**See ANSWERS below on PAGE 3.**
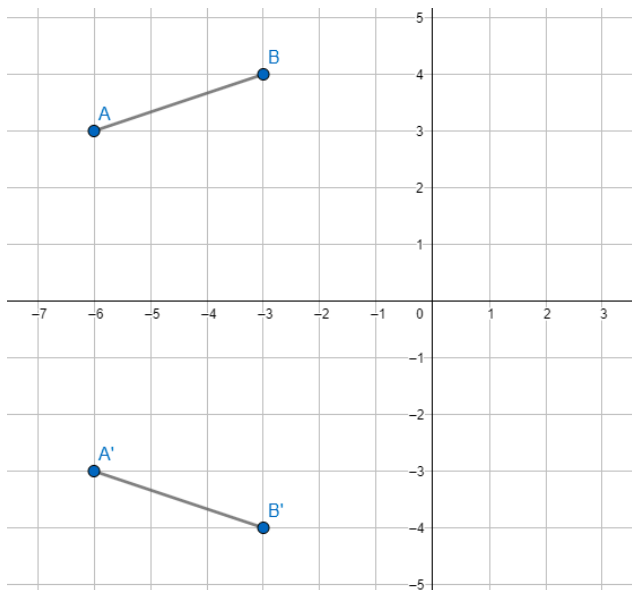
1. A figure is reflected across the y-axis. The image is then reflected across the x-axis. Which single transformation is equivalent to the composite transformation?

2. A figure is reflected over the y-axis. The image is then reflected across y = -x. Which single transformation is equivalent to the composite transformation?

3. A figure is translated left 2 and up 3 units. The image is then translated left 7 and down 5 units. Which single transformation is equivalent to the composite transformation?

4. A figure is translated right 3 and down 9 units. The image is then translated left 4 and up 3 units. Which single transformation is equivalent to the composite transformation?

5. A figure is rotated 90 degrees. The image is then rotated 180 degrees. Which single transformation is equivalent to the composite transformation?

6. A figure is rotated 180 degrees. The image is then rotated 270 degrees. Which single transformation is equivalent to the composite transformation?

7. A figure is reflected across the line y = x. The image is then reflected across the x-axis. Which single transformation is equivalent to the composite transformation?

8. A transformation is shown below



Segment A'B' is reflected across the line y = -x. What transformation will carry segment AB onto segment A"B"?

9. A figure is transformed by the rule $r_{x-axis} \circ r_{y=-x}$ . What single transformation is equivalent to the composite transformation?

10. Point X(3, 5) is reflected across the line y = 1 and then across the line y = -3. What single transformation will carry X" onto X?

11. Point M(-3, 8) is reflected across the line x = 3 and then across the line x = -2. What are the coordinates of M"? What single transformation is equivalent to the composition transformation?

12. Point R(-4, 2) is reflected across the line y = 3 and then across the line y = 1. What single transformation will carry R onto R"?

13. A figure is transformed by the rule $r_{y-axis} \circ R_{270°}$ . What single transformation is equivalent to the composite transformation?

**Answer Key: Feel free to graph a point to help you!**

1. rotate 180 degrees centered at the origin
   Reflect y then Reflect x
   $(-x, y) \rightarrow (-x, -y)$

2. rotate 90 degrees centered at the origin

   Reflect y then Reflect y=-x

   $(-x, y) \rightarrow (-y, x)$

3. translate left 9 and down 2

   Translate (x-2, y+3) then Translate (x-7, y-5)

   (x-9, y-2)

4. translate left 1 and down 6

   Translate (x+3, y-9) then Translate (x-4, y+3)

   (x-1, y-6)

5. rotate 270 degrees centered at the origin

   Rotate 90 then Rotate 180

   $(-y, x) \rightarrow (y, -x)$

6. rotate 90 degrees centered at the origin

   Rotate 180 then Rotate 270

   $(-x, -y) \rightarrow (-y, x)$

7. rotate 270 degrees centered at the origin

   Reflect y=x then Reflect x

   $(y, x) \rightarrow (y, -x)$

8. rotate 270 degrees centered at the origin

   Reflect x then Reflect y=-x

   $(x, -y) \rightarrow (y, -x)$

9. rotate 90 degrees centered at the origin

   Reflect y=-x then Reflect x

   $(-y, -x) \rightarrow (-y, x)$

10. translate up 8 units

$$X'' \rightarrow X$$

11. M'' = (-13, 8); translate left 10 units

12. translate up 4

$$R'' \rightarrow R$$

13. reflect across the line y = -x

Rotate 270 then Reflect y

(y, -x) → (-y, -x)