1.6: Represent Functions as Rules and Tables

Goals: *Understand what a function is and identify relationships as functions *Identify the domain and range of a function *Write a rule for a function

<mark>Function</mark>

Consists of input and output values. Each input can produce exactly one output value.

Domain: The set of all possible input values.

Range: The set of all possible output values.

Ex: The input-output table shows the cost of various amounts of regular unleaded gas from the same pump. Identify the domain and range of the function.

Input (gallons)	10	12	13	17
Output (dollars)	19.99	23.99	25.99	33.98
(donars)				

Domain: __10, 12, 13, 17_____

Range: 19.99, 23.99, 25.99, 33.98

Ex: Identify the domain and range of the given function:

Input	0	1	2	4
Output	5	2	2	1

Domain:___0, 1, 2, 4_____

Range:____1, 2, 5_____ *can list in order and don't have to repeat

Why is it a function even though 2 appears twice in the output? The **input 1, has only one output value. Its 2. The **input** 2, has only one output value. Its 2. Decide if the following relationships represent a function. Explain why or why not. If yes, identify the domain and range.

Ex:



Ex:

Input	Output
0	0
1	2
4	8
6	12

Yes, each input has 1 output

No, 0 has 2 outputs

Ex:

Input	3	6	9	12
Output	1	2	2	1

Yes, each input has one output

Ex:

Input	2	2	4	7
Output	0	1	2	3

No, 2 has two outputs: 0 and 1

Independent Variable: input variable, domain, the output depends on it. Usually x

Dependent Variable: output variable, range, depends on the input. Usually y

Ways to Represent Functions

Verbal Rule

Equation

y = 3 + x

Table

Input (<i>x</i>)	0	1	2	3
Output (y)	3	4	5	6

The output is 3 more than the input.

y = 3 + x

Ex: The domain of the function y = 2x is 0, 2, 5, 7, 8. Make a table for the function, then identify the range.

Input	0	2	5	7	8
Output	0	4	10	14	16

Range:____0, 4, 10, 14, 16_____

Ex: Make a table for the function y = x - 5 with a domain of 10, 12, 15, 18, 29. Then identify the range.

Input	10	12	15	18	29
Output	5	7	10	13	24

Range:____5, 7, 10, 13, 24_____

Writing a Rule for a Function:

Basic Premise: If you have *x*, how do you get *y*?

****REMEMBER THAT ALL FUNCTIONS START WITH: y** = ******

Ex:

Input	0	1	4	6	10
Output	2	3	6	8	12

y = x + 2

Ex:

Input	1	3	5	7	9
Output	1	5	9	13	17

 Δ Greek letter Delta- in math it means "Change in" So ΔT would mean change in temperature

1. Start with y =

2. Find Δy and Δx . (How much do *x* and *y* change by each time? If the table is not consistent, just use one segment)

Input	1	2	4	7	9
Output	0	1	3	6	8

y = x - 1

3. Make a fraction. $\frac{\Delta y}{\Delta x}$ and simplify if possible. This number will be the coefficient of *x* in the function. (It multiplies *x*)

4. Adjust as necessary by adding or subtracting.

5. Check that your function works for all input and output values.

Write a rule for the following functions. (If you cannot see the relationship between *x* and *y* easily, use the rules provided)

Ex:						Ex:							
Input	0	3	6	9	12	Inp	out	4	6	10	16	26	
Output	5	14	23	32	41	Out	ıtput	4	5	7	10	15	
$\Delta y = 9, \ \Delta x = 3$ $\frac{9}{3} = 3$							$\Delta y = 1, \ \Delta x = 2$ $\frac{1}{2}$						
y = 3x Plug in 0, get 0 out. Need 5 so add 5.					$y = \frac{1}{2}x$ If you plug in 4 you get 2 out. Need 4 so add 2.								
y = 3x + 5													

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

Ex: You are buying concert tickets that cost \$15 each. You can buy up to six tickets.

a) Write a rule for the amount you spend (in dollars) as a function of the number of tickets you buy.

- y = 15x
- b) Identify the independent and dependent variables.

The number of tickets (x) is independent The total cost (y) is dependent.

c) Identify the domain and range.

Domain (All of the possible numbers of tickets you can buy): 0, 1, 2, 3, 4, 5, 6 Range (All of the total costs depending on the number of tickets): 0, 15, 30, 45, 60, 75, 90 **Ex:** At a community center, art lessons are offered at night. The fee is \$12 per lesson. You plan to attend up to 5 lessons.

a) Write a rule for the amount you spend (in dollars) as a function of the number of lessons you attend.

y = 12x

b) Identify the independent and dependent variables.

x – the number of lessons attended – independent y – the total cost – dependent

c) Identify the domain and range.

Domain: 0, 1, 2, 3, 4, 5 Range: 0, 12, 24, 36, 48, 60