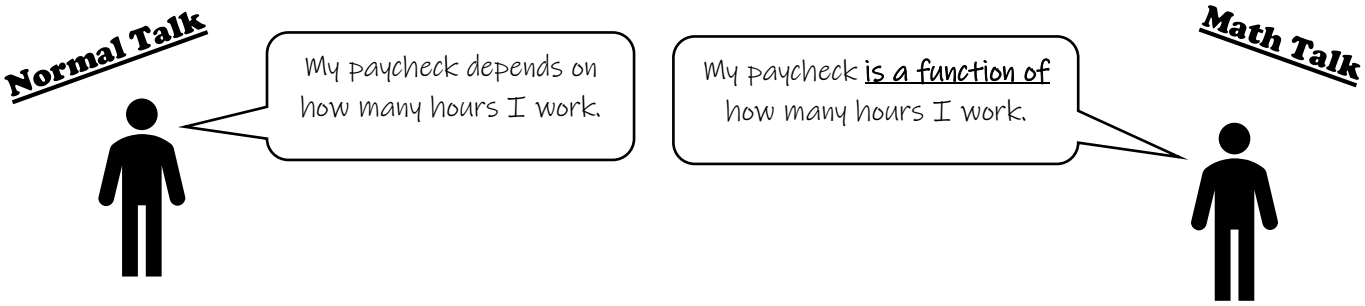
Notes 4-2 Function Language

What is a function (in normal talk)?

Functions describe situations where one thing depends on another. This is important because in nature and our society, we are constantly trying to connect things and find out if things are dependent upon one another. **Most of the equations we deal with in life are functions.**

Example of a function: Your paycheck depends on the number of hours you work.



*Example of a **non-function**:* The amount of time you study and your grade on a math test.

- On one test, you study 45 minutes and make a 95%
- Then on the next test, you study 45 minutes again, but make an 88%

You did the same input both times (studied 45 minutes) but got two different outputs.

The Soda Machine Example

A function is a certain kind of equation where each input only gives one specific output. With a function, you can't put in one input and get an output, and then put in the SAME input again and get a DIFFERENT output than before.

Imagine putting a dollar in a soda machine and pressing the Dr. Pepper button. Out comes a Dr. Pepper. Good.

Then you put in another dollar, press the Dr. Pepper button again, but out comes a Sprite. NOT good.

That means the machine is NOT FUNCTIONING.

You did the same input both times but got different outputs.

"f of x"…(Function Notation)

If you identify that an equation is indeed a *function*, then you can apply all sorts of language, notation, and terminology to the equation. We are now going to learn some of that language. This is setting us up to work extensively with functions as we study more and more complex mathematics. This language becomes essential the higher we go in the world of mathematics. Think of it as essential nerd-speak that you have finally earned the right to learn. Congratulations.

When you know an equation is indeed a function, you can replace the "y" with $f(x)$ (read as "f of x" or "the function of x"). You can use any combination of letters you want. P(h) would be read as "p of h", and so forth. But the letters f and g are the most common.

"f of x"

$$y = 3x + 2 \quad \xleftrightarrow{\text{same thing}} \quad f(x) = 3x + 2$$

Evaluating Functions (different ways to see it)

When writing functions using function notation, there are shortcut ways to show math operations. One of those is evaluating.

If $f(x) = 3x + 2$, find the following. Then write your answers as ordered pairs in set notation.

$f(3)$, $f(0)$, and $f(-5)$ Set Notation:	$D = \{-2,0,4\}$ Set Notation:

Evaluate the following, if given the function and the input values. Write your answers in set notation.

$\{(x, f(x)) \mid f(x) = 3x + 2; x = 3, 0, -5\}$ Set Notation:	$\{(x, f(x)) \mid f(x) = x^2 - 3x + 5; x = -2, 1, 4\}$ Set Notation:

Assignment 4-2 Function Language

If $f(x) = 4x - 3$, find the following, and write the answers in set notation.

1. $f(0), f(2), f(4)$	2. $f(-6), f(-2), f(2)$	3. $f(10), f(20)$

Evaluate $f(x) = -5x + 1$ if given the following inputs. Write your answers in set notation.

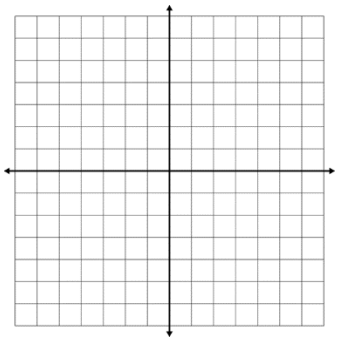
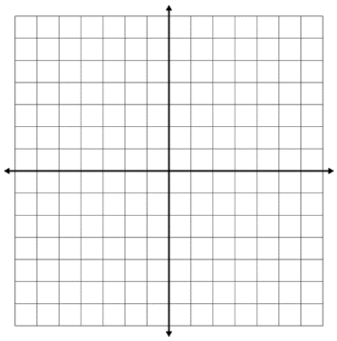
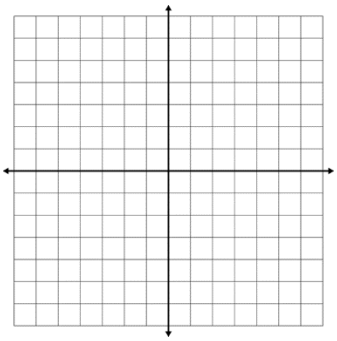
4. $D = \{3, 4, 5\}$	5. $D = \{-1, 0, 1\}$	6. $D = \{-5, 0, 5\}$

Evaluate the following, if given the function and the input values. Write your answers in set notation.

7. $\{(x, f(x)) \mid f(x) = 7x - 5; x = 2, 0, -1\}$	8. $\{(x, f(x)) \mid f(x) = x^2 - 4x - 2; x = 0, 2, 4\}$

Review

Graph the following equations.

9. $y = -\frac{1}{3}x + 5$ 	10. $y = -x$ 	11. $y = 4$ 

Identify whether the following represent functions.

12. $\{(1,3), (3,4), (5,5), (7,6)\}$	13.