

Algebra 2 2.6

*Algebra 1

Write and graph piecewise defined functions

Write and graph step functions

Write and graph absolute value functions

domain* $\mathbb{R}$ $\mathbb{N}$

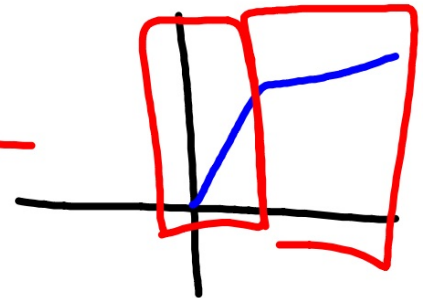
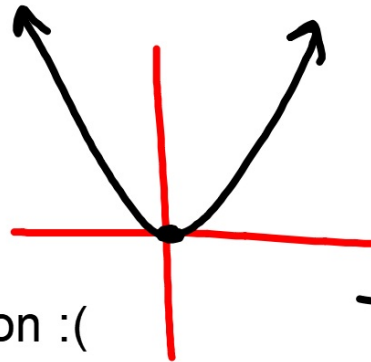
range* $y \geq 0$

2 + 2 = 4
piecewise function

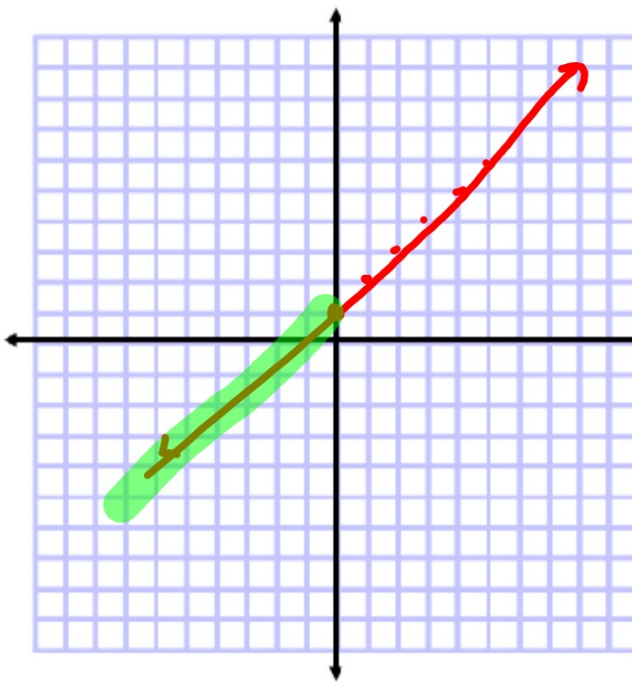
step function

greatest integer function :(

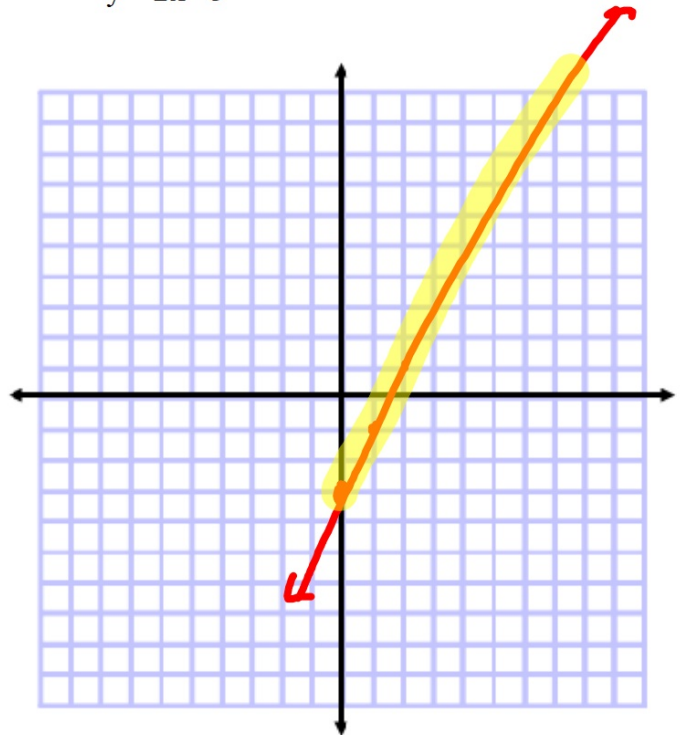
absolute value function



Graph $y = x + 1$



$y = 2x - 3$



Cut and paste

Graph $y = x + 1$ if x is negative

Graph $y = 2x - 3$ if x is positive

$$f(x) = \begin{cases} x+1 & \text{if } x < 0 \\ 2x-3 & \text{if } x > 0 \end{cases}$$

Piecewise defined function (*Frankenfunction*)
note where the changeover occurs.

1. changeover
2. right
3. left
4. ○ vs. ●
if $x < -1$

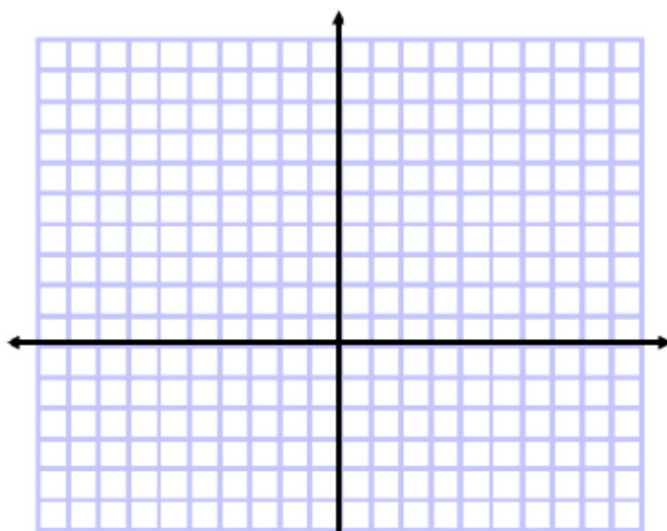
Graph this equation over its domain
(domain)

$$f(x) = x - 2$$

Graph the next equation over its domain
(domain)

$$f(x) = x + 3 \text{ if } x \geq -1$$

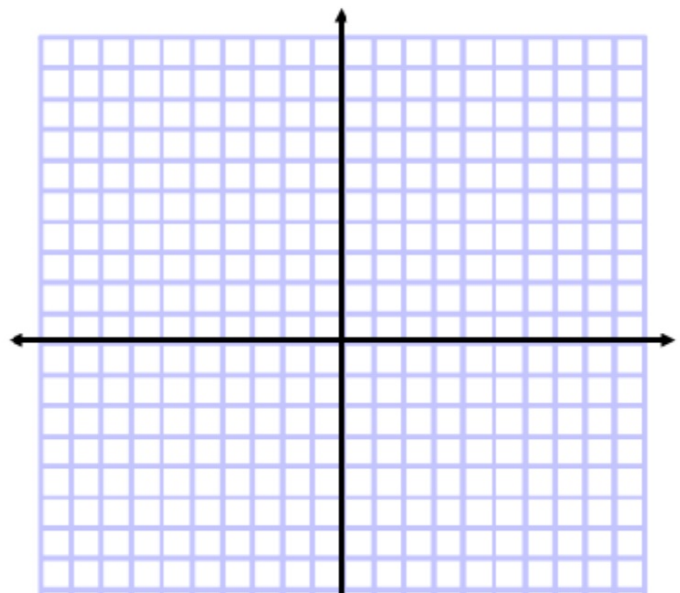
Maybe the two equations "join up", maybe not. Doesn't matter.



1. Note where the changeover is.
2. identify domain
3. graph the entire function
4. erase parts that don't apply
5. answer D & R (if asked)

Example 1 Piecewise-Defined Function

Graph $f(x) = \begin{cases} x - 2 & \text{if } x < -1 \\ x + 3 & \text{if } x \geq -1 \end{cases}$. Identify the domain and range.



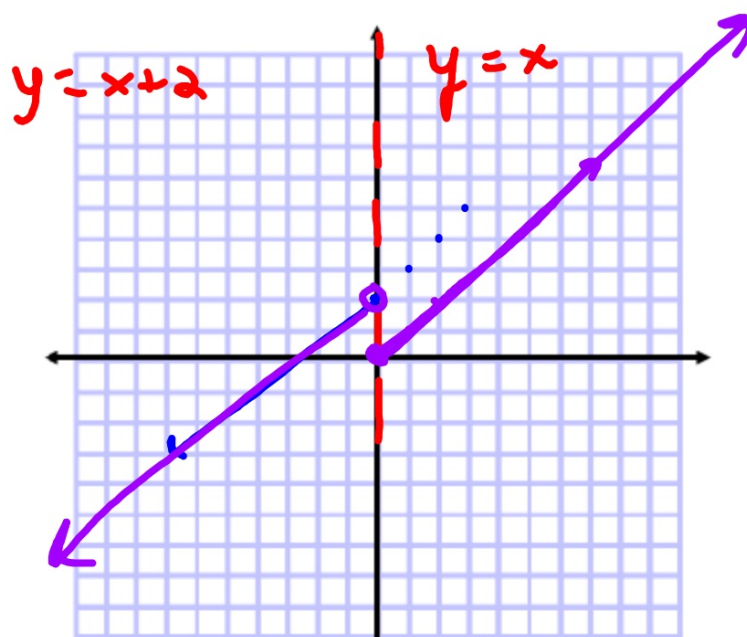
Graphing calculator interface showing a coordinate plane with a grid. The x-axis is labeled with a small 'x' and the y-axis with a small 'y'. A small blue checkmark is visible near the origin.

1. identify domain
2. graph the entire function
3. erase parts that don't apply
4. answer D & R (if asked)

Guided Practice

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.

D ∞
R ∞

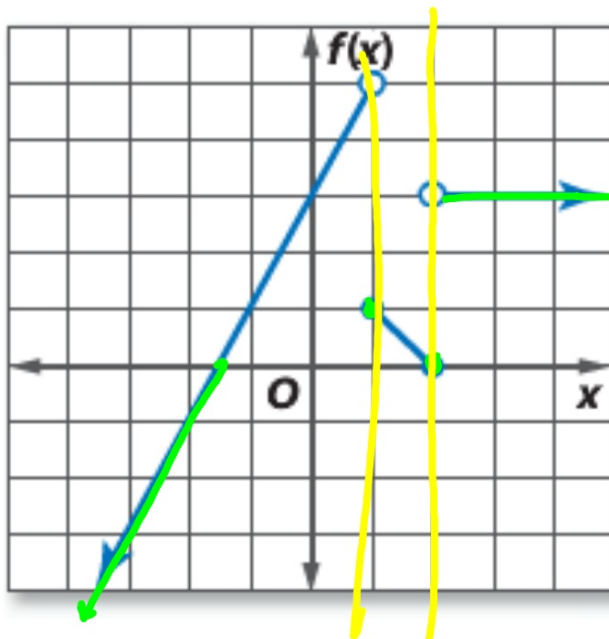


Example 2 Write a Piecewise-Defined Function

Write the piecewise-defined function shown in the graph.

How many pieces?

1. identify domain
2. write the equation
3. rinse & repeat

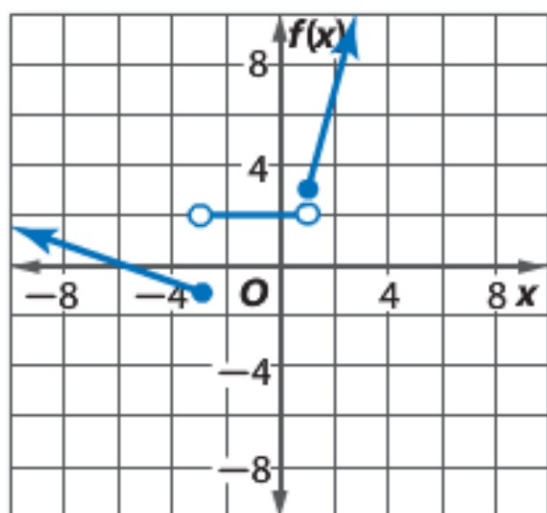


$$f(x) = \begin{cases} y = 2x + 3 & \text{if } x < 1 \\ y = 3 & \text{if } 1 \leq x \leq 2 \\ y = -x + 3 & \text{if } x > 2 \end{cases}$$
$$f(x) = \begin{cases} 2x + 3 & x < 1 \\ 3 & 1 \leq x \leq 2 \\ -x + 3 & x > 2 \end{cases}$$

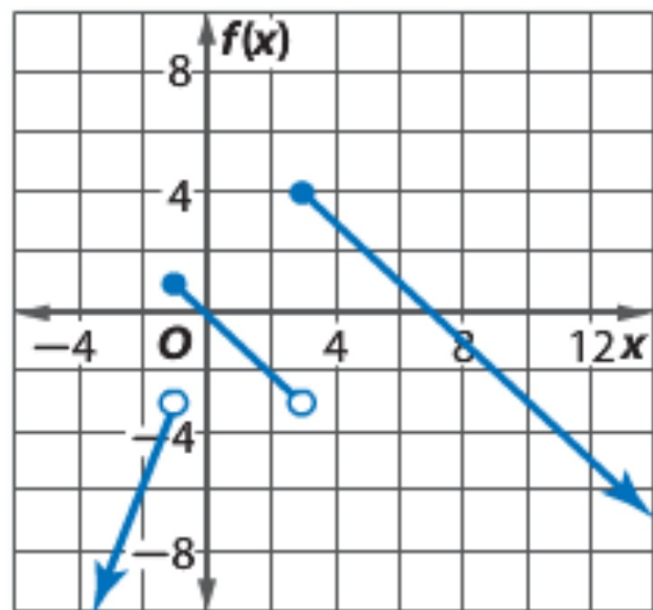
Guided Practice

Write the piecewise-defined function

2A.

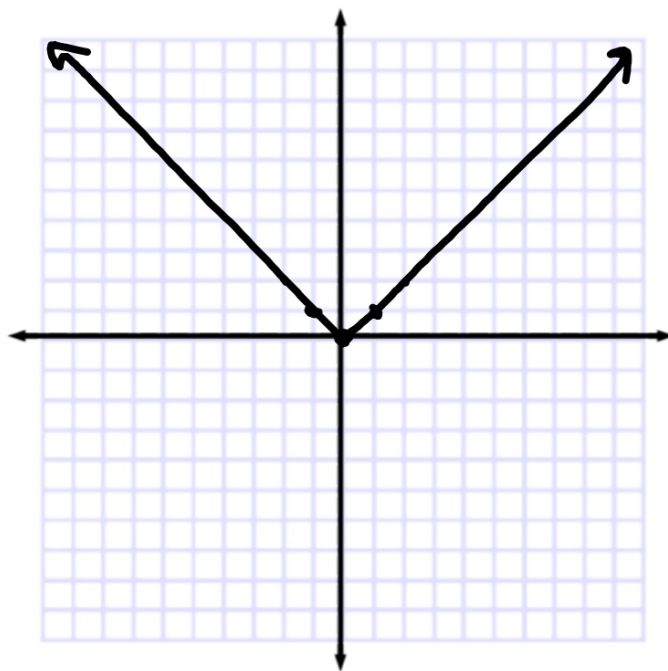


2B.



$D \subset \mathbb{R} \cup \mathbb{N}$
 $R: y \geq 0$
 graph $y = |x|$

x	$ x $
0	0
1	1
2	2
-1	1
-2	2



KeyConcept Parent Function of Absolute Value Functions

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:

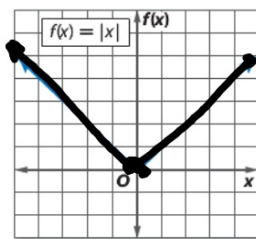
all nonnegative real numbers

Intercepts:

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

Not defined:

$f(x) < 0$



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

Graph each function. Identify the domain and range.

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

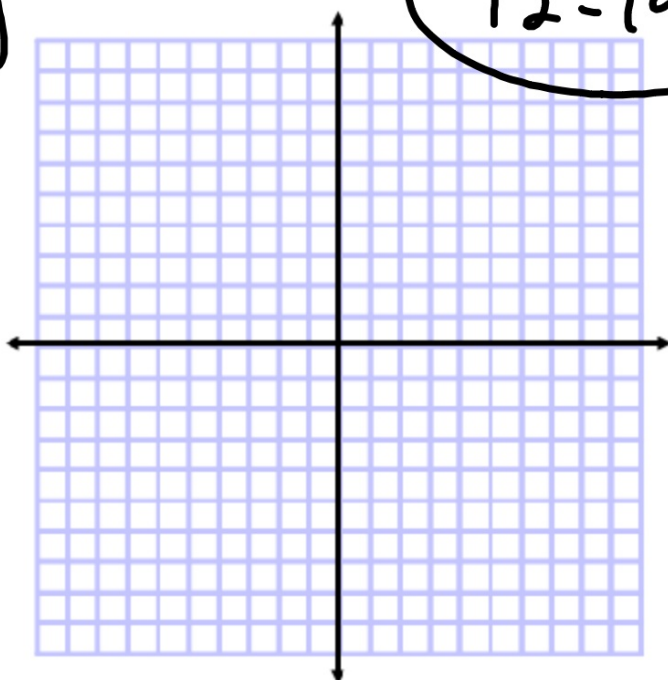
4B. $f(x) = -|x| + 1$

Parent graph

Slope?

Where does it turn around?

skip $[x]$



1-5
12-19 all

Example 4 Absolute Value Functions

Graph $f(x) = |2x| - 4$. Identify the domain and range.

Parent graph?

Slope?

Where does it turn around?

