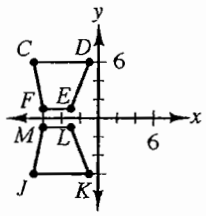
6-21. Imagine that Rowan reflected quadrilateral *CDEF* from problem 6-20 across the *x*-axis instead. What do you think would happen to the coordinates in that case?

a. First visualize how the quadrilateral will reflect across the *x*-axis.

b. Set up a four-quadrant coordinate graph on graph paper and plot quadrilateral *CDEF* from problem 6-19.



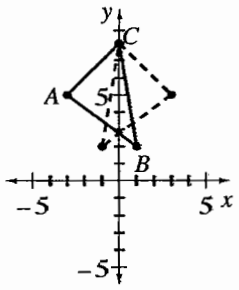
c. Reflect quadrilateral *CDEF* across the *x*-axis to get quadrilateral *JKLM*.

d. Compare the coordinates of point *C* with point *J*, point *D* with point *K*, point *E* with point *L*, and point *F* with point *M*. What do you notice? How can you use multiplication to describe this change?

6-22. In problem 6-20, Rowan noticed that multiplying the *x*-coordinates by –1 reflects the shape across the *y*-axis.

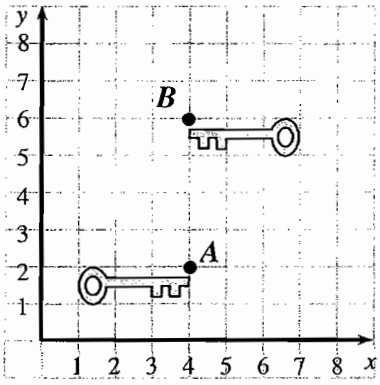
a. Test this strategy on a triangle formed by the points $A(-3,5)$, $B(1,2)$, and $C(0,8)$. Before you graph, multiply each *x*-coordinate by –1. What are the new points

b. Graph your original and new triangle on a new set of axes. Did your triangle get reflected across the *y*-axis?



6-23. In the last three lessons, you have investigated rigid transformations: reflections, rotations, and translations. What happens to a shape when you perform a rigid transformation? Do the side lengths or angles in the figure change? Do the relationships between the lines (parallel or perpendicular) change? Why do you think reflections, rotations, and translations are called rigid transformations?

6-24. Stella used three steps to move the key on the graph at right from A to B. On your graph paper, draw the key at A. (A triangle can be used to represent the key.) Then follow the steps Stella wrote below. What was her last move?

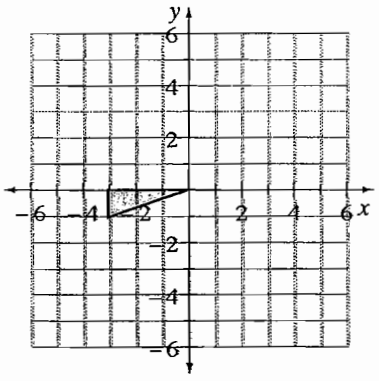


1. *Slide the key to the right 3 units and up 6 units.*

2. *Reflect the key across the line $x = 4$.*

3. *???*

6-25. **Additional Challenge:** Do you think there is a way to use translations to create a reflection or a rotation? Or can reflections be used to move a shape in the same way as a rotation? To investigate these questions, begin by making a graph like the one below. Then complete parts (a) through (c).



a. Reflect (flip) the triangle across the x-axis. Then reflect the new triangle over the y-axis.

b. Rotate the original triangle 180° around the point $(0,0)$. What do you notice?

c. Is there a way to use more than one reflection step so that at the end, the triangle looks like it was translated (slid)? If so, describe the combination of moves you would use.

6-26. LEARNING LOG

In your Learning Log, describe what the terms *translate*, *rotate*, and *reflect* mean in your own words. For each term, demonstrate the movement with a diagram. Title this entry "Rigid Transformations" and include today's date.