

Name: Kelly

Date: _____

UNIT 5

LESSON 7

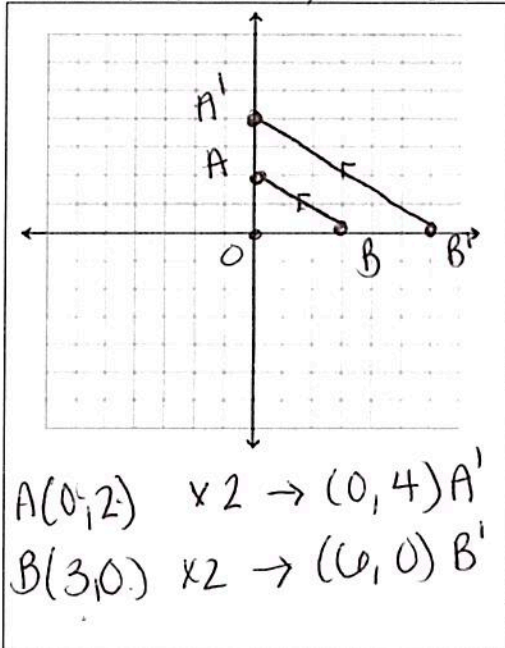
AIM: HOW DO WE DILATE A LINE?

Do Now: Find the slope of the following points- $(0, -2)$ and $(3, 4)$.

SLOPE FORMULA: $\frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-2)}{3 - 0} = \frac{6}{3} = \boxed{2}$

SCENARIO #1: CENTER OF DILATION OFF THE LINE

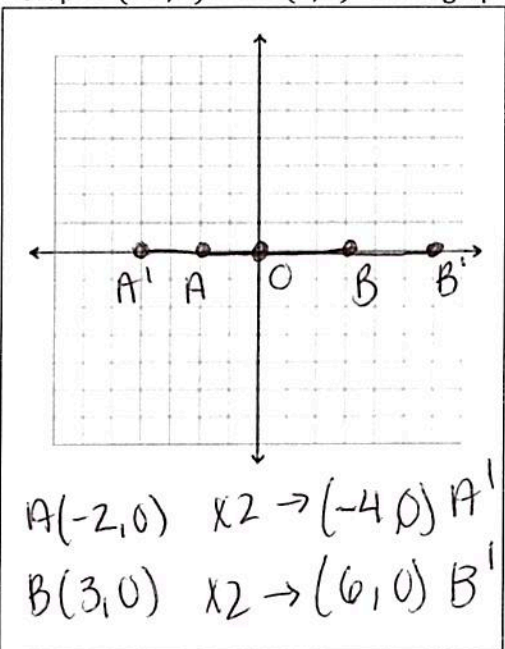
Graph $A(0, 2)$ and $B(3, 0)$ on the graphs below. Dilate AB through the origin with a scale factor of $r = 2$.



- \overline{AB} is parallel to $\overline{A'B'}$.
- What is the slope of \overline{AB} ? What is the y-intercept?
 $\frac{0 - 2}{3 - 0} = \boxed{\frac{-2}{3} = m}$ $\boxed{2 = b}$
- What is the slope of $\overline{A'B'}$? What is the y-intercept?
 $\frac{0 - 4}{6 - 0} = \frac{-4}{6} = \boxed{\frac{-2}{3} = m}$ $\boxed{4 = b}$
- When the center of dilation is OFF the line, the pre-image and the image are parallel.
- The lines have the same slope but different y-intercepts.

SCENARIO #2: CENTER OF DILATION ON THE LINE

Graph $A(-2, 0)$ and $B(3, 0)$ on the graphs below. Dilate AB through the origin with a scale factor of $r = 2$.



- \overline{AB} and $\overline{A'B'}$ are part of the same line.
- What is the slope of \overline{AB} ? What is the y-intercept?
 $\frac{0 - 0}{3 - (-2)} = \frac{0}{5} = \boxed{0 = m}$ $\boxed{0 = b}$
- What is the slope of $\overline{A'B'}$? What is the y-intercept?
 $\frac{0 - 0}{6 - (-4)} = \frac{0}{10} = \boxed{0 = m}$ $\boxed{0 = b}$
- When the center of dilation is ON the line, the pre-image and the image are part of the same line.
- The lines have the same slope and the same y-intercept.

DILATING LINESEGMENTS

STEPS:

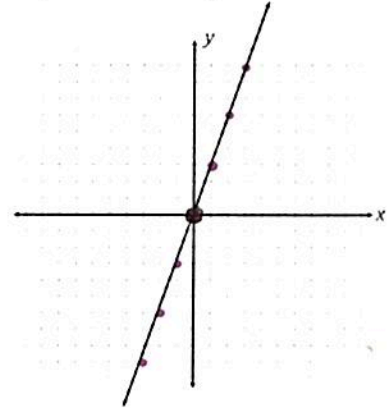
**RECALL: The equation of a line: $y = mx + b$
 Where $m =$ slope and $b =$ y-intercept **

1. Sketch the line and identify if the center of dilation is **ON** or **OFF** the line.
2. If the center of dilation is **ON** the line, the equation remains exactly the same.
3. If the center of dilation is **OFF** the line, the equation will have the same slope but a different y-intercept.
 To find the new y-intercept, **multiply** the original y-intercept by the scale factor.

1. The line $y = 3x$ is dilated by a scale factor of 2 and centered at the origin. Write the equation that represents the image of the line after the dilation.

C.O.D. is ON the line, same equation!

$$\boxed{y = 3x}$$



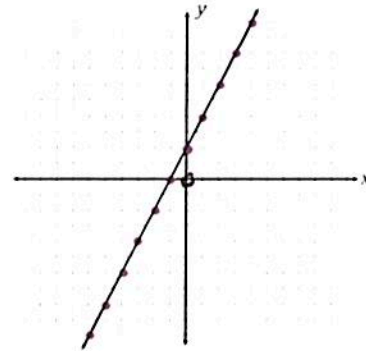
2. The line $y = 2x + 2$ is dilated by a scale factor of 3 and centered at the origin. Write the equation that represents the image of the line after the dilation.

C.O.D. is OFF the line, same slope
different y-int!

$$2 \times 3 = 6 = b$$

$$2 = m$$

$$\boxed{y = 2x + 6}$$



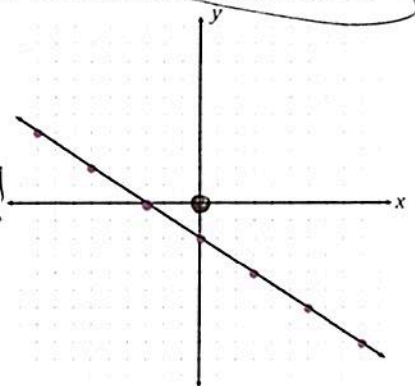
3. The line $y = -\frac{2}{3}x - 2$ is graphed to the below. Write the equation of the image of this line after a dilation of 2.5 centered at the origin.

C.O.D. is OFF the line, same slope
different y-int!

$$-2 \times 2.5 = -5 = b$$

$$-\frac{2}{3} = m$$

$$\boxed{y = -\frac{2}{3}x + 5}$$



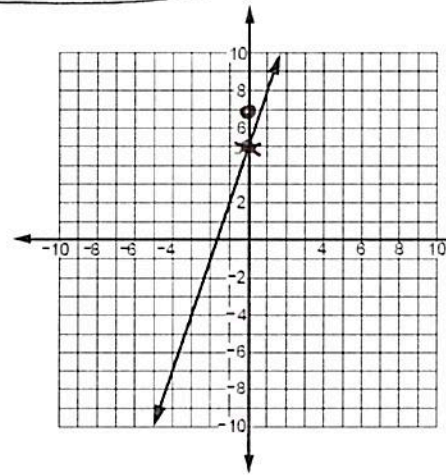
4. Rosa graphs the line $y = 3x + 5$. Then she dilates the line by a factor of $1/5$ with $(0, 7)$ as the center of dilation. Write the equation that represents the image of the line after the dilation.

COO is OFF the line! same slope
different y-int.

$$5 \times \frac{1}{5} = 1 = b$$

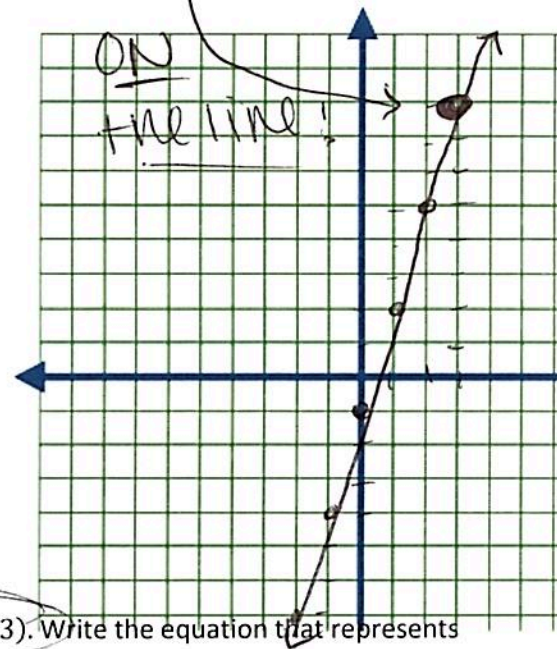
$$m = 3$$

$$y = 3x + 1$$



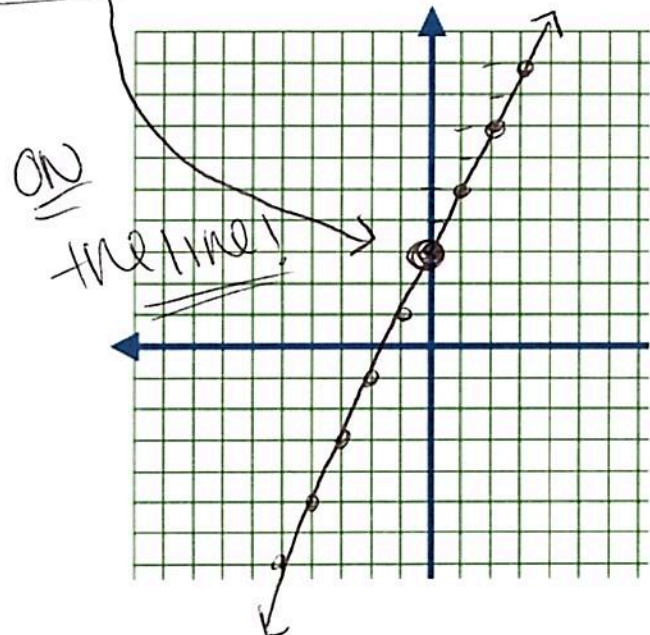
5. Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3, 8)$. The line's image is

- 1) $y = 3x - 8$
- 2) $y = 3x - 4$
- 3) $y = 3x - 2$
- 4) $y = 3x - 1$



6. The line $y = 2x + 3$ is dilated by a scale factor of 3 and centered at $(0, 3)$. Write the equation that represents the image of the line after the dilation.

$$y = 2x + 3$$

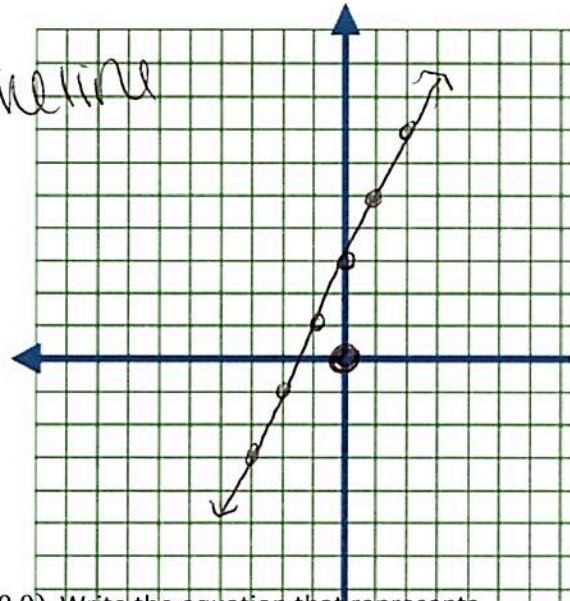


7. The line $y = 2x + 3$ is dilated by a scale factor of 3 and centered at $(0,0)$. Write the equation that represents the image of the line after the dilation.

$$3 \times 3 = 9$$

$$y = 2x + 9$$

OFF the line

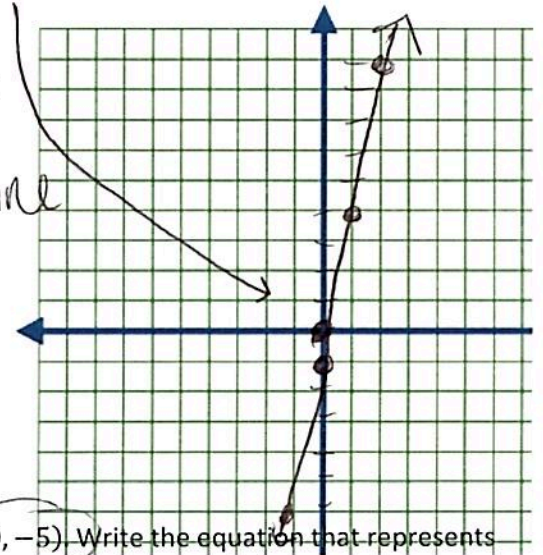


8. The line $y = 5x - 1$ is dilated by a scale factor of $\frac{3}{2}$ and centered at $(0,0)$. Write the equation that represents the image of the line after the dilation.

$$-1 \times \frac{3}{2} = -\frac{3}{2}$$

$$y = 5x - \frac{3}{2}$$

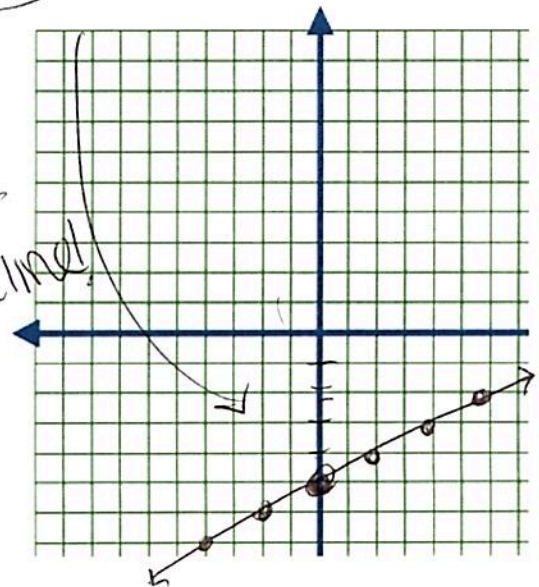
OFF the line



9. The line $y = \frac{1}{2}x - 5$ is dilated by a scale factor of 3 and centered at $(0, -5)$. Write the equation that represents the image of the line after the dilation.

$$y = \frac{1}{2}x - 5$$

ON the line!



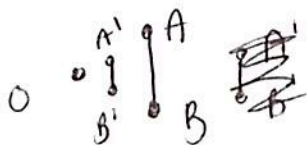
10. Point O is not on \overline{AB} . When \overline{AB} is dilated with the center of dilation at O with a positive scale factor, image $\overline{A'B'}$ is shorter than \overline{AB} . What must be true about the scale factor?

(1) The scale factor is $k > 1$

(3) The scale factor is $0 < k < 1$

(2) The scale factor is $k = 1$

(4) The lengths of \overline{AB} and $\overline{A'B'}$ are not related to scale factor k .



11. \overline{AB} , shown in the graph to the below, is dilated with a center of dilation at the origin and a scale factor of $\frac{5}{2}$.

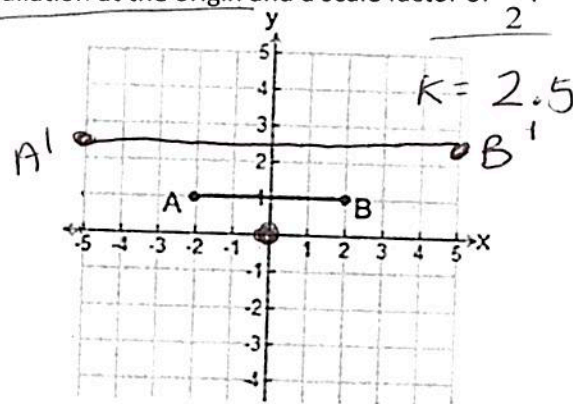
Which of the following statements regarding \overline{AB} is not true?

(1) \overline{AB} will be parallel to $\overline{A'B'}$ ✓

(2) $\overline{A'B'}$ is an enlargement of \overline{AB} ✓

(3) $AB = \frac{5}{2} A'B'$

(4) The coordinates of A' will be $(-5, 2.5)$ ✓



$$(-2, 1) \times 2.5 \rightarrow (-5, 2.5)$$

$$(2, 1) \times 2.5 \rightarrow (5, 2.5)$$