LESSON MAKER PRO

Coordinate Motion Lab

Use rules to move points on a coordinate plane.

GRADE 8 · TEKS 8.10.C

8.10.C "explain the effect of translations, reflections over the x- or y-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation; and"

NAME _____ DATE _____

RULES FOR MOVING POINTS

Use an ordered-pair rule to show what happens to each vertex. A translation adds or subtracts from coordinates, and reflections use (x, y) -> (x, -y) over the x-axis or (x, y) -> (-x, y) over the y-axis. About the origin, 90° counterclockwise is (x, y) -> (-y, x), 180° is (x, y) -> (-x, -y), 270° counterclockwise is (x, y) -> (y, -x), and 360° leaves a point unchanged.

WORKED EXAMPLE

Point M(7, -8) is translated by the rule (x, y) -> (x + 4, y + 9). Find M'.

1. Start with M(7, -8).
2. Add 4 to the x-coordinate: 7 + 4 = 11.
3. Add 9 to the y-coordinate: -8 + 9 = 1.

Answer: M'(11, 1)

PRACTICE 5 problems

1 Translate Q(-2, 3) by the rule (x, y) -> (x - 3, y + 2). Find Q'.

ANSWER _____

2 Reflect R(3, -6) over the x-axis. Find R'.

ANSWER _____

3 Reflect S(-5, 2) over the y-axis. Find S'.

ANSWER _____

4 Rotate T(2, -6) 90° counterclockwise about the origin. Find T'.

ANSWER _____

5 Rotate U(-6, 3) 180° about the origin. Find U'.

ANSWER _____

APPLY IT Show your work

1 A video game designer rotates a triangular logo 270° counterclockwise about the origin. Its vertices are A(-6, 2), B(-5, 3), and C(-3, 5). What are the coordinates of A', B', and C'?

WORK SPACE

ANSWER _____

2 A robotics team moves a triangular sensor zone using the rule (x, y) -> (x - 3, y + 2). The vertices are D(6, -5), E(3, -5), and F(6, -2). What are the new coordinates?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Point P(x, y) is reflected over the x-axis and then rotated 180° about the origin. Write the final ordered-pair rule. Explain why this result is the same as one reflection.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Translate Q(-2, 3) by the rule (x, y) -> (x - 3, y + 2). Find Q'.	**Q'(-5, 5)**
2	Reflect R(3, -6) over the x-axis. Find R'.	**R'(3, 6)**
3	Reflect S(-5, 2) over the y-axis. Find S'.	**S'(5, 2)**
4	Rotate T(2, -6) 90° counterclockwise about the origin. Find T'.	**T'(6, 2)**
5	Rotate U(-6, 3) 180° about the origin. Find U'.	**U'(6, -3)**

PART 2 · APPLY IT

1. **A'(2, 6), B'(3, 5), C'(5, 3)** Use the 270° counterclockwise rule (x, y) -> (y, -x) on each vertex.
2. **D'(3, -3), E'(0, -3), F'(3, 0)** Subtract 3 from each x-coordinate and add 2 to each y-coordinate.

CHALLENGE

(-x, y). Reflecting over the x-axis gives (x, -y). A 180° rotation gives (-x, y), which is the same result as reflecting the original point over the y-axis.

Accept ordered pairs with or without point labels. For the challenge, accept any correct explanation that identifies the final rule as a reflection over the y-axis.