Sequences of Transformations Worksheet

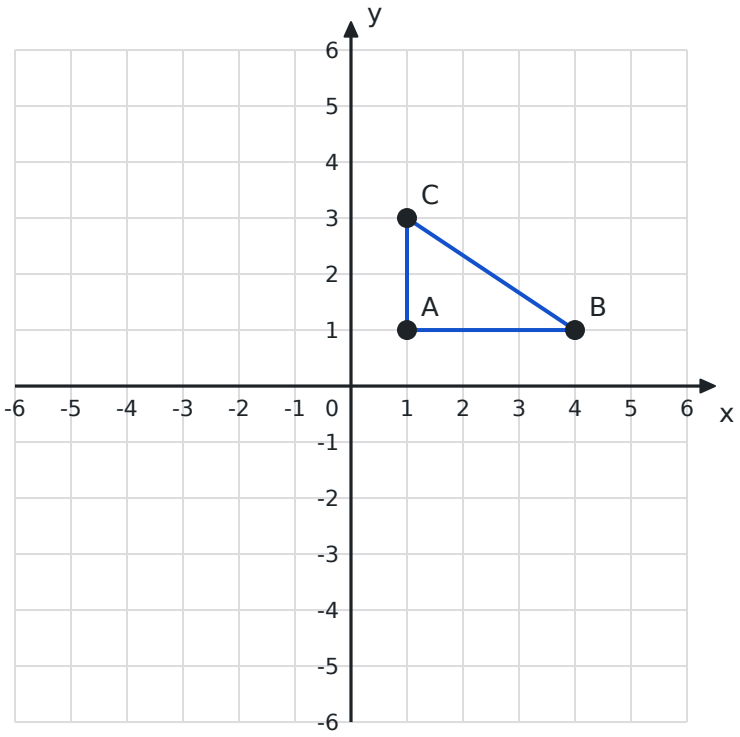
Geometry · Common Core HSG-CO.A.5

> Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

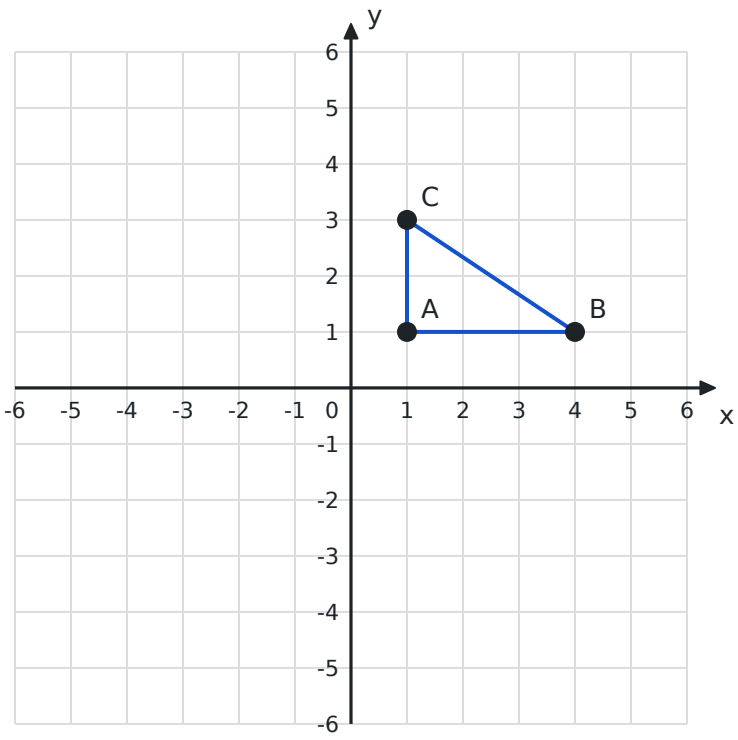
Practice

Builds the skill step by step.

1. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Translate it by (x, y) → (x + 2, y − 3). What is the image of B?



2. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the y-axis. What is the image of C?



3. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 180° about the origin. What is the image of B?

4. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the x-axis. What is the image of A?

5. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 90° counterclockwise about the origin. What is the image of B?

6. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Which single transformation maps it to the triangle with vertices (−1, −1), (−4, −1) and (−1, −3), with A, B and C going to those points in order?

   A. a translation

   B. a 180° rotation about the origin

   C. a reflection across the y-axis

   D. a reflection across the x-axis

7. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Translate it by $(x, y) \to (x - 5, y)$. What is the image of C?

8. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 90° clockwise about the origin. What is the image of C?

9. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the line $y = x$. What is the image of A?

10. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Apply $(x, y) \to (x + 1, y)$, then reflect across the x-axis. What is the final image of B?

ALBERT

Name _____ Date _____

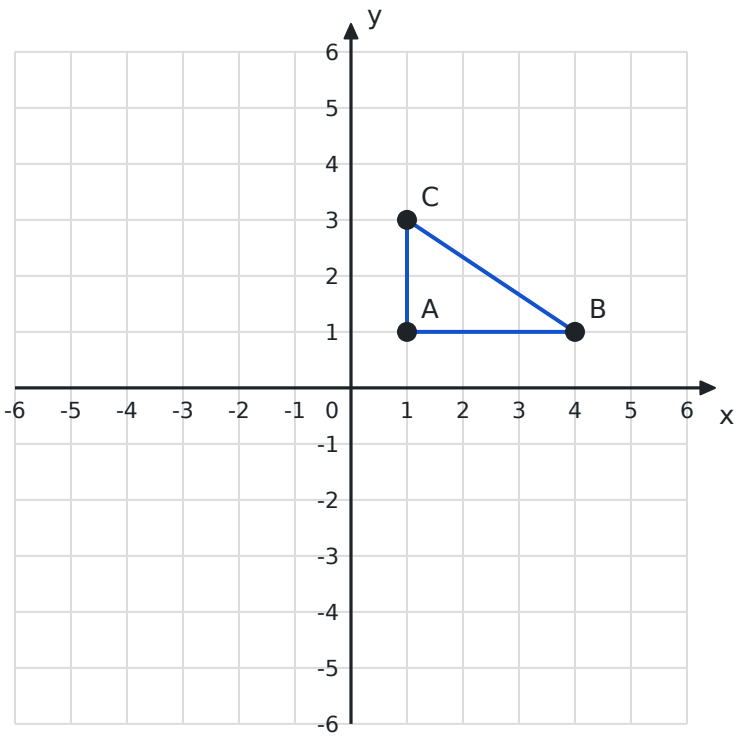
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On Level

Grade-level practice.

1. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 90° counterclockwise about the origin, then translate by (x, y) → (x + 3, y). What is the final image of C?



2. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the line x = 2. What is the image of B?

3. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the line $y = 2$. What is the image of C?

4. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Which transformation maps A, B and C to $A'(3, -1)$, $B'(6, -1)$ and $C'(3, 1)$?

   A. a reflection across the x-axis

   B. $(x, y) \to (x - 2, y + 2)$

   C. a 90° rotation about the origin

   D. $(x, y) \to (x + 2, y - 2)$

5. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 90° counterclockwise about point A. What is the image of B?

6. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the line $y = -x$. What is the image of C?

7. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Which single transformation maps A, B and C to $A'(-1, 1)$, $B'(-1, 4)$ and $C'(-3, 1)$?

   A. a 90° counterclockwise rotation about the origin

   B. a reflection across the y-axis

   C. a 90° clockwise rotation about the origin

   D. a reflection across the line $y = x$

8. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Translate it by $(x, y) \to (x - 1, y + 2)$, then rotate it 180° about the origin. What is the final image of B?

9. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the x-axis, then across the y-axis. What is the final image of C?

10. A reflection across the x-axis followed by a reflection across the y-axis is the same as which single transformation?

    A. a reflection across y = x

    B. a 90° rotation about the origin

    C. a 180° rotation about the origin

    D. a translation

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Challenge

Multi-step and word problems that stretch it.

1. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). A translation maps A to (−2, 5). What is the image of C under the same translation?

2. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across x = 3, then across x = 6. What is the final image of B?

3. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Which single transformation maps A, B and C to A′(1, −1), B′(1, −4) and C′(3, −1)?

   A. a 90° counterclockwise rotation about the origin

   B. a reflection across the x-axis

   C. a 90° clockwise rotation about the origin

   D. a reflection across y = −x

4. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Rotate it 90° counterclockwise about the origin two times. What is the final image of B?

5. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Reflect it across the line y = x, then rotate 90° counterclockwise about the origin. What is the final image of C?

6. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). Which sequence maps A, B and C to A′(−1, −2), B′(−4, −2) and C′(−1, −4)?

   A. Reflect across the y-axis, then translate down 3.

   B. Rotate 180° about the origin, then translate down 1.

   C. Reflect across the x-axis, then translate left 2.

   D. Translate down 3 only.

7. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). It is rotated 90° about the origin. What is the area of the image?

8. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). The translation (x, y) → (x + a, y + b) maps C to (5, 0). What is a + b?

9. Triangle ABC has vertices A(1, 1), B(4, 1) and C(1, 3). It is reflected across the y-axis. How far does point B move?

10. Which of these changes the orientation of a triangle (clockwise order of its vertices becomes counterclockwise)?

    A. a translation

    B. a reflection followed by another reflection

    C. a rotation

    D. a single reflection