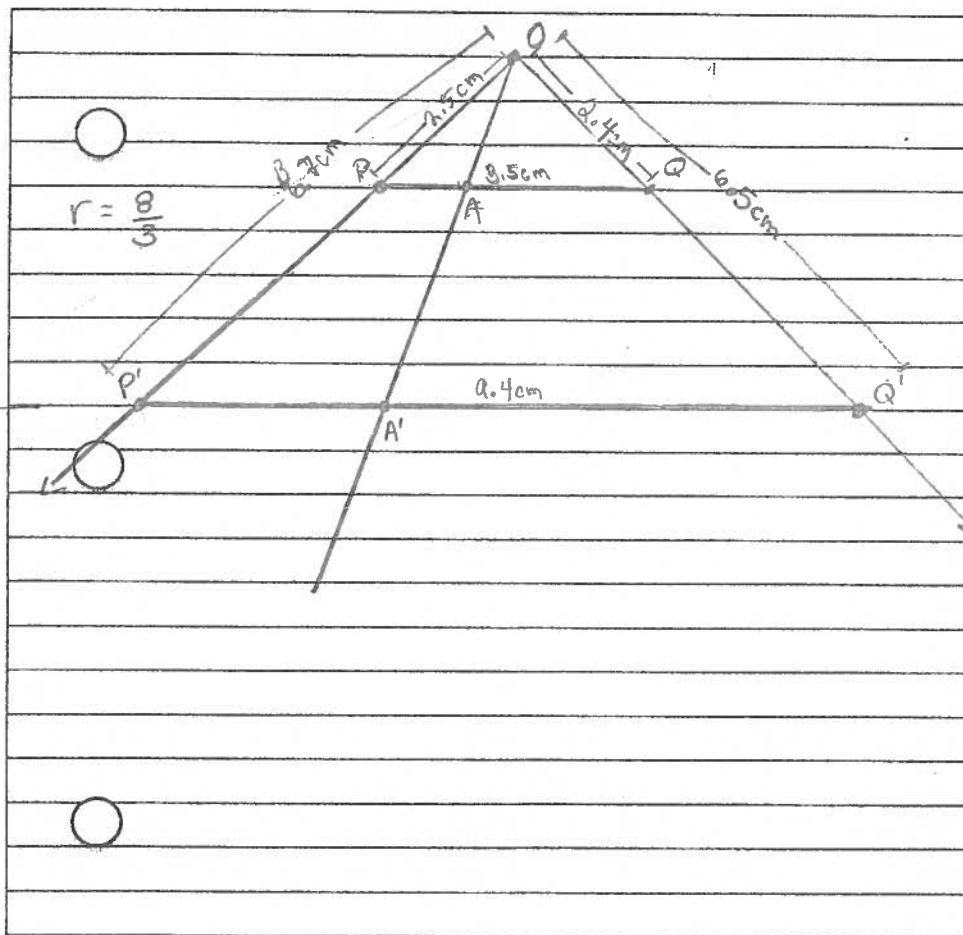


LEARNING OBJECTIVE:

We will verify the Fundamental Theorem of Similarity (G8M3L4)

CONCEPT DEVELOPMENT:

The Fundamental Theorem of Similarity (FTS): Given a dilation with center O and scale factor r , then for any two points P and Q in the plane so that $O, P,$ and Q are not collinear, the lines PQ and $P'Q'$ are parallel, where $P' = \text{dilation}(P)$ and $Q' = \text{dilation}(Q)$ and furthermore $|P'Q'| = r|PQ|$.

"Lined Paper" Proof

1. On line 2, make center O
2. Mark point P
- 3 rows down
3. Draw ray \overrightarrow{OP}
4. Mark P' 8 rows from O
5. Mark Q ^{1/4} Find scale factor and draw ray \overrightarrow{OQ}
6. Mark Q' using same scale factor.
7. Connect PQ and $P'Q'$
8. Measure OP and OP'
9. Measure OQ and OQ' .

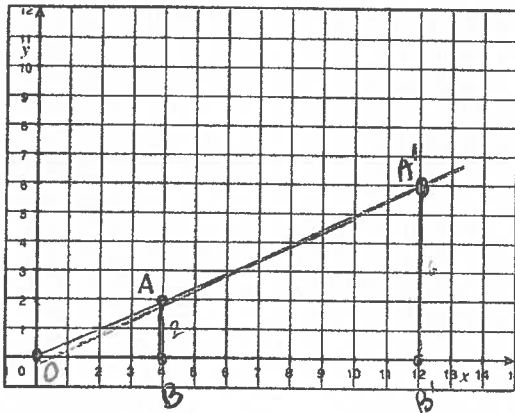
Verify that they have the same scale factor.

10. Measure PQ and $P'Q'$
11. From O draw another ray
12. Label A and A'

GUIDED PRACTICE:**How to use the FTS to Determine Points of Dilation on a Coordinate Plane**

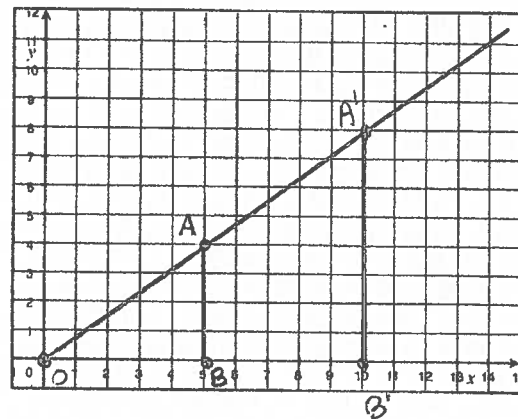
1. Locate the center of dilation (for this lesson, it will be the origin).
2. Locate the original point that is being dilated. Draw a ray from the origin through the point and label the point A.
3. Draw a vertical line from Point A to the x-axis, and label the point of intersection with the x-axis B.
4. Find B' by multiplying the distance of segment OB by the given scale factor.
5. Draw a vertical line from B' to the ray OA. The point of intersection with your ray is the dilation of A.

Find A' when A is dilated from the origin by a scale factor of 3.



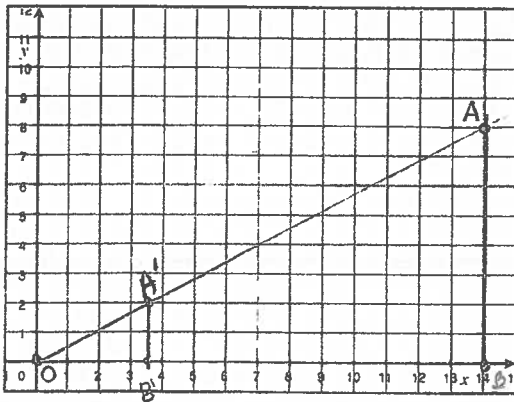
$$A' (12, 6)$$

Find A' when A is dilated from the origin by a scale factor of 2.



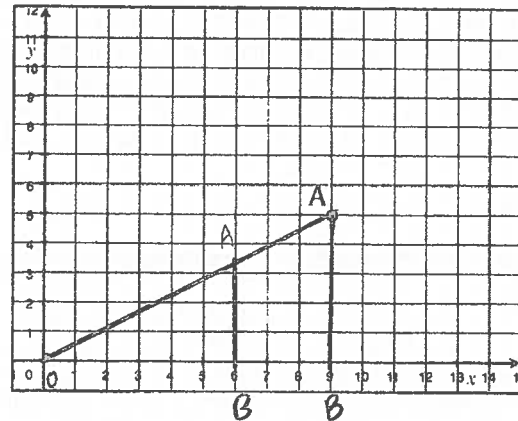
$$A' (10, 8)$$

Find A' when A is dilated from the origin by a scale factor of $\frac{1}{4}$.



$$A' (3.5, 2)$$

Find A' when A is dilated from the origin by a scale factor of $\frac{2}{3}$.



$$A' (6, \frac{10}{3})$$

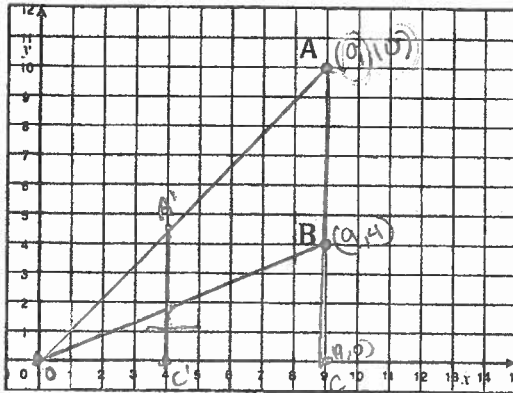
NAME: _____

Math _____, Period 3/4

Mr. Rogove

Date: _____

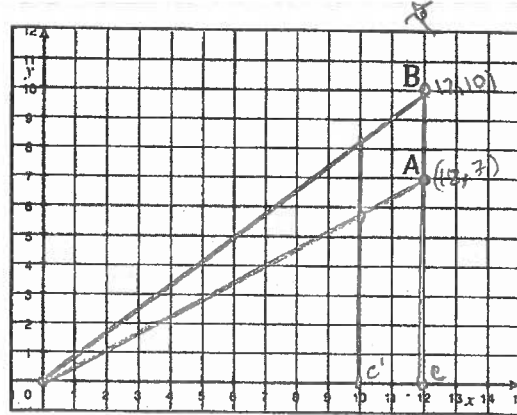
Find A' and B' when A and B are dilated from the origin by a scale factor of $\frac{4}{9}$



$$A' = \left(4, \frac{40}{9}\right)$$

$$B' = \left(4, \frac{16}{9}\right)$$

Find A' and B' when A and B are dilated from the origin by a scale factor of $\frac{5}{6}$ *

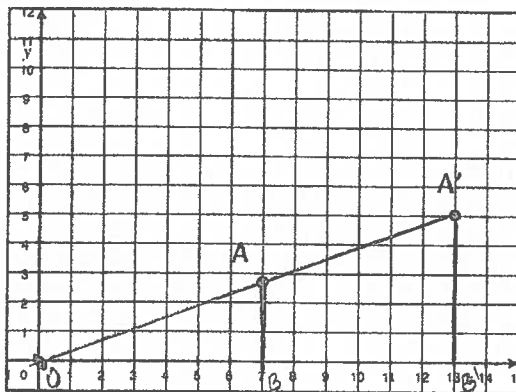


$$A' = \left(10, \frac{35}{6}\right)$$

$$B' = \left(10, \frac{25}{3}\right)$$

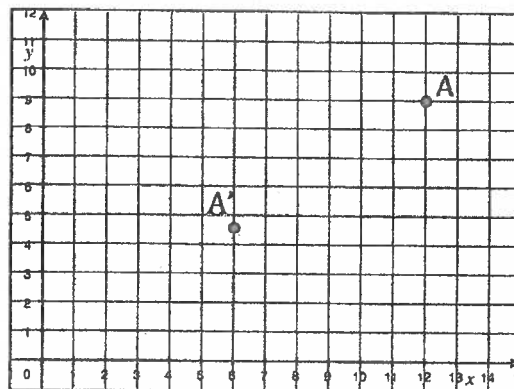
$$12 \times \frac{5}{6} = 10$$

Find the scale factor of the dilation from A to A' .



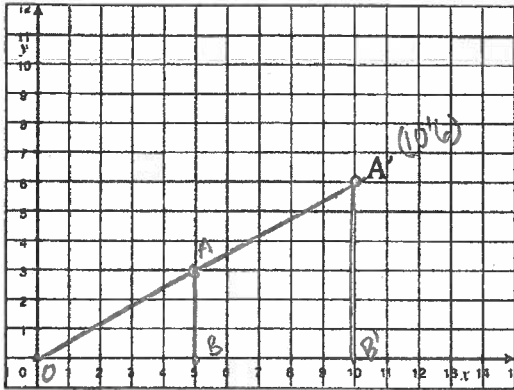
$$r = \frac{|OB'|}{|OB|} = \frac{13}{7}$$

Find the scale factor of the dilation from A to A' .



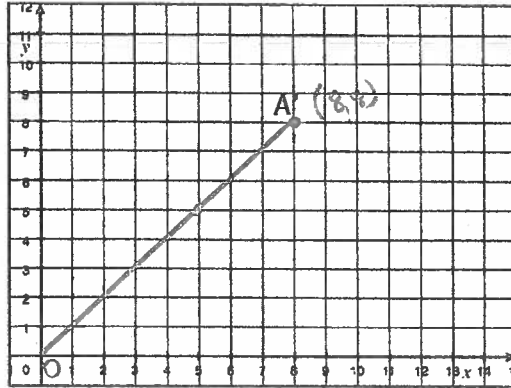
$$r = \frac{6}{12} = \frac{1}{2}$$

Find A when A' has been dilated from the origin by a scale factor of 2.



A (5, 3)

Find A when A' has been dilated from the origin by a scale factor of $\frac{8}{5}$.



A (5, 5) $\times \frac{8}{5} = 8$

Line of Learning:

What have you learned about the concepts of similarity in general and dilations specifically?

1. A dilation is a transformation that changes the size of an object by a scale factor from a center.
2. When we dilate, we multiply by the scale factor.
3. Scale factor \times original point = dilated point.

4. If $r > 1$ the dilation expands
 If $0 < r < 1$ the dilation shrinks.

5. Area is $4 \times$ when $r = 2$
 Area is $A_0 \times r^2$ when $r = x$

6. You can make an extra line to check work.

7. To find coordinates of dilation from (0,0) multiply by r.

8. When you dilate 2 points from the same center, and connect those points, the lines are parallel.