Things to Remember
- Translations (slides)
- Rotations (turns)
- Reflections (flips)
- Dilations (get bigger or smaller)
- Compositions (more than 1 of the things listed above)

Translations

Graph $\triangle XYZ$ with vertices $X(2, 3)$, $Y(-3, 2)$, and $Z(-4, -3)$ and its image after the translation.

1. $(x, y) \rightarrow (x, y + 2)$ 2. $(x, y) \rightarrow (x - 3, y)$
3. $(x, y) \rightarrow (x + 3, y - 1)$ 4. $(x, y) \rightarrow (x + 4, y + 1)$

Graph $\triangle PQR$ with vertices $P(0, -4)$, $Q(1, 3)$, and $R(2, -5)$ and its image after the composition.

5. Translation: $(x, y) \rightarrow (x + 1, y + 2)$ 6. Translation: $(x, y) \rightarrow (x, y + 3)$
   Translation: $(x, y) \rightarrow (x - 4, y + 1)$ Translation: $(x, y) \rightarrow (x - 1, y + 1)$

Given the points A(-2, 3) and B(5, 4). Determine its image after each translation.

7. $\langle 3, -1 \rangle$ 8. $\langle -4, 0 \rangle$ 9. $\langle 0, 5 \rangle$
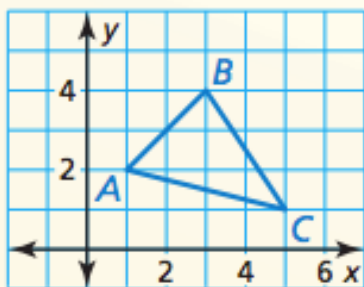
Reflections

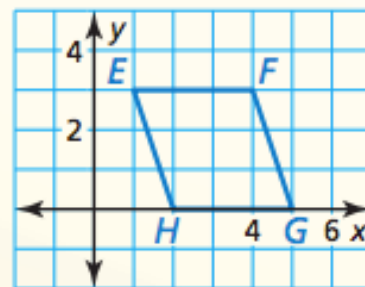**Given each pre-image, determine the image after the given reflection.**

1.   (1, -2) reflection over the x-axis   2.   (-3, 4) reflection over the y-axis

3.   (2, -4) reflection over the line $y = x$ 4.   (-1, -2) reflection over the x-axis

5.   (7, 2) reflection over the line $y = x$ 6.   (-4, -5) reflection over the y-axis

Graph the polygon and its image after a reflection in the given line.

7. $x = 4$

8. $y = 3$

Rotations

Determine the image after the given rotation of the pre-image.

1. (-2, 4); 90° clockwise

2. (1, -5); 180° clockwise

3. (1, 2); 90° counterclockwise

4. (-3, -2); 270° clockwise

5. (2, -2); 90° clockwise

6. (-4, -1) 270° counterclockwise

7. (5, -4); 180° counterclockwise

8. (-3, -2); 180° clockwise

Dilations

Determine the image after the given dilation on ΔABC, A(0, 6), B(-6, 12), and C(12, 12)

1. $k = \frac{1}{2}$

2. $k = 2$

3. $k = \frac{2}{3}$

4. $k = 4$

Compositions

Determine the image after each composition of A(2, 4).

1. Reflection: over the x-axis
    Translation: $(x, y) \rightarrow (x, y - 3)$

2. Rotation: 90° clockwise
    Reflection: over the line $y = x$

3. Translation: $\langle 4, -2 \rangle$
    Rotation: 180° counterclockwise

4. Reflection: over the x-axis
    Rotation: 270° clockwise