

Moving Shapes with Translations, Reflections, Rotations

Grade 8 math · Worksheet · Standards: 8.G.A.1, 8.G.A.3

Name: _____ Date: _____ Class: _____

These problems train the three rigid motions from standards 8.G.A.1 and 8.G.A.3. Early problems apply one coordinate rule to a point; later ones combine several motions and ask which properties survive.

Draw a quick sketch whenever a problem gives coordinates, and check each image against the figure before writing the final answer.

Standards: 8.G.A.1, 8.G.A.3 · **Level:** Grade 8

Problem 1 Slide a point (easy)

Translate the point $(6, -7)$ by 9 units to the right and 3 units up. Write the image.

Problem 2 Reflect over the x-axis (easy)

Reflect the point $(-4, 6)$ across the x-axis.

Problem 3 Reflect over the y-axis (easy)

Reflect the point $(7, -3)$ across the y-axis.

Problem 4 Quarter turn (easy)

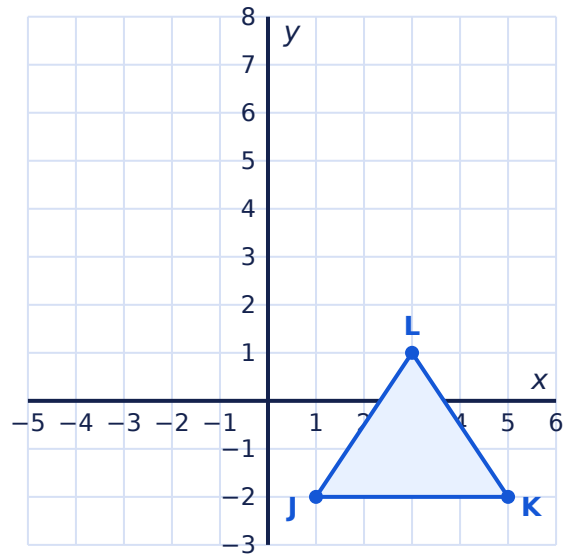
Rotate the point $(7, 3)$ by 90° counterclockwise about the origin.

Problem 5 Half turn (easy)

Rotate the point $(-6, 1)$ by 180° about the origin.

Problem 6 Translate a triangle (medium)

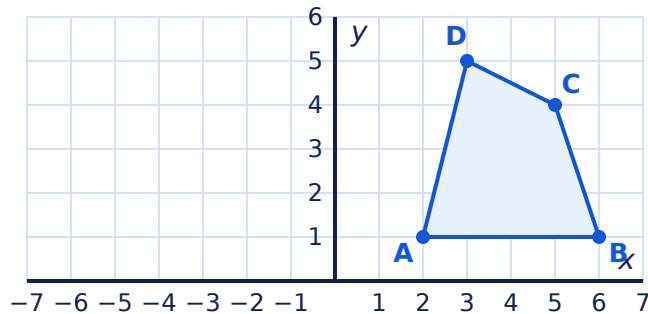
Triangle JKL is shown. Apply the rule $(x, y) \rightarrow (x - 4, y + 6)$ and list the vertices of $\triangle J'K'L'$.



Triangle JKL.

Problem 7 Mirror a quadrilateral (medium)

Reflect quadrilateral ABCD across the y-axis. Write the coordinates of each image vertex.



Quadrilateral ABCD.

Problem 8 Three-quarter turn (medium)

Rotate the point $(4, -3)$ by 270° counterclockwise about the origin.

Problem 9 Clockwise turn (medium)

Rotate the point $(-5, 2)$ by 90° clockwise about the origin.

Problem 10 Name the reflection (medium)

Points $A(2, 3)$ and $B(-4, 1)$ are mapped to $A'(2, -3)$ and $B'(-4, -1)$. Name the transformation and write its rule.

Problem 11 Name the rotation (medium)

Points $P(1, 4)$ and $Q(3, -2)$ are mapped to $P'(-4, 1)$ and $Q'(2, 3)$. Name the transformation and

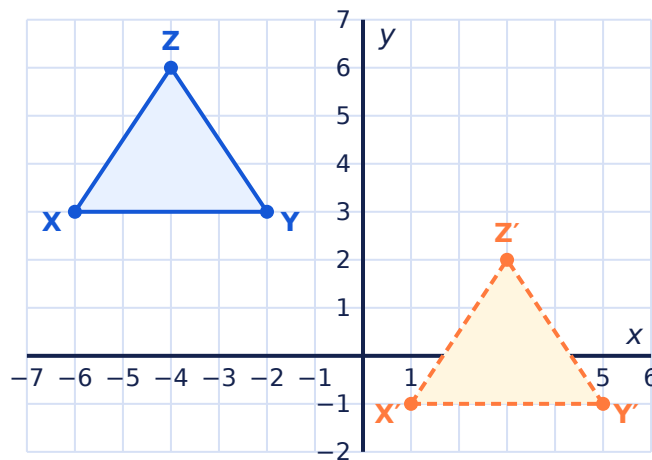
write its rule.

Problem 12 What stays the same? (medium)

A triangle has sides 7 cm, 9 cm, and 12 cm, and one angle of 48° . The triangle is reflected across the y -axis. Give the three side lengths and that angle measure in the image.

Problem 13 Describe the slide (medium)

The figure shows $\triangle XYZ$ and its image. Describe the translation in words and write the rule.



Triangle XYZ (solid) and its image $\triangle X'Y'Z'$ (dashed).

Problem 14 Parallel lines survive (hard)

Line m passes through $(0, 1)$ and $(2, 4)$. Line n passes through $(3, 0)$ and $(5, 3)$. Reflect both lines across the x -axis. Show that the image lines are parallel.

Problem 15 Robot on a grid (medium)

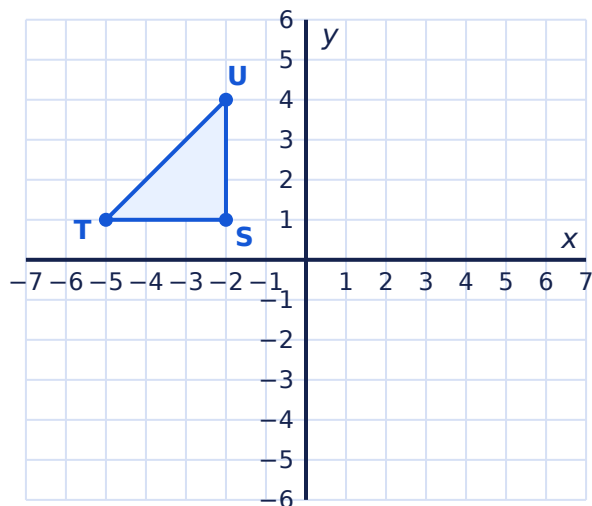
A cleaning robot starts at $(-4, 3)$ on a floor map measured in feet. It drives 7 feet east and 5 feet south. A mirror program then reflects its position across the y -axis. Where does the robot end up?

Problem 16 Order matters (hard)

A game designer tests two programs on the point $(2, 3)$. Program 1: reflect across the y -axis, then rotate 90° counterclockwise about the origin. Program 2: rotate 90° counterclockwise first, then reflect across the y -axis. Find both final points. Are they the same?

Problem 17 Sprite in motion (hard)

In a video game, sprite $\triangle STU$ rotates 180° about the origin and then slides 3 units left and 5 units up. Find the coordinates of the final image $\triangle S''T''U''$.



Sprite $\triangle STU$.

Problem 18 Table turn (hard)

A rectangular table in a school cafeteria plan has corners (1, 2), (5, 2), (5, 4), and (1, 4). The plan is rotated 90° counterclockwise about the origin. Find the new corners. Then show that the area is unchanged.

Problem 19 Logo in three steps (hard)

A logo pennant has vertices (2, 2), (6, 3), and (3, 6). Rotate it 90° counterclockwise about the origin, reflect the result across the x-axis, then translate it 2 units right and 1 unit down. Find the final vertices.

Problem 20 Two mirrors, one turn (hard)

Reflect the points (6, -1) and (-7, 2) across the x-axis, and then reflect each result across the y-axis. Which single rotation about the origin gives the same result? Explain.