

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Transformations with Lines

1. The line  $y = 2x - 4$  is dilated by a scale factor of  $\frac{3}{2}$  and centered at the origin. Which equation represents the image of the line after the dilation?

- (1)  $y = 2x - 4$
- (2)  $y = 2x - 6$
- (3)  $y = 3x - 4$
- (4)  $y = 3x - 6$

2. What is an equation of the image of a line with equation  $3x - 2y = 6$  that is rotated  $90^\circ$  clockwise about the origin?

- A)  $2x + 3y = -6$
- B)  $2x - 3y = 6$

- C)  $2x + 3y = 6$
- D)  $2x - 3y = -6$

3. If the line with equation  $y + 2 = 3x$  is translated  $\langle 2, -1 \rangle$ . Write an equation of a line that represents the image of the line after the translation.

4. The equation of line  $h$  is  $2x + y = 1$ . Line  $m$  is the image of line  $h$  after a dilation of scale factor 4 with respect to the origin. What is the equation of the line  $m$ ?

- (1)  $y = -2x + 1$
- (2)  $y = -2x + 4$
- (3)  $y = 2x + 4$
- (4)  $y = 2x + 1$

5. If the line with equation  $y = x - 5$  is rotated  $90^\circ$  counterclockwise about the origin, an equation of its image is

- A)  $y = -x - 5$       E)  $y = x + 5$       C)  $y = x - 5$       D)  $y = -x + 5$

6. If the line with equation  $(y + 4) = x$  is translated 3 units to the left and 2 units down, write an equation to represent the new image.

7. What is an equation of the image of a line with equation  $y = -x + 3$  that is rotated  $90^\circ$  clockwise about the origin?
- A)  $y = -x - 3$       B)  $y = x - 3$       C)  $y = x + 3$       D)  $y = -x + 3$
8. If the line with equation  $4x + 3y = 12$  is rotated  $90^\circ$  counterclockwise about the origin, what are the coordinates of the image of its y-intercept?
- A) (4,0)      B) (12,0)      C) (-12,0)      D) (-4,0)
9. If the line with equation  $2x + y = 7$  is rotated  $90^\circ$  clockwise about the origin, the coordinates of the image of its y-intercept are
- A) (7,0)      B) (-7,0)      C) (2,0)      D) (0,-7)



Name: Key

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## Transformations with Lines

1. The line  $y = 2x - 4$  is dilated by a scale factor of  $\frac{3}{2}$  and centered at the origin. Which equation represents the image of the line after the dilation?

- (1)  $y = 2x - 4$   
 (2)  $y = 2x - 6$   
 (3)  $y = 3x - 4$   
 (4)  $y = 3x - 6$

$$y = 2x - 4$$

x	y
0	-4
2	0

$\rightarrow (0, -6)$   
 $\rightarrow (3, 0)$

$$m = \frac{-6 - 0}{0 - 3} = \frac{-6}{-3} = 2$$

$$y = 2x - 6$$

2. What is an equation of the image of a line with equation  $3x - 2y = 6$  that is rotated  $90^\circ$  clockwise about the origin?

- (A)  $2x + 3y = -6$   
 (B)  $2x - 3y = 6$

(C)  $2x + 3y = 6$

(D)  $2x - 3y = -6$

$$\begin{array}{r} 3x - 2y = 6 \\ -3x \quad \quad \quad y - 3x \\ \hline -2y = -3x + 6 \\ \quad \quad \quad -2 \quad \quad \quad -2 \\ \hline y = \frac{3}{2}x - 3 \end{array}$$

x	y
0	-3
2	0

$R_{90^\circ} = R_{270^\circ}$   
 $\rightarrow (-3, 0)$   
 $\rightarrow (0, -2)$

$$m = \frac{0 - (-2)}{-3 - 0} = \frac{2}{-3} = -\frac{2}{3}$$

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

3. If the line with equation  $y + 2 = 3x$  is translated  $\langle 2, -1 \rangle$ . Write an equation of a line that represents the image of the line after the translation.

$$y = 3x - 2$$

x	y
0	-2
1	1

$T_{2, -1}$   
 $\rightarrow (2, -3)$   
 $\rightarrow (3, 0)$

$$m = \frac{-3 - 0}{2 - 3} = \frac{-3}{-1} = 3$$

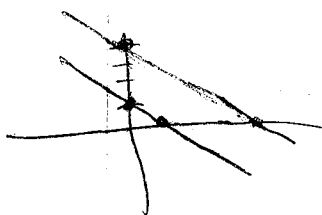
$$y - 0 = 3(x - 3)$$

$$y = 3x - 9$$

same slope

4. The equation of line  $h$  is  $x + y = 1$ . Line  $m$  is the image of line  $h$  after a dilation of scale factor 4 with respect to the origin. What is the equation of the line  $m$ ?

- (1)  $y = -2x + 1$   
 (2)  $y = -2x + 4$   
 (3)  $y = 2x + 4$   
 (4)  $y = 2x + 1$



$y = -2x + 1$  (parallel)

x	y
0	1
1	-1

$\rightarrow (0, 4)$   
 $\rightarrow (4, -4)$

$m = \frac{4 - (-4)}{0 - 4} = \frac{8}{-4} = -2$

$y = -2x + 4$

5.

If the line with equation  $y = x - 5$  is rotated  $90^\circ$  counterclockwise about the origin, an equation of its image is

A)  $y = x - 5$

B)  $y = x + 5$

C)  $y = x - 5$

(D)  $y = -x + 5$

$y = x - 5$

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

x	y
0	-5
5	0
1	-4
4	1

$m = \frac{0 - 1}{5 - 4} = \frac{-1}{1} = -1$

$y - 0 = -1(x - 5)$   
 $y = -x + 5$

6. If the line with equation  $y + 4 = x$  is translated 3 units to the left and 2 units down, write an equation to represent the new image.

$2y + 8 = x$

$2y = \frac{x}{2} - 4$

$y = \frac{1}{2}x - 4$

$y + 4 = \frac{1}{2}(x + 3)$

$y + 4 = \frac{1}{2}x + \frac{3}{2}$

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

$y = \frac{1}{2}x - \frac{9}{2}$

x	y
0	-4
2	-3

$T(-3, -2) \rightarrow (-3, -6)$   
 $\rightarrow (-1, -5)$

$m = \frac{-6 - (-5)}{-3 - (-1)} = \frac{-1}{-2} = \frac{1}{2}$

7.

What is an equation of the image of a line with equation  $y = -x + 3$  that is rotated  $90^\circ$  clockwise about the origin?

A)  $y = -x - 3$

B)  $y = x - 3$

C)  $y = x + 3$

D)  $y = -x + 3$

$$y = -x + 3$$

x	y	Point
0	3	$\rightarrow (3, 0)$
1	2	$\rightarrow (2, -1)$

$$m = \frac{0 - (-1)}{3 - 2} = \frac{1}{1} = 1$$

$$y - 0 = 1(x - 3)$$

$$y = x - 3$$

8. If the line with equation  $4x + 3y = 12$  is rotated  $90^\circ$  counterclockwise about the origin, what are the coordinates of the image of its y-intercept?  $(-y, x)$

A) (4,0)

B) (12,0)

C) (-12,0)

D) (-4,0)

$$4x + 3y = 12$$

$$3y = -4x + 12$$

$$y = -\frac{4}{3}x + 4$$

$$y = -\frac{4}{3}x + 4$$

x	y	Point
0	4	$\rightarrow (-4, 0)$
3	0	$\rightarrow (0, 3)$

$$m = \frac{0 - 3}{-4 - 0} = \frac{-3}{-4} = \frac{3}{4}$$

9.

If the line with equation  $2x + y = 7$  is rotated  $90^\circ$  clockwise about the origin, the coordinates of the image of its y-intercept are  $(y, -x)$

A) (7,0)

B) (-7,0)

C) (2,0)

D) (0,-7)

$$y = -2x + 7$$

$$(0, 7) \rightarrow (7, 0)$$

ex:  $A(-2, -4)$   $B(6, 1)$   $3:2=5$

$\frac{3}{5}$

$T_{8,5}$

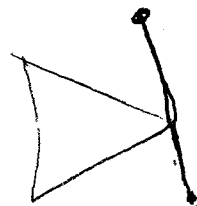
$\frac{3}{5}(8) = \frac{24}{5} = 4.8$

$\frac{3}{5}(8) = 3$

$-2, -4$

$+4.8, 3$

$(2.8, -1)$



ex: dist. from

$A(-9, -3)$

to  $y = x - 6$

$m = 1$

$m_{\perp} = -1$

$y + 3 = -1(x + 9)$

$y + 3 = -x - 9$

$y = -x - 12$

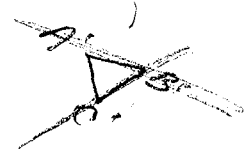
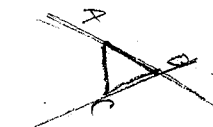
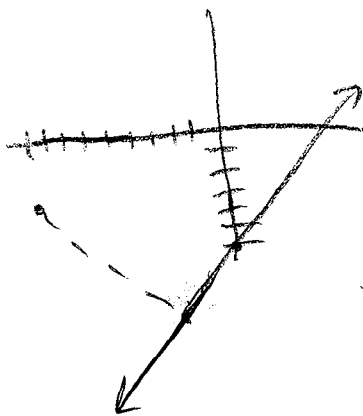
$x - 6 = -x - 12$

$2x = -6$

$x = -3$

$y = -3 - 12 = -15$

$P(-3, -15)$



$d = \sqrt{(-9 + 3)^2 + (-3 + 9)^2}$   
 $= \sqrt{36 + 36} = \sqrt{72} = 6\sqrt{2}$