4-1 Triangle Similarity with Dilations

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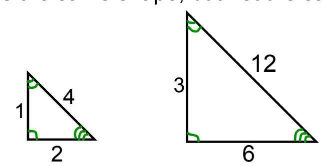
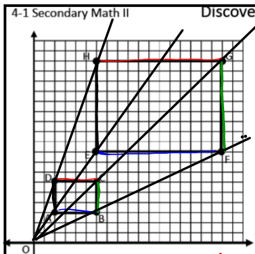
1. Similar Triangles:

- Corresponding ANGLES are congruent
- Corresponding SIDES are proportional
- Have the same shape, but not the same size



4-1 Secondary Math II   Discovering Similarity Task



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

$AB=4$ $\overline{CD}=4$ $\overline{EF}=12$ $\overline{GH}=12$
$\overline{BC}=3$ $\overline{DA}=3$ $\overline{FG}=9$ $\overline{HE}=9$

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?

$\frac{12}{4}=3$ $\frac{9}{3}=3$ $\frac{12}{4}=3$ $\frac{9}{3}=3$

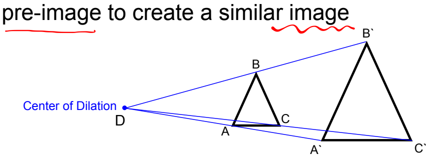
3. Using a ruler, draw the lines that connect: O, A, and E   O, C, and G   O, B, and F   O, D and H

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?

2. Dilation:

- a transformation that enlarges or reduces a pre-image to create a similar image



A dilation requires a center point and a scale factor. The letter r usually represents the scale factor.

In the above figure - Triangle A'B'C' is a dilation of triangle ABC

3.Scale Factor:

- Is the ratio:
- the distance from the center of dilation to a point on the image: to the distance from the center of dilation to the corresponding point on the pre-image.

- When |r| is greater than 1, the dilation is an enlargement.
- When |r| is between 0 and 1, the dilation is a reduction.
- If r>0, P' lies on CP, and CP' = r(CP)
- If r<0, P' lies on CP' (the ray opposite CP) and |r|(CP)

4. Dilations preserve angle measure, betweenness of points, and collinearity, $\boxed{\text{but do NOT preserve distance.}}$ Therefore, a dilation is a **similarity** $\boxed{\textbf{transformation.}}$

A B C

Vocabulary

Image: The Dialation

Preimage: Before the Dialation

Dilation: to get bigger/smaller

Center of Dilation: A point that you Dialate from.

Scale Factor: How much you dialate By

Similar: Close but not the same

ex) Find the measure of the dilation image $\overline{A'B'}$ or the preimage $\overline{AB}$ using the given scale factor.

a) AB = 12, r = 2

$\overline{A'B'} = 24$

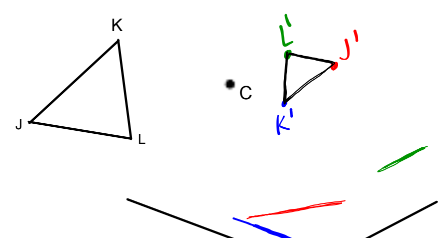
b) A'B' = 36, r = 1/4

$\overline{A'B'} = 36$

$\boxed{\overline{AB} = 144}$

5. Constructing dilations.

ex) Draw the dilation image of triangle JKL with center C and r = -1/2



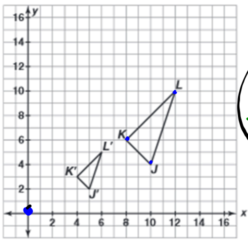
Steps:

1) Draw CJ, CK, and CL. Since r is negative, J', K', and L' will lie on CJ', CK' and CL' respectively.

2) Locate J', K', and L' so that CJ' = (1/2)(CJ), CK' = (1/2)(CK), and CL' = (1/2)(CL).

3) Draw triangle J'K'L'

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



a. List the coordinates of the vertices of Triangle JKL and Triangle J'K'L'. How do the coordinates of the image compare to the coordinates of the pre-image?

L:(12,10)
J:(10,4)
K:(8,6)

L':(6,5)
J':(5,2)
K':(4,3)

b. What is the scale factor?

$\boxed{\frac{1}{2}}$

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

*The point (x,y) dilated can be described as (kx,ky) when the center of dilation is at the origin.