## Algebra 2 - Core Concept Cheat Sheet

### 01: Introduction to Algebra 2

#### Algebra Key Concepts

- **Algebra**: a branch of mathematics in which symbols represent numbers or quantities and express relationships that hold for all members of a set.
- **Algebraic equation**: a method to describe the relationship between natural events in mathematical form.
- **Equation**: a mathematical relationship in which two expressions are joined with an equal sign.
- **Expression**: a combination of constants, operators, and variables representing numbers or quantities.
- **Function**: a relation where each element of the first set corresponds to exactly one element of the second set.
- **Graph**: a method to describe the relationship between natural events by analyzing curves in a coordinate system.
- **Relation**: any set of ordered pairs.
- **Variable**: a symbol or letter used to represent an unknown quantity.

#### How to Study Algebra

VANG is an acronym to help you remember the four ways an algebraic situation can be represented.

- **Verbally** (with words)
  
  *Example*: Maureen is two years older than Amy.

- **Analytically/Algebraically** (with symbols)
  
  *Example*: \( m = a + 2 \)

- **Numerically** (with numbers)
  
  *Example*: When Amy was 4, Maureen was 6.  
  When Amy was 7, Maureen was 9.  
  When Amy was 11, Maureen was 13.  
  When Amy was 12, Maureen was 14.

- **Graphically** (with charts or graphs)
  
  *Example*:

#### Differences: Algebra vs. Other Math Courses

Some differences between algebra and other math courses include:

- Algebra is more abstract than previous courses.
- Since mastery of basic concepts is necessary to progress through the course, Algebra might require more practice than previous courses.
- Algebra is the basis for all future courses involving mathematics.

#### Topics Covered

Some of the topics that appear in Algebra are:

- **Quadratic Equations**: one variable where the highest degree is 2; for example, \( 2y^2 + 5 = 0 \).
- **Radical Equations**: the variable is under a square root symbol called a "radical sign"; for example, \( \sqrt{2x} = 9 \).
- **Rational Equations**: the variable is in the denominator of a rational expression; for example, \( \frac{3}{2x-1} = 17 \).
- **Exponential Equations**: the variable is in the exponent; for example, \( 2^{x+1} = 5 \).
- **Logarithmic Equations**: the inverse of exponential equations; the variable is in the value of the log; for example, \( \log_7(x + 5) = 3 \).
- **Conic Sections**: curves created from the intersection of a double right cone and a plane. The conic sections are: parabola, circle, ellipse, and hyperbola.
- **Probability**: the likelihood that an outcome occurs; is always between 0 and 1.
- **Statistics**: the analysis and interpretation of numerical data.
- **Sequences**: an ordered set of elements that can be put into a one-to-one correspondence with the set of positive integers.
- **Series**: the sum of the terms of a sequence of real numbers.
- **Trigonometry**: the measurement of triangles; the trigonometric functions are: sine, cosine, tangent, cosecant, secant, and cotangent.

#### Tips for Success in Algebra

- Represent relationships between natural events verbally, analytically, numerically, and graphically (VANG).
- Strive to understand the meaning of variables and basic mathematical principles.
- Work on Algebra problems with others.
- Expect and embrace challenging problems that require a deeper understanding and multiple steps.
- Do not just read through example problems, work them out yourself!
- Be patient while learning fundamental algebra skills – you’ll value them later.
- Find 2-5 people who are reliable and study weekly with them.
- Continue to solve practice problems!

#### Similarities: Algebra vs. Other Math Courses

Some similarities between Algebra and other math courses include:

- Material is rigidly structured
- What you have learned in the past is built upon
- What you learn now will be used later

**How to Use This Cheat Sheet**: These are the key concepts related this topic. Try to read through it carefully twice then rewrite it out on a blank sheet of paper. Review it again before the exam.