Déjà Vu, It's Algebra 2!

Lesson 02

Notation, Functions, Domain & Range

Since Algebra grew out of arithmetic, which is operations on number sets, it is important early on to understand the different types of number sets and how to represent them.

<u>Here are some examples:</u>

Natural Numbers:

Whole Numbers:

Integers:

Rational Numbers:

Irrational Numbers:

Real Numbers:

There are two ways to list sets of numbers:
Roster/Set-Builder notation and Interval notation.

Roster- a list of elements or members of a set.
Examples:

- The set of whole numbers less than or equal to 5.
- The letters *A* of the Alphabet.
- The set of Natural numbers.

Set-Builder-similar to roster, but instead we define properties of the sets to define them.
Examples:

- The set of Rational numbers.
- The set *F* of integers greater than or equal to 15.
- The set *P* of all positive even numbers.

Interval Notation-used primarily for real numbers, it lists a set of all numbers between two endpoints. We use a parenthesis (or) when the endpoint is _____ included, and we use a bracket [or] if it _____ included. You must list the endpoints and intervals in ____________________ order.

NOTE: if the set of numbers in a set is not specified, we assume it is the set of ___________ numbers!!!

Examples:

- The set of numbers between 3 and 5 inclusive.

- All numbers greater than zero

- All numbers less than or equal to 2 or greater than 3.

Let's try to put them all together, and throw in a graphical meaning.

"Algebra is Awesome!!"

—Mr. Wenzel, NBHS Geography teacher and lover of math

Verbal	Roster	Set-Builder	Interval	Graphic
All real numbers except 1.				
Positive Odd numbers				
Numbers within 3 units of 2				
Negative integers greater than -5				

Throughout the year, we will be studying functions and solving equations involving them. It's important to understand what functions are and why we study them at all.

Imagine going to the store to buy a bag of chips and getting to the checkout. The clerk tells you that you owe either **2 dollars or 5 dollars**!!! What?! This doesn't make any sense. This is where functions come in.

A function is a relation between two variables, like what we choose to buy and the ultimate price, an independent input and a dependent output. The important part of a function, though, is that for each input, there is NO MORE THAN ONE OUTPUT!

In our case, since we will be looking at equations this year, we will call our set of independent inputs the ________________. We usually use the variable x or t to denote this.

The set of all dependent outputs are called the ________________, since we get a variety of outputs. These are our function values or y-values. We denote it as $f(x)$, read "f of x." f is the name of our function and x is the independent variable, but $f(x)$ itself is the output or y-value.

Think of a function as a "machine" that takes an input, usually a number or algebraic expression, and transforms it into another number or expression.

Example:

$$f(x) = x + 7$$

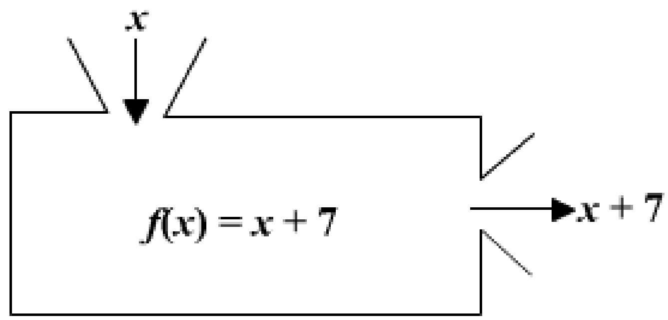
$$f(\quad) = (\quad) + 7$$

$$f(2) = (2) + 7 = 9$$

$$f(-2) = (-2) + 7 = 5$$

$$f(m) = (m) + 7$$

$$f(2x-1) = (2x-1) + 7 = 2x - 6$$



The function "machine."
For any independent choice of an input, this function adds seven to it, then gives the output.

We are going to be interested in WHICH sets of numbers we can plug into our function "machine" that will yield an output. Not all inputs will always work, and so we want to identify these values (we don't want to break our machine, do we?) The two operations that will not yield an output will be division by zero and square roots of negative numbers, so be on the lookout!!

For our machine above, all values of *x* will work.
Domain

Range

Déjà RE-Vu

Let's look at two functions that have restricted domains.

Example 1

$$g(x)=\frac{1}{x}$$

The reciprocal function of the *"flipping machine"*

Example 2

$$r(t) = \sqrt{t}$$

The radical "dude" function