

2.7 Exploring Transformations ★ TEKS a.5, a.6, 2A.4.A, 2A.4.B

MATERIALS • graphing calculator

QUESTION How are the equation and the graph of an absolute value function related?

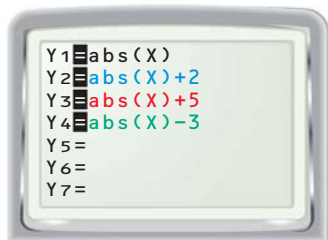
You can investigate families of *absolute value functions* with equations of the form $y = a|x - h| + k$ by varying the values of a , h , and k and then graphing. The resulting graphs are *transformations* of the graph of the parent function $y = |x|$.

EXAMPLE 1 Graph $y = |x| + k$

Graph and describe the family of absolute value functions of the form $y = |x| + k$.

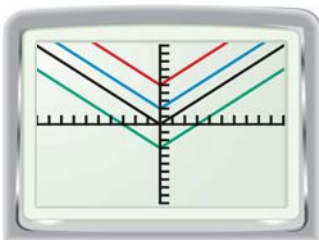
STEP 1 Vary the value of k

Enter $y = |x|$, $y = |x| + 2$,
 $y = |x| + 5$, and $y = |x| - 3$.



STEP 2 Display graphs

Graph the equations in the standard viewing window by pressing **ZOOM 6**.



STEP 3 Compare graphs

Describe how the family of graphs of $y = |x| + k$ is related to the graph of $y = |x|$.

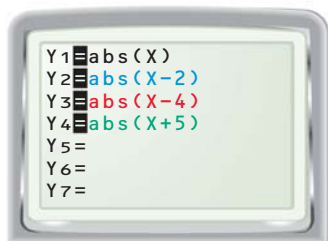
The graphs of absolute value functions of the form $y = |x| + k$ have the same shape as the graph of $y = |x|$, but are shifted k units vertically.

EXAMPLE 2 Graph $y = |x - h|$

Graph and describe the family of absolute value functions of the form $y = |x - h|$.

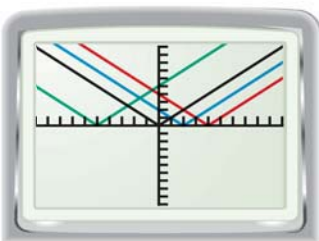
STEP 1 Vary the value of h

Enter $y = |x|$, $y = |x - 2|$,
 $y = |x - 4|$, and $y = |x + 5|$.



STEP 2 Display graphs

Graph the equations in the standard viewing window by pressing **ZOOM 6**.



STEP 3 Compare graphs

Describe how the family of graphs of $y = |x - h|$ is related to the graph of $y = |x|$.

The graphs of absolute value functions of the form $y = |x - h|$ have the same shape as the graph of $y = |x|$, but are shifted h units horizontally.