# 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.**

- **V**erbally (with words)

  *Example:* Maureen is two years older than Amy.

- **A**nalytically/Algebraically (with symbols)

  *Example:* $m = a + 2$

- **N**umerically (with numbers)

  *Example:* When Amy was 4, Maureen was 6.

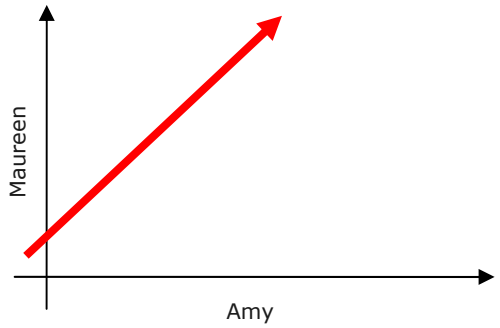
  When Amy was 7, Maureen was 9.

  When Amy was 11, Maureen was 13.

  When Amy was 12, Maureen was 14.

- **G**raphically (with charts or graphs)

  *Example:*




## 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

## 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!

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.