

G.SRT.A.1: Line Dilations

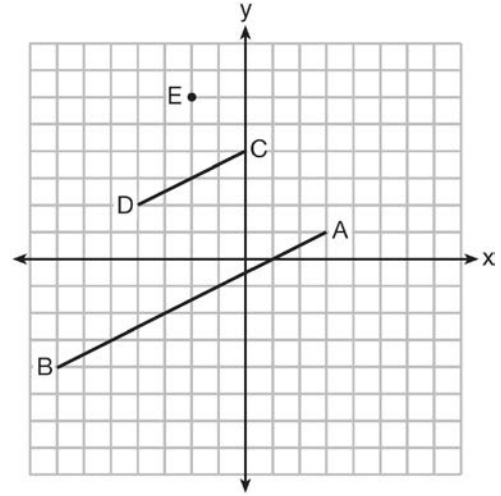
- 1 A line segment is dilated by a scale factor of 2 centered at a point not on the line segment. Which statement regarding the relationship between the given line segment and its image is true?
 - 1) The line segments are perpendicular, and the image is one-half of the length of the given line segment.
 - 2) The line segments are perpendicular, and the image is twice the length of the given line segment.
 - 3) The line segments are parallel, and the image is twice the length of the given line segment.
 - 4) The line segments are parallel, and the image is one-half of the length of the given line segment.

- 2 A line that passes through the points whose coordinates are $(1, 1)$ and $(5, 7)$ is dilated by a scale factor of 3 and centered at the origin. The image of the line
 - 1) is perpendicular to the original line
 - 2) is parallel to the original line
 - 3) passes through the origin
 - 4) is the original line

- 3 A three-inch line segment is dilated by a scale factor of 6 and centered at its midpoint. What is the length of its image?
 - 1) 9 inches
 - 2) 2 inches
 - 3) 15 inches
 - 4) 18 inches

- 4 Line segment $A'B'$, whose endpoints are $(4, -2)$ and $(16, 14)$, is the image of \overline{AB} after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of \overline{AB} ?
 - 1) 5
 - 2) 10
 - 3) 20
 - 4) 40

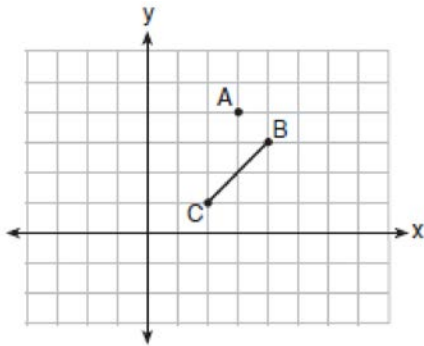
- 5 In the diagram below, \overline{CD} is the image of \overline{AB} after a dilation of scale factor k with center E .



Which ratio is equal to the scale factor k of the dilation?

- 1) $\frac{EC}{EA}$
- 2) $\frac{BA}{EA}$
- 3) $\frac{EA}{BA}$
- 4) $\frac{EA}{EC}$

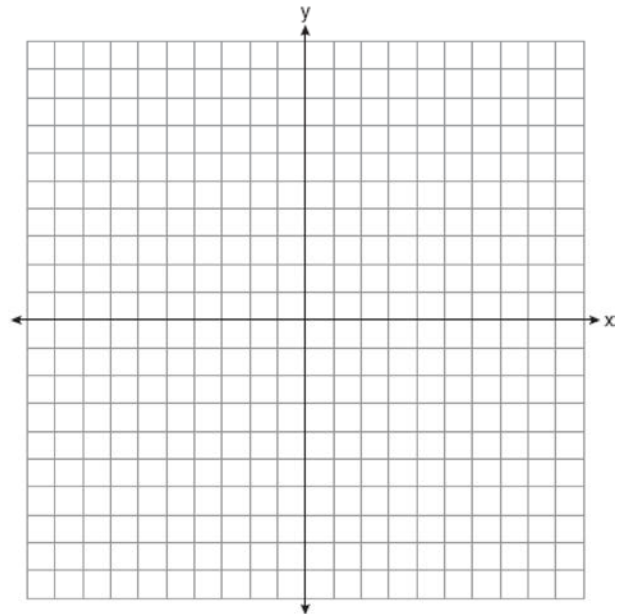
- 6 On the graph below, point $A(3,4)$ and \overline{BC} with coordinates $B(4,3)$ and $C(2,1)$ are graphed.



What are the coordinates of B' and C' after \overline{BC} undergoes a dilation centered at point A with a scale factor of 2?

- 1) $B'(5,2)$ and $C'(1,-2)$
 - 2) $B'(6,1)$ and $C'(0,-1)$
 - 3) $B'(5,0)$ and $C'(1,-2)$
 - 4) $B'(5,2)$ and $C'(3,0)$
- 7 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) $3x - 2y = 5$
- 8 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) $3x - 4y = 9$
 - 2) $3x + 4y = 9$
 - 3) $4x - 3y = 9$
 - 4) $4x + 3y = 9$
- 9 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) $y = 2x + 1$

- 10 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) $y = 3x - 6$
- 11 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) $y = 3x - 1$
- 12 Line l is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line l is $3x - y = 4$. Determine and state an equation for line m .
- 13 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.



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Answer Section

1 ANS: 3 REF: 061706geo

2 ANS: 2 REF: 011610geo

3 ANS: 4
 $3 \times 6 = 18$

REF: 061602geo

4 ANS: 4
 $\sqrt{(32-8)^2 + (28-(-4))^2} = \sqrt{576 + 1024} = \sqrt{1600} = 40$

REF: 081621geo

5 ANS: 1 REF: 061518geo

6 ANS: 1
B: $(4-3, 3-4) \rightarrow (1, -1) \rightarrow (2, -2) \rightarrow (2+3, -2+4)$
C: $(2-3, 1-4) \rightarrow (-1, -3) \rightarrow (-2, -6) \rightarrow (-2+3, -6+4)$

REF: 011713geo

7 ANS: 1
The line $3y = -2x + 8$ does not pass through the center of dilation, so the dilated line will be distinct from $3y = -2x + 8$. Since a dilation preserves parallelism, the line $3y = -2x + 8$ and its image $2x + 3y = 5$ are parallel, with slopes of $-\frac{2}{3}$.

REF: 061522geo

8 ANS: 1
Since a dilation preserves parallelism, the line $4y = 3x + 7$ and its image $3x - 4y = 9$ are parallel, with slopes of $\frac{3}{4}$.

REF: 081710geo

9 ANS: 2
The given line h , $2x + y = 1$, does not pass through the center of dilation, the origin, because the y -intercept is at $(0, 1)$. The slope of the dilated line, m , will remain the same as the slope of line h , -2 . All points on line h , such as $(0, 1)$, the y -intercept, are dilated by a scale factor of 4; therefore, the y -intercept of the dilated line is $(0, 4)$ because the center of dilation is the origin, resulting in the dilated line represented by the equation $y = -2x + 4$.

REF: spr1403geo

10 ANS: 2

The line $y = 2x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from $y = 2x - 4$. Since a dilation preserves parallelism, the line $y = 2x - 4$ and its image will be parallel, with slopes of 2. To obtain the y -intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y -intercept, $(0, -4)$. Therefore, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2}\right) \rightarrow (0, -6)$. So the equation of the dilated line is $y = 2x - 6$.

REF: fall1403geo

11 ANS: 4

The line $y = 3x - 1$ passes through the center of dilation, so the dilated line is not distinct.

REF: 081524geo

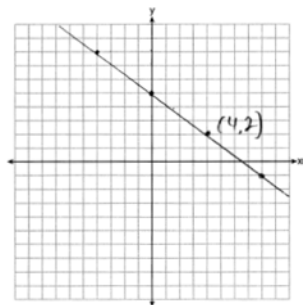
12 ANS:

$$\ell: y = 3x - 4$$

$$m: y = 3x - 8$$

REF: 011631geo

13 ANS:



The line is on the center of dilation, so the line does not change. $p: 3x + 4y = 20$

REF: 061731geo