Algebra 1 Name _____
Chapter 1 Note Packet

Section 1.1: Variables in Algebra

Variable: a letter that is used to represent one or more numbers Ex: x, y, t, etc.
(*The most popular one is "x")

Variable Values: the number you substitute in for a variable Ex: Let x = 4…..then 3x = 3(4) = ___

Variable Expression: a collection of numbers, variables, and operations Ex: 4y, 8s + 1, 3x – 4, 7xy, etc.
*Expressions DO NOT have _____ signs

Evaluating the Expression: replacing each variable in the expression with a number

Ex: If x = 3…… 6x = Ex: if y = 9….. 3y – 4 =

Write the Variable Expression → Substitute Values for Variables → Simplify the Numerical Expression

Ex 1: Let x = 4 and y = -3 Evaluate 2x + 4y Ex 2: Let p = -6 and r = 2 Evaluate -3pr

Ex 3: Let y = 7 and z = -1 Evaluate 5y – z

Simple Interest Formula: I = PRT

I = Interest Earned
P = _____ Amount (amount of $ you invest at the start)
R = The Interest Rate Earned (*Rate is ALWAYS plugged in as a _____)
T = Time Period (in _____)

*If you know the principle amount, interest rate, and time period, you can calculate the interest earned!

Ex 1: P = $1000, r = 4%, t = 3 years I =

Ex 2: P = $2500, r = 6%, t = 5 years I =

Unit Analysis: Can help determine if your model is correct by showing how the units cancel

*You always need to know the _____ _____to do unit analysis!
Ex: 12 in = 1ft 16 oz = 1 lb

Ex 1: Change 125 lbs to Kg (2.2 lbs = 1 kg)

Ex 2: 100cm to inches (2.54cm = 1 inch)

Ex 3: 7632 ft into miles (5280 ft = 1mile)

Average Speed = distance/time
Find the average speed for the following:
Ex 1: A 4-wheeler travels 58 miles in 2 hours

Ex 2: In 10 seconds a runner goes 85 feet

Section 1.2: Exponents and Powers

Power: an expression where a number is raised to an exponent

Power **=** _____

Base- the number being multiplied times _____

Exponent- how many times you multiply the base times itself

****Which key do you use on your calculator to quickly evaluate powers???***

Examples*:*
"Four to the third power" 4^3 =
"Six to the fourth power" 6^4 =
"Two to the sixth power" 2^6 =
"Ten to the second power" 10^2 = *Also said "Ten squared"
"Five to the third power" 5^3 = *Also said "Five cubed"

What is any base raised to the "zero power"? ALWAYS = _____ Try it!

3^0 = 7^0 = $(-2)^0$ = -2^0 =

Examples**:** Evaluate when x = 3 x^3 = x^5 = x^{10} =

Grouping Symbols- (brackets or parentheses) indicate the order in which operations should be performed

***Remember PEMDAS**…..In the Order of Operations, Parentheses come first!
1) P → _____ (grouping symbols) first….always follow PEMDAS within () too!
2) E → _____ (from left to right)
3) MD → Multiplication and _____ (from left to right)
4) AS → Addition and _____ (from left to right)

Examples: Evaluate when x = 3 and y = 4

$(x + y)^2$ = $(x^2) + (y^2)$ = $3xy^2$ = $(3xy)^2$ =

Section 1.3: Order of Operations

Order of Operations- the order to evaluate expressions with more than one operation

PEMDAS- (Parentheses, Exponents, Multiplication, Division, Addition, Subtraction)
Then **LEFT → RIGHT**

1) Parentheses (grouping symbols) first
2) Exponents (powers)
3) Multiplication/Division from left to right
4) Addition/Subtraction from left to right

Ex 1: $2 \cdot 3^2 \div 3$

Ex 2: $4 - (3 - 5)^2 \div 2$

Ex 3: $[4 + (6 - 3)^2 - 9 \div 3]$

Examples with Substitution: Let x = 3

Ex 4: $2x - 6 \div 2$

Ex 5: $(2x)^2 - 20 \div (2 + x)$

Examples With Fraction Bars:

- Simplify the top and bottom using PEMDAS, and divide top by bottom or simplify fraction as the last step

Ex 6: $\dfrac{3+(4-2)^3 \div 8}{[20-(2-4)^2 \cdot 4]}$

Ex 7: Let x = 2 $\dfrac{3x-6 \div x+7}{8-x+(3+x) \div 5}$

Section 1.4: Equations and Inequalities

Equation: Two expressions with an _____ sign (=) between them

Solution of an Equation: If a given value for a variable makes an equation _____, it is a solution!

Solving an equation means Finding ALL Solutions!

*To check a solution, plug the value in for the variable and simplify both sides of the equation. If the two sides are equal, the value IS a solution!

Ex 1 : Is 3 a solution to the equation $3x - 2 = 7$?

Ex 2: Is -1 a solution to the equation $4x - 5 = x + 3$?

Using Mental Math Questions:

Ex 3: $x + 4 = 7$ "What number added to 4 is 7?"

Ex 4: $3x = 12$ "Three times what number is 12?"

Ex 5: $x^2 = 25$ "What number squared is 25?"

Inequality Symbols- like an equation, an inequality symbol can be placed between two mathematical expressions
*Substitute in values for the variable, simplify, and determine whether or not the given variable makes the inequality true!

$<$ is "_____ than"

$\leq$ is "_____ than or _____ to"

$>$ is "_____ than"

$\geq$ is "_____ than or _____to"

Ex 6: Is -2 a solution to the inequality $3x - 4 > 5$?

Ex 7: Is 4 a solution to the inequality $2x - 3 \leq 9$?

Section 1.5: A Problem Solving Plan Using Models

Changing Phrases Into Algebraic Expressions:

Operation	Verbal Expression
Addition	
Subtraction	
Multiplication	
Division	

*The "unknown number" is your variable, usually called x
*"is" means equals…..that is where you put the = in an equation

Operation	Verbal Phrase	Expression
Addition	The *sum* of 6 and a number Eight *more than* a number A number *plus* 5 A number *increased by* 7	
Subtraction	The *difference of* 5 and a number Four *less than* a number Seven *minus* a number A number *decreased by* nine	

Multiplication	The *product of* 9 and a number Ten *times* a number A number *multiplied by* 3	
Division	The *quotient of* a number and 4 Seven *divided by* a number	

Translating Word Statements Into Algebraic Equations

Verbal Phrase	Algebraic Equation
Seven more than the product of eight and a number is thirty-one.	
Six less than four times a number is ten.	
Five more than the quotient of twenty and a number is seven.	
Eight multiplied by a number then decreased by three is twenty-nine.	
Nine times the difference between a number and four is fifty-four	
The sum of a number and six, multiplied by two is twenty-eight	

Section 1.6: Tables and Graphs

What is data?

Data: information, facts, or numbers that _____ something

What are some graphical representations we use to display or analyze data?

Bar Graph: _____ or _____ bars used to represent different pieces of data

Line Graph: Data is represented by _____, which may or may not be connected into a _____

***How do you know when to connect the points in a line graph and when NOT to?**

1) *A Graph shows number of cd's purchased vs. cost (Not connected)*
2) *A Graph shows Time vs. number of miles biked (Connected)*

*Have students come up with their own examples of graphs that should have connected points or not

Section 1.7: An Introduction to Functions

Function: a rule that establishes a relationship between _____ quantities

Input: The number you "put in" (the x-values)

Output: The number you "get out" (the y-values)
*In order to be a function, for every input there must be exactly _____ output!

Are the following tables functions?

X	y
1	4
2	7
3	12
4	19

X	y
1	13
2	15
3	17
3	19

X	y
2	3
4	9
6	3
8	9

Domain: The collection of all the _____ values

Range: The collection of all the _____ values

Tables Should Have:
- Title
- Row Labels (horizontal)
- Column Labels (vertical)
- Key (if needed)

Graphs Should Have:
- Title
- X-axis Label (horizontal)
- Y-axis Label (vertical)
- Key (if needed)
- Scale with _____ _____!!

Example: Make a table for and graph the following function:

$y = 250 + 20x$ Domain: $\{0 \le x \le 5\}$

Input (x values)	**Output** (y values)
0	
1	
2	
3	
4	
5	