

Geometry - Translations, Reflections and Rotations - Answer Key

Common Core G-CO.A.2, G-CO.A.4, G-CO.A.5 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on transformations. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-CO.A.2, G-CO.A.4, G-CO.A.5**

Exercise 1 - Translate a point

$$(3+4, -2+5) = (7, 3)$$

(7, 3)

Exercise 2 - Reflect across the x-axis

Change the sign of y.

$$(5, -(-3)) = (5, 3)$$

(5, 3)

Exercise 3 - Reflect across the y-axis

Change the sign of x.

(4, 6)

Exercise 4 - Rotate 90 degrees

Use (x, y) maps to $(-y, x)$.

$$(-5, 2)$$

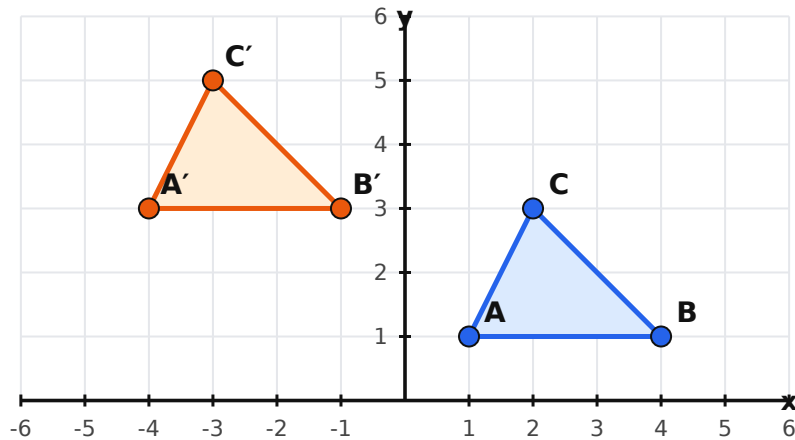
(-5, 2)

Exercise 5 - Rotate 180 degrees

Use (x,y) maps to $(-x,-y)$.

(3, -4)

Exercise 6 - Translate a triangle



The image is 5 units left and 2 units up.

$$A' = (1-5, 1+2) = (-4, 3)$$

$$B' = (4-5, 1+2) = (-1, 3)$$

$$C' = (2-5, 3+2) = (-3, 5)$$

A'(-4, 3), B'(-1, 3), C'(-3, 5)

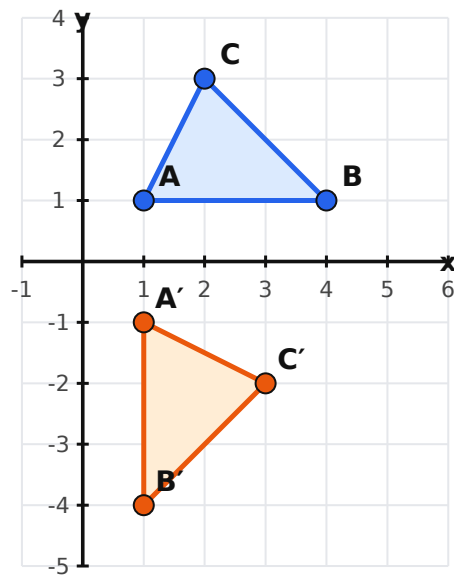
Exercise 7 - Reflect a triangle

Change the sign of each y-coordinate.

$$D'(-3, -2), E'(-1, -5), F'(-1, -2)$$

D'(-3, -2), E'(-1, -5), F'(-1, -2)

Exercise 8 - Rotate a triangle clockwise



Rotation of 90° clockwise.

A 90° clockwise turn equals a 270° counterclockwise turn: (x, y) maps to $(y, -x)$.

$A'(1, -1)$, $B'(1, -4)$, $C'(3, -2)$

$A'(1, -1)$, $B'(1, -4)$, $C'(3, -2)$

Exercise 9 - Reflect across $y = x$

Swap the coordinates.

$(-7, 3)$

Exercise 10 - Reflect across a vertical line

The point is 4 units right of the line, so the image is 4 units left of it.

$$2 - 4 = -2$$

$(-2, 1)$

Exercise 11 - Find the translation rule

$-1 - 2 = -3$ and $7 - 3 = 4$, so the rule is (x, y) maps to $(x - 3, y + 4)$.

$$B' = (0-3, -5+4) = (-3, -1)$$

$$(x - 3, y + 4); B'(-3, -1)$$

Exercise 12 - Identify the transformation

Each x-coordinate changes sign and each y-coordinate stays the same.

A reflection across the y-axis

Exercise 13 - Rotate 270 degrees

Use (x, y) maps to $(y, -x)$.

$$(-1, -4)$$

$$(-1, -4)$$

Exercise 14 - Reflect, then translate

$$(3, 4) \text{ maps to } (3, -4)$$

$$(3+2, -4-1) = (5, -5)$$

$$(5, -5)$$

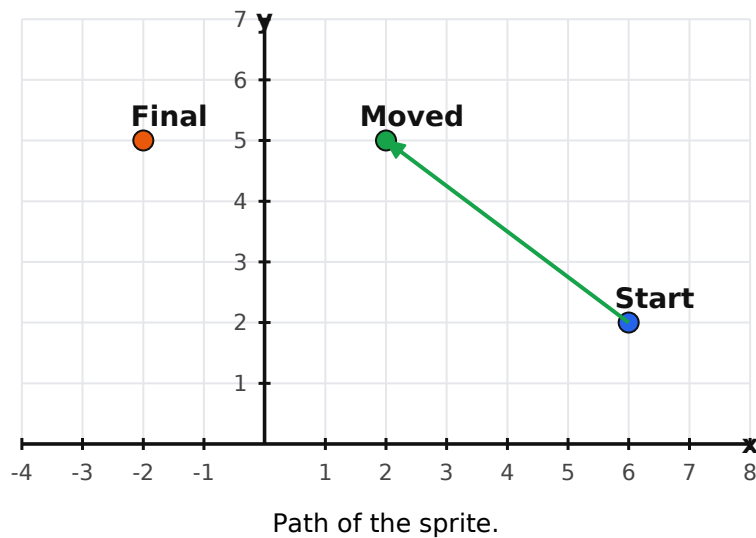
Exercise 15 - Does the order matter?

$$(3, 4) \text{ maps to } (5, 3) \text{ maps to } (5, -3)$$

The previous answer was $(5, -5)$, so the order changes the result.

$(5, -3)$; the order matters

Exercise 16 - Video game sprite



After moving: $(6-4, 2+3) = (2, 5)$.

After the reflection across the y-axis: $(-2, 5)$.

$(-2, 5)$

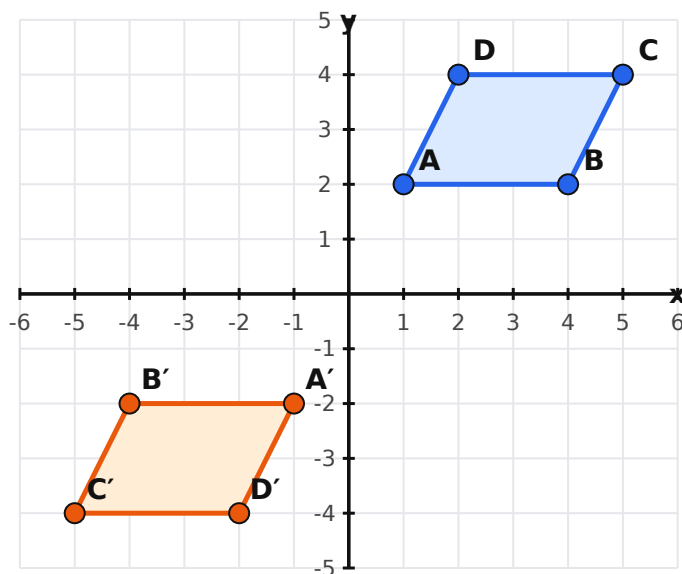
Exercise 17 - Crane arm

New location: $(-6, 8)$.

Before: $\sqrt{8^2 + 6^2} = 10$. After: $\sqrt{(-6)^2 + 8^2} = 10$.

$(-6, 8)$; the length stays 10 units

Exercise 18 - Floor tile



The tile and its 180° image.

Use (x, y) maps to $(-x, -y)$ for each vertex.

$(-1, -2), (-4, -2), (-5, -4), (-2, -4)$

Exercise 19 - Two-step sequence

$(2, -3)$ maps to $(-2, -3)$ after the reflection.

$(-2, -3)$ maps to $(3, -2)$ after the rotation.

$(3, -2)$

Exercise 20 - Rigid motions keep distance

$A'(-2, 1)$ and $B'(-6, 4)$.

$$AB = \sqrt{3^2 + 4^2} = 5$$

$$A'B' = \sqrt{(-6+2)^2 + (4-1)^2} = \sqrt{16+9} = 5$$

Both lengths are 5 units