EXAMPLE 2 Graph $g(x) = a|x|$

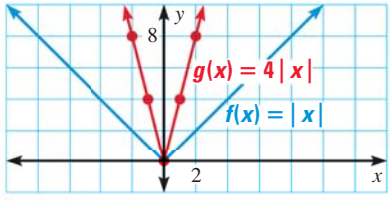
Graph each function. Compare the graph with the graph of $f(x) = |x|$.

a. $g(x) = 4|x|$

STEP 1 **Make** a table of values.

x	−2	−1	0	1	2
$g(x)$	8	4	0	4	8

STEP 2 **Graph** the function.



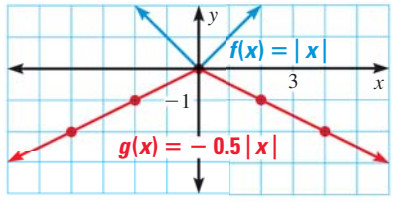
STEP 3 **Compare** the graphs of g and f. The graph of $g(x) = 4|x|$ opens up and is narrower than the graph of $f(x) = |x|$.

b. $g(x) = -0.5|x|$

STEP 1 **Make** a table of values.

x	−4	−2	0	2	4
$g(x)$	−2	−1	0	−1	−2

STEP 2 **Graph** the function.



STEP 3 **Compare** the graphs of g and f. The graph of $g(x) = -0.5|x|$ opens down and is wider than the graph of $f(x) = |x|$.

APPLY TRANSFORMATIONS

The graph in part (a) of Example 2 is a vertical stretch of the graph of $f(x) = |x|$. The graph in part (b) is a vertical shrink with a reflection in the x-axis of the graph of $f(x) = |x|$.

KEY CONCEPT *For Your Notebook*

Comparing Graphs of Absolute Value Functions with the Graph of $f(x) = |x|$

$g(x) = |x - h|$

If $h > 0$, the graph of g is $|h|$ units to the right of the graph of $f(x) = |x|$.

If $h < 0$, the graph of g is $|h|$ units to the left of the graph of $f(x) = |x|$.

$g(x) = |x| + k$

If $k > 0$, the graph of g is $|k|$ units above the graph of $f(x) = |x|$.

If $k < 0$, the graph of g is $|k|$ units below the graph of $f(x) = |x|$.

$g(x) = a|x|$

If $|a| > 1$, the graph of g is narrower than the graph of $f(x) = |x|$. If $0 < |a| < 1$, the graph of g is wider.

If $a > 0$, the graph of g opens up. If $a < 0$, the graph opens down.

PRACTICE

EXAMPLES 1 and 2 on pp. 396–397 for Exs. 1–6

Graph the function. *Compare* the graph with the graph of $f(x) = |x|$.

1. $g(x) = |x + 3|$
2. $g(x) = |x| + 5$
3. $g(x) = |x| - 7$
4. $g(x) = 2|x|$
5. $g(x) = 0.6|x|$
6. $g(x) = -3|x|$

7. Make a table of values for $g(x) = 2|x - 3| + 4$. Use the following values for x: 1, 2, 3, 4, 5. Then graph the function and compare the graph with the graph of $f(x) = |x|$.