

* Exploration

Extending Dilations

Dilations with the Center of Dilation not at the Origin

- On a sheet of grid paper, plot triangle ABC with a colored pencil with the following vertices. A(2, 6), B(8, 7) and C(4, 4).
- Plot point P(8, 2). This will be the center of dilation.
- Using point P, construct lines of extension through each of the three vertices.
- Dilate the figure by a scale factor of 2 using a different color pencil. Use the table below to record your findings.

Original Figure		Image Dilated by Scale Factor of 2 with Center Of Dilation at P(8, 2).	
Point	Coordinates	Point	Coordinates
A	(2, 6)	A'	(-4, 10)
B	(8, 7)	B'	(0, 12)
C	(4, 4)	C'	(0, 6)

*We do together

- In the previous activity, you discovered that if some point (x, y) was dilated by a scale factor of some real number r with the origin as the center of dilation, then the resulting image point had coordinates $(r \cdot x, r \cdot y)$. In other words, as long as the origin was the center of dilation, image points could be found by multiplying the original coordinates by the scale factor of dilation. Does that work for the data in the table above? Explain.

NO, when center of dilation moves away from origin, the pts will be different

- Suppose you multiplied each of the original coordinates by a scale factor of 2. Complete the table below and respond to the questions that follow.

Original Figure		Coordinates of Original Figure Doubled ($2 \cdot x, 2 \cdot y$)	Actual coordinates of image Dilated by Scale Factor of 2 with Center Of Dilation at P(8, 2)
Point	Coordinates		
A	(2, 6)	(4, 12)	(-4, 10)
B	(8, 7)	(16, 14)	(0, 12)
C	(4, 4)	(8, 8)	(0, 6)

- Notice that multiplying the coordinates of A(2, 6) by 2 gives (4, 12). How different is the x coordinate from the actual coordinate? What about the x coordinates for the other points? How different are they from the actual coordinates?

Difference of 8 units

$$4 - (-4) = 8 \quad 8 - 8 = 0$$

$$16 - 8 = 8$$

- Notice that multiplying the coordinates of A(2, 6) by 2 gives (4, 12). How different is the y coordinate from the actual coordinate? What about the y coordinates for the other points? How different are they from the actual coordinates?

Difference of 2 units

$$12 - 10 = 2$$

$$14 - 12 = 2$$

$$8 - 6 = 2$$

-8

-2

Extending Dilations

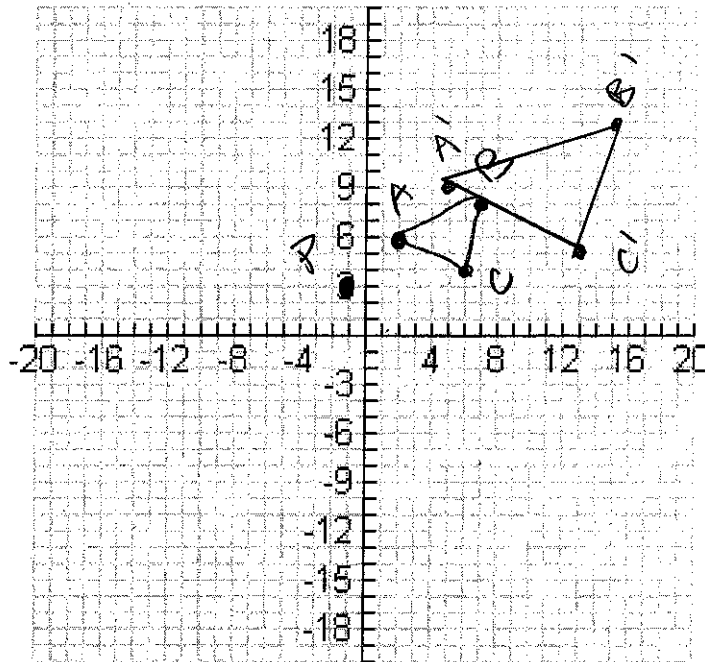
9. How do the "differences" discovered in #7 & 8 above relate to point P(8, 2), the center of dilation?

The differences were the same as the pt of dilation

10. Based on the above findings, write a rule for dilating any point (x, y) with center of dilation P(8, 2) by a scale factor of 2.

$$(x, y) \rightarrow (2x - 8, 2y - 2)$$

11. Using the coordinate grid below, dilate a triangle by a scale factor of two using point P(-1, 3) as the center of dilation. Respond to the questions that follow.



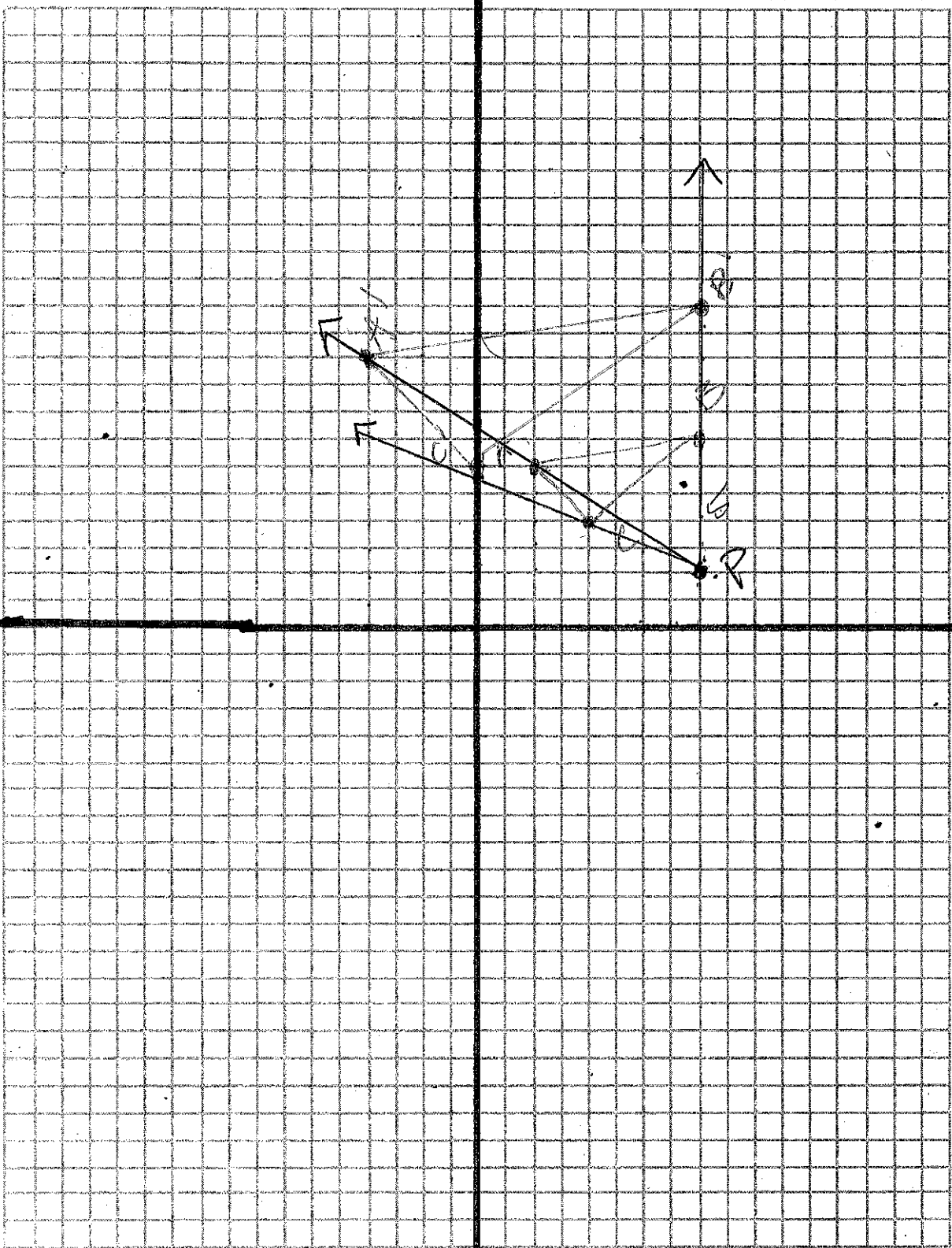
$k = 2$
 $(x, y) \rightarrow (2x + 1, 2y - 3)$

- * 12. Construct a table of values that shows the coordinates of the original triangle, as well as the coordinates of the dilation.

- * 13. Write a brief summary of how you constructed the dilation.

	PRE	IM.
A	(2, 6)	(5, 9)
B	(7, 0)	(15, 13)
C	(6, 4)	(13, 5)

I determined the rule for the dilation by translating the center of dilation back to the origin to $\langle -1, -3 \rangle$ perform the dilation, then translated the dilation back $\langle -1, 3 \rangle$



Name: _____

Date: _____