Name: _____ Date: _____

Learning Goal 1.1	Understanding new ideas about functions and applying that to previously knowledge.

Function a relationship between a set of inputs (domain) and a set of potential outputs (range).

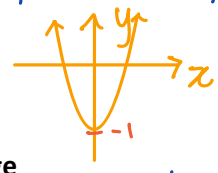
1. WORDS

a number squared and subtract one.

2. Numerical

x	y
-1	0
0	-1
1	0

3. GRAPHING



4. ALGEBRAICALLY

$f(x) = x^2 - 1$

Domain the full set of possible x-values

$\{x \mid x \in \mathbb{R}\}$

Range a full set of all possible y-values

$\{y \mid y \geq -1, y \in \mathbb{R}\}$

Example Find the domain of the following functions.

a. $f(x) = \dfrac{2x+3}{x^2-4}$

$x^2 - 4 \neq 0$

$x^2 \neq 4$

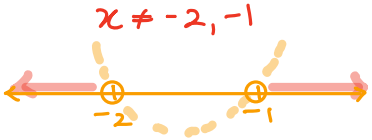
$x \neq \pm 2$

$\{x \mid x \neq \pm 2, x \in \mathbb{R}\}$

b. $g(x) = \dfrac{5x-1}{\sqrt{x^2+3x+2}}$

$x^2+3x+2 = (x+2)(x+1)$

$x \neq -2, -1$



$\{x \mid x < -2, x > -1, x \in \mathbb{R}\}$

c. $h(x) = \sqrt{x} + \sqrt{4-x}$

$x \geq 0$ $\quad 4 - x \geq 0$

$4 \geq x$

$\{x \mid 0 \leq x \leq 4, x \in \mathbb{R}\}$

Example If $f(x)$ and $g(x)$ are defined as follows, find the composition of functions.

$$f(x) = x^2 + 5 \qquad g(x) = \frac{1}{x}$$

a. $f(g(x)) = (f \circ g)(x)$

$= \left(\frac{1}{x}\right)^2 + 5$

$= \frac{1}{x^2} + 5$

$= \frac{5x^2+1}{x^2}$

b. $(g \circ f)(x) = g(f(x))$

$= \frac{1}{(x^2+5)}$

$= \frac{1}{x^2+5}$

c. $(f \circ f)(x) = f(f(x))$

$= (x^2+5)^2 + 5$

$= (x^2+5)(x^2+5) + 5$

$= x^4 + 10x^2 + 30$

Piece – Wise Functions

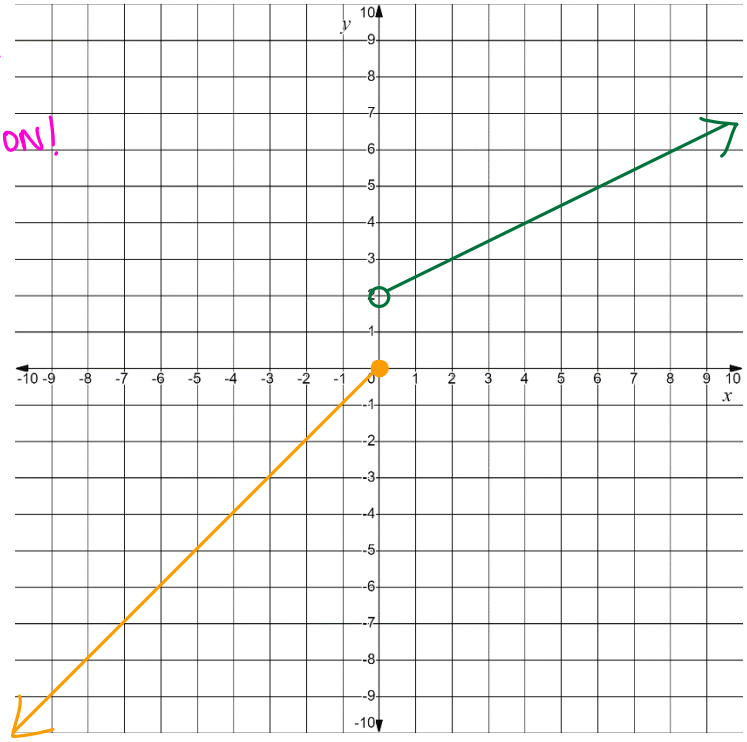
are functions defined by different rules for different values in the domain

Example Sketch the functions. State the range.

a. $$f(x) = \begin{cases} x, & x \le 0 \\ \frac{1}{2}x + 2, & x > 0 \end{cases}$$

Make sure it's a function!

$\{y \mid y \le 0,\ y > 2,\ y \in \mathbb{R}\}$



b. $$g(x) = \begin{cases} 4 - x, & x \le 1 \\ x^2, & 1 < x \le 3 \\ -6, & x > 3 \end{cases}$$

$\{y \mid y = -6,\ y > 1,\ y \in \mathbb{R}\}$