Algebra 2 2.6 *Algebra 1

Write and graph piecewise defined functions

Write and graph step functions

Write and graph absolute value functions

domain* x

range* y

piecewise function

step function

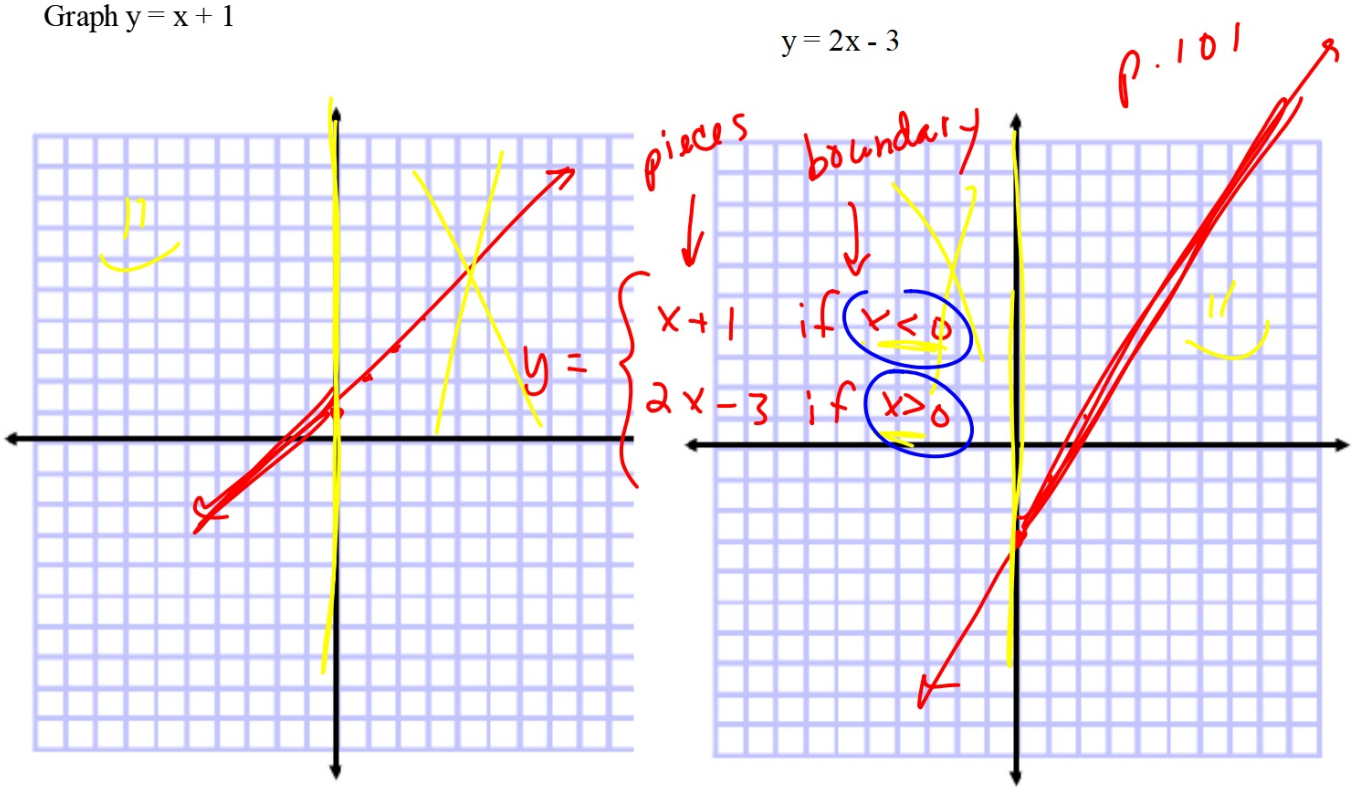
greatest integer function :(

absolute value function

Piecewise

Graph y = x + 1

y = 2x - 3



Cut and paste

$y = \frac{1}{2}x - 3$

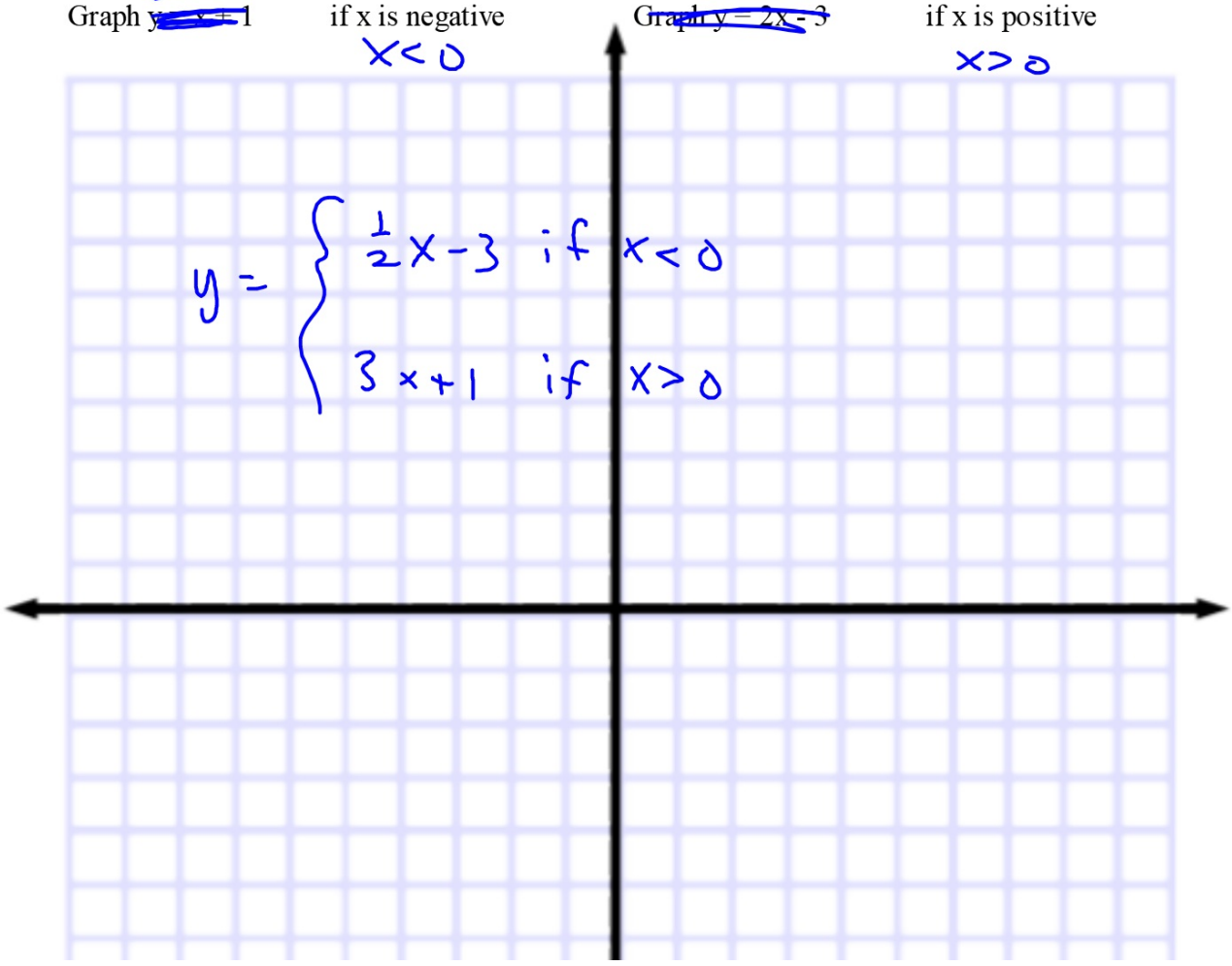
Graph ~~$y = x + 1$~~ if x is negative

$x < 0$

$y = 3x + 1$

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

$x > 0$



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

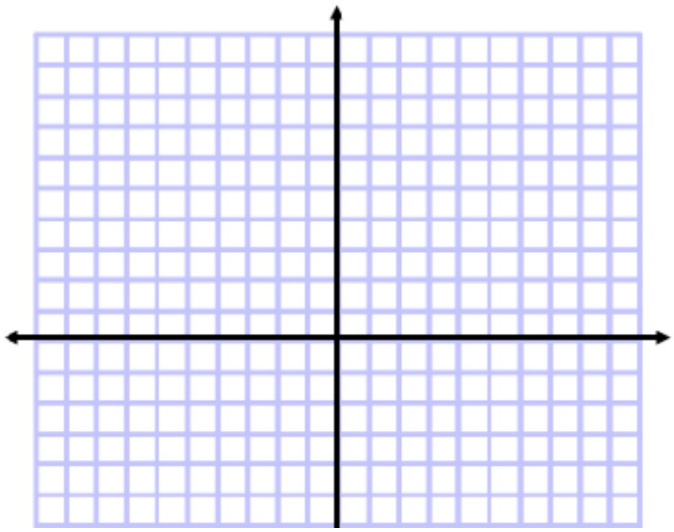
Graph this equation over its domain (domain) $f(x) = x-2$ if $x<-1$

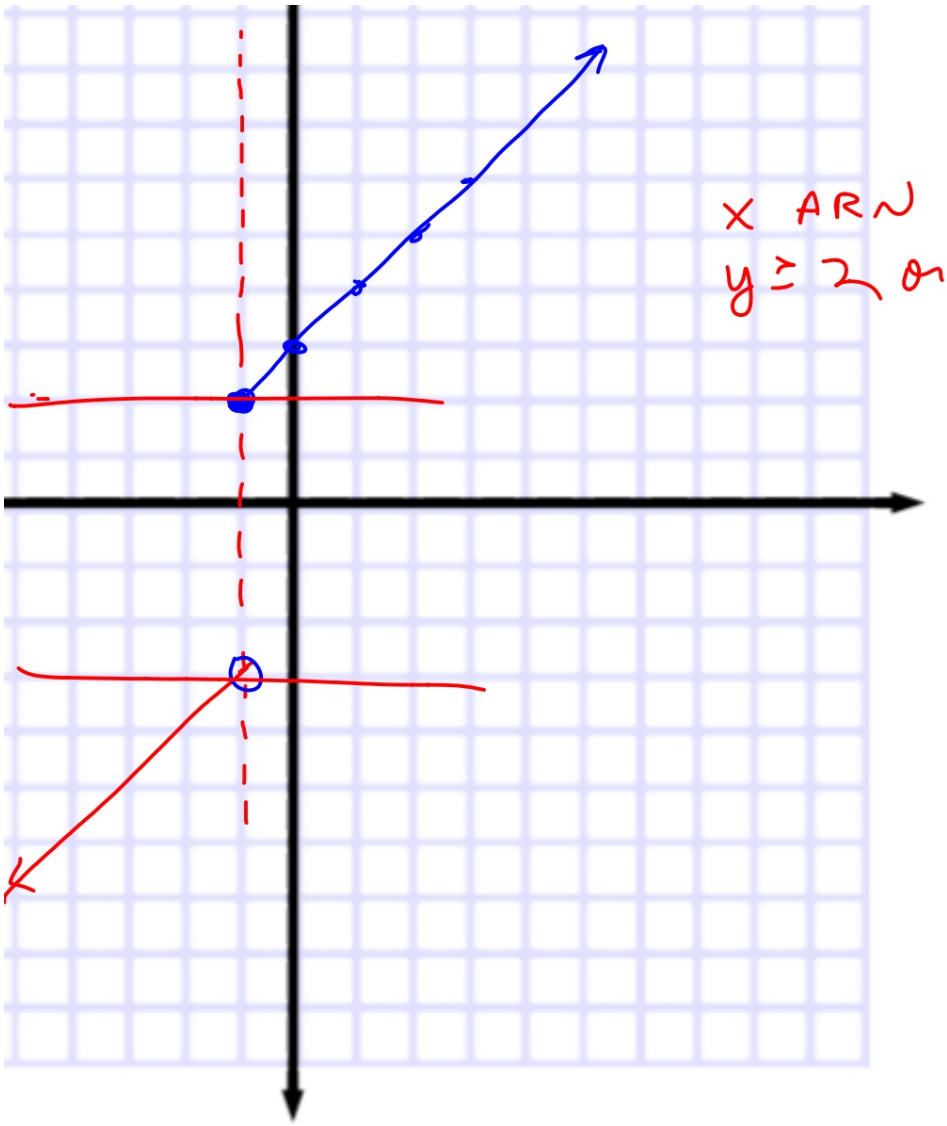
$y = x-2$

Graph the next equation over its domain (domain) $f(x) = x + 3$ if $x \geq -1$

$y = x+3$

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





$x \in \mathbb{R}$

$y \geq 2$ or $y \leq -3$

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)

2. Graph keep/erase.

1. Changeover

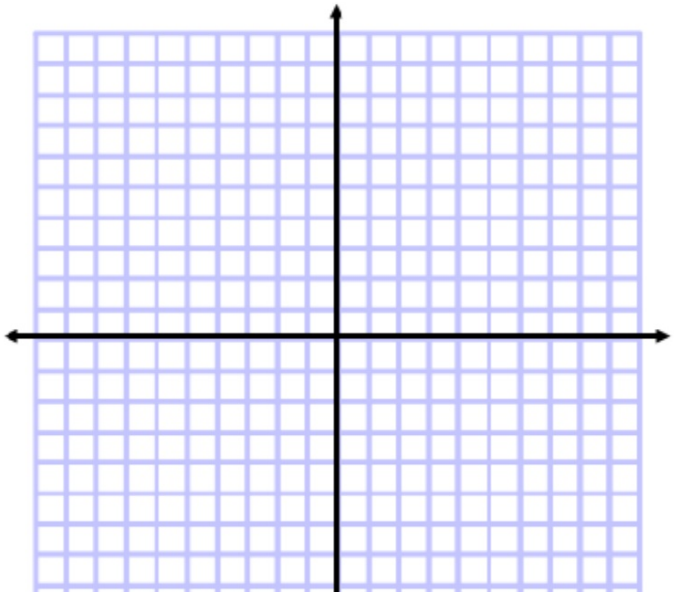
Example 1 Piecewise-Defined Function

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.

3. graph keep/erase

$y = x - 2 \quad x < -1$

$y = x + 3 \quad x \geq -1$



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

GuidedPractice

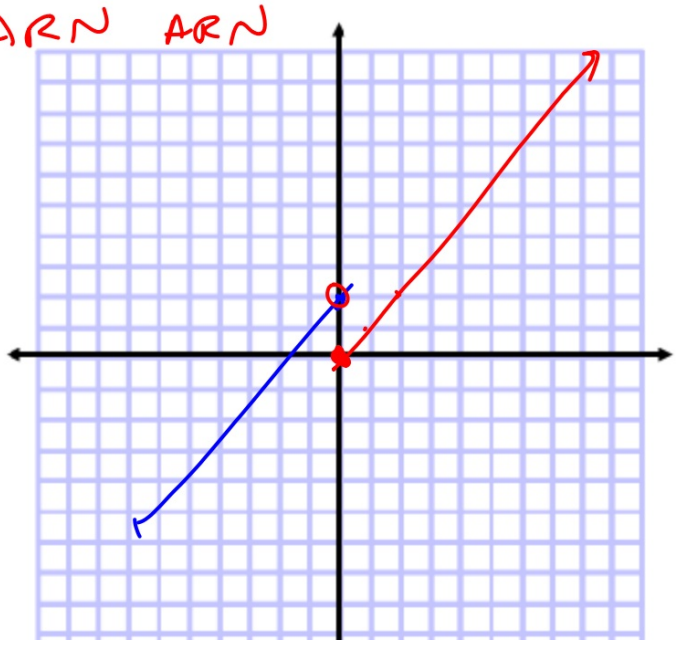
1. Graph $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$. Identify the domain and range.

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

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

x y

ARN ARN

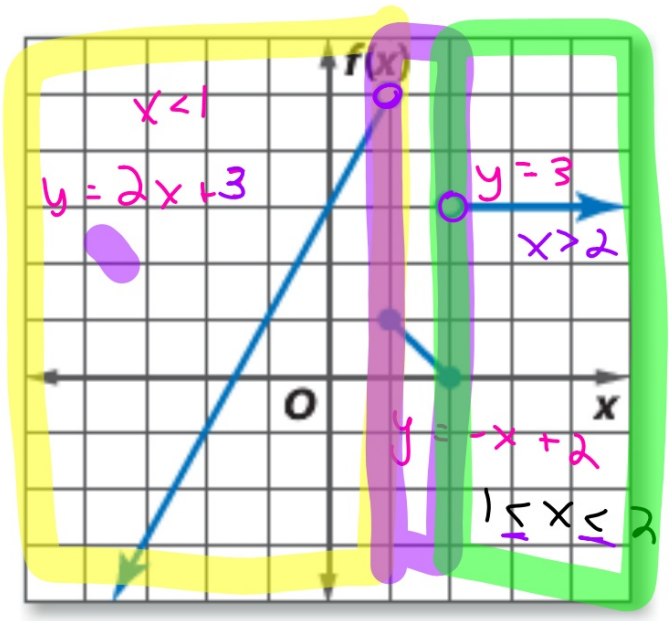


Example 2 Write a Piecewise-Defined Function

Write the piecewise-defined function shown in the graph.

How many pieces?

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

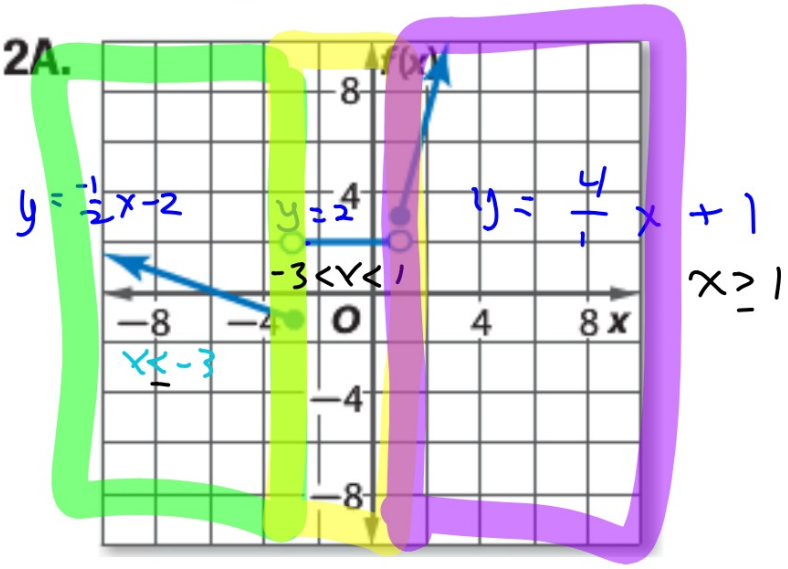


$$f(x)\begin{cases} 2x+3 & \text{if } x<1 \\ -x+2 & \text{if } 1\le x\le 2 \\ 3 & \text{if } x>2 \end{cases}$$

GuidedPractice

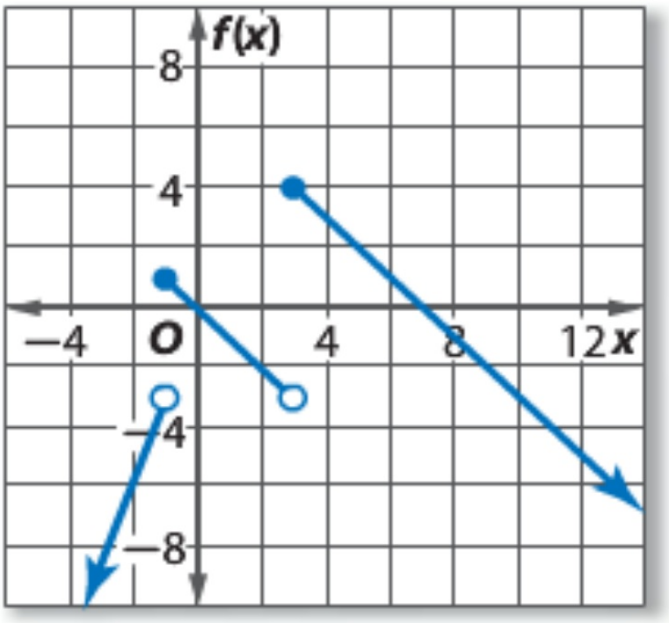
Write the piecewise-defined function

2A.

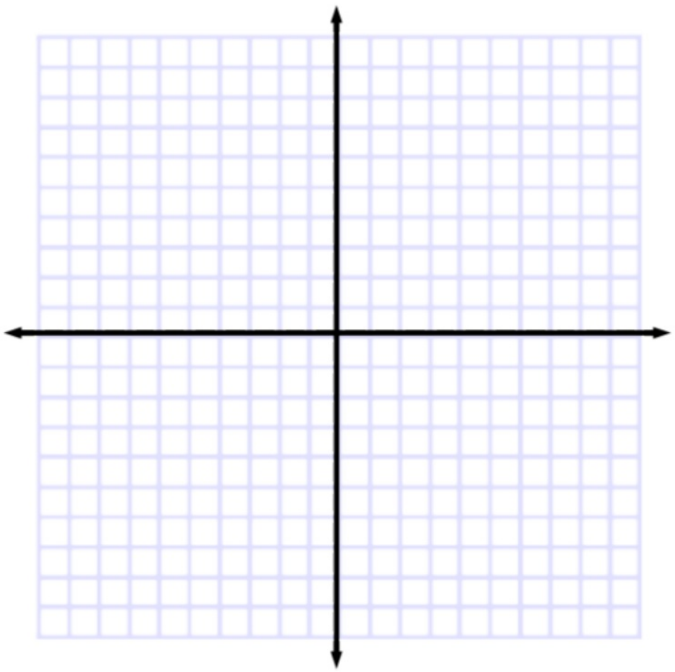


$$f(x)\begin{cases}\frac{1}{2}x-2 & x\le -3\\ 2 & -3<x<1\\ 4x+1 & x\ge 1\end{cases}$$

2B.



graph y=|x|



KeyConcept Parent Function of Absolute Value Functions

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

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

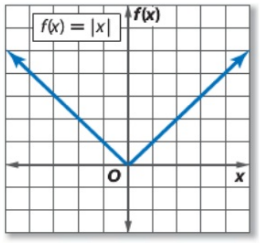
Type of graph: V-shaped

Domain: all real numbers

Range: all nonnegative real numbers

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

Not defined: $f(x) < 0$



GuidedPractice **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?

Step

abs