Dilations Worksheet

Geometry · Common Core HSG-SRT.A.1

> Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

Practice

Builds the skill step by step.

1. A dilation with center at the origin and scale factor 3 maps $(2, -1)$ to what point?

2. A dilation with center at the origin and scale factor $\frac{1}{2}$ maps $(8, 6)$ to what point?

3. A segment 5 units long is dilated by a scale factor of 4. How long is the image?

4. A dilation maps a line that does NOT pass through the center. What is the image?

   A. a curve

   B. a line perpendicular to the original

   C. a line parallel to the original

   D. the same line

5. A dilation maps a line that DOES pass through the center. What is the image?

   A. the same line

   B. a parallel line

   C. a perpendicular line

   D. a shorter line segment

6. A segment of length 4 is dilated, and its image is 12 units long. What is the scale factor?

7. A segment 9 units long is dilated by a scale factor of 0.5. How long is the image?

8. A dilation has scale factor $\frac{1}{3}$. How does the image compare with the original?

   A. It is larger.

   B. It is the same size.

   C. It is flipped.

   D. It is smaller.

9. A dilation with center at the origin and scale factor 2 maps $(-3, 4)$ to what point?

10. The line $y = 2x + 3$ is dilated by a scale factor of 3 with center at the origin. What is the slope of the image line?

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On Level

Grade-level practice.

1. A dilation with center (1, 1) and scale factor 2 maps P(3, 4) to what point?

2. The line $y = x + 2$ is dilated by a scale factor of 3 with center at the origin. What is the equation of the image?

3. $AB = 6$ and its image under a dilation is $A'B' = 15$. What is the scale factor?

4. A dilation with center (2, 0) and scale factor $\frac{1}{2}$ maps P(6, 4) to what point?

5. A dilation with center C and scale factor 2 maps P to P′. $CP = 5$. What is CP'?

6. A triangle with perimeter 18 is dilated by a scale factor of $\frac{2}{3}$. What is the perimeter of the image?

7. An angle of 50° is part of a figure that is dilated by a scale factor of 4. What does the image angle measure?

8. The line y = 3x passes through the origin. It is dilated by a scale factor of 4 with center at the origin. Write the equation of the image.

9. Which is NOT preserved by a dilation with scale factor 3?

   A. angle measure

   B. length

   C. the shape of the figure

   D. parallel lines

10. A dilation with center (2, 3) and scale factor 5 maps the origin to what point?

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Challenge

Multi-step and word problems that stretch it.

1. A dilation maps A(1, 1) to A′(3, 3) and B(2, 1) to B′(5, 3). What is the center of the dilation?

2. For the dilation in the last problem (A(1, 1) → A′(3, 3) and B(2, 1) → B′(5, 3)), what is the scale factor?

3. A square with side 3 is dilated by a scale factor of 4. What is the area of the image?

4. The line $2x + y = 4$ is dilated by a scale factor of 2 with center at the origin. What is the y-intercept of the image line?

5. What does a dilation with scale factor 1 do?

   A. It leaves every point where it is.

   B. It doubles every length.

   C. It reflects the figure.

   D. It shrinks the figure to a point.

6. Why is the image of a line not through the center parallel to the original?

   A. It isn't always parallel.

   B. Every point moves away from the center by the same factor, so the image keeps the same direction.

   C. Because dilations are rigid motions.

   D. Because the center is on the line.

7. A segment of length 4 is dilated by a scale factor of 2, and the image is dilated again by a scale factor of 3 (same center). How long is the final image?

8. A dilation centered at the origin maps (4, 6) to (10, 15). What is the scale factor?

9. The segment from (0, 0) to (3, 4) is dilated by a scale factor of 2 with center at the origin. How long is the image?

10. A dilation with center (0, 4) and scale factor 3 is applied to the line $y = 4$. Write the equation of the image.