

Shortcut  
slope is always the same

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origin  
multiply the  
scale factor and  
b

not origin  
same line  
same equation

Date \_\_\_\_\_  
Geometry

## Line Dilations Practice

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

multiply scale factor and b

1)  $y = 3x - 2$

$m = 3$

2)  $y = 3x - 4$

3)  $y = 6x - 2$

$b = 2(-2) = -4$

4)  $y = 6x - 4$

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

not origin  
same equation

1)  $y = 3x - 2$

2)  $y = 3x - 4$

3)  $y = 6x - 2$

4)  $y = 6x - 4$

3. The line  $y = -\frac{1}{2}x + 6$  is dilated by a scale factor of 4 and centered at  $(2, 5)$ . Write an equation that represents the image of the line after the dilation.

not origin  
same equation

1)  $y = -\frac{1}{2}x + 6$

2)  $y = -\frac{1}{2}x + 24$

3)  $y = -2x + 6$

4)  $y = -2x + 24$

4. The line  $y = -\frac{1}{2}x + 6$  is dilated by a scale factor of 4 and centered at the origin. Write an equation that represents the image of the line after the dilation.

multiply scale  
factor and b

1)  $y = -\frac{1}{2}x + 6$

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

2)  $y = -\frac{1}{2}x + 24$

$b = 4(6) = 24$

3)  $y = -2x + 6$

4)  $y = -2x + 24$

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)  $y = 3x - 1$

not origin  
same equation!  
multiply scale factor  
and b

6. 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)  $y = 3x - 6$

$$m = 2$$

$$b = \frac{3}{2}(-4) = -6$$

origin  
multiply scale factor and b

7. Line  $MN$  is dilated by a scale factor of 2 centered at the origin. If  $MN$  is represented by  $y = -3x + 6$ , which equation can represent  $M'N'$ , the image of  $MN$ ?

- 1)  $y = -3x + 12$
- 2)  $y = -3x + 6$
- 3)  $y = -6x + 12$
- 4)  $y = -6x + 6$

$$m = -3$$

$$b = 2(6) = 12$$

multiply scale factor and b

8. Line  $MN$  is dilated by a scale factor of 2 centered at the point  $(0, 6)$ . If  $MN$  is represented by  $y = -3x + 6$ , which equation can represent  $M'N'$ , the image of  $MN$ ?

- 1)  $y = -3x + 12$
- 2)  $y = -3x + 6$
- 3)  $y = -6x + 12$
- 4)  $y = -6x + 6$

not origin  
same equation

9. The line  $y = 4x - 2$  is dilated by a scale factor of 3 and centered at the point  $(-1, -6)$ . Which equation represents the image of the line after the dilation?

- 1)  $y = 4x - 2$
- 2)  $y = 4x - 6$
- 3)  $y = 12x - 2$
- 4)  $y = 12x - 6$

not origin  
same equation

10. The line  $y = \frac{1}{2}x + 5$  is dilated by a scale factor of 4 and centered at the point  $(4, 7)$ . Which equation represents the image of the line after the dilation?

- 1)  $y = \frac{1}{2}x + 20$
- 2)  $y = \frac{1}{2}x + 5$
- 3)  $y = 2x + 20$
- 4)  $y = 2x + 5$

not origin  
same equation

11. 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)  $y = 2x + 1$

$2x + y = 1$   
 $-2x \quad -2x$   
 $y = -2x + 1$   
 $m = -2$   
 $b = 4(1) = 4$   
*multiply scale factor and b*

12. The line  $2x + 3y = 8$  is dilated by a scale factor of 3 and centered at the point  $(1, 2)$ . Which equation represents the image of the line after the dilation?

1)  $y = -\frac{2}{3}x + \frac{8}{3}$

3)  $y = -2x + \frac{8}{3}$

2)  $y = -\frac{2}{3}x + 8$

4)  $y = -2x + 8$

$2x + 3y = 8$   
 $-2x \quad -2x$   
 $3y = -2x + 8$   
 $y = -\frac{2}{3}x + \frac{8}{3}$   
*not origin*  
*same equation*  
*must put into  $y = mx + b$  form*

13. Line  $y - 2x = 4$  is transformed by a dilation with a scale factor of 2 centered at the origin. What is the equation of the line's image?

$y - 2x = 4$   
 $+2x \quad +2x$   
 $y = 2x + 4$

$m = 2$

$b = 2(4) = 8$

$y = 2x + 8$

*multiply scale factor and b*

14. The equation of a line is given by the equation  $2x + 2y = 6$ . Write an equation for the image of the line after a dilation of 2 centered at  $(3, 0)$ .

*not origin*  
*same equation*

$2x + 2y = 6$

*\*you don't have to get y by itself.*

15. The equation of line  $l$  is  $y + 2x = 1$ . Line  $m$  is the image of line  $l$  after a dilation of 3 centered at the origin. What is the equation of line  $m$ ?

*multiply scale factor and b*

$y + 2x = 1$   
 $-2x \quad -2x$

$y = -2x + 1$

$m = -2$

$b = 3(1) = 3$

$y = -2x + 3$



If I don't have the scale factor and center, all I know is the image is parallel and the slope must be the same.

16. The line  $y = 2x - 1$  is dilated centered at  $(4, 1)$ . Which linear equation could be its image?

- 1)  $y = -2x + 3$  *same slope*      3)  $y = -\frac{1}{2}x - 4$   
 2)  $y = 2x + 7$       4)  $y = \frac{1}{2}x$

17. The line  $y = \frac{2}{3}x + 3$  is dilated centered at the origin. Which linear equation could be its image?

- 1)  $2x + 3y = 7$       3)  $3x - 2y = 7$   
 2)  $2x - 3y = 7$       4)  $3x + 2y = 7$

*Handwritten work:*  
 $\frac{-3y}{-3} = \frac{-2x+7}{-3} \rightarrow y = \frac{2}{3}x - \frac{7}{3}$

*Handwritten work:*  
 $3x - 2y = 7$   
 $-3x \quad -3x$   
 $-2y = 7$   
 $-2y = 7$

18. The line  $3y = -2x + 8$  is transformed by a dilation centered at the origin. Which linear equation could be its image?

- 1)  $2x + 3y = 5$   
 2)  $2x - 3y = 5$   
 3)  $3x + 2y = 5$   
 4)  $3x - 2y = 5$

*Handwritten work:*  
 $2x + 3y = 5$   
 $-2x \quad -2x$   
 $3y = -2x + 5$   
 $\frac{3y}{3} = \frac{-2x+5}{3}$   
 $y = -\frac{2}{3}x + \frac{5}{3}$

*Handwritten work:*  
 $3y = -2x + 8$   
 $\frac{3y}{3} = \frac{-2x+8}{3}$   
 $y = -\frac{2}{3}x + \frac{8}{3}$

19. The line represented by the equation  $4y = 3x + 7$  is transformed by a dilation centered at the origin. Which linear equation could represent its image?

- 1)  $3x - 4y = 9$       3)  $4x - 3y = 9$   
 2)  $3x + 4y = 9$       4)  $4x + 3y = 9$

*Handwritten work:*  
 $3x - 4y = 9$   
 $-3x \quad -3x$   
 $-4y = 9$   
 $\frac{-4y}{-4} = \frac{9}{-4}$   
 $y = -\frac{9}{4}$

*Handwritten work:*  
 $4y = 3x + 7$   
 $\frac{4y}{4} = \frac{3x+7}{4}$   
 $y = \frac{3}{4}x + \frac{7}{4}$

20. The line  $-3x + 4y = 8$  is transformed by a dilation centered at the origin. Which linear equation could represent its image?

- 1)  $y = \frac{4}{3}x + 8$       3)  $y = -\frac{3}{4}x - 8$   
 2)  $y = \frac{3}{4}x + 8$       4)  $y = -\frac{4}{3}x - 8$

*Handwritten work:*  
 $-3x + 4y = 8$   
 $+3x \quad +3x$   
 $4y = 8$   
 $\frac{4y}{4} = \frac{8}{4}$   
 $y = 2$

21. Line  $l$  is represented by the equation  $y = 4x - 1$ . Emely says that the equation of line  $l$  after a dilation with a scale factor of 3 centered at  $\overset{x, y}{(2, 7)}$  is  $y = 4x - 3$ . Is Emely correct? Explain your answer.

No, the center of dilation is on the line which means the equation is the same.

$$\begin{aligned} 7 &= 4(2) - 1 \\ 7 &= 7 \end{aligned}$$

22. Josue believes that the image of  $y = \frac{2}{3}x + 2$  after a dilation of scale factor 2 centered at the origin is  $3y = 2x + 6$ . Is Josue correct? Explain your answer.

~~8/10~~ multiply scale factor and b

$$\begin{aligned} 3y &= 2x + 6 \\ \frac{3y}{3} &= \frac{2x + 6}{3} \\ y &= \frac{2}{3}x + 2 \end{aligned}$$

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

$$b = 2(2) = 4$$

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

$$\begin{aligned} 0 &= \frac{2}{3}(0) + 2 \\ 0 &= 2 \end{aligned}$$

No, the center is not on the line. ~~the~~ If origin is center, multiply scale factor and b.

23. Line  $n$  is represented by the equation  $3x + 4y = 20$ . Determine and state the equation of line  $p$ , the image of line  $n$ , after a dilation of scale factor  $\frac{1}{3}$  centered at the point  $(4, 2)$ . [The use of the set of axes below is optional.] Explain your answer.

$3x + 4y = 20$   
The center of dilation is on the line so the image is the same line.

$$\begin{aligned} 3(4) + 4(2) &= 20 \\ 12 + 8 &= 20 \\ 20 &= 20 \end{aligned}$$

24. Aliyah says that when the line  $4x + 3y = 24$  is dilated by a scale factor of 2 centered at the point  $\overset{x, y}{(3, 4)}$ , the equation of the dilated line is  $y = -\frac{4}{3}x + 16$ . Is Aliyah correct? Explain why. [The use of the set of axes below is optional.]

$$\begin{aligned} 4(3) + 3(4) &= 24 \\ 12 + 12 &= 24 \\ 24 &= 24 \end{aligned}$$

$$\begin{aligned} 4x + 3y &= 24 \\ -4x &\quad -4x \\ \hline 3y &= -4x + 24 \\ \frac{3y}{3} &= \frac{-4x + 24}{3} \\ y &= -\frac{4}{3}x + 8 \end{aligned}$$

No, the equation should be  $y = -\frac{4}{3}x + 8$  because the center of dilation is on the line so the equation stays the same.