4-1 Proportions and Dilations

Proportion: an equation that equates two ratios

Properties of proportions

Cross Product Property: If $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$.

Reciprocal Property: If $\frac{a}{b} = \frac{c}{d}$, then $\frac{b}{a} = \frac{d}{c}$.

Solve the proportion for x.

a. $\frac{x}{3}=\frac{10}{15}$

b. $\frac{5}{2y-7}=\frac{3}{y}$

c. $\frac{6}{x}=\frac{8}{x+3}$

(more) Properties of Proportions

If $\frac{a}{b}=\frac{c}{d}$, then $\frac{\text{a}}{\text{c}}=\frac{b}{d}$.

If $\frac{\text{a}}{\text{b}}=\frac{c}{d}$, then $\frac{a+b}{b}=\frac{c+d}{d}$.

Complete the sentence:

if $\frac{a}{b}=\frac{3}{4}$ then $\frac{b}{a}=$

if $\frac{a}{b}=\frac{3}{4}$ then $\frac{a+b}{b}=$

True or False:

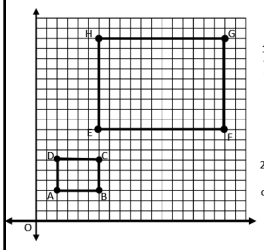
If $\frac{m}{n}=\frac{4}{5}$, then $\frac{n}{m}=\frac{4}{5}$.

If $\frac{m}{n}=\frac{2}{3}$, then $\frac{m+n}{n}=\frac{5}{3}$.

Discovering Similarity Task

4-1 Secondary Math II

Discovering Similarity Task



1. Using the grid, calculate the lengths of the following segments:
$\overline{AB}, \overline{BC}, \overline{CD}, \overline{DA}, \overline{EF}, \overline{FG}, \overline{GH}, \overline{HE}$

2. Express the ratios $\frac{EF}{AB}, \frac{FG}{BC}, \frac{GH}{CD}$ *and* $\frac{HE}{DA}$ as decimals. What do you notice about the ratios?

3. Using a ruler, draw the lines that connect: O, A, and E O, C, and G O, B, and F O, D and H

If we imagine our flashlight at point O, these segments represent the path of the light coming from the flashlight. What do these lines connect in the rectangles?

4. Measure the corresponding angles in the rectangles. What can you conclude?

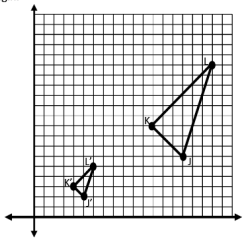
5. Triangle $J'K'L'$ is a dilation of ΔJKL. The center of dilation is the origin.

List the coordinates of the vertices for each triangle:

How do the coordinates of the vertices compare?

What is the scale factor of the dilation? Explain.

How do you think you can use the scale factor to determine the coordinates of the vertices of an image?



6. Is the scale factor greater or less than 1 for the problem on page 1? How does the preimage ($\square ABCD$) compare to the image ($\square EFGH$)?

7. If the scale factor is less than 1, how would the preimage and image compare?

8. What can you conclude, using the scale factor, about an image and preimage?

Vocabulary and Notation

Image

Preimage

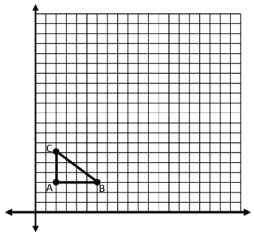
Dilation

Center of dilation

Scale factor

Similar

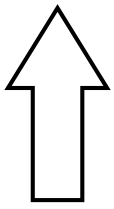
9. Draw the image for Triangle ABC with a scale factor of 3 and the center of dilation at the origin:



Hint: Use the scale factor and the coordinates of the vertices of the triangle to come up with the coordinates of the new triangle.

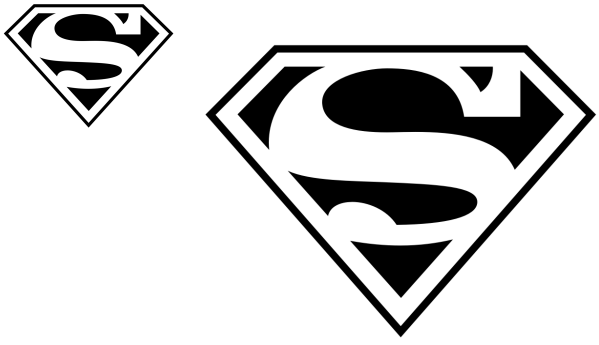
(Honors)

Using any focal point construct a figure that is 3 times as big as the one below.



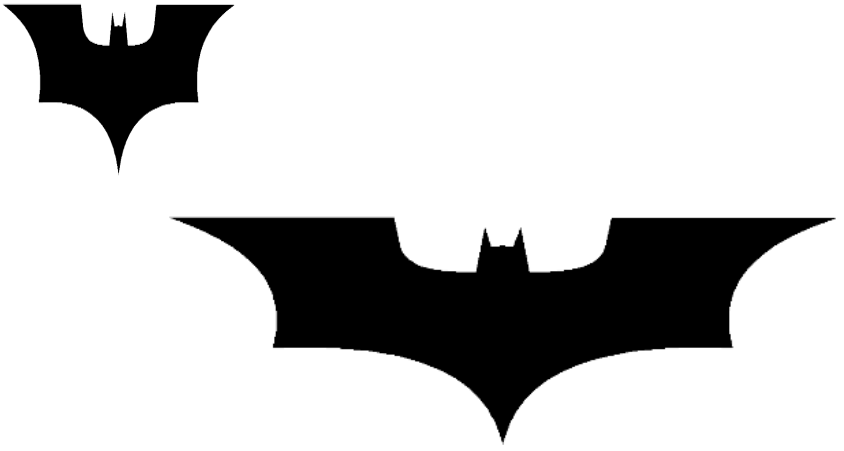
(Honors)

Use the property of dilation see if the two figures are similar.



(Honors)

Use the property of dilation see if the two figures are similar.



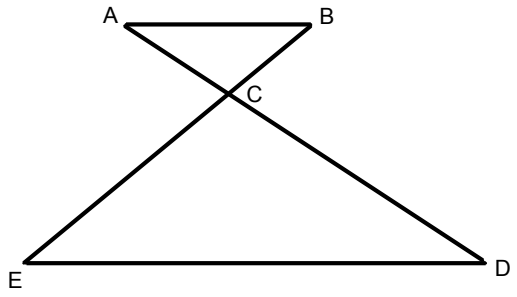
Conclusions about similar objects:

-Corresponding angles are congruent
-Corresponding side ratios are equal proportions

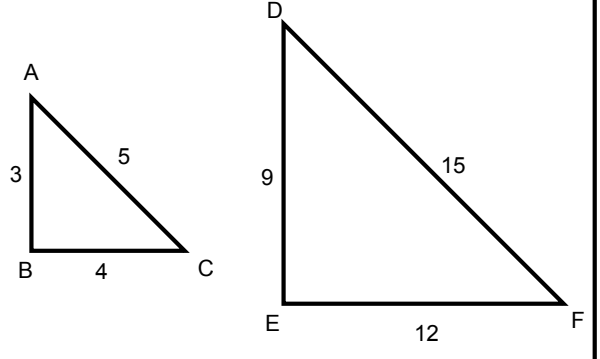
Scale Factor:

*Zoolander Clip

Suppose $\angle A \cong \angle E$. Describe a sequence of transformations that maps one triangle to the other triangle.



How to write similarity:

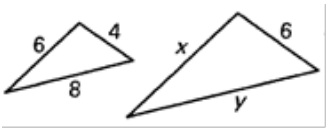


$$\Delta ABC \sim \Delta DEF$$

Write all the pairs of congruent angles and all the proportional sides.

The two polygons are similar, find the value of x and y.

a.



b.