BEAT THE TEST!

1. When the transformation $(x, y) \rightarrow (x - 4, y + 7)$ is performed on point P, its image is point $P'(-3, 4)$. What are the coordinates of P?

   Ⓐ $(-7, 11)$
   Ⓑ $(-1, 3)$
   Ⓒ $(1, -3)$
   Ⓓ $(7, -11)$

2. Consider the following points.

   $R(-6, 5)$ and $U(5, -6)$

   $\overline{RU}$ undergoes the translation $T_{h,k}(x, y)$, such that $R'(5, 1)$ and $U'(16, -10)$.

   Part A: Complete the following algebraic description.

   $(x, y) \rightarrow (x + \boxed{}, y + \boxed{})$

   Part B: What is the difference between $\overline{RU}$ and $\overline{R'U'}$?

Section 2 – Topic 3
Examining and Using Dilations – Part 1

Dilation stretches or shrinks the original figure.

Consider the following figure.

*What is making the image shrink or grow?*

The **center of dilation** is a fixed point in the plane about which all points are expanded or contracted.

How different is one line from the other in the above figure?

The **scale factor** refers to how much the figure grows or shrinks, and it is denoted by k.

  ➤ If $0 < k < 1$, the image gets smaller and closer to the center of dilation.
  ➤ If $k > 1$, the image gets larger and farther from the center of dilation.

Section 2: Introduction to Geometry – Transformations and Constructions
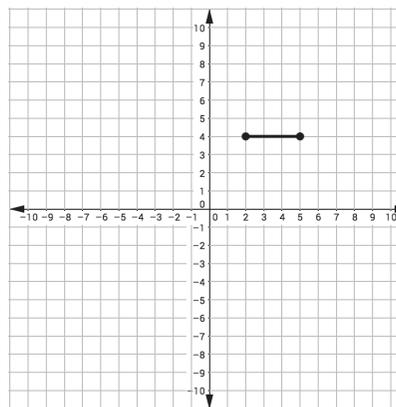
Consider the following graph.
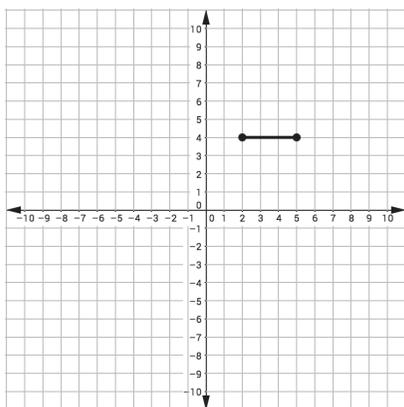
How do you dilate the line segment on the above graph centered at a point on the same line?

Use $(2, 4)$ as the center of dilation and complete the following:

➢ If $k = 2$, then the dilated line segment will have coordinates: _____ and _____.

➢ If $k = \frac{1}{2}$, then the dilated line segment will have coordinates: _____ and _____.

➢ When dilating a line that passes through the center of dilation, the line is _____.

Let's use the same graph.

How do you dilate the line segment on the above graph centered at the origin?

➢ If $k = 2$, then the dilated line segment will have coordinates: _____ and _____.

➢ If $k = \frac{1}{2}$, then the dilated line segment will have coordinates: _____ and _____.

➢ When dilating a line that does not pass through the center of dilation, the dilated line is _____ to the original.

➢ $(x, y) \rightarrow (kx, ky)$ changes the size of the figure by a factor of k when the center of dilation is the origin.

Section 2: Introduction to Geometry – Transformations and Constructions

Again, let's use the same graph.
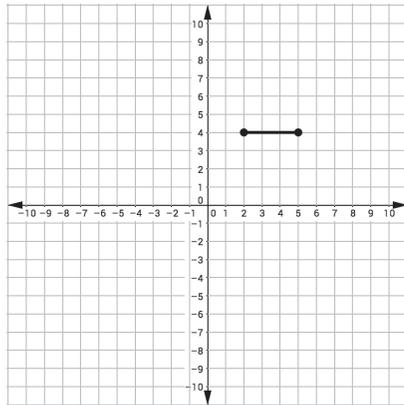
Use $(9, 6)$ *as the center of dilation and complete the following statements:*

➢ If $\text{k} = 4$, *then the dilated line segment will have the coordinates* _____ *and* _____.

➢ If $\text{k} = \frac{1}{4}$, *then the dilated line segment will have the coordinates* _____ *and* _____.

In conclusion,

➢ A dilation produces an image that is the same _____ as the original, but is a different _____.

➢ When dilating a line segment, the dilated line segment is longer or shorter with respect to the _____ _____.

Let's Practice!

1. $\overline{AB}$ has coordinates $A(-3, 9)$ and $B(6, -12)$. $\overline{PQ}$ has coordinates $P(3, -6)$ and $Q(3, 9)$.

   a. Find the coordinates of $\overline{A'B'}$ after a dilation with a scale factor of $\frac{2}{3}$ centered at the origin.

   b. Find the coordinates of $\overline{P'Q'}$ after a dilation with a scale factor of $\frac{1}{5}$ centered at $(3, -1)$.

2. Line l is mapped onto the line t by a dilation centered at the origin with a scale factor of 3. The equation of line l is $2x - y = 7$. What is the equation for line t?
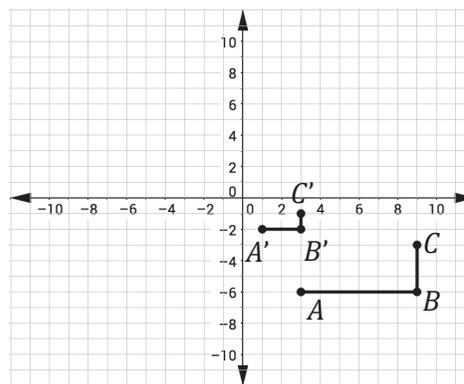
    Ⓐ $6x - 3y = 21$
    Ⓑ $\frac{1}{6}x - y = \frac{1}{21}$
    Ⓒ $y = 2x - 21$
    Ⓓ $y = 6x - 21$

3. Suppose the line l represented by $f(x) = 2x - 1$ is transformed into $g(x) = 2(f(x + 1)) - 7$.

    a. Describe the transformation from $f(x)$ to $g(x)$.

    b. What is the y-coordinate of $g(0)$?

Try It!

4. What is the scale factor for the dilation of A into A′ B′ C′?

$k =$

5. $\overline{CD}$ has coordinates $C(-8, -2)$ and $D(-4, -12)$.

    a. Determine the coordinates of $\overline{C'D'}$ if $(x, y) \rightarrow (3x, 3y)$.

   b. Find the coordinates of $\overline{C'D'}$ after a dilation with a scale factor of 2 centered at $(2, 2)$.

Section 2: Introduction to Geometry – Transformations and Constructions

1. $\overline{M'T'}$ has coordinates $M'(-8, 10)$ and $T'(2, -4)$, and it is the result of the dilation of $\overline{MT}$ centered at the origin. The coordinates of $\overline{MT}$ are $M(-4, 5)$ and $T(1, -2)$. Complete the following algebraic description so that it represents the transformation of $\overline{MT}$.

$$(x, y) \rightarrow (\boxed{} x, \boxed{} y)$$

2. Line l is mapped onto line m by a dilation centered at the origin with a scale factor of $\frac{4}{5}$. Line m is represented by $y = 3x + 8$ and it passes through the point whose coordinates are $(-4, -4)$. Which of the following is true about line l?

  Ⓐ Line l is parallel to line m.
  Ⓑ Line l is perpendicular to line m.
  Ⓒ Line l does not pass through the origin.
  Ⓓ Line l is the same as line m.

3. $P(-6, -10)$, $Q(-10, -4)$ and $R(-4, 2)$ form figure PQR.
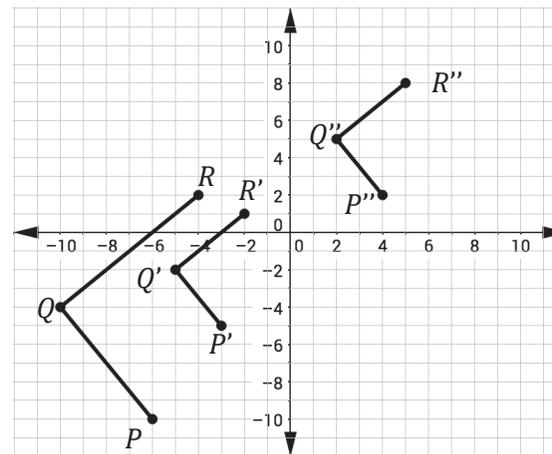
Part A: Gladys transformed figure PQR into $P'Q'R'$. Which of the following represents her transformation?

  Ⓐ $(x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$
  Ⓑ $(x, y) \rightarrow (2x, 2y)$
  Ⓒ $(x, y) \rightarrow (x + 3, y + 5)$
  Ⓓ $(x, y) \rightarrow (x - 3, y - 5)$

Part B: She then transformed $P'Q'R'$ into $P''Q''R''$. What is the transformation?

$$(x, y) \rightarrow (\underline{\hspace{3cm}}, \underline{\hspace{3cm}})$$