cong \angle K$
$\angle E \cong \angle L$

$$\frac{AB}{HI} = \frac{BC}{IJ} = \frac{CD}{JK} = \frac{DE}{KL} = \frac{EA}{LH}$$

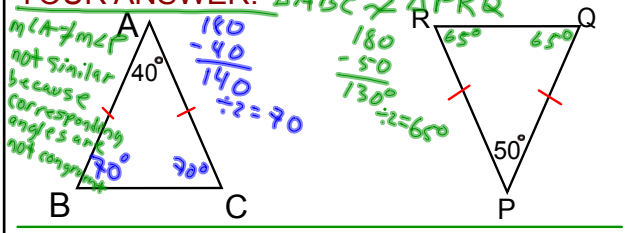
Scale Factor

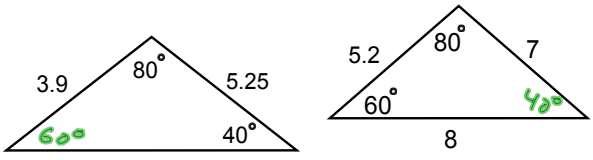
*Used to compare models with real-life objects.

* A ratio comparing the corresponding sides.

*All the corresponding side ratios should reduce to the same scale factor.

Example 1: Determine whether each pair of figures is similar. JUSTIFY YOUR ANSWER. $\triangle ABC \sim \triangle PRQ$





corresponding sides are congruent

$\frac{5.2}{3.9} = \frac{7}{5.25} = \frac{8}{6}$

$1.3 = 1.3 = 1.3$

corresponding sides are in the same ratio.

∴ the triangles are similar.

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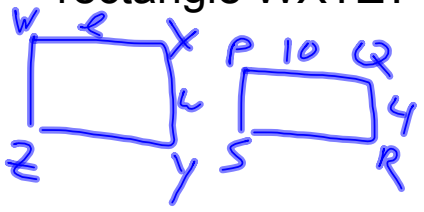
Example 2: An architect prepared a 12-inch model of a skyscraper to look like a real 1100 foot building. What is the scale factor of the model to the real building?

$$\frac{\text{model}}{\text{real}} = \frac{12}{1100(12)} = \frac{1}{1100}$$

Example 3: Rectangle WXYZ is similar to rectangle PQRS with a scale factor of 1.5. If the length and width of PQRS are 10 meters and 4 meters, respectively, what are the length and width of the rectangle WXYZ?



$$\frac{WXYZ}{PQRS} = \frac{1.5}{1} = \frac{\ell}{10}$$

$$\ell = 1.5(10)$$

$$\ell = 15 \text{ m}$$

$$\frac{1.5}{1} = \frac{w}{4}$$

$$w = 1.5(4)$$

$$w = 6 \text{ m}$$

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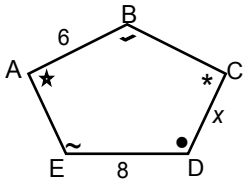
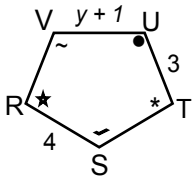
Example 4: The two polygons are similar





a. Write a similarity statement. Then find x, y, and UV.

ABCDE ~ RSTUV

b. Find the scale factor of polygon ABCDE to polygon RSTUV.

Scale Factor = $\frac{6}{4}$ or $\frac{3}{2}$

find x

$\frac{6}{4} = \frac{x}{3}$

$4x = 18$

$\frac{4x}{4} = \frac{18}{4}$

$x = 4.5$

find y

$\frac{6}{4} = \frac{8}{y+1}$

$32 = 6(y+1)$

$32 = 6y + 6$

$-6 \quad -6$

$\frac{26}{6} = \frac{6y}{6}$

$\frac{13}{3} = y$

find UV

$UV = \frac{13}{3} + 1$

$UV = \frac{16}{3}$

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Example 5:

The scale on the map of a city is (1/4) inch equals 2 miles. On the map, the width of the city at its widest point is 3.75 inches. The city hosts a bicycle race across town at its widest point. Kelli bikes at 10 miles per hour. How long will it take her to complete the race.

$\frac{\text{map}}{\text{city}} = \frac{\frac{1}{4}}{2} = \frac{3.75}{x}$

$(4)\ \frac{1}{4}x = 7.5(4)$

$x = 30$

$D = rt$

$30 = 10t$

$\frac{30}{10} = \frac{10t}{10}$

$3 = t$ hours