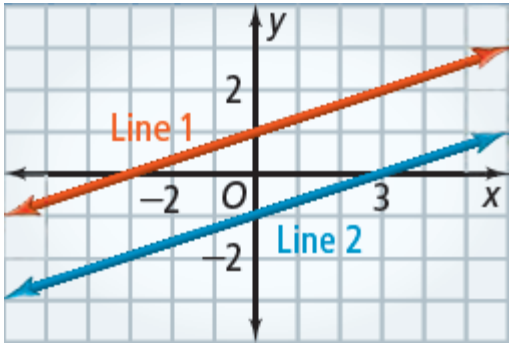
Name _____

5-8 Graphing Absolute Value Functions

OBJECTIVE: **I can graph an absolute value function to translate the graph of an absolute value function**

Warm-Up

Write the equations of Line 1 and Line 2. How can you transform the equation of Line 1 into the equation of Line 2? How can you slide Line 1 in the coordinate plane so that it becomes Line 2? Explain.

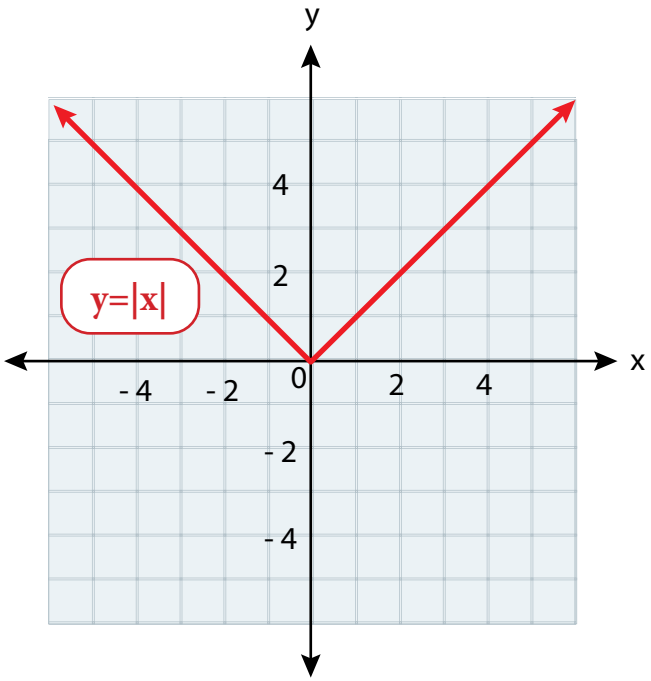


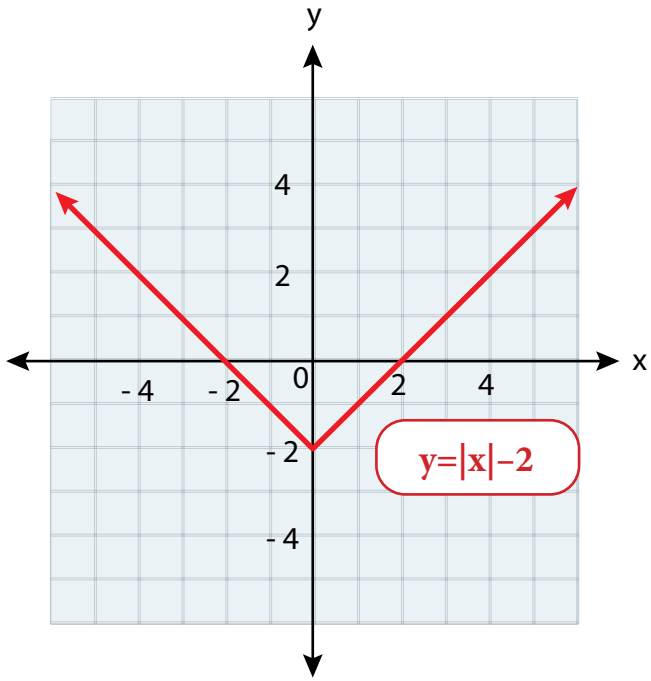
Essential Understanding

Essential Understanding You can quickly graph absolute value equations by shifting the graph of $y = |x|$.

Example #1 Describing Translations

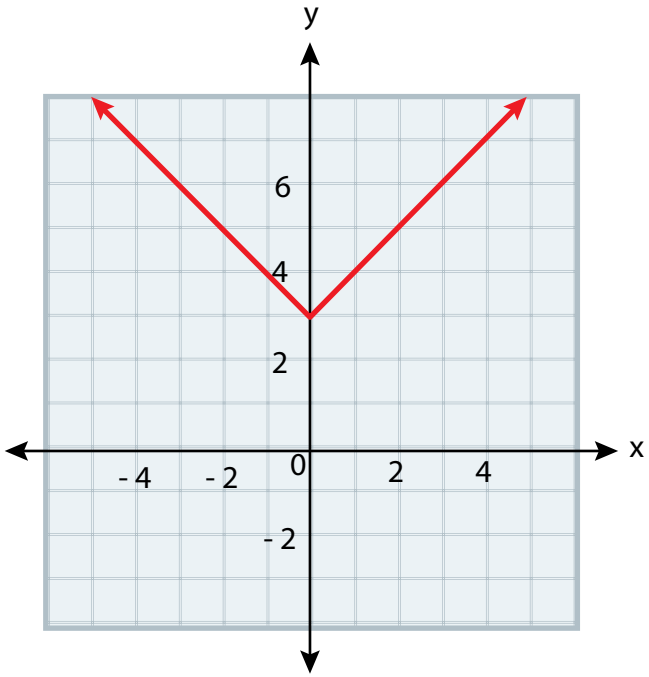
Below are the graphs of $y = |x|$ and $y = |x| - 2$. How are the graphs related?





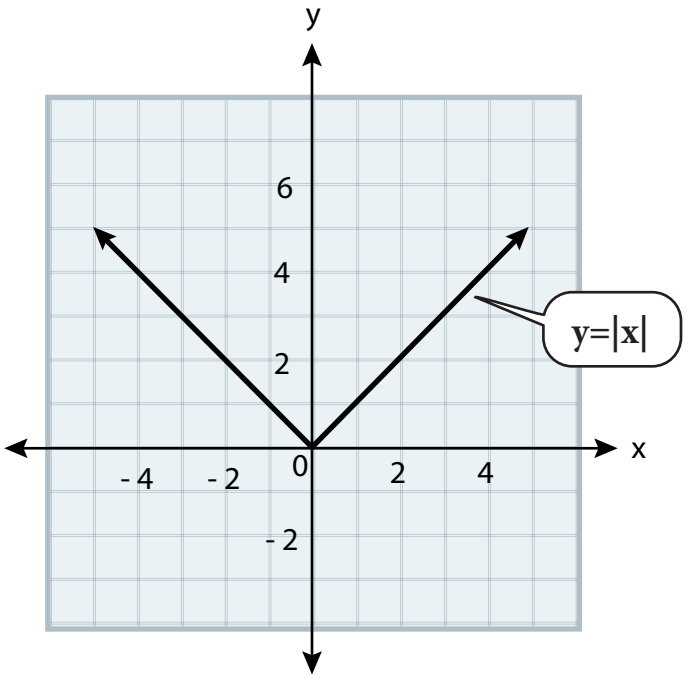
Your Turn to Work it Out

1. How is the graph at the right related to the graph of $y = |x|$?



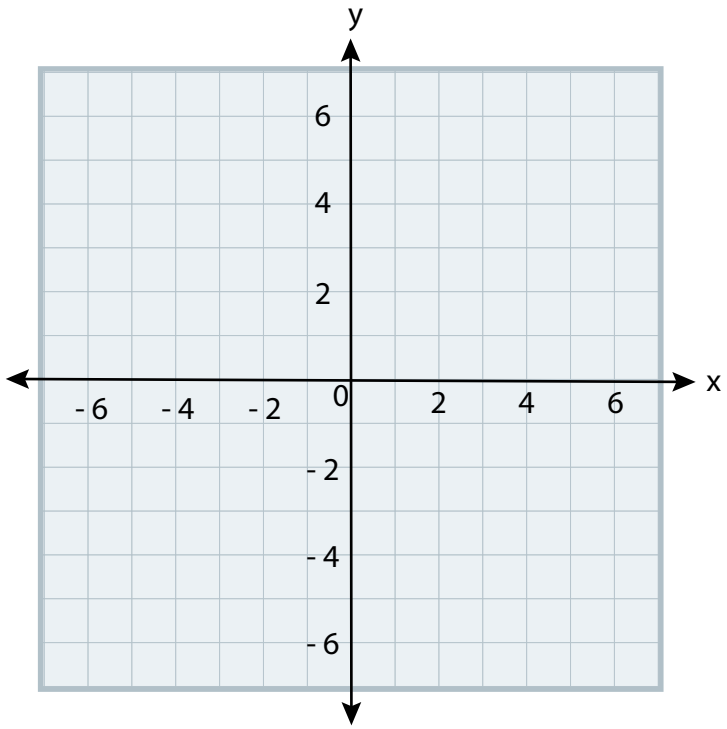
Example #2 Graphing a Vertical Translation

What is the graph of $y = |x| + 2$?



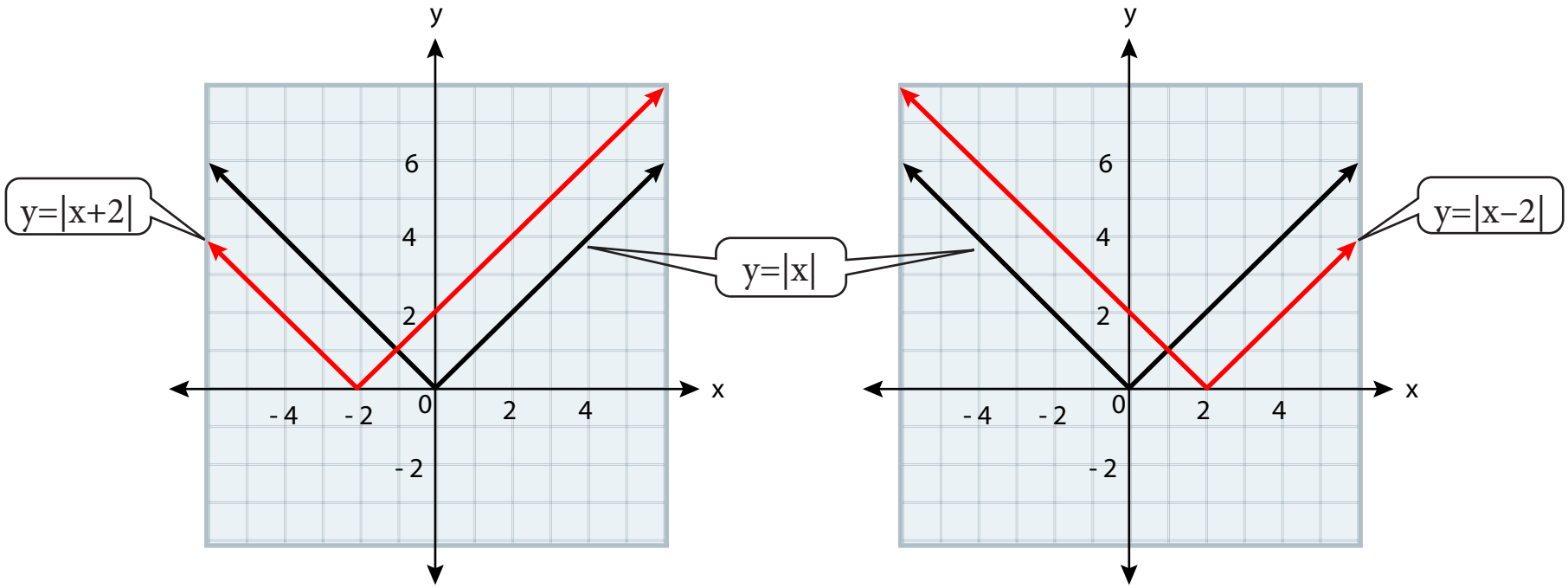
Your Turn to Work it Out

2. What is the graph of $y = |x| - 4$?



Concept Understanding

The graphs below show what happens when you graph $y = |x + 2|$ and $y = |x - 2|$.

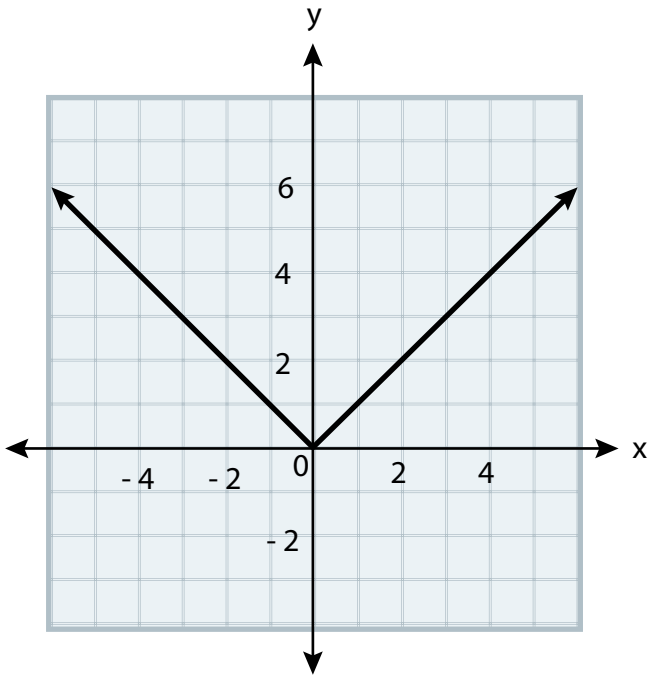


For a positive number h, $y = |x + h|$ translates the graph of $y = |x|$ left h units, and $y = |x - h|$ translates the graph of $y = |x|$ right h units.

Example

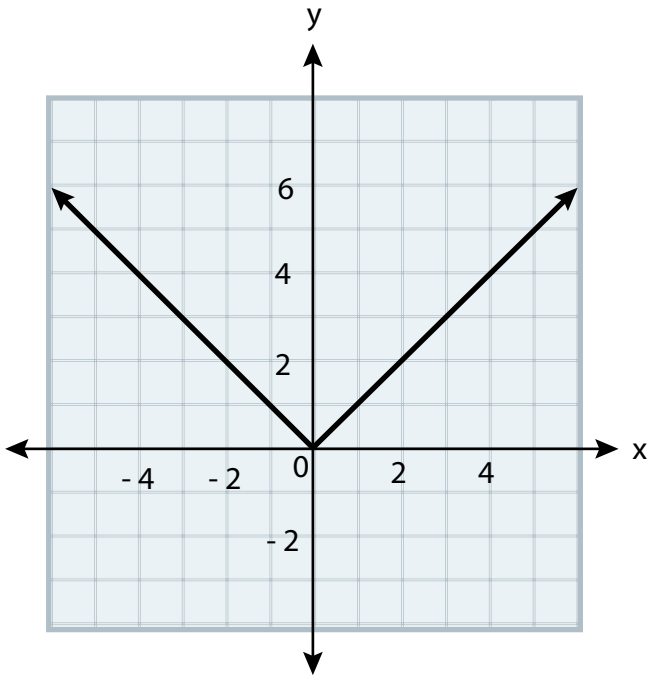
#3 Graphing a Horizontal Translation

What is the graph of $y = |x + 5|$?



Your Turn to Work it Out

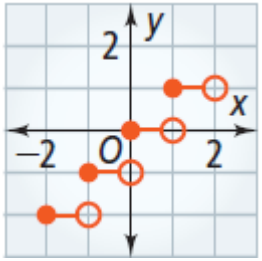
3. What is the graph of $y = |x - 5|$?



Concept Understanding

The absolute value function is an example of a piecewise function. A piecewise function is a function that has different rules for different parts of its domain. For example, when $x \geq 0$, $|x| = x$. When $x < 0$, $|x| = -x$.

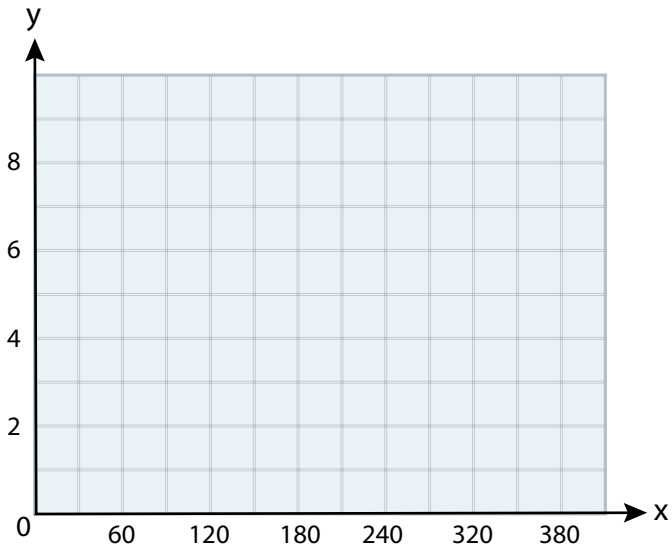
Another example of a piecewise function is a step function. A step function is a function that pairs every number in an interval with a single value.



The graph of a step function can look like the steps of a staircase.
Each piece of the graph is a horizontal s segment that is missing its right endpoint, indicated by an open circle.

Example #4 Graphing a Step Function

Transportation A school will charter buses so that the student body can attend a football game. Each bus holds a maximum of 60 students. Make a graph that models the relationship between the number of students x that go to the game by bus and the number of buses y that are needed.



Your Turn to Work it Out

4. Make a graph that models the relationship between the number of students x that go to the game by bus and the number of buses y that are needed if each bus holds a maximum of 50 students.