

Name _____ Date _____ Period _____

Graphing $f(x) = |x|$ and Key Attributes

TEACHER KEY | Algebra II | Unit 2 | Day 1 | TEK A2.2.A

Objective: I can graph $f(x) = |x|$ from a table and identify its domain, range, intercepts, symmetry, and minimum value.

Vocabulary

Absolute value: the distance a number is from **0**, always **non-negative** (≥ 0).

Vertex: the point where the two straight-line pieces of $f(x) = |x|$ meet: **(0, 0)**.

Symmetric about the y-axis: the left and right halves of the graph are **mirror images**.

KEY IDEA

$f(x) = |x|$ graphs as a V-shape with its corner (the vertex) at **(0, 0)**.

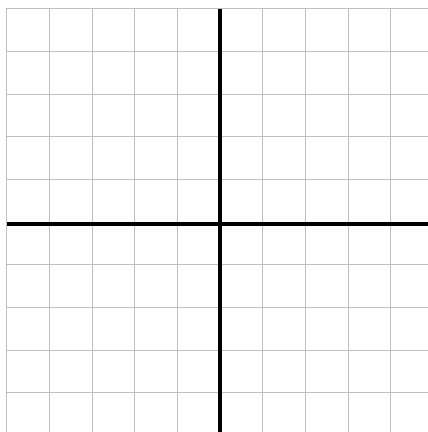
Domain: all real numbers **Range:** **[0, ∞)**

Symmetric about the y-axis, minimum value **0**, no maximum.

Let's Work Through It

Example 1 — Complete the table for $f(x) = |x|$, then graph the seven points. Each square is 1 unit.

x	-3	-2	-1	0	1	2	3
f(x)	3	2	1	0	1	2	3



Example 2 — Use your graph to fill in the key attributes.

Domain: **$(-\infty, \infty)$** Range: **$[0, \infty)$**

Vertex: **(0, 0)** Symmetric about: **the y-axis**

Minimum value: **0** Maximum value: **none**

Example 3 — Evaluate each.

$$|-8| = \mathbf{8} \quad |6| = \mathbf{6} \quad |-2.5| = \mathbf{2.5} \quad f(-10) = \mathbf{10}$$

Example 4 — A hiking trail runs both directions from a trailhead at position 0. A hiker's distance from the trailhead is $d(x) = |x|$ miles.

Distance for a hiker at $x = -3.5$: **3.5 miles** at $x = 6$: **6 miles**

Example 5 — Compare $f(x) = |x|$ to the line $y = x$.

Both have domain **all real numbers** and both pass through **(0, 0)**

$f(x) = |x|$ has range **$[0, \infty)$** and minimum **0**

$y = x$ has range **all real numbers** and minimum value **none**

Your Turn

You Try 1 — A different trail also has its trailhead at 0. Find the distance from the trailhead for a hiker at $x = -9$ and a hiker at $x = 7$.

$x = -9$: **9 miles** $x = 7$: **7 miles**

You Try 2 — True or False: the graph of $f(x) = |x|$ is symmetric about the x-axis. Explain in one sentence.
