

Move It Right

Map figures with precise transformations.

HIGH SCHOOL • HSG-CO.A.5

CCSS.Math.Content.HSG-CO.A.5 "Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software..."

NAME _____

DATE _____

TRACK EVERY VERTEX

A translation adds the same vector to every vertex. A reflection flips a figure across a line, and a 90-degree counterclockwise rotation about the origin sends (x, y) to $(-y, x)$.

WORKED EXAMPLE

Translate triangle $D(30, 31)$, $E(33, 31)$, $F(31, 33)$ by $\langle -8, 7 \rangle$.

1. Start with $D(30, 31)$, $E(33, 31)$, $F(31, 33)$.
2. Subtract 8 from each x-coordinate.
3. Add 7 to each y-coordinate.

Answer: $D'(22, 38)$, $E'(25, 38)$, $F'(23, 40)$

PRACTICE 5 problems

- 1** Reflect $A(-3, 4)$ across the y-axis.

ANSWER _____

- 2** Translate $B(-4, -1)$, $C(-2, -1)$, $D(-3, 1)$ by $\langle 5, 2 \rangle$.

ANSWER _____

- 3** Rotate $P(4, -2)$, $Q(1, -2)$, $R(1, -4)$ 90 degrees counterclockwise about the origin.

ANSWER _____

- 4** Reflect $E(-1, 3)$, $F(2, 3)$, $G(2, 5)$, $H(-1, 5)$ across the x-axis.

ANSWER _____

- 5** Name a transformation that maps $J(-5, 0)$, $K(-3, 0)$, $L(-4, 2)$ onto $J'(-2, -4)$, $K'(0, -4)$, $L'(-1, -2)$.

ANSWER _____

APPLY IT Show your work

- 1** An esports club mirrors its triangular logo across the y-axis. The logo has vertices $S(-4, 1)$, $T(-2, 1)$, and $U(-3, 3)$. Draw or list the image vertices.

WORK SPACE

ANSWER _____

- 2** A game designer turns a sprite 90 degrees clockwise about the origin. Its vertices are $M(-1, 4)$, $N(-3, 2)$, and $O(-1, 2)$. Draw or list the image vertices.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Triangle $A(1, 1)$, $B(3, 1)$, $C(1, 2)$ maps onto $A'(1, 4)$, $B'(1, 6)$, $C'(0, 4)$. Give a two-step sequence of transformations and use vertex A to show why it works.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Reflect $A(-3, 4)$ across the y -axis.	$A'(3, 4)$
2	Translate $B(-4, -1)$, $C(-2, -1)$, $D(-3, 1)$ by $\langle 5, 2 \rangle$.	$B'(1, 1)$, $C'(3, 1)$, $D'(2, 3)$
3	Rotate $P(4, -2)$, $Q(1, -2)$, $R(1, -4)$ 90 degrees counterclockwise about the origin.	$P'(2, 4)$, $Q'(2, 1)$, $R'(4, 1)$
4	Reflect $E(-1, 3)$, $F(2, 3)$, $G(2, 5)$, $H(-1, 5)$ across the x -axis.	$E'(-1, -3)$, $F'(2, -3)$, $G'(2, -5)$, $H'(-1, -5)$
5	Name a transformation that maps $J(-5, 0)$, $K(-3, 0)$, $L(-4, 2)$ onto $J'(-2, -4)$, $K'(0, -4)$, $L'(-1, -2)$.	Translate by $\langle 3, -4 \rangle$.

PART 2 • APPLY IT

- $S'(4, 1)$, $T'(2, 1)$, $U'(3, 3)$** Change the sign of each x -coordinate. The y -coordinates stay the same.
- $M'(4, 1)$, $N'(2, 3)$, $O'(2, 1)$** For a 90-degree clockwise rotation, use (x, y) to $(y, -x)$ for each vertex.

CHALLENGE

Rotate 90 degrees counterclockwise about the origin, then translate by $\langle 2, 3 \rangle$. $A(1, 1)$ rotates to $(-1, 1)$, then translates to $(1, 4)$.

Accept vertices in any order when the labels remain correct. For the challenge, also accept translating by $\langle 3, -2 \rangle$ first, then rotating 90 degrees counterclockwise about the origin.