

Translations, Reflections and Rotations

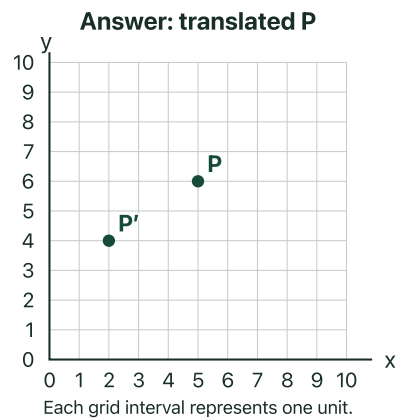
Compare your reasoning, not just the final result. Equivalent correct methods are welcome.

Public practice with published answers. This is not a full-topic readiness assessment.

1. Translate $P(5, 6)$ by 3 units left and 2 units down. Plot the image.

Worked solution 1: $P' = (2, 4)$.

1. Left means subtract from x : $5 - 3 = 2$.
2. Down means subtract from y : $6 - 2 = 4$.
3. Plot $P'(2, 4)$.

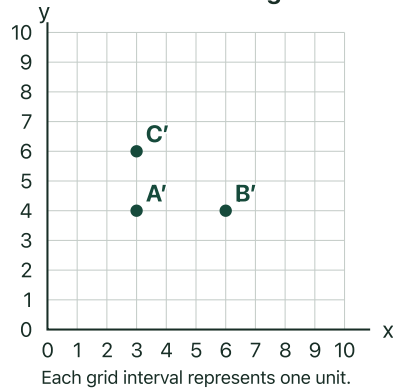


2. Triangle A(1, 1), B(4, 1), C(1, 3) moves 2 units right and 3 units up. Find all image vertices and check AB and A'B'.

Worked solution 2: A'(3, 4), B'(6, 4), C'(3, 6). Both AB and A'B' are 3 units long.

1. Apply $(x + 2, y + 3)$ to every vertex.
2. A becomes (3, 4), B becomes (6, 4), and C becomes (3, 6).
3. $AB = 4 - 1 = 3$; $A'B' = 6 - 3 = 3$. Translation preserves the length.

Answer: translated triangle vertices

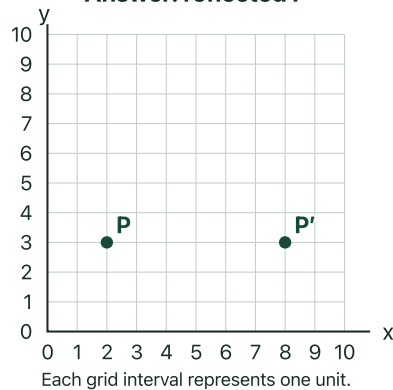


3. Reflect P(2, 3) across the vertical line $x = 5$. Draw the mirror line and find P'.

Worked solution 3: P' = (8, 3).

1. P is $5 - 2 = 3$ units left of the mirror line.
2. Place P' 3 units right of it: $x = 5 + 3 = 8$.
3. The y-coordinate stays 3. The mirror line is halfway between the points.

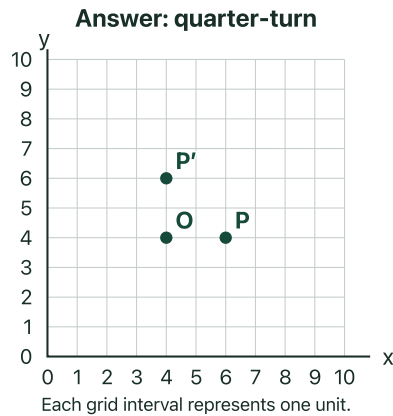
Answer: reflected P



4. Rotate $P(6, 4)$ 90° counterclockwise about $O(4, 4)$. Find P' and show the radius before and after the turn.

Worked solution 4: $P' = (4, 6)$.

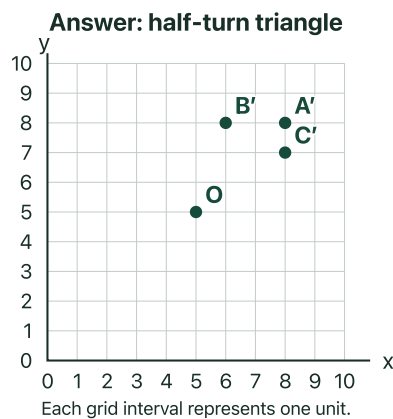
1. Relative to O , P is 2 units to the right.
2. A 90° counterclockwise turn sends that direction upward.
3. Move 2 units above O to $(4, 6)$. Both radii are 2 units.



5. Rotate triangle $A(2, 2)$, $B(4, 2)$, $C(2, 3)$ by 180° about $O(5, 5)$. Find the image vertices.

Worked solution 5: $A'(8, 8)$, $B'(6, 8)$, $C'(8, 7)$.

1. A half-turn puts the centre halfway between each point and its image.
2. For this centre, calculate $x' = 10 - x$ and $y' = 10 - y$.
3. $A' = (8, 8)$, $B' = (6, 8)$, $C' = (8, 7)$.



6. Start with P(1, 2). First translate 2 units right, then reflect across $x = 5$. Compare that result with doing the reflection first and the translation second. Do the two orders agree?

Worked solution 6: Translate then reflect gives (7, 2). Reflect then translate gives (11, 2). They differ.

1. First order: $(1, 2) \rightarrow (3, 2) \rightarrow (10 - 3, 2) = (7, 2)$.
2. Second order: $(1, 2) \rightarrow (10 - 1, 2) = (9, 2) \rightarrow (11, 2)$.
3. The order matters: the reflection reverses the horizontal direction relative to its fixed mirror line.

Answer: compare final positions

