Unit 3 Dilation and Similarity

Learning Target #1: Dilations & Similar Figures
MGSE9-12.G.SRT.1: Verify experimentally the properties of dilations given by a center and a scale factor.
a. The dilation of a line not passing through the center of the dilation results in a parallel line and leaves a line passing through the center unchanged.
b. The dilation of a line segment is longer or shorter according to the ratio given by the scale factor.
***MGSE9-12.G.SRT.2**:* Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain, using similarity transformations, the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Learning Target #2: Similar Triangles and Proofs
MGSE9-12.G.SRT.2: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain, using similarity transformations, the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MGSE9-12.G.SRT.3: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MGSE9-12.G.SRT.4: Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, (and its converse); the Pythagorean Theorem using triangle similarity.
MGSE9-12.G.SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Look at the standards above, create 2 learning goals on the space provided for the unit

1.____

2.____

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Dilation - transformation that produces an image that is the Same Shape as the original but a different Size.

- A dilation is Similar to the original figure.
- Dilations are centered around the origin (0, 0), unless otherwise stated.

Scale factor – is $\frac{\text{image length}}{\text{pre - image length}}$, which is a number (K).

- If the scale factor is greater than 1, the figure becomes enlargement (larger)
- If the scale factor is between 0 and 1, the figure becomes Reduction (smaller)

Rule: (x,y) → (x multiplied by *k*, y multiplied by *k*) where *k* represents the scale factor.

Example 1: If the scale factor is 3, how would you write the rule?

$(3x, 3y)$

Example 2:

Triangle *ABC* has vertices *A* (0, 2), *B* (4, 4), and *C* (-1, 4).

What are the vertices of its *image* with a scale factor of 4?

$A(0,2)$
$B(4,4)$ $\rightarrow$ (x, y) $\downarrow$ $(4x, 4y)$
$C(-1,4)$

$A'(0,8)$
$B'(16,16)$
$C'(-4,16)$

Example 3:

Triangale PQR has vertices P (-2, 4), Q (4, 4), and R (4, -2). It is dilated by a scale factor of ½.

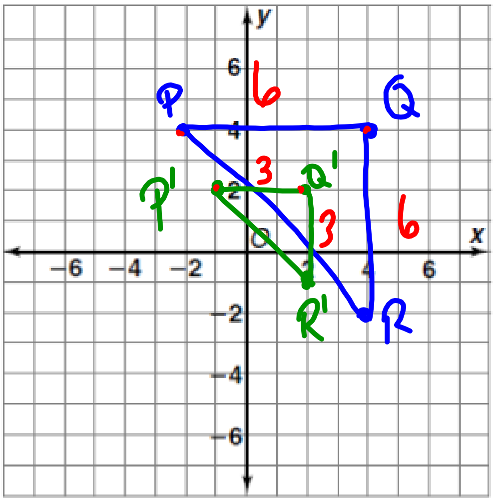
a) What are the coordinates of the image?

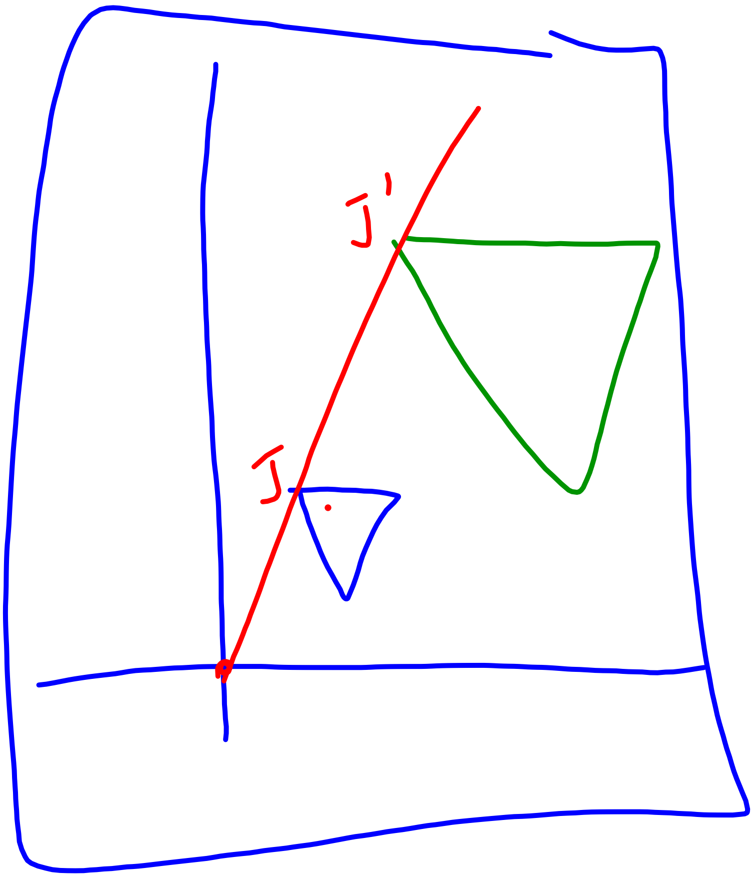
$P(-2,4)$ $P'(-1,2)$

$Q(4,4) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$ $Q'(2,2)$

$R(4,-2)$ $R'(2,-1)$

b) First graph the first coordinates. Then graph the new image after the dilation.





Englarge by 2

J(2,4) J'(8,16)

K(4,4) K'(16,16)

P(3,2) P'(12,8)

enlarge by a factor of 4

Create a triangle

A (15, 2)

B (22, 2)

C (18, 7)

Point

(10, 3)

by 2