Algebra 2 2.6 *Algebra 1

Write and graph piecewise defined functions
Write and graph step functions
Write and graph absolute value functions

domain*
range*
piecewise function
step function
    greatest integer function (tricky)
absolute value function*

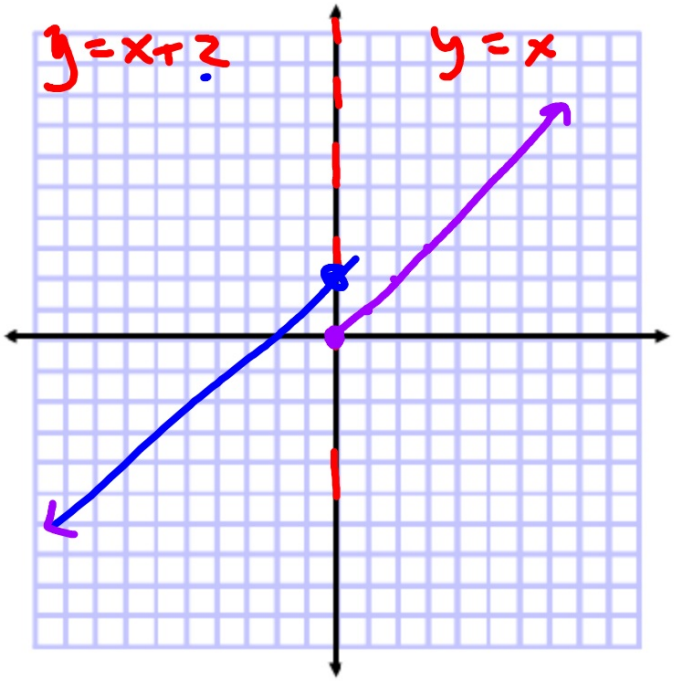
GuidedPractice

1. Graph $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$. Identify the domain and range.

Piecewise

D: ARN

R: ARN



Absolute value: distance from zero (can't be negative)

KeyConcept Parent Function of Absolute Value Functions

Algebra 1

Parent function: $f(x) = |x|$, defined as

$$f(x) = \begin{cases} x \text{ if } x > 0 \\ 0 \text{ if } x = 0 \\ -x \text{ if } x < 0 \end{cases}$$

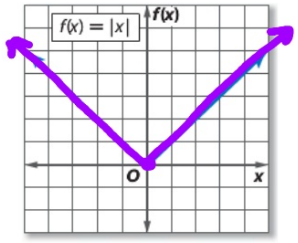
Type of graph: V-shaped

Domain: all real numbers

Range: all nonnegative real numbers

Intercepts: $x = 0$, $f(x) = 0$

Not defined: $f(x) < 0$



D: ∀R

R: $y \geq 2$

$y = |x| + 2$

$-3 \mid |-3| + 2 \mid 5$

$y = -x + 2 \quad x < 0$

$y = x + 2 \quad x \geq 0$

Guided Practice **4A, 4B. See margin.**

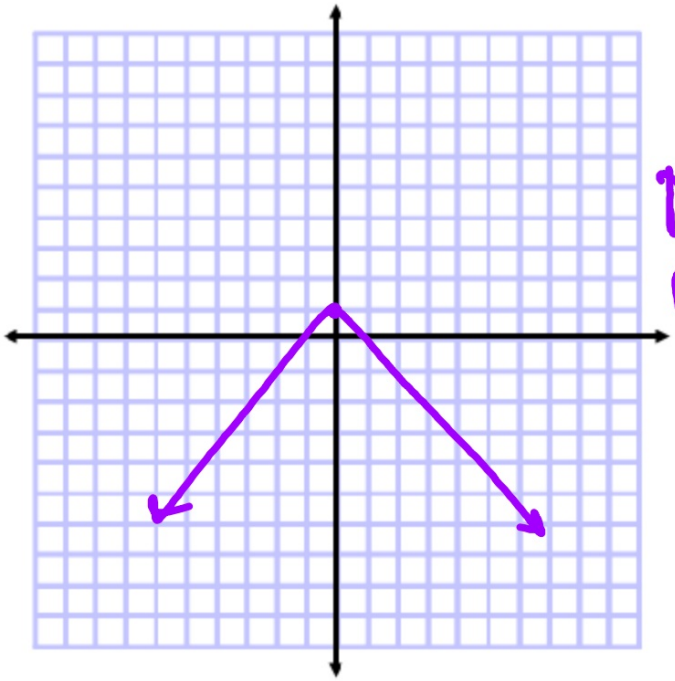
Graph each function. Identify the domain and range.

4A. $f(x) = |x - 2|$

4B. $f(x) = -|x| + 1$

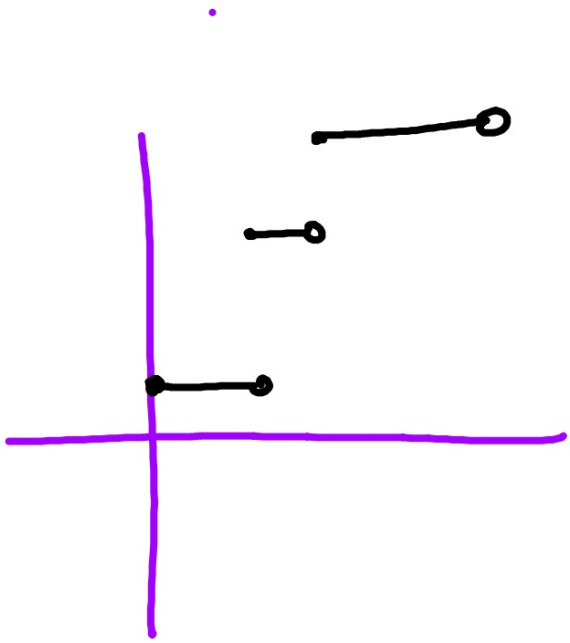
D: ARN

R: $y \geq 0$



D: ARN

R: $y \leq 1$



Step function: (informally, it is a floor function)

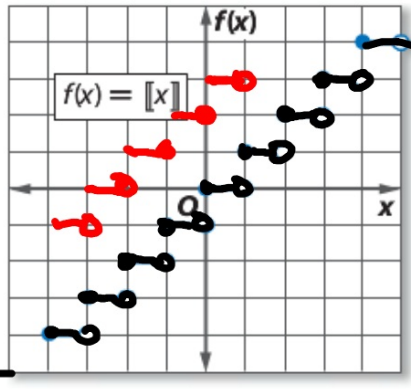
The **greatest integer function**, written $f(x) = [\![x]\!]$, is one kind of step function. The symbol $[\![x]\!]$ means *the greatest integer less than or equal to x*. For example, $[\![3.25]\!] = 3$ and $[\![-4.6]\!] = -5$.

D: ARN

R: integers

$[\![3]\!]$ $[\![4]\!]$

$[\![3.1]\!]$ _



StudyTip

Greatest Integer Function

Notice that the domain of this step function is all real numbers and the range is all integers.

→ Recognize as a specific subtype of step function G.I.F.

Be able to tell domain and range--that's all

Step $f(x) = [\![x]\!] + 3$

2. LWB (prac.)

3. $f(x) = [\![x]\!]$

4. $f(x) = |x-2|$