Algebra 1A

Unit 1: FOUNDATIONS OF ALGEBRA

Assignment 2: Variables and Expressions

Vocabulary

Word	My own description	Illustration/Example
Algebraic Expression		
Coefficient		
Constant		
Expression		
Variable		

Algebra: Numerical and Algebraic Expressions

Algebra and Arithmetic

_____ uses known numbers.

_____ uses known and <u>unknown</u> numbers. Solving the equation means finding out the unknown numbers.

The variable

In algebra, _____ are used to represent numbers. These numbers can be called unknowns or

_____.

_____ are incomplete sentences.

> **Check:** Without more information, can you judge whether an *expression* is true or false?
>
> Circle one: YES   NO

Known numbers in an expression are called _____.

Unknown numbers are called _____.

An *algebraic expression* can be a mixture of both of these or just unknowns.

Plugging in numbers:

If you have an algebraic expression AND are given the value of the variables, all you have to do is replace the variable with the number you're given.

Example:

If *x* is 5, then 6*x* = _____.

1) Rewrite the expression, but leave a blank with parentheses for the "x":

   6 (_____) = _____

2) Put the number in the blank:

   6 (5) = _____

3) Evaluate (solve) the equation:

   6 (5) = 30

Translating Expressions

Addition Words	Subtraction Words	Multiplication Words	Division Words
		per, each	

Examples:

	the difference of *x* and *y*
	the sum of a number and 6
	the product of ten and a number
	twice the sum of *A* and *B*
	the quotient of *x* and *y*
	five less than the product of 3 and *y*
	one half of *x*
	The product of 6 and a number diminished by 3
	The product of 6 and a number, diminished by 3

NOTE: Pay attention to the **order** and **commas**!

_____ and _____ are commutative (can switch order) but _____

and division are not. In other words, we can change the order that we _____ and

_____ but not the order that we _____ or _____ .

MULTIPLICATION

Symbols: Because the letter _____ is often used as a variable, it is not used in algebra to indicate

multiplication. Instead, the other ones are used:

➢ Dot: 2 • 7

   Parentheses: (2)(7)

➢ When typing - asterisk: 2*7

➢ When variables are involved, they can go side-by-side and the number comes before the

   variables: 10a   3ab   15xy   abc   XYZ

   The number in front of the variables is the *coefficient* (10a   3ab)

   NOTE: You <u>cannot</u> place two numbers side by side! (10*5 is not 105!!)

MODELING

A _____ is an equation that represents a real world situation. You may need to write multiple

equations to solve a problem.

Example #1:

Jennifer is buying pizza for a party. These are the prices:

   Small pizza – $10 for 6 slices

   Medium pizza – $12 for 8 slices

   Large pizza – $14 for 10 slices

Assuming that each slice is the same size, which pizza size would give Jennifer the maximum amount of pizza

for $70? How many pizzas of this size can she buy?

   1) Identify the variable

      In this problem, we want as many **slices** as possible. So, we need to know how

      much the slices cost for each pizza.

2) Write an equation with the variable

To find the cost of each slice, we need to divide the cost of the pizza by the number of slices it
has.

- Small pizza: $10/6 slices = _____
- Medium pizza: $_____/_____ slices = _____
- Large Pizza: $_____/_____ =_____

To figure out how many pizzas of a certain size she can buy, we set up an equation taking the
amount of money she has divided the cost of each pizza:

- $70 / pizza price = number of pizzas

3) Complete your calculations and make a decision based on them:

The slices cost the **least** on the _____ pizza size.

This pizza costs _____

Calculate how many pizzas she can buy: $70 / _____ (price) = _____ pizzas

So, Jennifer should by _____ (#) _____ (size) pizzas.

Example #2

The Happy Barbells gym membership includes a $75 joining fee and a monthly fee of $13. The
Aerobics Plus gym membership costs $28 per month. If you plan on joining a gym for 12 months,
which gym will cost less?

1) Identify the variable.

The variable you have to use to find out the total cost is the number of **months**. So, let's
use an m to represent "months".

2) Write an equation with the variable.

We have two gyms that will cost different amounts, so we have to write two equations.

- Happy Barbells: It costs $75 up front and that won't change PLUS you have you
  pay $13 *per* month. Since "per" is a multiplication word, we know that we have to
  multiply $13 by the number of months. Complete the following equation for the
  total cost of Happy barbells:

  _____ (joining fee) + _____ (monthly fee) * m (number of months) = TOTAL

  Copy your formula here → _____ + _____m = **total cost**

- Aerobics Plus: There is no joining fee, so you just have to multiply the monthly
  fee ($28) by the number of months:

  _____(monthly fee) * m = TOTAL

  Copy your formula here → _____m = **total cost**

3) Complete your calculations and make a decision based on them:

Since you're planning on joining the gym for 12 months, replace the "m" with 12 and then calculate the total:

- Happy Barbells: _____ + _____ (12) = _____
- Aerobics Plus: _____ (12) = _____

Which gym is more cost effective (cheaper)? _____

Let's review!

Make sure that you understand the main points of this lesson:

- Numerical expressions contain constants and have a definite value.
- Algebraic expressions contain variables and their value changes with the value of the variable(s).
- We can translate between English phrases and algebraic expressions (words and mathematical symbols).
- Product expressions with variable factors are written using closeness with the numerical coefficient first.