ALGEBRA REVIEW
UNIT 1 --- BASIC TERMS

Before we get started, we should make a few quick definitions. In these notes, we will be using the word "variable", "unknown", "constant", "expression", and "equation" quite a bit; so it would be a good idea to make sure everyone understands what these words mean.

Variable --- A variable is a letter used to represent values of a quantity in a problem that can change.

Constant --- A constant is a value of a quantity in a problem that does not change.

Expression --- An expression is a collection of variables and constants connected by arithmetic operations like addition, multiplication, etc.

Equation / Inequality --- An equation is two expressions related by an equal sign, and an inequality is two expressions related by an inequality symbol. The symbol always points to the expression having the smaller value in the problem.

Expressions are themselves built from other expressions; consequently, we have a lot of Words that refer to parts of an expression. These terms are not always used consistently and sometimes can be confusing; unfortunately, there is no way to avoid this. In these notes, however, we will be as consistent as possible. Here are some words and phrases commonly used to refer to parts of expressions.

Term --- Expressions that are added or subtracted to create a larger expression are called terms of the larger expression.

> The expression $3xt^2 - 5y + 8$ contains three terms, namely $3xt^2$, $-5y$, and 8.

Factor --- Expressions that are multiplied to create a larger expression are called factors of the larger expression. A single expression could have many different combinations of factors.

> The expression $3xt^2$ contains many combinations of factors.
>
> - 3 and xt^2 is one combination of factors
> - $3x$ and t^2 is another
> - 3, xt, and t is still another

Exercise 1 Identify at least four different combinations of factors in the expression $5xyt^2$.

⭐ *Coefficient* --- When we are focusing on a particular factor in a product of expressions, all of the other factors in that expression together form the coefficient of the particular factor we are looking at.

In the expression $3xt^2p$

- The coefficient of p is the factor $3xt^2$.
- The coefficient of t^2 is the factor $3xp$.
- The coefficient of x is the factor $3t^2p$.
- The coefficient of t is the factor $3xtp$.

Exercise 2 Consider the expression $-2\sqrt{3}\,ux^3y$.

Part (a) What is the coefficient of y ?

Part (b) What is the coefficient of x^3?

Part (c) What is the coefficient of u ?

Part (d) What is the coefficient of x ?

⭐ *Like terms* --- When two or more terms in a sum or difference contain the same factor, we refer to them as like terms with respect to this particular factor. The particular factor we are focusing on is often called a common factor of the like terms.

In the expression $4y - 3yt + 9t + 5$, we see that

- $4y$ and $-3yt$ are like terms with respect to the factor y. Combining these like terms gives us the expression
$$(4 - 3t)y + 9t + 5$$

- $-3yt$ and $9t$ are like terms with respect to the factor t. Combining these like terms gives us the expression
$$4y + (9 - 3y)t + 5$$

Exercise 3 Consider the expression $3x + 5tx + 8$. Rewrite this expression by combining the like terms with respect to x.

Exercise 4 Consider the expression $11yt + \sqrt{5}\,py - 7p$.

Part (a) Rewrite this expression by combining the like terms with respect to y.

Part (b) Rewrite this expression by combining the like terms with respect to p.