Properties of Transformations Worksheet

Grade 8 · Common Core 8.G.A.1

> Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.

Practice

Builds the skill step by step.

1. A segment 5 cm long is translated 8 cm to the right. How long is its image?

   A. 5 cm

   B. 13 cm

   C. 3 cm

   D. It depends on the direction of the translation.

2. One angle of a triangle measures 40°. The triangle is reflected across a line. What is the measure of the image of that angle?

3. A figure is rotated 90° about a point. Which of these can change?

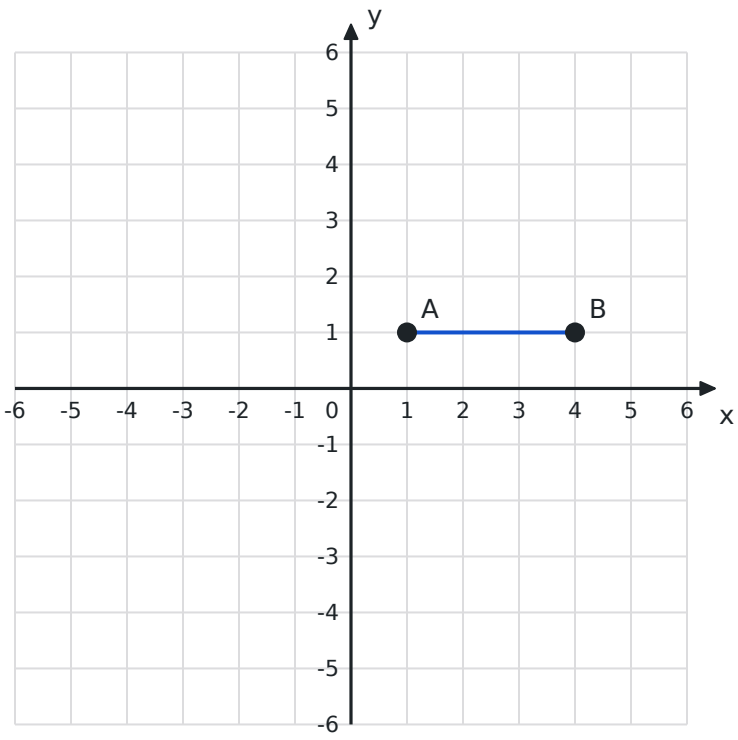
   A. The measures of its angles

   B. The position of the figure

   C. Whether its parallel sides stay parallel

   D. The lengths of its sides

4. Segment AB is translated 3 units up to make segment A′B′. How long is A′B′?



5. A rectangle that is 6 cm long and 4 cm wide is reflected across a line. What is the perimeter of the image?

6. Lines p and q are parallel. Both are rotated 90° about the same point. What is true about their images?

   A. They are the same line.

   B. They meet at exactly one point.

   C. They are perpendicular.

   D. They are parallel.

7. ∠ABC measures 115°. It is rotated 180° about a point to make ∠A′B′C′. What is the measure of ∠A′B′C′?

8. Triangle ABC has AB = 3 cm, BC = 4 cm and CA = 5 cm. It is translated to make triangle A′B′C′. How long is B′C′?

9. A line is reflected across the y-axis. What is the image?

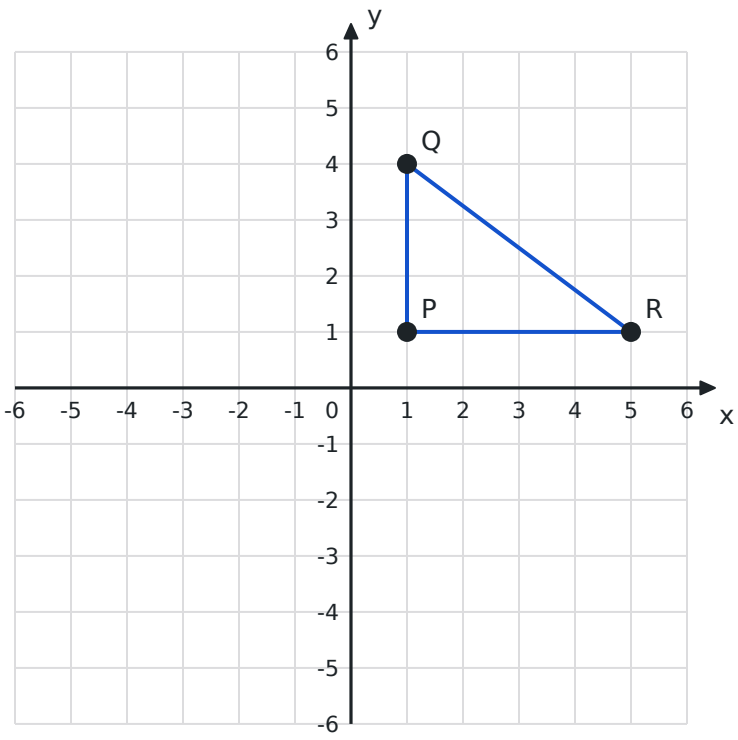
   A. A segment with two endpoints

   B. A curve

   C. A line

   D. A single point

10. Triangle PQR has a right angle at P. It is rotated 90° counterclockwise about the origin. What is the measure of the angle at P′?



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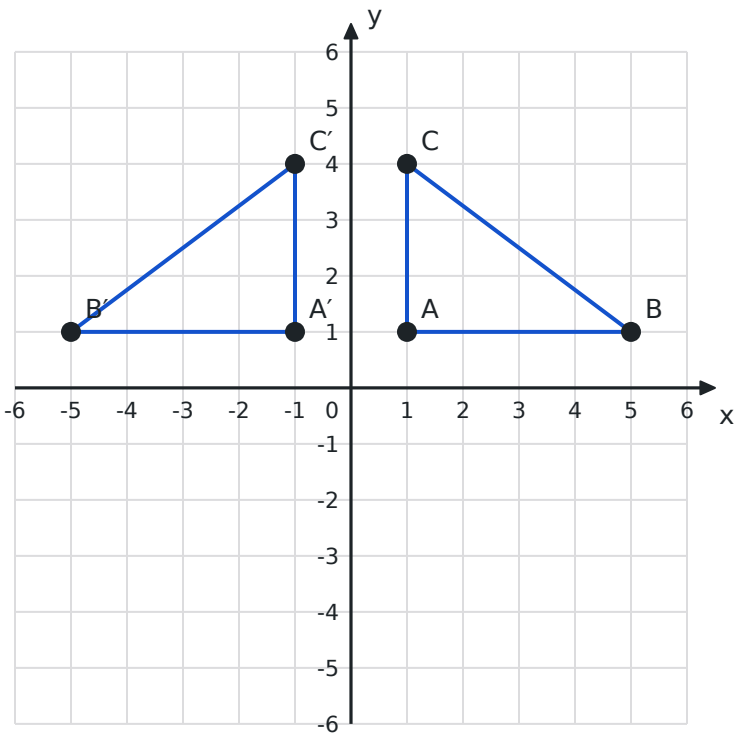
On Level

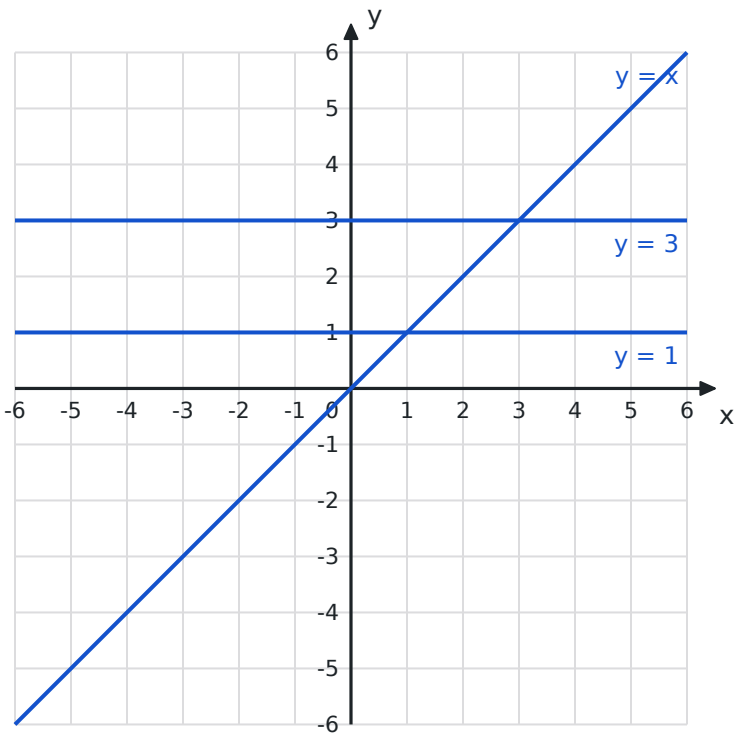
Grade-level practice.

1. In triangle ABC, BC = 5 units. The triangle is reflected across the y-axis to make triangle A′B′C′. What is B′C′?



2. Parallelogram PQRS is rotated to make P′Q′R′S′. In PQRS, ∠P = 65°. What is the measure of ∠Q′?

3. The lines y = 1 and y = 3 are reflected across the line y = x. Which describes their images?



A. Two perpendicular lines

B. Two parallel horizontal lines

C. Two parallel vertical lines

D. Two lines that cross at (1, 3)

4. The segment from (−2, 3) to (2, 3) is translated 5 units down. What is the length of the image?

5. A triangle has angles of 35° and 85°. It is reflected across a line. What is the measure of the third angle of the image?

6. Ana rotates a square 45°. She says the image is not a square anymore because it now looks like a diamond. Is she right? Explain.

7. Which transformation could change the length of a segment?

   A. A dilation with a scale factor of 2

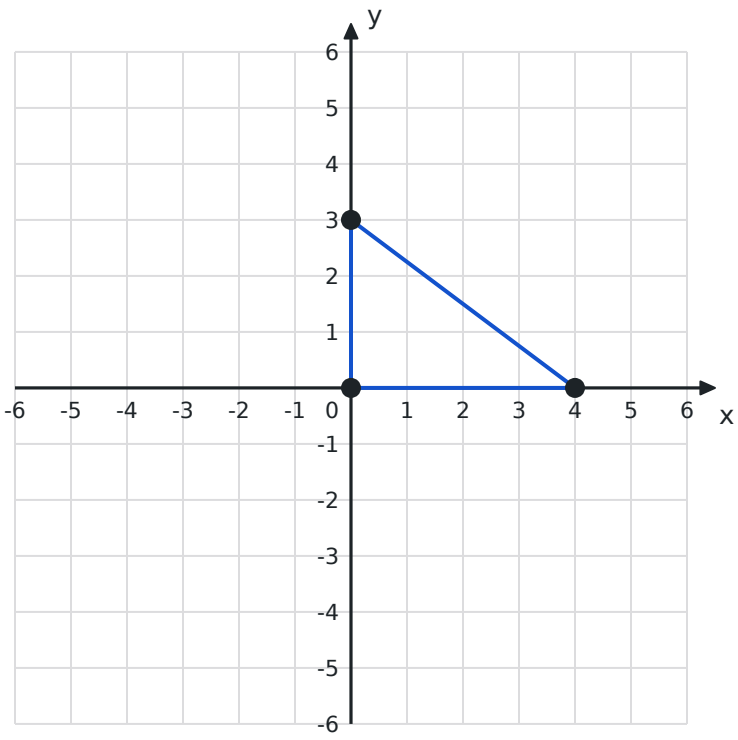
   B. A translation 3 units left

   C. A reflection across the x-axis

   D. A rotation of 90° about the origin

8. Lines m and n cross, and one of the angles they form measures 50°. The lines are reflected across a line. What is the measure of the obtuse angle formed by the image lines?

9. A triangle with vertices (0, 0), (4, 0) and (0, 3) is translated 2 units right and 1 unit down. What is the area of the image?



10. Trapezoid ABCD has AB parallel to DC. It is reflected to make A′B′C′D′. Which pair of sides of the image must be parallel?

A. A′D′ and B′C′

B. A′B′ and B′C′

C. No pair must be parallel

D. A′B′ and D′C′

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Challenge

Multi-step and word problems that stretch it.

1. In triangle ABC, AB = 2x + 1. The triangle is rotated, and the image has A′B′ = 11. What is x?

2. ∠K measures (3x + 15)°. After a reflection, its image ∠K′ measures 72°. What is x?

3. Ben reflects a small triangle across a line that is far away. He says the image will be bigger because it ends up farther from the original. What is the error?

   A. Only the angles change in a reflection, not the lengths.

   B. Reflections keep lengths, so the image is the same size no matter where the line is.

   C. There is no error; images farther away are bigger.

   D. Reflections make figures smaller, not bigger.

4. Parallelogram ABCD is translated and then rotated to make A′B′C′D′. ∠A = (2x)° and ∠B′ = (x + 30)°. What is x?

5. A segment is rotated 180° about its own midpoint. Describe the image.

6. An 8 cm by 3 cm rectangle is rotated 90° and then translated 5 cm to the left. What is the area of the final image?

7. Line ℓ passes through (0, 2) and has a slope of 3. It is translated 4 units to the right. What is the slope of the image?

   A. -3

   B. 3

   C. 4

   D. 7

8. A triangle is reflected. The image has angles of 48° and 67°. What is the measure of the third angle of the original triangle?

9. A quadrilateral has exactly one pair of parallel sides and exactly two right angles. It is rotated 120°. What must be true of the image?

   A. It has exactly one pair of parallel sides and exactly two right angles.

   B. It has two pairs of parallel sides.

   C. It has no right angles.

   D. It has exactly one right angle.

10. A triangle has sides of x, $x + 2$ and $2x - 1$ units. It is translated, and the image has a perimeter of 25 units. How long is the longest side of the image?