Rigid-Motion Route on a Grid

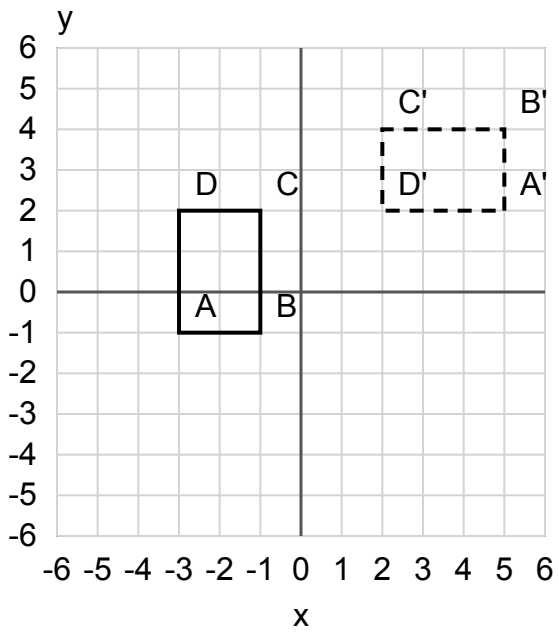
Find and record a rotation-translation sequence that maps one congruent figure to another.

Name: _____ Date: _____

Part 1: Read the coordinate map

Goal: Map solid quadrilateral ABCD exactly onto dashed quadrilateral A'B'C'D'. Use exactly two moves: one 90-degree counterclockwise rotation about the origin and one translation. You may choose the order of the two moves.

Listen as your teacher reads the start direction. The solid outline is the original figure. The dashed outline is the target. Keep every image point on this grid.



Plan before calculating: Decide which move will be Step 1. Write each rule using ordered-pair notation, such as (x, y) -> (x + a, y + b).

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Part 2: Execute, check, and describe

1. Write your Step 1 rule. Then calculate the image of every vertex after Step 1 and after Step 2. Your final coordinates must match the dashed target on Part 1.

Vertex	Original coordinate	After Step 1	After Step 2 (final)
A	(-3, -1)		
B	(-1, -1)		
C	(-1, 2)		
D	(-3, 2)		

Step 1 rule: _____

Step 2 rule: _____

2. Describe your sequence in words. Explain how your coordinate table shows that ABCD lands on A'B'C'D'.

Check: I used the same rule for all four vertices. □ I checked all four final coordinates against the dashed figure. □

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Answer key and teaching notes

Answers: More than one valid order is possible.

1. Rotation first: Step 1 is a 90-degree counterclockwise rotation about the origin: (x, y) -> (-y, x). A -> (1, -3), B -> (1, -1), C -> (-2, -1), D -> (-2, -3). Step 2 is translation 4 units right and 5 units up: (x, y) -> (x + 4, y + 5). Final points are A' (5, 2), B' (5, 4), C' (2, 4), D' (2, 2).

2. Translation first, also correct: Step 1: (x, y) -> (x + 5, y - 4), giving A (2, -5), B (4, -5), C (4, -2), D (2, -2). Step 2: rotate 90 degrees counterclockwise, (x, y) -> (-y, x), giving A' (5, 2), B' (5, 4), C' (2, 4), D' (2, 2).

3. Sample description/rubric: “I rotated ABCD 90 degrees counterclockwise about the origin. Then I translated every point 4 units right and 5 units up. Each final coordinate matches the corresponding dashed vertex.” Award full credit for either valid order, a correct rule applied to all four vertices, all final coordinates matching the target, and an explanation that names both motions and connects the final coordinates to the target. Rigid motions preserve side lengths and angle measures, so the matching image supports congruence.

Exact setup and materials: Print and supply all student pages, keeping teacher-key pages separate. Give each student all student pages together, plus a pencil and eraser. No measuring tools or calculator are needed. Students should keep the coordinate map visible while completing the coordinate table.

Teaching script: Student page says, “Listen as your teacher reads the start direction.” Read: “A sequence has ordered moves. Choose an order, but use one rule on every point. Record the image after Step 1 before doing Step 2. Your final coordinates must match the dashed figure.” Do not announce a preferred order.

Observation method: Circulate while students fill the table. For each student, inspect one Step 1 coordinate, ask the student to state the rule used, then inspect whether the same rule is used in another row. Before students write the explanation, check that all four final coordinates are A' (5, 2), B' (5, 4), C' (2, 4), and D' (2, 2). If needed, prompt: “What does your rule do to both coordinates?” Do not provide the next coordinate.

Source credit: New York Next Generation Mathematics Learning Standards, NY-8.G.2 task reference: https://lessonmakerpro.com/standards/ny-nextgen-math/ny-8-g-2