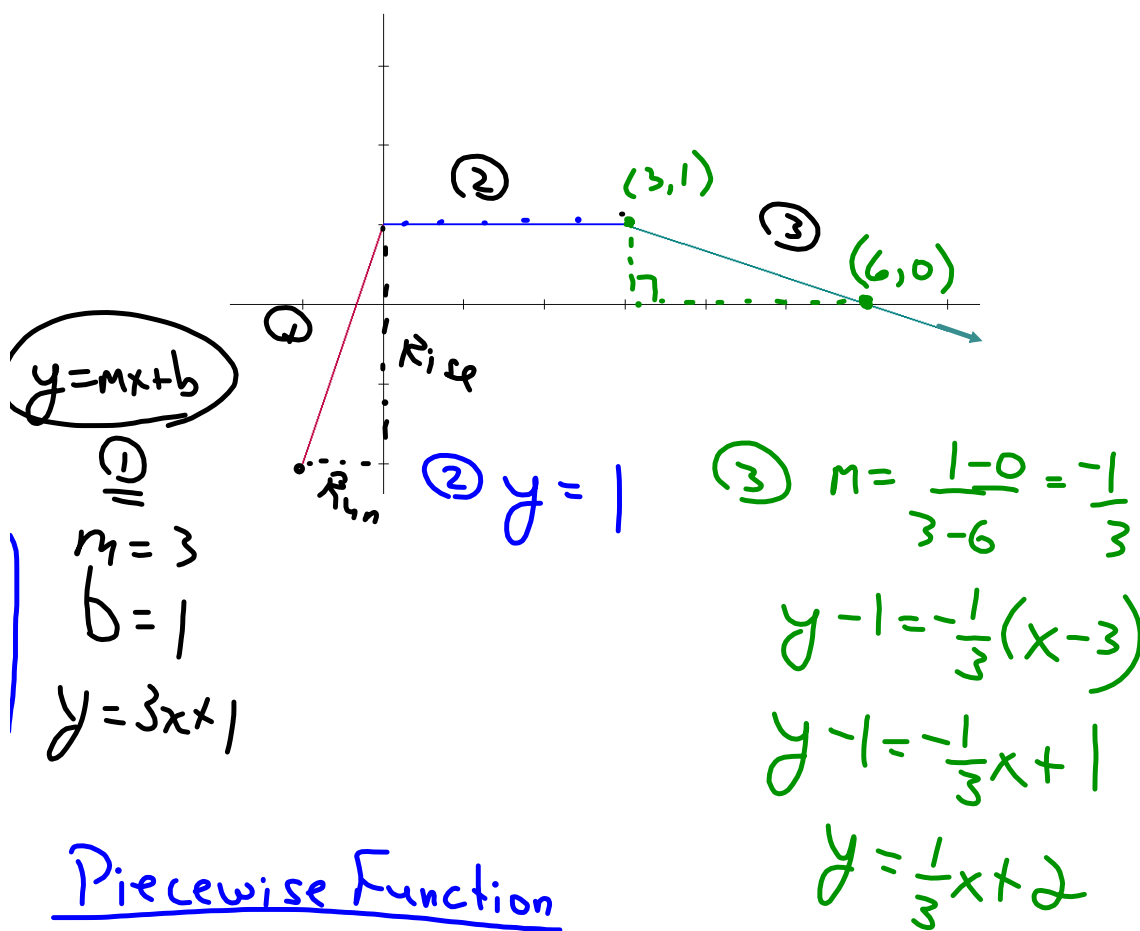# Quick Review of Functions

- What is a function?
- Domain and Range-----> Remember to look at restrictions on functions
- Function Notation
- How to check for a function (Table and Graph)

Let's head into a new direction...

What is the equation of the function that would describe the graph shown below???

$(3,1)$

$(6,0)$

$y = mx + b$

①   Rise, Run

$m = 3$

$b = 1$

$y = 3x + 1$

② $y = 1$

③ $m = \dfrac{1 - 0}{3 - 6} = \dfrac{-1}{3}$

$y - 1 = -\dfrac{1}{3}(x - 3)$

$y - 1 = -\dfrac{1}{3}x + 1$

$y = \dfrac{1}{3}x + 2$

Piecewise Function

$$y = \begin{cases} 3x+1, & -1 \leqq x \leqq 0 \\ 1, & 0 < x \leqq 3 \\ -\dfrac{1}{3}x + 2, & x > 3 \end{cases}$$

Piecewise Defined Functions

Definition:
• **Functions defined by different formulas in different parts of their domains**

Example:

$$f(x) = \begin{cases} ① & x+3 & if \ x \leq 2 \\ ② & x^2-2 & if \ x > 2 \end{cases} \leftarrow \text{Boundary Numbers}$$

1) Determine $f(1)$, $f(3)$, and $f(2)$.
2) Sketch $f(x)$.

① $f(1) = 1+3$ $f(3) = (3)^2 - 2$
        $= 4$ $= 7$

$f(2) = 2+3$
        $= 5$

① $y = x+3$

x	y
2	5	← Boundary
0	3

② $y = x^2 - 2$
  $-$ Parabola
  $V(0,-2)$

x	y
2	2
3	7
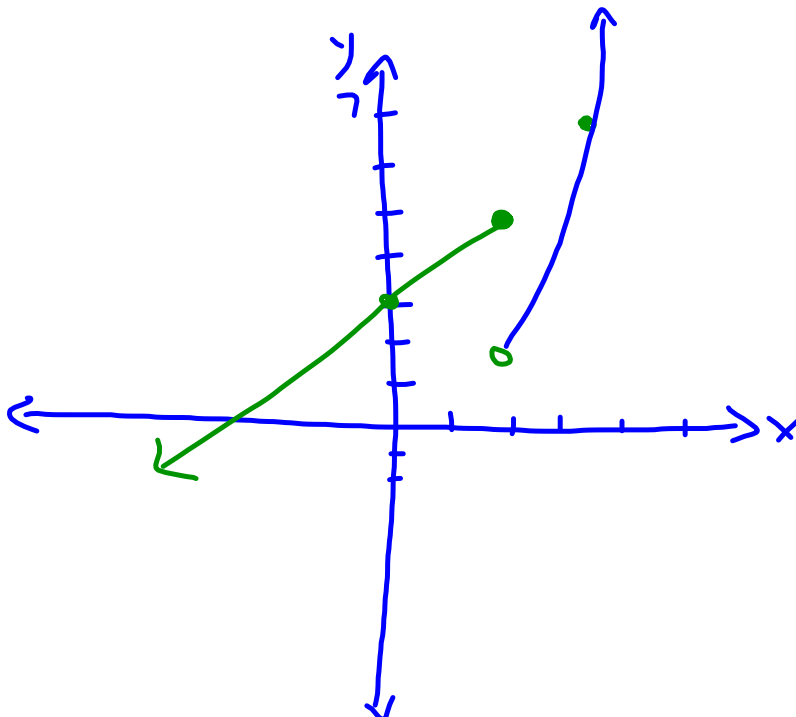
Warm Up

Determine the equation of a piecewise function to describe the graph below...

① Must remember how to find the equation of a line ⟶ "POINT-SLOPE FORMULA"
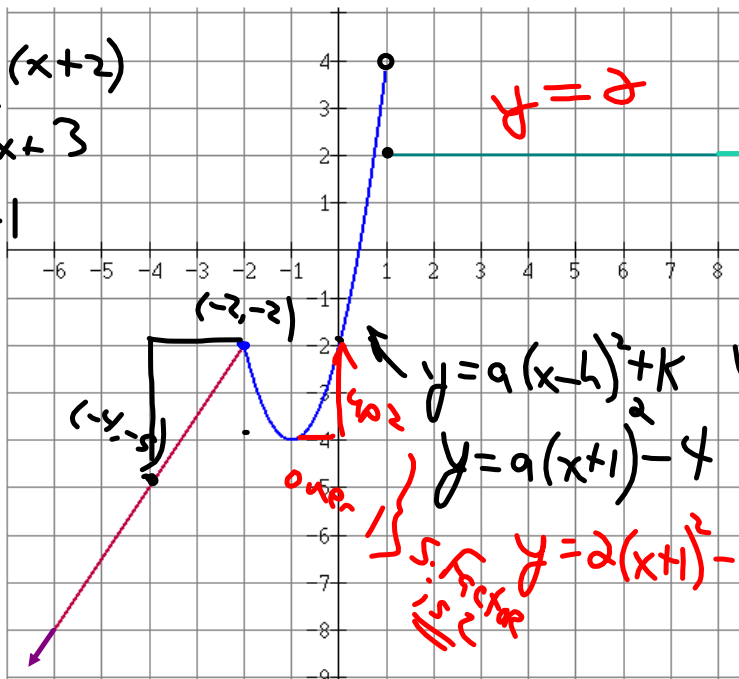
$$y - y_1 = m(x - x_1)$$

OR

$$y = mx + b$$

$$M = \frac{3}{2}$$

$$y + 2 = \frac{3}{2}(x + 2)$$

$$y + 2 = \frac{3}{2}x + 3$$

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

$y = 2$

$(-2, -2)$

$(-4, -5)$

$y = a(x-h)^2 + k$ $V(-1, -4)$

$$y = a(x+1)^2 - 4$$

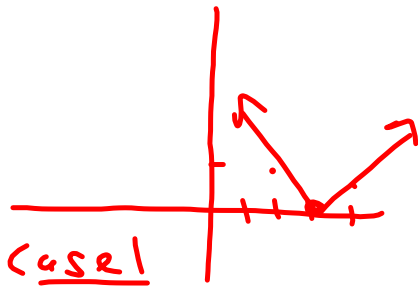$$y = 2(x+1)^2 - 4$$

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

More Practice...

- Express the following absolute value function as a piecewise function
- Sketch the function

$$f(x) = |x - 3| + 0$$

Vertex (3,0)

up
stretch factor 1

Case1

$$|7| = 7$$ $$|-7| = 7$$

$$7 = 7$$ (BBP) $$-(-7) = 7$$ (BBN)

Between Bars Positive
...erase Bars!!

Between Bars Negative
... Multiply between bars
by a negative.

$$f(x) = |x - 3|$$

BBP   BBN

$$x - 3 \geq 0$$ $$x - 3 < 0$$
$$x \geq 3$$ $$x < 3$$

$$-(x-3)$$

$$f(x) = \begin{cases} x - 3, & x \geq 3 \quad (BBP) \\ -x + 3, & x < 3 \quad (BBN) \end{cases}$$

$$y = |4 - x|$$ Express as a piecewise function

BBP

$4 - x \geq 0$

$4 \geq x$

BBN

$4 - x < 0$

$4 < x$

$$f(x) = \begin{cases} 4 - x, & x \leq 4 \\ -4 + x, & x > 4 \end{cases}$$

Write as piecewise ...

① $y = -3|x+5| - 4$ ③ $y = 4 - |3x+5|$

② $y = |3x-2|$

④ $y = -2|7x-1| + 4$

① $\underline{BBP}$ $\underline{BBN}$
$x+5 \geq 0$ $x+5 < 0$
$x \geq -5$ $x < -5$

$$f(x) = \begin{cases} -3(x+5) - 4, & x \geq -5 \\ 3(x+5) - 4, & x < -5 \end{cases}$$