Unit 2 functions and Their Graphs

Subject: Algebra 1	Grade: 9th – 10th

| Standards and Benchmarks: 1 – a, b; 3 – a, b; 4 – a, b; ||

Overview
    Students will build their knowledge of algebra skills learned in Unit 1. They will learn to classify data as continuous or discreet, and identify trends, identify dependent and independent variables in tables and graphs. They will learn to use the vertical line test to analyze graphs. Students will write rules from tables and words examine three views of a function, and study families of functions. Finally they will use tree diagrams and sample space to learn about the probability concepts, and they will make predictions about real world situations such as mall promotions.

Rationale
    Algebra is the bases for mathematical thought and expression. Math is at its fundamental level a study of complex logical arguments. These skills are in every way transferable to any goal of success in the western world.

	Objectives	Content to be Covered	Learning Activities

Analyzing Data using Scatter Plots
   a. Drawing and Interpreting Scatter Plots
   b. Analyzing Trends in Data
	TSWBAT *understand* <u>the difference between causation and correlation</u> **in order to explain the concept to their parents.**	Collect the heights and arm spans for everyone in the class. Us this information to make a graph of arm span vs. height. Is there a noticeable correlation between height and wing span? Which one causes causation?
		   Define: scatter plot, trend line, positive correlation, negative correlation, no correlation. Run through the examples and show the difference between the different types of correlation. Make a worksheet so students have as much in class help as possible.
			Lecture
			Worksheet
			Homework
			Content has more in depth activities.

Relating Graphs to Events	TSWBAT *interpret* <u>the	Make a graph of my commute and ask the	Lecture

a. Interpreting Graphs b. Sketching Graphs c. Classifying Data	<u>meaning of a graph</u> **with full comprehension.**	students to help interpret it. Have students make their own graphs, vote on who's graph is the most interesting. Explain: continuous data, discrete data. After going through all the examples make sure to go through all the graphs again and examine them in detail such as the one on page 65. (looking for slope, f(x) value, changes in slope and interpret each individually) If you have extra time print out some graphs from TV that week and have the students identify what they mean.	Worksheet Homework *Content has more in depth activities.*
Linking Graphs to Tables	TSWBAT *create* <u>graphs from tables</u> **with an 80% accuracy.**	Ask the students for the tables that we have made in the last few weeks. Ask the students which is their favorite and use it to introduce the conversion from table to graph. Work with a partner to construct stairs made from blocks. Count up the stairs and record them in a table with respect to how many blocks are needed. Students need to understand the differences between a variable and a dependent variable. Cover the examples and answer questions be sure to trigger self-thought by asking them to analyze graphs that they have seen during the week. Help students find a real life example where they can find a dependent variable.	Lecture Worksheet Homework *Content has more in depth activities.*

Functions
    a. Identifying relations and Functions
    b. Evaluating Functions
    c. Analyzing Graphs
	TSWBAT *identify* <u>functions</u> **correctly identifying non functions from functions and the concept of domain and range.**	Last lesson we covered depended variables now we will further unpack them. Functions are little more than equations that are built with dependent variables. Have students build personal functions to model their own work situation, what would the dependent variables	Lecture
			Worksheet
			Homework
			Content has more in depth activities.

		be? Students need to understand what: function, relation, domain, function rule, range, vertical line test mean. Use the examples in the book… along with the example of a gun. (domain are the bullets, range is the stuff you can hit) Break down why the vertical line test works, because of not only function rules, but because we always graph the function as the y axis and the dependent variable as the x axis. This is a large lesson so a worksheet and hand out would be very helpful, make one that has all the definitions along with one or two pre-worked problems.	

Writing a function Rule
    a. Understanding Function notation
    c. Using a Table of Values
    d. Using Words to Write a Rule
	TSWBAT *write* <u>function notation</u> **without error.**	Part of understanding math is understanding the language, students need to be able to understand, identify, and write function notation. Explain that function notation is integral not only to making math readable but for programing as well… talk about the remake of halo ($40 dollar remake which is essentially a find an replace function for pixels RIP OFF) Also I used to think that function notation was retarded, and ignored it for years. This can be done, but when you start higher levels of math it is more important, same goes for grammer.
		  Have students complete a worksheet and answer / address any missed / confusing material from the day before. Functions are a large topic and need days to sink in. Students WILL have questions.
			Lecture
			Worksheet
			Homework
			Content has more in depth activities.

The three views of a Function	TSWBAT *explore* <u>the three views of a function</u> **and**	Functions can be viewed in three major ways. Return the students attention to previous	Lecture Worksheet

	correctly identify them.	in class work and ask them to remember their favorite table of data. Show the students the function notation (from the day before) , the table , and the graph these are the three main views of a function and the students should already know them. Go through the chapter hitting each example as practice is what students need the most at this point. Answer any of their questions and supervise an in class worksheet. Help any struggling students. Students who are still not grasping major concepts at this point need to meet you after school.	Homework *Content has more in depth activities.*
Families of Functions a. Identifying the Family of an Equation b. Identifying the Family of a Graph	TSWBAT *identify* <u>the different families of functions</u> **with and without a graphing calculator.**	Families of functions are delineated by what operators are used on the dependent variable. We learned about operators in unit 1. One of the quickest ways to spot a given "family" is to graph the function. Have students break up into groups and each graph a different, more complex function. When everyone is completed have the students share their graph and everyone use the handout to identify which family the function belongs to. The major function families that should be covered are: absolute value, quadratic, cube, line, exponent, and log. Students should also be able to recognize their inverses and negative functions.	Lecture Worksheet Homework *Content has more in depth activities.*
The Probability Formula a. Finding Theoretical Probability b. Using a Tree Diagram to Find a Sample Space	TSWBAT *use* <u>the probability formula</u> **with a 80% accuracy.**	In one of the last chapters of our last unit covered simple probability. Now we will examine more complicated probabilities with the help of the probability function. Do a full review with the students of what probability is… refer them to	Lecture Worksheet Homework *Content has more in depth activities.*

| | | page 36 if need be.
     The concepts that need to be covered today include: outcomes, theoretical probability, Impossible event, Certain event, complement of an event, sample space. Once the examples have been explained have the students test out probability by doing their own experiments. This time try and find the probability associated with various chance card games. Hand out decks, assign games, and tell groups to find the probability of different hands / winning moves. | |
| **Assessment/Evaluation**
a. Quizzes
b. Homework
c. Worksheets
d. Notes
e. Diagrams
f. Test | **Formatting for Objectives:**
TSWBAT = audience
italicized = verb
<u>underlined</u> = condition - object of instruction
bold = degree - method with which to assign grade.

Standards and Benchmarks code follow the PDF available at sinclairjohnston.com for standards and benchmarks. | **Sources:**
Author = Sinclair Johnston
Prentice Hall Algebra 1: ISBN-10: 013052316X | |