NAME ______________________ DATE __________

Reteaching with Practice

For use with pages 404–410

GOAL **Identify and use reflections in a plane and identify relationships between reflections and line symmetry.**

VOCABULARY

A transformation which uses a line that acts like a mirror, with an image reflected in the line, is called a **reflection.** The line which acts like a mirror in a reflection is called the **line of reflection.**

A figure in the plane has a **line of symmetry** if the figure can be mapped onto itself by a reflection in the line.

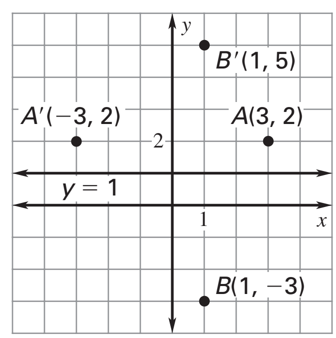
Theorem 7.1 Reflection Theorem
A reflection is an isometry.

EXAMPLE 1 *Reflections in a Coordinate Plane*

Graph the given reflection.

a. $A(3, 2)$ in the y-axis

b. $B(1, -3)$ in the line $y = 1$



SOLUTION

a. Since A is three units to the right of the y-axis, its reflection, A', is three units to the left of the x-axis.

b. Start by graphing $y = 1$ and B. From the graph, you can see that B is 4 units below the line of reflection. This implies that its reflection, B', is 4 units above the line.

Exercises for Example 1

In Exercises 1–8, graph the given reflection.

1. $C(-1, 4)$ in the x-axis

2. $D(0, 3)$ in the y-axis

3. $E(4, -2)$ in the line $y = 3$

4. $F(1, -2)$ in the line $y = -2$

5. $G(3, 5)$ in the line $x = 1$

6. $H(-3, -1)$ in the line $x = 4$

7. $I(4, 5)$ in the line $x = -2$

8. $J(-2, 3)$ in the line $y = 1$

EXAMPLE 2 *Finding Lines of Symmetry*

Triangles can have different lines of symmetry depending on their shape. Find the number of lines of symmetry a triangle has when it is one of the following.

a. equilateral **b.** isosceles **c.** scalene

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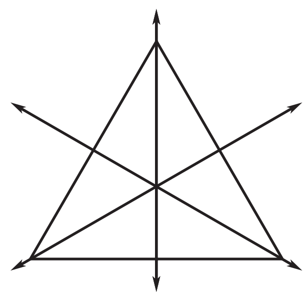
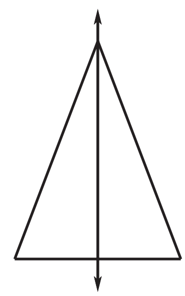
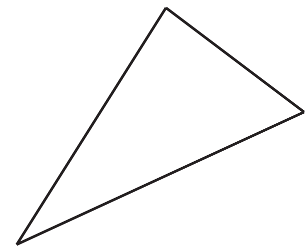
SOLUTION







a. Equilateral triangles have three lines of symmetry.

b. Isosceles triangles have one line of symmetry.

c. Scalene triangles do not have any lines of symmetry.

Exercises for Example 2

Find the number of lines of symmetry for the figure described.

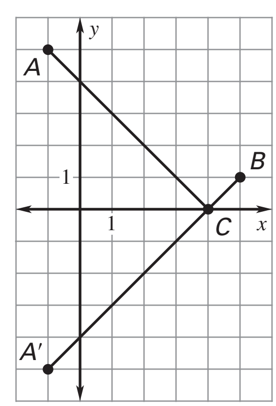
9. Rectangle

10. Kite

EXAMPLE 3 *Finding a Minimum Distance*

Find point C on the x-axis so $AC + BC$ is a minimum where A is $(-1, 5)$ and B is $(5, 1)$.

SOLUTION



Reflect A in the x-axis to obtain $A'(-1, -5)$. Then, draw $\overline{A'B}$. Label the point at which this segment intersects the x-axis as C. Because $\overline{A'B}$ represents the shortest distance between A' and B, and $AC = A'C$, you can conclude that at point C a minimum length is obtained. Next, to find the coordinates of C, find an equation for $\overline{A'B}$. Slope of $\overline{A'B} = \dfrac{1-(-5)}{5-(-1)} = \dfrac{6}{6} = 1$

Then use this slope and$A'(-1, -5)$ in $y - y_o = m(x - x_o)$ to get $y + 5 = x + 1$ or $y = x - 4$. Because C is on the x-axis, $y = 0$, so $x = 4$. Therefore, C is $(4, 0)$.

Exercises for Example 3

In Exercises 11–13, find point *C* on the *x*-axis so *AC* + *CB* is a minimum.

11. $A(-1, -2)$, $B(8, -4)$

12. $A(1, 4)$, $B(8, 3)$

13. $A(-1.5, 6)$, $B(6, 9)$