Guided Notes 4

5.1 Understanding Linear Functions

A. A racecar can travel up to 210 mph. If the car could travel continuously at this speed, the equation $y = 210x$ gives the number of miles y that the car would travel in x hours. (Draw the graph of the solution)

- The graph of the car's speed is a function because every x-value is paired with exactly one y-value.
- The graph is non-vertical so that lines are considered _____ _____.

   1) Fill in the table using the data points.

x	y

   2) Using the table check that x has a constant change between consecutive terms. (Show your work below)

   3) Now check that y has a constant change between consecutive terms. (Show your work below)

B. All linear functions are just like the one we described in A. So based on this information, a generalization can be made that a _____ change in x will correspond to a _____ change in y.

C. Reflect

    1) Discussion: Will a non-linear function have a constant change in x that correspond to a constant change in y?

    2) $y = x^2$ represents a typical non-linear function. Using the table of values, check whether a constant change in x corresponds to a constant change in y.

D. Linear functions change by the same amounts over equal intervals. Here we're going to explore the proofs of these statements.

- Let $X_2 - X_1$ and $X_4 - X_3$ represent two equal intervals in the x-values of a linear function.

- We need to recognize that _____ is any linear function where _____ and _____ are constants (numbers).

- We are going to complete the "proofs" that linear functions grow by _____ over _____.

E. Proof

(We will discuss this in class. Copy what I put onto the board into this space.)

F. Reflect

3. **Discussion:** Consider the function $y = x^3$. Use two equal intervals to determine if the function is linear. The table for $y = x^3$ is shown. (Write the response from the video or craft your own response.)

x	$y = x^3$
1	1
2	8
3	27
4	64
5	125

4. In that proof we just covered, it states that: f is a linear function of the form $f(x) = mx+b$. What is the name of the form for this linear function? (Write the name of the form).

G. A _____ _____ is any equation that can be written in _____
_____.

H. Standard From of a Linear Equation is _____. Where A, B, and C are real numbers. Also, A and B are NOT both O.

I. Determine whether the equation is linear. If so, graph the function.

1) $5x + y = 10$

Is this Linear? Why?

Fill in the table:

X	-1	0	1	2	3
Y					

Graph the function below:

2) -4x + y = 11

The equation is linear because it is in the _____ form of a linear equation.

A=_____ B=_____ C=_____

Solve for Y:

Complete the table:

X	-4	-2	0	2	4
Y					

Graph the function below:

Continued in (Part 2):

A. Recall, a linear equation written in Standard Fom is _____, where A, B, and C are real numbers, and A and C are not both 0.

-Write an equation that is linear, but not in standard form below. (Copy from video or craft your own response.)

B. What if B=0?

C. Determine whether $6x+y=12$ is linear. If so, graph the function.

D. A _____ _____ is a function whose graph has unconnected points.

A _____ _____ is a function whose graph is an unbroken line or curve with no gaps or breaks.

E. Graph each function and give its Domain and Range.

1) Sal opens a new video store and pays the film studio $2.00 for each DVD he buys from them. The amount Sal pays each day is given by $f(x)=2x.$, where x is the number of DVD purchased. (Graph the function)

X	F(x)=2x
0	
1	
2	
3	
4	

2) Elisa rents a booth in her grandfather's mall to open an ice cream stand. She pays $1 to her grandfather for each hour of operation. The amount Elisa pays each hour is given by $f(x)=x$, where x is the number of hours her booth is open. (Graph the function)

X	F(x) = x
0	
1	
2	
3	
4	

This is a _____ function.

The domain is _____; and the range is _____.

F. Reflect
1) Why are the points in the last example connected?

2) **Discussion:** How is the graph of the function with Sal's DVD video store related to the graph of an arithmetic sequence?

G. Elaborate

3) What is a solution to a linear equation in two variables?

4) What type of function has a graph with a series of unconnected points?

5) **Essential Question**: What is the standard form of a linear equation?