G.SRT.A.1: Line Dilations 1

1 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

2 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

3 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.
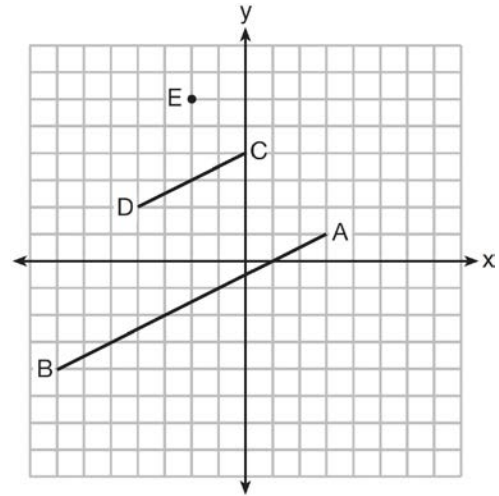
Which ratio is equal to the scale factor k of the dilation?
   1) $\dfrac{EC}{EA}$
   2) $\dfrac{BA}{EA}$
   3) $\dfrac{EA}{BA}$
   4) $\dfrac{EA}{EC}$

4 After a dilation centered at the origin, the image of $\overline{CD}$ is $\overline{C'D'}$. If the coordinates of the endpoints of these segments are $C(6,-4)$, $D(2,-8)$, $C'(9,-6)$, and $D'(3,-12)$, the scale factor of the dilation is
   1) $\dfrac{3}{2}$
   2) $\dfrac{2}{3}$
   3) 3
   4) $\dfrac{1}{3}$

5   After a dilation with center $(0,0)$, the image of $\overline{DB}$
is $\overline{D'B'}$. If $DB = 4.5$ and $D'B' = 18$, the scale factor
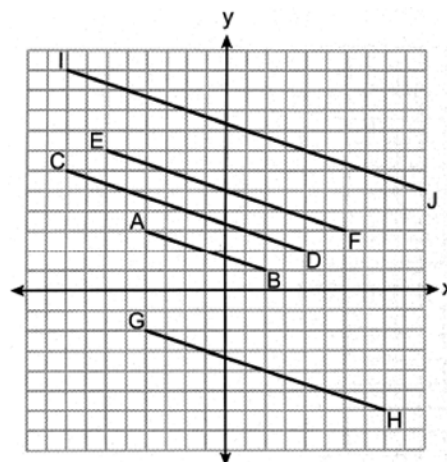of this dilation is
1) $\dfrac{1}{5}$
2) 5
3) $\dfrac{1}{4}$
4) 4

6   The line represented by $2y = x + 8$ is dilated by a
scale factor of k centered at the origin, such that the
image of the line has an equation of $y - \dfrac{1}{2}x = 2$.
What is the scale factor?
1) $k = \dfrac{1}{2}$
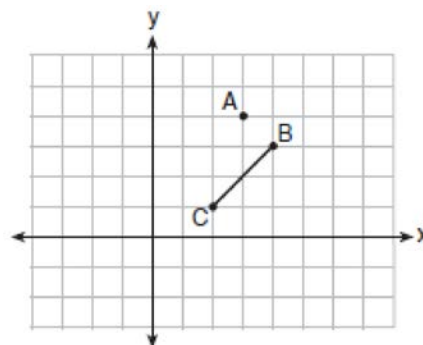2) $k = 2$
3) $k = \dfrac{1}{4}$
4) $k = 4$

7   On the set of axes below, $\overline{AB}, \overline{CD}, \overline{EF}, \overline{GH}$, and
$\overline{IJ}$ are drawn.

Which segment is the image of $\overline{AB}$ after a dilation
with a scale factor of 2 centered at $(-2,-1)$?
1) $\overline{CD}$
2) $\overline{EF}$
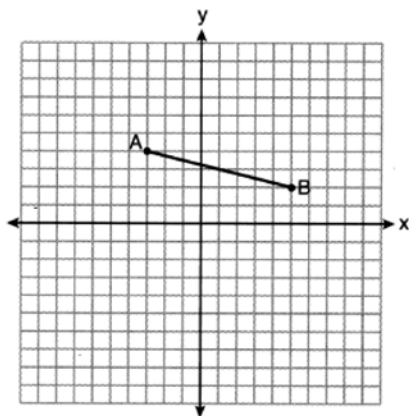3) $\overline{GH}$
4) $\overline{IJ}$

8   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 $C'(1,-2)$
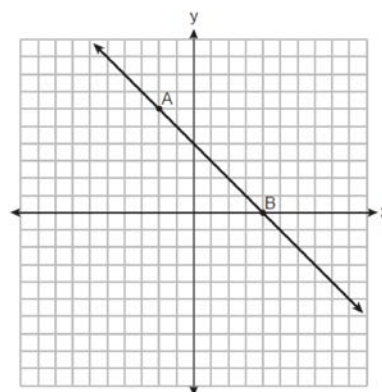4) $B'(5,2)$ and $C'(3,0)$

9 On the set of axes below, the endpoints of $\overline{AB}$ have coordinates $A(-3,4)$ and $B(5,2)$.

If $\overline{AB}$ is dilated by a scale factor of 2 centered at $(3,5)$, what are the coordinates of the endpoints of its image, $\overline{A'B'}$?
1) $A'(-7,5)$ and $B'(9,1)$
2) $A'(-1,6)$ and $B'(7,4)$
3) $A'(-6,8)$ and $B'(10,4)$
4) $A'(-9,3)$ and $B'(7,-1)$

10 On the set of axes below, $\overleftrightarrow{AB}$ is drawn and passes through $A(-2,6)$ and $B(4,0)$.

If $\overleftrightarrow{CD}$ is the image of $\overleftrightarrow{AB}$ after a dilation with a scale factor of $\dfrac{1}{2}$ centered at the origin, which equation represents $\overleftrightarrow{CD}$?
1) $y = -x + 4$
2) $y = -x + 2$
3) $y = -\dfrac{1}{2}x + 4$
4) $y = -\dfrac{1}{2}x + 2$

11 The line represented by the equation $y = 4x + 15$ is dilated by a scale factor of 2 centered at the origin. Which equation represents its image?
1) $y = 4x + 15$
2) $y = 4x + 30$
3) $y = 8x + 15$
4) $y = 8x + 30$

12 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) $y = 2x + 1$

3

13 Line m, whose equation is $y = -2x + 8$, is dilated by a scale factor of $\frac{1}{2}$ centered at the origin. Which equation represents the image of line m?
1) $y = -x + 4$
2) $y = -2x + 4$
3) $y = -x + 8$
4) $y = -2x + 8$

14 The equation of line t is $3x - y = 6$. Line m is the image of line t after a dilation with a scale factor of $\frac{1}{2}$ centered at the origin. What is an equation of the line m?
1) $y = \frac{3}{2}x - 3$
2) $y = \frac{3}{2}x - 6$
3) $y = 3x + 3$
4) $y = 3x - 3$

15 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) $y = 3x - 6$

16 What is an equation of the image of the line $y = \frac{3}{2}x - 4$ after a dilation of a scale factor of $\frac{3}{4}$ centered at the origin?
1) $y = \frac{9}{8}x - 4$
2) $y = \frac{9}{8}x - 3$
3) $y = \frac{3}{2}x - 4$
4) $y = \frac{3}{2}x - 3$

17 The line whose equation is $6x + 3y = 3$ is dilated by a scale factor of 2 centered at the point $(0,0)$. An equation of its image is
1) $y = -2x + 1$
2) $y = -2x + 2$
3) $y = -4x + 1$
4) $y = -4x + 2$

18 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) $y = 3x - 1$

19 Line MN is dilated by a scale factor of 2 centered at the point $(0,6)$. If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?
1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

20 A line whose equation is $y = -2x + 3$ is dilated by a scale factor of 4 centered at $(0,3)$. Which equation represents the image of the line after the dilation?
1) $y = -2x + 3$
2) $y = -2x + 12$
3) $y = -8x + 3$
4) $y = -8x + 12$

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Answer Section

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

REF: 061602geo

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

REF: 081621geo

3 ANS: 1   REF: 061518geo

4 ANS: 1
$\dfrac{9}{6} = \dfrac{3}{2}$

REF: 061905geo

5 ANS: 4
$\dfrac{18}{4.5} = 4$

REF: 011901geo

6 ANS: 1
$y = \dfrac{1}{2}x + 4 \quad \dfrac{2}{4} = \dfrac{1}{2}$

$y = \dfrac{1}{2}x + 2$

REF: 012008geo

7 ANS: 2
$A(-4,3) \rightarrow A(-2,4) \rightarrow A(-4,8) \rightarrow E(-6,7) \quad B(2,1) \rightarrow B(4,2) \rightarrow B(8,4) \rightarrow F(6,3)$

REF: 082412geo

8 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

9 ANS: 4
$A: (-3-3, 4-5) \rightarrow (-6,-1) \rightarrow (-12,-2) \rightarrow (-12+3,-2+5)$

$B: (5-3, 2-5) \rightarrow (2,-3) \rightarrow (4,-6) \rightarrow (4+3,-6+5)$

REF: 012322geo

10 ANS: 2   REF: 012416geo

11 ANS: 2   REF: 082417geo

12 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

13 ANS: 2   REF: 012518geo

14 ANS: 4

Another equation of line t is $y = 3x - 6$. $-6 \bullet \dfrac{1}{2} = -3$

REF: 012319geo

15 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, $\dfrac{3}{2}$, can be applied to the y-intercept, $(0,-4)$. Therefore, $\left(0 \cdot \dfrac{3}{2}, -4 \cdot \dfrac{3}{2} \right) \rightarrow (0,-6)$. So the equation of the dilated line is $y = 2x - 6$.

REF: fall1403geo

16 ANS: 4

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

REF: 011924geo

17 ANS: 2

$3y = -6x + 3$

$y = -2x + 1$

REF: 062319geo

18 ANS: 4

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

REF: 081524geo

19 ANS: 2

The line $y = -3x + 6$ passes through the center of dilation, so the dilated line is not distinct.

REF: 061824geo

20 ANS: 1 REF: 062424geo