

Lesson 7-9R / 7.10L: Line Dilations

Agenda

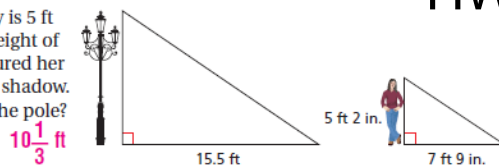
- Check & Review HW 7.8/7.9
- 7-9/7-10 Exploration and Guided Notes
- Quiz

Homework:

- Complete Problem Set

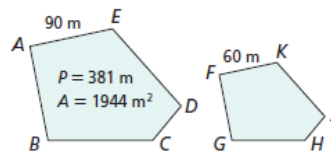
PRACTICE AND PROBLEM SOLVING**HW Answers**

12. **Measurement** Jenny is 5 ft 2 in. tall. To find the height of a light pole, she measured her shadow and the pole's shadow. What is the height of the pole?



Given that pentagon $ABCDE \sim$ pentagon $FGHIK$, find each of the following.

18. perimeter of pentagon $FGHIK$ **254 m**
 19. area of pentagon $FGHIK$ **864 m²**



Given: $\triangle ABC \sim \triangle DEF$

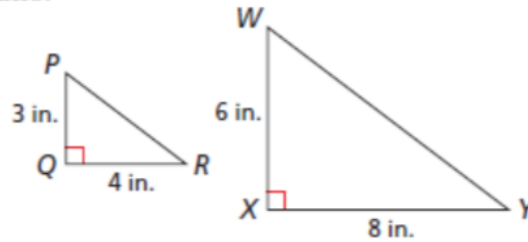
24. The ratio of the perimeter of $\triangle ABC$ to the perimeter of $\triangle DEF$ is $\frac{8}{9}$.
 What is the similarity ratio of $\triangle ABC$ to $\triangle DEF$?
25. The ratio of the area of $\triangle ABC$ to the area of $\triangle DEF$ is $\frac{16}{25}$.
 What is the similarity ratio of $\triangle ABC$ to $\triangle DEF$?
26. The ratio of the area of $\triangle ABC$ to the area of $\triangle DEF$ is $\frac{4}{81}$.
 What is the ratio of the perimeter of $\triangle ABC$ to the perimeter of $\triangle DEF$?
27. **Space Exploration** The scale of this model of the space shuttle is 1 ft : 50 ft. In the actual space shuttle, the main cargo bay measures 15 ft wide by 60 ft long. What are the dimensions of the cargo bay in the model? **0.3 ft by 1.2 ft**

28. Given that $\triangle PQR \sim \triangle WXY$, find each ratio.

a. $\frac{\text{perimeter of } \triangle PQR}{\text{perimeter of } \triangle WXY} = \frac{1}{2}$

b. $\frac{\text{area of } \triangle PQR}{\text{area of } \triangle WXY} = \frac{1}{4}$

c. How does the result in part a compare with the result in part b?



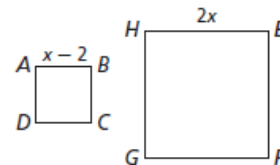
29. Given that rectangle $ABCD \sim EFGH$. The area of rectangle $ABCD$ is 135 in^2 . The area of rectangle $EFGH$ is 240 in^2 . If the width of rectangle $ABCD$ is 9 in. , what is the length and width of rectangle $EFGH$? **20 in.; 12 in.**

36. **$AB = 16$ units;**
 $HE = 36$ units

36. The ratio of the perimeter of square $ABCD$ to the perimeter of square $EFGH$ is $\frac{4}{9}$. Find the side lengths of each square.



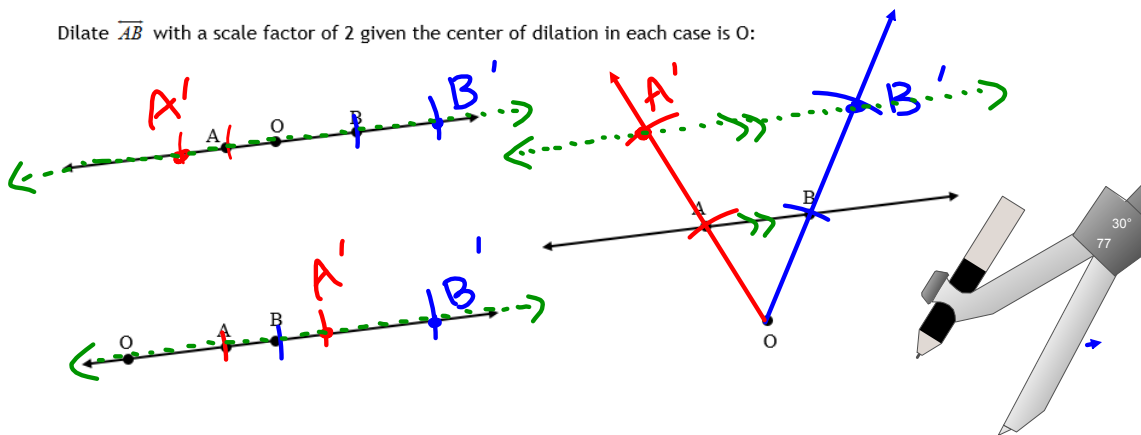
37. **Write About It** Explain what it would mean to make a scale drawing with a scale of 1:1.



7-9 R & 7-10 SB Notes: Line Dilations

DILATIONS OF LINES

Dilate \overline{AB} with a scale factor of 2 given the center of dilation in each case is O:



- Describe the relationship between the pre-image and image lines when the center of dilation was on the pre-image line (collinear with the pre-image line): **COINCIDENT**
- Describe the relationship between the pre-image and image lines when the center of dilation was not on the pre-image line (not collinear): **PARALLEL**
- Keep in mind that a pre-image point will not map to itself unless it is the center of dilation, but rather will map onto a parallel or coincident line.

*** SLOPE IS PRESERVED UNDER D**

LINE DILATIONS IN THE COORDINATE PLANE

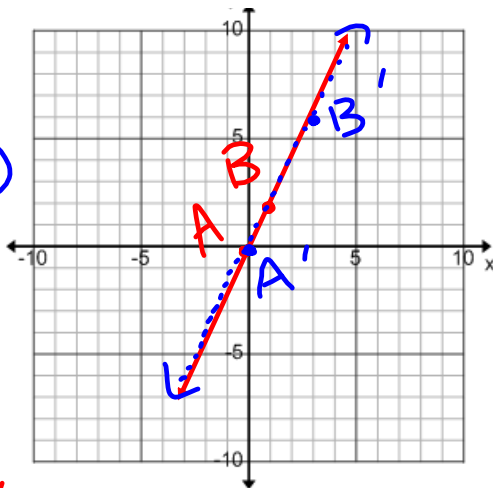
Remember that dilations can be done in the coordinate plane with any center of dilation. To dilate a line in the coordinate plane, follow the same general rules as all line transformations.

- 1) Graph the line and select two points to be your pre-image points.
- 2) Transform the two pre-image points using
 - a. The rule $(a, b) \xrightarrow{D_k} (ka, kb)$ if centered at the origin or
 - b. Counting/Construction if not centered at the origin.
- 3) Plot the image points and graph the line that contains them.
- 4) Compare the lines to answer any follow up questions.

EXAMPLES: Perform the following transformations and compare the pre-image and image line relationships:

A. $D_{\text{origin}, 3} (y = 2x)$ $y = 2x + 0$
 $A(0, 0) \rightarrow A'(0, 0)$
 $B(1, 2) \rightarrow B'(3, 6)$

- What point was significant?
 $A(0, 0) = \text{CENTER OF DILATION}$
- Write the equation of the image line:
 $y = 2x$
- What is the relationship between the pre-image and image line? COINCIDENT
- Where was the center of dilation? *ON / COLLINEAR W/ PRE-IMAGE
- Does this match dilations of lines that contain/are collinear with the center of dilation?
YES!



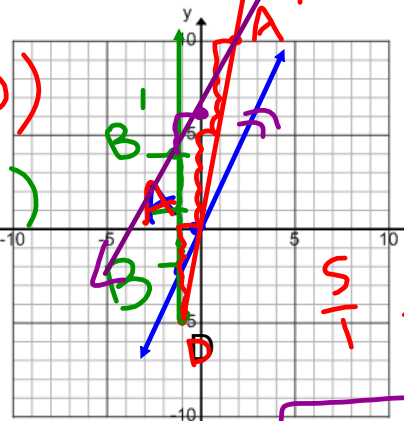
To dilate a line in the coordinate plane, follow the same general rules as all line transformations.

- 1) Graph the line and select two points to be your pre-image points.
- 2) Transform the two pre-image points using
 - a. The rule $(a, b) \xrightarrow{D_k} (ka, kb)$ if centered at the origin or
 - b. Counting/Construction if not centered at the origin.
- 3) Plot the image points and graph the line that contains them.
- 4) Compare the lines to answer any follow up questions.

- a. The ruler is centered at the origin or
 b. Counting/Construction if not centered at the origin.
 3) Plot the image points and graph the line that contains them.
 4) Compare the lines to answer any follow up questions.

B. D $(-1, -5), 3 (y = 2x)$

$A(0, 0) \rightarrow A'(2, 10)$
 $B(-1, -2) \rightarrow B'(-1, 4)$



$A'B' \parallel AB$
 $m = \frac{2}{1}$

$\frac{S}{T} = 3$
 3 TIMES

- Write the equation of the image line: _____

$y = 2x + b$ $y = 2x + 6$
 $y - y_1 = 2(x - x_1)$

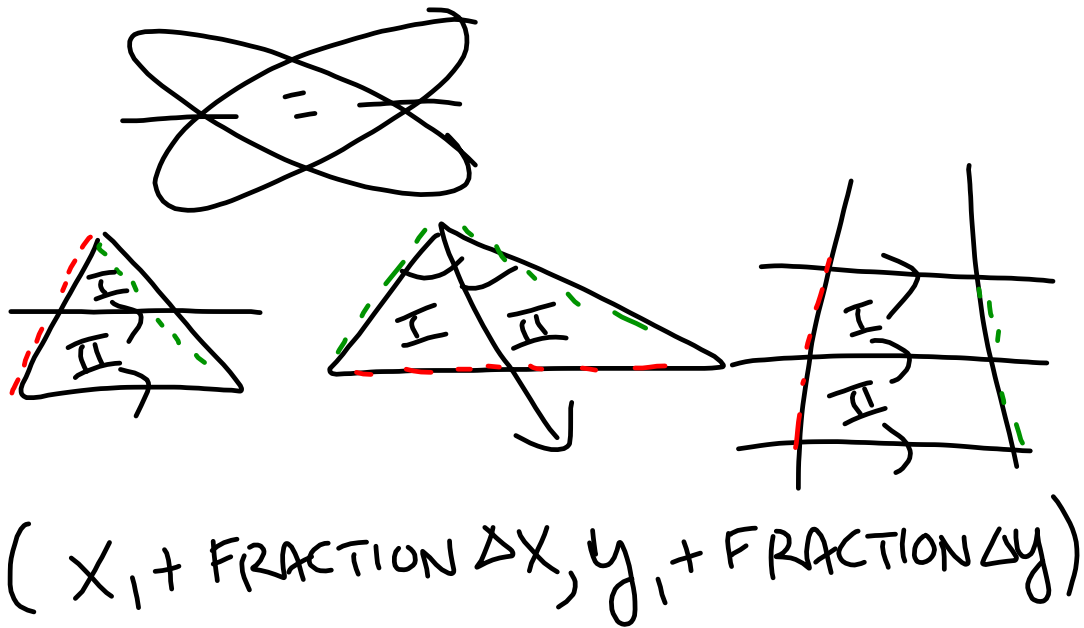
- What is the relationship between the pre-image and image line? PARALLEL
- Where was the center of dilation? OFF / NON-COLLINEAR W/ PRE
- Does this match dilations of lines that do not contain/are not collinear with the center of dilation? YES

#2 - STATE
 COORDINATES OF
 THE POINT

Quiz Time

Take Out Lesson Summaries

If done early, work on HW



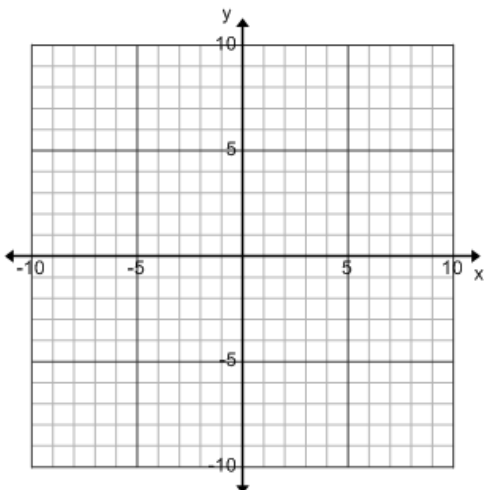
PROBLEM SET 7-9R & 7-10L

Perform the following dilations with the indicated center of dilation and scale factor, compare the pre-image and image line relationships, and write an equation for the image line:

A. $D_{origin, \frac{1}{3}}(y = 3x - 6)$

Relationship: _____

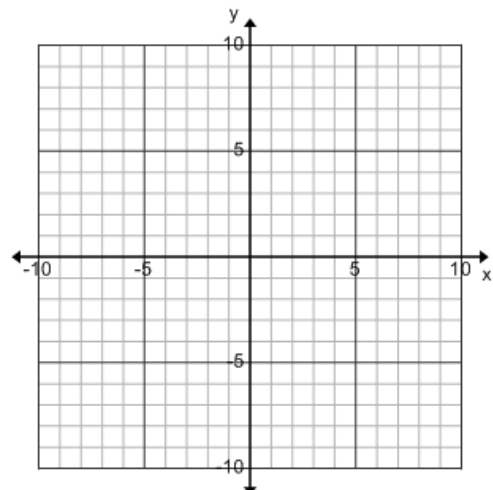
Image Line Eq: _____



B. $D_{(2,0), \frac{1}{3}}(y = 3x - 6)$

Relationship: _____

Image Line Eq: _____



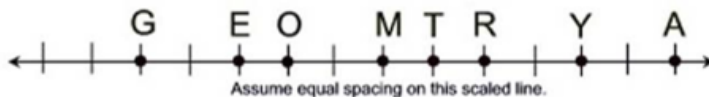
1. Given line m and point O **not** on line m . The image of line m is constructed through a dilation centered at O with a scale factor of 3. Which of the following statements best describes the image of line m ?

- a) a line passing through point O b) a line intersecting with line m
 c) a line parallel to line m d) a line perpendicular to line m

2. Line \overline{AB} is dilated with a center of dilation at A and a scale factor of 2. Which of the following statements will be true about \overline{AB} and its image $\overline{A'B'}$?

- a) The slope of $\overline{A'B'}$ will be twice the slope of \overline{AB} .
 b) The slope of $\overline{A'B'}$ will be half the slope of \overline{AB} .
 c) The slope of $\overline{A'B'}$ will be two more than the slope of \overline{AB} .
 d) The slope of $\overline{A'B'}$ will be the same as the slope of \overline{AB} .

3. For the scaled line shown below, determine the image points which represent the dilations.



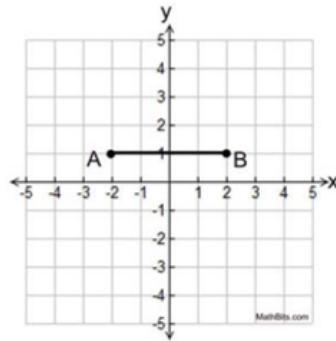
- a) $D_{O,2}(M) = \underline{\hspace{2cm}}$ b) $D_{O,3}(E) = \underline{\hspace{2cm}}$ c) $D_{O,\frac{1}{4}}(A) = \underline{\hspace{2cm}}$
 d) $D_{O,-1}(T) = \underline{\hspace{2cm}}$ e) $D_{M,2}(R) = \underline{\hspace{2cm}}$

4. Point O is not on \overline{AB} . When \overline{AB} is dilated with the center of the 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?

- a) The scale factor is $k > 1$.
 b) The scale factor is $0 < k < 1$.
 c) The scale factor is $k = 1$.
 d) The lengths of \overline{AB} and $\overline{A'B'}$ are not related to scale factor k .

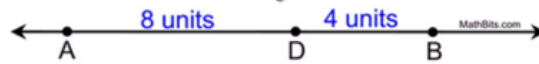
5. If $\overline{AB} = 16$ inches and \overline{AB} is dilated by a scale factor of $\frac{3}{2}$, find $A'B'$.

6. \overline{AB} , shown at the right, is dilated with a dilation centered at the origin and a scale factor of $\frac{5}{2}$. Which of the following statements regarding \overline{AB} is NOT true?



- a) \overline{AB} will be parallel to $\overline{A'B'}$.
- b) $AB = \frac{5}{2} \cdot A'B'$
- c) $\overline{A'B'}$ is an enlargement of \overline{AB} .
- d) Coordinates of A' will be $(-5, 2.5)$.

7. Given \overline{AB} with point D on \overline{AB} as shown below. A dilation on D is centered at A with a scale factor of 2. Determine if the following statements are TRUE or FALSE.



- a) D' lies on line \overline{AB} .
- b) D' lies between A and D .
- c) D' lies on \overline{AB} .
- d) D' is 16 units from A .
- e) $BD' = 8$ units.