UNIT ONE – Tools of Algebra

Subject: Algebra 1	Grade: 9th – 10th

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

Overview
   My Lessons are following the first unit from Prentice Hall Algebra 1[1]. Students are guided through a review of middle grade math, students build on their basic understandings of math to explore relationships shown in a variety of ways. Students use integers and fractions to represent relationships in graphs and with variables.

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
Displaying Data Relationships with Graphs	TSWBAT *display* <u>different types of data in a visual model</u> **to proficiency**.	Get students to create some tables of data based on class diversity. Age, grades, years to graduation, sex, birthdays, could all be used. Once data is collected students should choose one visual method of displaying one of the data sets. Turned in as a "quiz." Lecture and examples on data visualization. Different types of graphs will be covered: pie graphs, tables, stem-leaf plots, bar graphs, line graphs, line plots / histograms (y = frequency x = variable). Examples will be completed on the board (notes should be taken) Terminology to master: mode, mean, median.	Lecture Worksheet Homework *Content has more in depth activities.*

Modeling Relationships with Variables	TSWBAT *identify and use* <u>variables</u> **in order to solve equations**.	Review lesson on graphing. Answer any questions on homework. Use one of the examples from yesterday (with student help) to show that the data we are graphing is really just an example of a variables. Use example of geometry (page 11) to introduce variables in mathematical expressions. Lecture and examples on what variables are and how to use them in solving problems. Terminology to cover: variable, variable expression, terms, equation. Word problems and relation to the real world in examples... find an example the students may want to solve for their own life. (cost of tuition in relation to number of credits taken)	Lecture Worksheet Homework *Content has more in depth activities.*
Order of Operations	TSWBAT *solve* <u>complex equations</u> **without mixing up the order of operations**.	Work in groups of two and solve for the perimeter of a rectangle using two different equations. Answer the questions (page 15). Use the example problem from the day before (tuition as a function of credits) to show what oder of operations are used. Lecture and examples on what oder of operations to use and why. Oder: Parentheses, Exponents, Multiplication + division, addition + subtraction. Easy way for remembering: **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally. Show correct and incorrect examples. Reason: What is addition? What is multiplication? What are exponents?	Lecture Worksheet Homework *Content has more in depth activities.*

Adding and subtracting Integers	TSWBAT *add and subtract* <u>any combination of integers</u> **without mixing up the sign.**	What are numbers? Give me an example where you would use a number? Give me an example of where you would want to use a negative number to represent something in the real world? (debt, depth, ect) Reference geology with Marianas trench, and mount everest. (mount everest is 29,029 feet = 5.49 miles, Marianas trench is 36,168 feet = 6.85) Lecture and examples on the number line, positive numbers and negative numbers. Terminology: opposites, integers, absolute value, number-line. Modeling addition as: movement on the number line, digging and filling in, tiles of different colors. Interesting case: Minus a minus????	Lecture Worksheet Homework *Content has more in depth activities.*
Multiplying and Dividing Integers	TSWBAT *multiply and divide* <u>any combination of integers</u> **without mixing up the sign.**	Review of number line from day before. Extra credit to whoever remembers the most about everest and that "one" trench. What is multiplication? Review order of operations: please excuse my dear aunt sally. Today we will see what happens when we use negative integers. What is the opposite of a number??? Lecture and examples on what exactly multiplication and division is. Terminology: product, quotient, opposite. Use the concept of opposites and the definition of multiplication to discover what happens when you multiply: a*b ; -a*b ; -a*-b. Memorize the three situations.	Lecture Worksheet Homework *Content has more in depth activities.*

Real Numbers and Rational Numbers	TSWBAT *identify and use* <u>real, rational, and imaginary numbers</u> **in common mathematical equations.**	Draw a Venn diagram of all numbers: numbers, real numbers, imaginary numbers, complex numbers (real part, imaginary part), rational numbers, irrational numbers, integers, whole numbers. Ask students for examples and definitions for all the types of numbers. Why might we want to have different types of numbers? (computers data saving, discrete mathematics, easy models) The most beautiful, aesthetic, and accurate models of numbers will be given extra credit tomorrow. Lecture and examples on number types, uses, and properties. Terminology: numbers, real numbers, imaginary numbers, rational numbers, irrational numbers, integers, whole numbers, reciprocal. How do these numbers fit on the number line. (complex numbers assigned for extra credit to gifted students) Use new found knowledge to compare numbers on a number line. How does a decimal relate to these types of numbers?	Lecture Worksheet Homework *Content has more in depth activities.*
Experimental Probability and Simulations	*TSWBAT solve for* <u>*experimental probability*</u> *and identify* <u>*probability associated with simulations*</u> **in a variety of common chance scenarios.**	Work with a partner. Imagine rolling dice and predict the outcome. Roll dice sixty times and keep track of results. Report results in a table and then a graph of your choice, how did the data reflect your predictions? What are some examples of everyday probability? (statistics on life, driving weather ect.) Lecture and go through the examples of probability. Cover the concepts of: event, experimental probability, simulation. Review from previous chapter that a ration, fraction	Lecture Worksheet Homework *Content has more in depth activities.*

		and probability are very similar. Examine the differences and similarities.	
Organizing Data in Matrices	*TSWBAT display and modify* <u>*data held in a matrix*</u> **in order to solve simple linear equations.**	What are all the ways that we have displayed data so far? (tables, charts, graphs, lists, ect…) Matrix is another way to store data. Why was the movie called the matrix? And why was the matrix portrayed as a bunch of numbers? First start with the definition of a row and column, entry, and finally matrix. Go through examples and answer questions. Students need to become comfortable with matrix notation. Explain the relationship between matrices and programming, also matrices and linear equations, also matrices and vectors (physics). Puzzles can be made by the students and tied to the idea of programing, a list of clues to each element in the matrix for another student to solve.	Lecture Worksheet Homework *Content has more in depth activities.*
Variables and Formulas in Spreadsheets	*TSWBAT display and modify* <u>*data held in a excel*</u> **in order to solve simple word problems with programing.**	At the park today I saw ducks and squirrels, I counted 19 heads and 54 legs, How many ducks and how many squirrels were there? (11 ducks 8 squirrels) Intro to programing, have you seen a spreadsheet before? What could you have done to solve this problem? Spreadsheets look similar to matrices and are very powerful. Explain what a spreadsheet is, and a cell. When you buy stuff at the store or online do you have to total everything up by yourself? Do you have to calculate the tax by yourself? How is this done? What "short" cuts could we make on page 45? For tactile learners make example 2 a	Lecture Worksheet Homework *Content has more in depth activities.*

		real world hands on experience. Bring in boxes and have students measure them and compare their specs with the listed shipped specs.	
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	