

Translations (Part 1) — ANSWER KEY

Slide every vertex the same direction and distance. Draw the image and label it with prime marks (A' , B' , ...).

1. Translate the figure 6 units left and 5 units down.

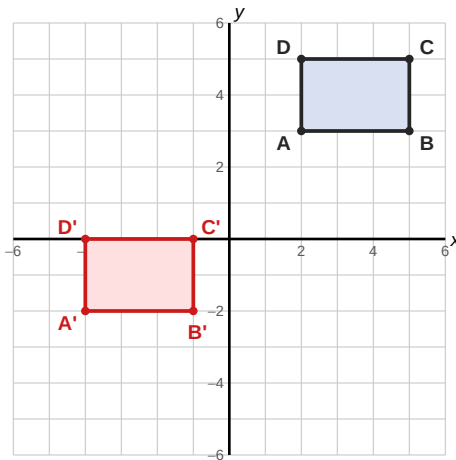


Image coordinates:

$A' (-4, -2)$

$B' (-1, -2)$

$C' (-1, 0)$

$D' (-4, 0)$

Original:

$A (2, 3)$

$B (5, 3)$

$C (5, 5)$

$D (2, 5)$

2. Translate using the rule $(x, y) \rightarrow (x - 2, y - 2)$.

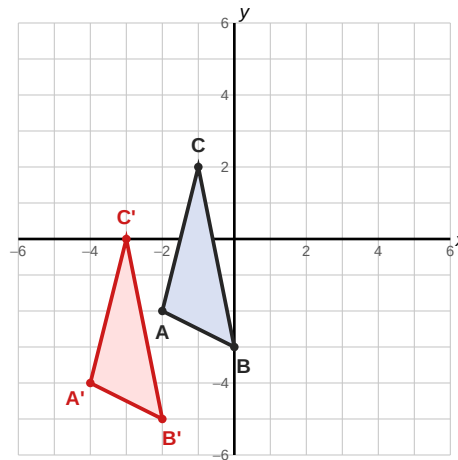


Image coordinates:

$A' (-4, -4)$

$B' (-2, -5)$

$C' (-3, 0)$

Original:

$A (-2, -2)$

$B (0, -3)$

$C (-1, 2)$

3. Translate the figure 3 units left and 2 units up.

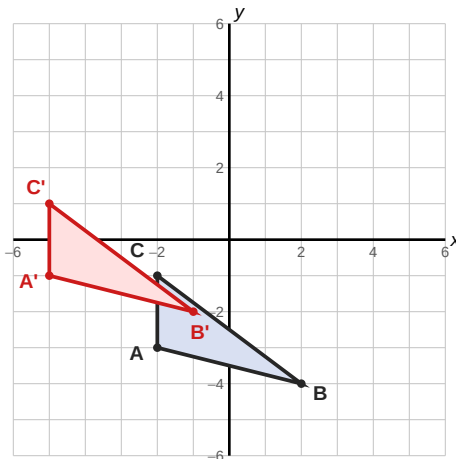


Image coordinates:

$A' (-5, -1)$

$B' (-1, -2)$

$C' (-5, 1)$

Original:

$A (-2, -3)$

$B (2, -4)$

$C (-2, -1)$

4. Translate using the rule $(x, y) \rightarrow (x - 5, y - 6)$.

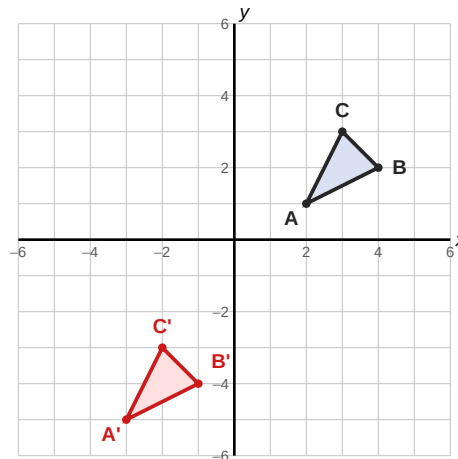


Image coordinates:

$A' (-3, -5)$

$B' (-1, -4)$

$C' (-2, -3)$

Original:

$A (2, 1)$

$B (4, 2)$

$C (3, 3)$

5. Translate the figure 1 unit left and 4 units down.

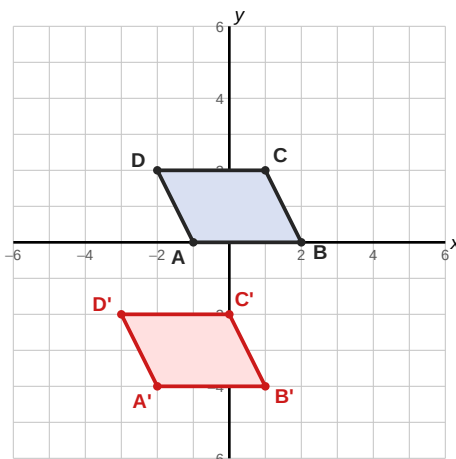


Image coordinates:

$A' (-2, -4)$

$B' (1, -4)$

$C' (0, -2)$

$D' (-3, -2)$

Original:

$A (-1, 0)$

$B (2, 0)$

$C (1, 2)$

$D (-2, 2)$

6. Translate using the rule $(x, y) \rightarrow (x - 3, y + 1)$.

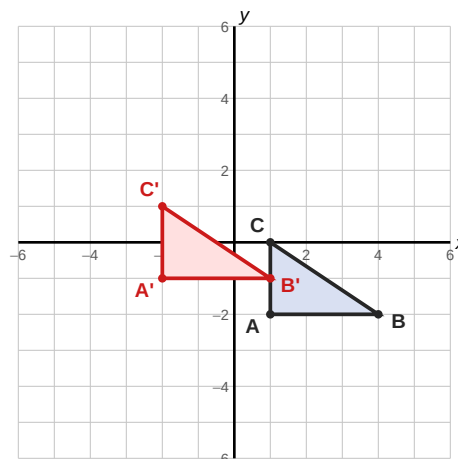


Image coordinates:

$A' (-2, -1)$

$B' (1, -1)$

$C' (-2, 1)$

Original:

$A (1, -2)$

$B (4, -2)$

$C (1, 0)$

Translations (Part 2) — ANSWER KEY

Slide every vertex the same direction and distance. Draw the image and label it with prime marks (A' , B' , ...).

7. Translate the figure 2 units left and 6 units up.

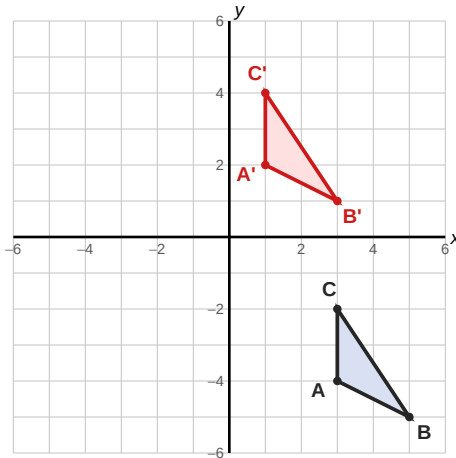


Image coordinates:

A' (1, 2)

B' (3, 1)

C' (1, 4)

Original:
A (3, -4)
B (5, -5)
C (3, -2)

8. Translate using the rule $(x, y) \rightarrow (x + 1, y - 3)$.

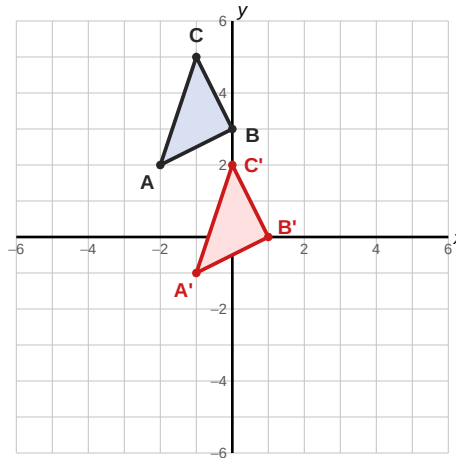


Image coordinates:

A' (-1, -1)

B' (1, 0)

C' (0, 2)

Original:
A (-2, 2)
B (0, 3)
C (-1, 5)

9. Translate the figure 4 units left.

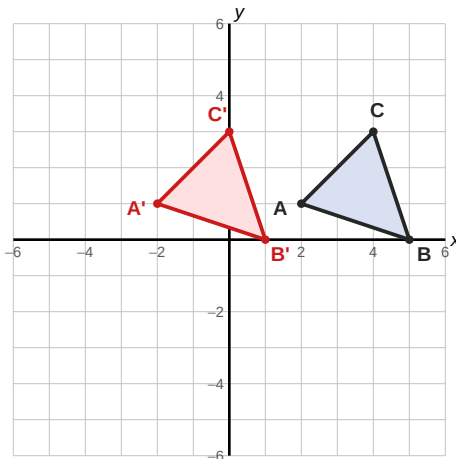


Image coordinates:

A' (-2, 1)

B' (1, 0)

C' (0, 3)

Original:
A (2, 1)
B (5, 0)
C (4, 3)

10. Translate using the rule $(x, y) \rightarrow (x + 1, y - 2)$.

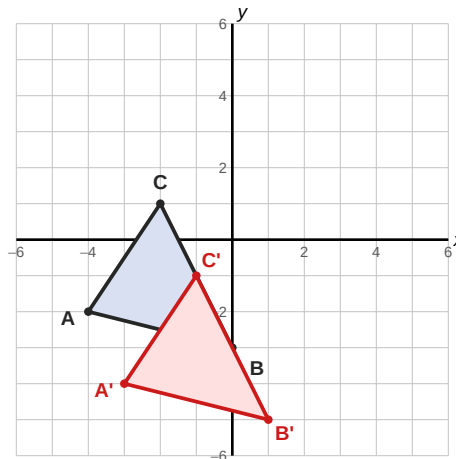


Image coordinates:

A' (-3, -4)

B' (1, -5)

C' (-1, -1)

Original:
A (-4, -2)
B (0, -3)
C (-2, 1)

11. Translate the figure 5 units right and 5 units up.

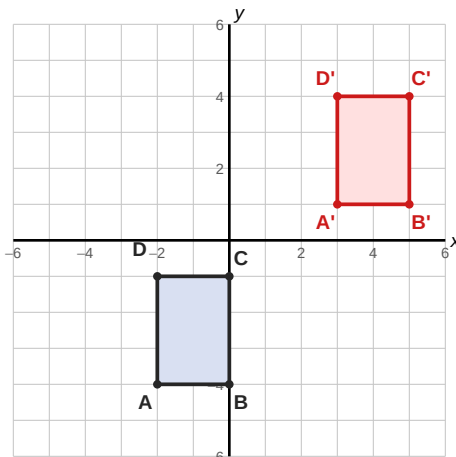


Image coordinates:

A' (3, 1)

B' (5, 1)

C' (5, 4)

D' (3, 4)

Original:
A (-2, -4)
B (0, -4)
C (0, -1)
D (-2, -1)

12. Translate using the rule $(x, y) \rightarrow (x + 4, y - 6)$.

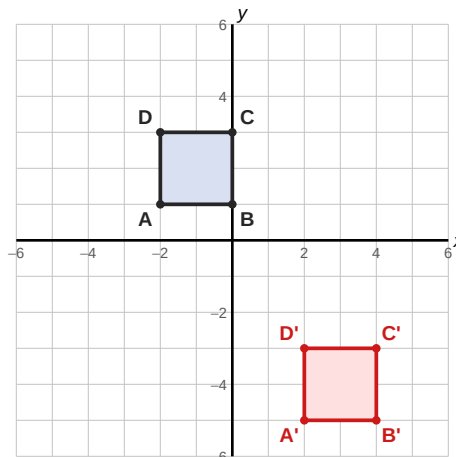


Image coordinates:

A' (2, -5)

B' (4, -5)

C' (4, -3)

D' (2, -3)

Original:
A (-2, 1)
B (0, 1)
C (0, 3)
D (-2, 3)

Reflections (Part 1) — ANSWER KEY

Flip the figure over the given line. Each image point is the same distance from the line as the original.

1. Reflect the figure over the x-axis.

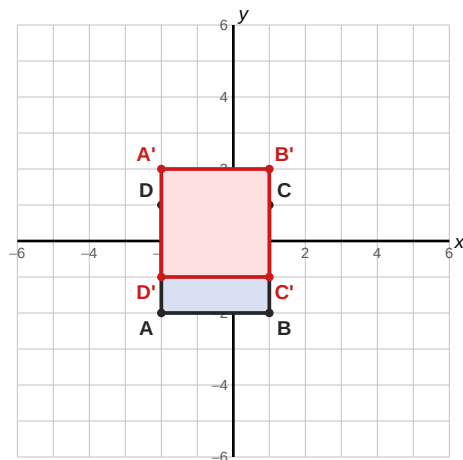


Image coordinates:

A' **(-2, 2)**

B' **(1, 2)**

C' **(1, -1)**

D' **(-2, -1)**

Original:

A (-2, -2)

B (1, -2)

C (1, 1)

D (-2, 1)

2. Reflect the figure over the y-axis.

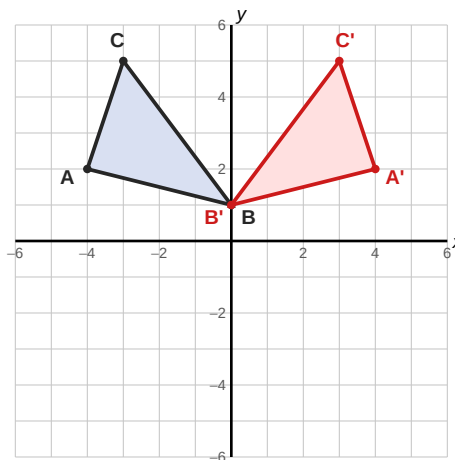


Image coordinates:

A' **(4, 2)**

B' **(0, 1)**

C' **(3, 5)**

Original:

A (-4, 2)

B (0, 1)

C (-3, 5)

3. Reflect the figure over the line $y = x$.

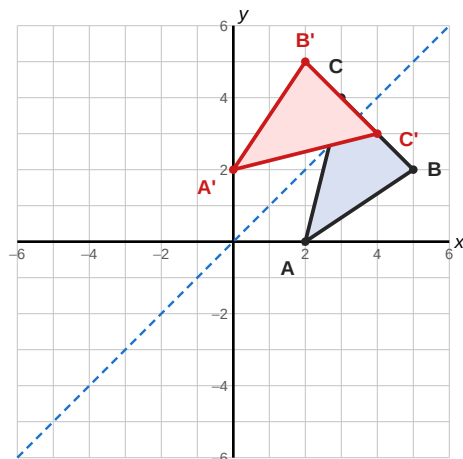


Image coordinates:

A' **(0, 2)**

B' **(2, 5)**

C' **(4, 3)**

Original:

A (2, 0)

B (5, 2)

C (3, 4)

4. Reflect the figure over the line $y = -x$.

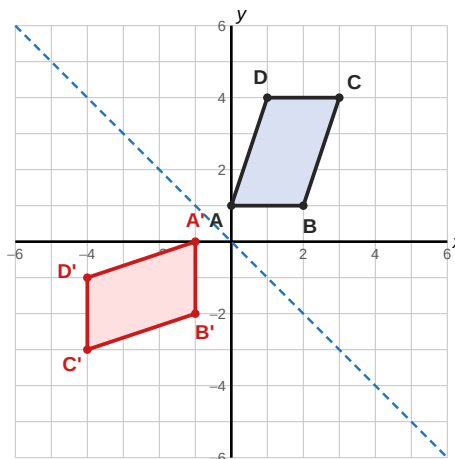


Image coordinates:

A' **(-1, 0)**

B' **(-1, -2)**

C' **(-4, -3)**

D' **(-4, -1)**

Original:

A (0, 1)

B (2, 1)

C (3, 4)

D (1, 4)

5. Reflect the figure over the x-axis.

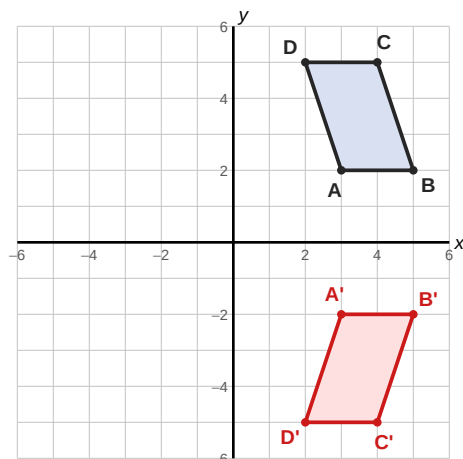


Image coordinates:

A' **(3, -2)**

B' **(5, -2)**

C' **(4, -5)**

D' **(2, -5)**

Original:

A (3, 2)

B (5, 2)

C (4, 5)

D (2, 5)

6. Reflect the figure over the y-axis.

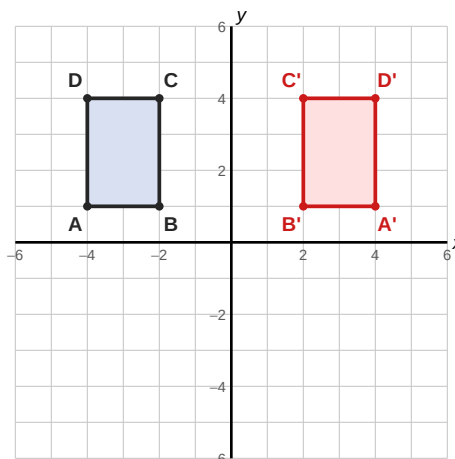


Image coordinates:

A' **(4, 1)**

B' **(2, 1)**

C' **(2, 4)**

D' **(4, 4)**

Original:

A (-4, 1)

B (-2, 1)

C (-2, 4)

D (-4, 4)

Reflections (Part 2) — ANSWER KEY

Flip the figure over the given line. Each image point is the same distance from the line as the original.

7. Reflect the figure over the line $y = x$.

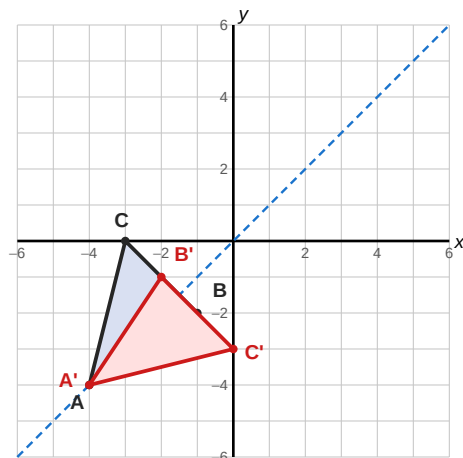


Image coordinates:

$A' (-4, -4)$

$B' (-2, -1)$

$C' (0, -3)$

Original:
 $A (-4, -4)$
 $B (-1, -2)$
 $C (-3, 0)$

8. Reflect the figure over the line $y = -x$.

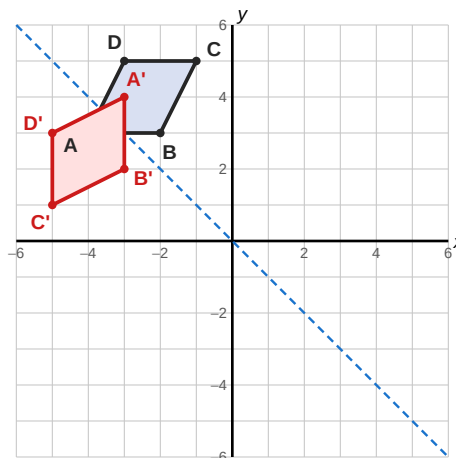


Image coordinates:

$A' (-3, 4)$

$B' (-3, 2)$

$C' (-5, 1)$

$D' (-5, 3)$

Original:
 $A (-4, 3)$
 $B (-2, 3)$
 $C (-1, 5)$
 $D (-3, 5)$

9. Reflect the figure over the line $x = 3$.

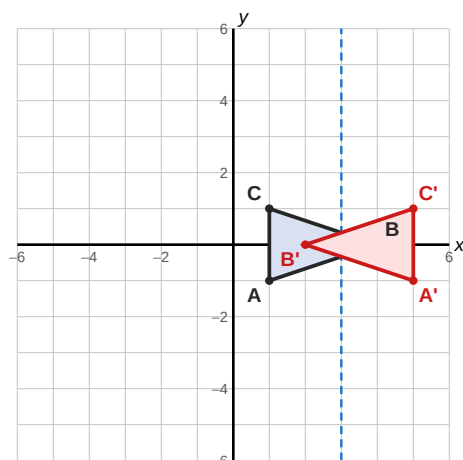


Image coordinates:

$A' (5, -1)$

$B' (2, 0)$

$C' (5, 1)$

Original:
 $A (1, -1)$
 $B (4, 0)$
 $C (1, 1)$

10. Reflect the figure over the line $y = -1$.

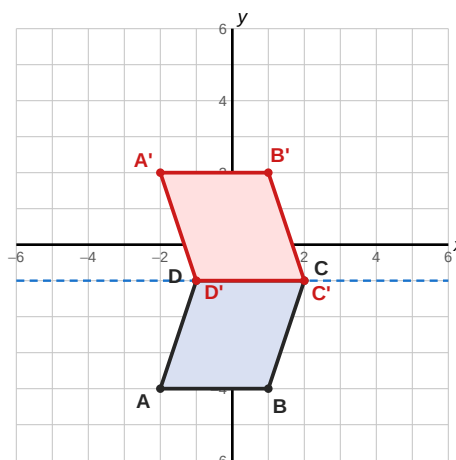


Image coordinates:

$A' (-2, 2)$

$B' (1, 2)$

$C' (2, -1)$

$D' (-1, -1)$

Original:
 $A (-2, -4)$
 $B (1, -4)$
 $C (2, -1)$
 $D (-1, -1)$

11. Reflect the figure over the line $x = 1$.

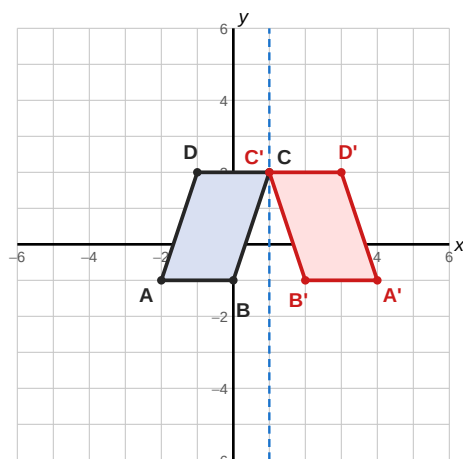


Image coordinates:

$A' (4, -1)$

$B' (2, -1)$

$C' (1, 2)$

$D' (3, 2)$

Original:
 $A (-2, -1)$
 $B (0, -1)$
 $C (1, 2)$
 $D (-1, 2)$

12. Reflect the figure over the line $y = -2$.

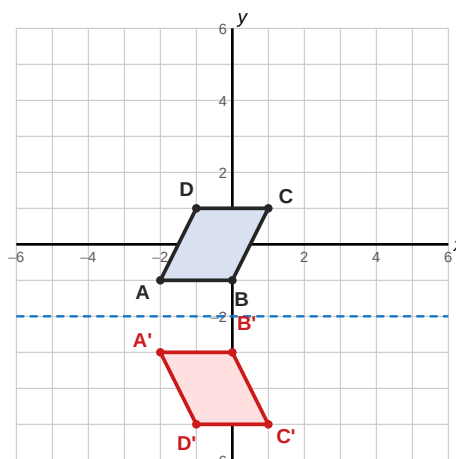


Image coordinates:

$A' (-2, -3)$

$B' (0, -3)$

$C' (1, -5)$

$D' (-1, -5)$

Original:
 $A (-2, -1)$
 $B (0, -1)$
 $C (1, 1)$
 $D (-1, 1)$

Rotations (Part 1) — ANSWER KEY

Turn the figure about the origin (0, 0). Tip: trace the figure, put your pencil on the origin, and turn the paper.

1. Rotate the figure 90° counterclockwise about the origin.

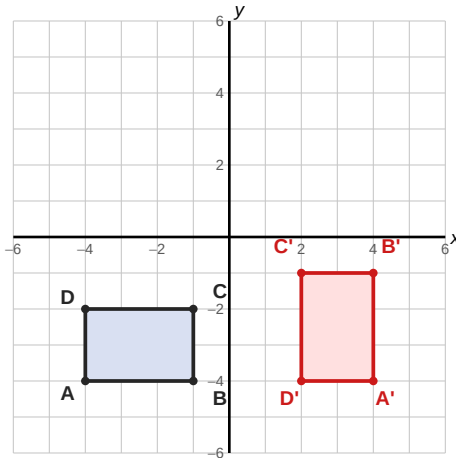


Image coordinates:

A' (4, -4)

B' (4, -1)

C' (2, -1)

D' (2, -4)

Original:

A (-4, -4)

B (-1, -4)

C (-1, -2)

D (-4, -2)

2. Rotate the figure 90° clockwise about the origin.

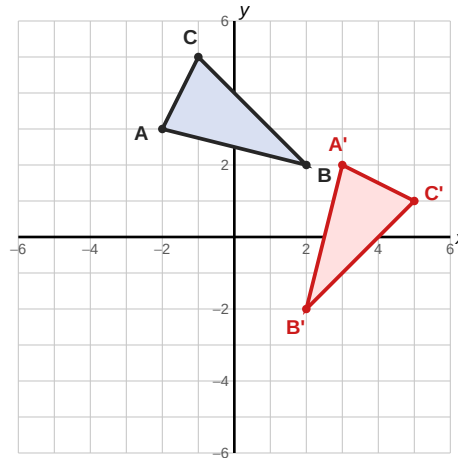


Image coordinates:

A' (3, 2)

B' (2, -2)

C' (5, 1)

Original:

A (-2, 3)

B (2, 2)

C (-1, 5)

3. Rotate the figure 180° about the origin.

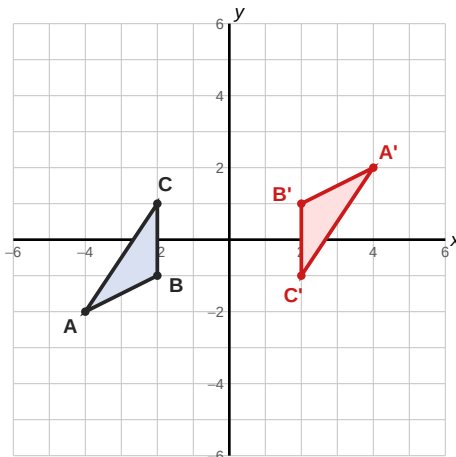


Image coordinates:

A' (4, 2)

B' (2, 1)

C' (2, -1)

Original:

A (-4, -2)

B (-2, -1)

C (-2, 1)

4. Rotate the figure 270° counterclockwise about the origin.

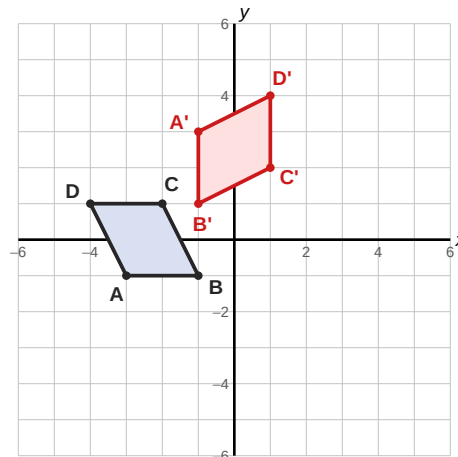


Image coordinates:

A' (-1, 3)

B' (-1, 1)

C' (1, 2)

D' (1, 4)

Original:

A (-3, -1)

B (-1, -1)

C (-2, 1)

D (-4, 1)

5. Rotate the figure 90° counterclockwise about the origin.

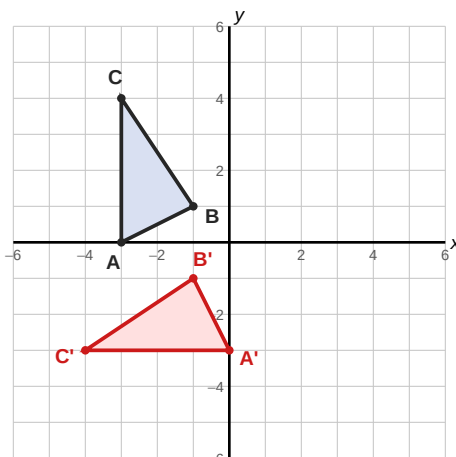


Image coordinates:

A' (0, -3)

B' (-1, -1)

C' (-4, -3)

Original:

A (-3, 0)

B (-1, 1)

C (-3, 4)

6. Rotate the figure 90° clockwise about the origin.

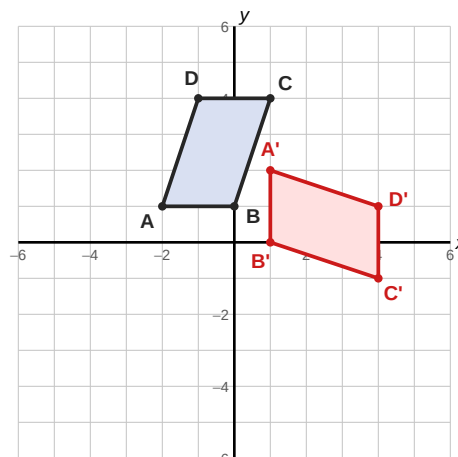


Image coordinates:

A' (1, 2)

B' (1, 0)

C' (4, -1)

D' (4, 1)

Original:

A (-2, 1)

B (0, 1)

C (1, 4)

D (-1, 4)

Rotations (Part 2) — ANSWER KEY

Turn the figure about the origin (0, 0). Tip: trace the figure, put your pencil on the origin, and turn the paper.

7. Rotate the figure 180° about the origin.

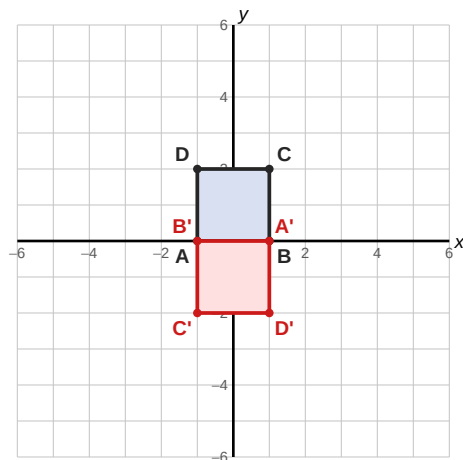


Image coordinates:

A' (1, 0)

B' (-1, 0)

C' (-1, -2)

D' (1, -2)

Original:

A (-1, 0)

B (1, 0)

C (1, 2)

D (-1, 2)

8. Rotate the figure 270° counterclockwise about the origin.

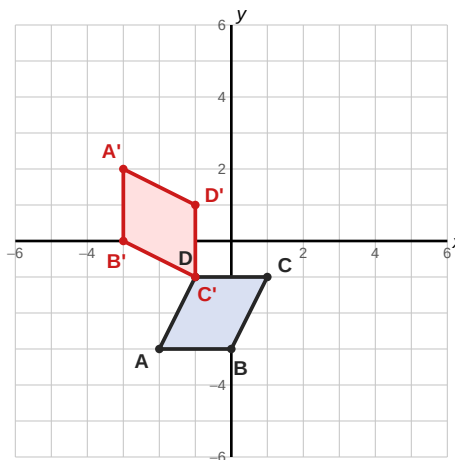


Image coordinates:

A' (-3, 2)

B' (-3, 0)

C' (-1, -1)

D' (-1, 1)

Original:

A (-2, -3)

B (0, -3)

C (1, -1)

D (-1, -1)

9. Rotate the figure 90° counterclockwise about the origin.

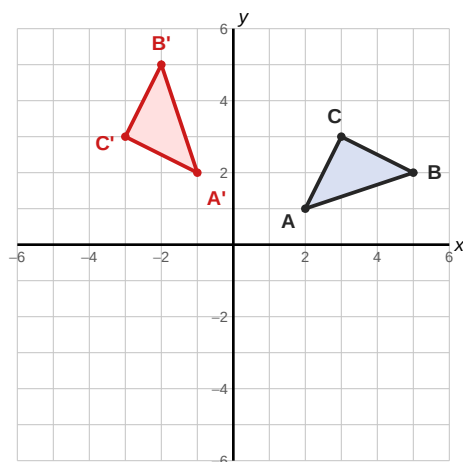


Image coordinates:

A' (-1, 2)

B' (-2, 5)

C' (-3, 3)

Original:

A (2, 1)

B (5, 2)

C (3, 3)

10. Rotate the figure 90° clockwise about the origin.

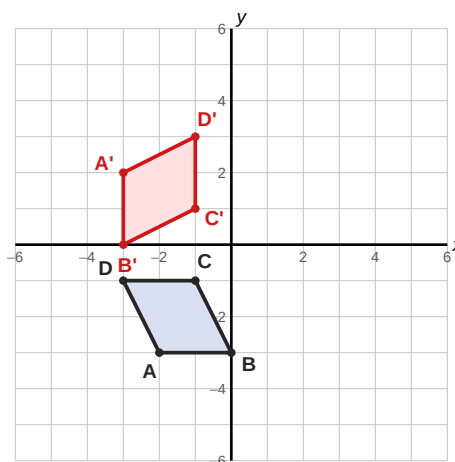


Image coordinates:

A' (-3, 2)

B' (-3, 0)

C' (-1, 1)

D' (-1, 3)

Original:

A (-2, -3)

B (0, -3)

C (-1, -1)

D (-3, -1)

11. Rotate the figure 180° about the origin.

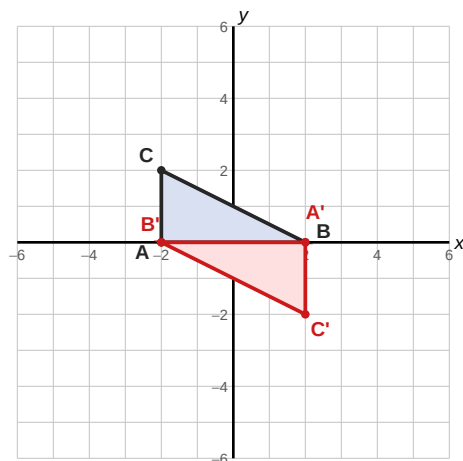


Image coordinates:

A' (2, 0)

B' (-2, 0)

C' (2, -2)

Original:

A (-2, 0)

B (2, 0)

C (-2, 2)

12. Rotate the figure 270° counterclockwise about the origin.

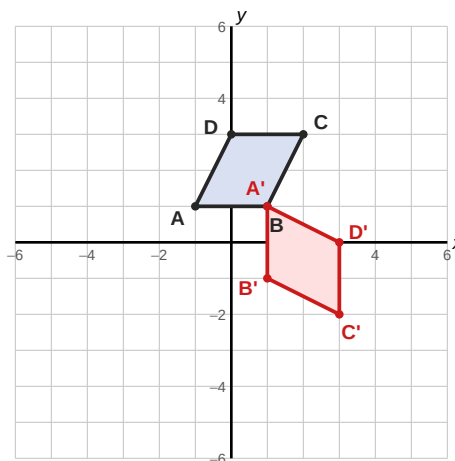


Image coordinates:

A' (1, 1)

B' (1, -1)

C' (3, -2)

D' (3, 0)

Original:

A (-1, 1)

B (1, 1)

C (2, 3)

D (0, 3)

Mixed Review (Two-Step) — ANSWER KEY

Do the first transformation, then apply the second one to that result. Graph only the final image.

1. Translate 2 units right and 2 units up, then reflect over the line $y = -x$.

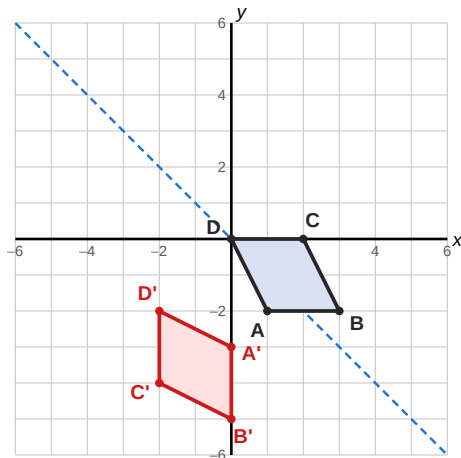


Image coordinates:

A' (0, -3)

B' (0, -5)

C' (-2, -4)

D' (-2, -2)

Original:

A (1, -2)

B (3, -2)

C (2, 0)

D (0, 0)

2. Reflect over the y-axis, then rotate 270° counterclockwise about the origin.

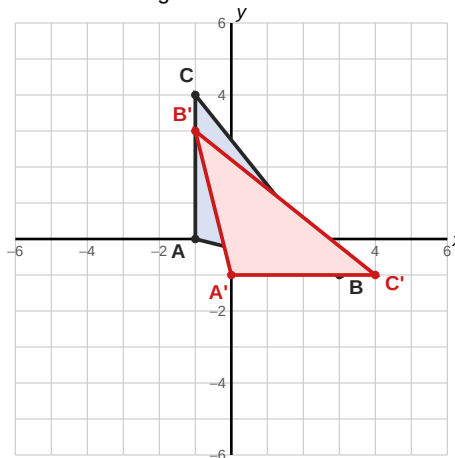


Image coordinates:

A' (0, -1)

B' (-1, 3)

C' (4, -1)

Original:

A (-1, 0)

B (3, -1)

C (-1, 4)

3. Rotate 90° clockwise about the origin, then translate 3 units left and 1 unit down.

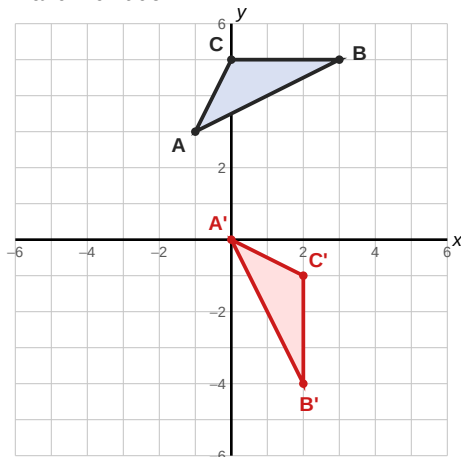


Image coordinates:

A' (0, 0)

B' (2, -4)

C' (2, -1)

Original:

A (-1, 3)

B (3, 5)

C (0, 5)

4. Translate 2 units left and 1 unit up, then reflect over the x-axis.

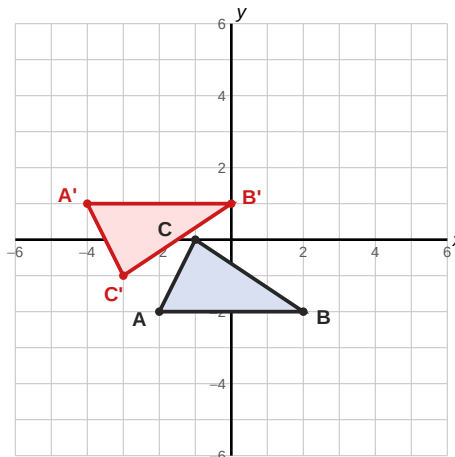


Image coordinates:

A' (-4, 1)

B' (0, 1)

C' (-3, -1)

Original:

A (-2, -2)

B (2, -2)

C (-1, 0)

5. Reflect over the line $y = -x$, then rotate 180° about the origin.

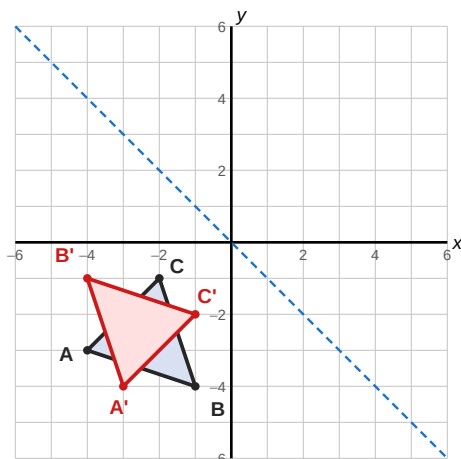


Image coordinates:

A' (-3, -4)

B' (-4, -1)

C' (-1, -2)

Original:

A (-4, -3)

B (-1, -4)

C (-2, -1)

6. Rotate 90° clockwise about the origin, then translate 3 units right.

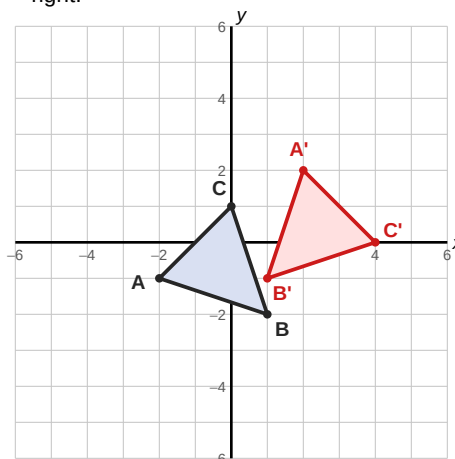


Image coordinates:

A' (2, 2)

B' (1, -1)

C' (4, 0)

Original:

A (-2, -2)

B (1, -2)

C (0, 1)