

# Introductory Algebra

Instructor: Anthony Zhang

Semi-Weekly Classes on Monday and Friday, 7:00 PM EST

## Course Description

This course is aimed towards middle school to high school students who wish to gain an understanding of algebra. It will focus on problem solving skills, which will be useful in not only later courses, but also competition math. We will begin by reviewing the basic operations and their rules, and then move on to higher level concepts such as equations, inequalities, exponents, and complex numbers. After completing this course, students will have a strong foundation in algebra, which will assist them in harder mathematic courses, as well as other areas of mathematics such as geometry.

## Meeting Agenda

Start Date: 8/13

End Date: 10/11

Meeting 1: Basic Operations and their Rules

- Order of Operations
- Distribution and Factoring
- Equations
- Exponents and Radicals

Meeting 2: The Variable,  $x$ , and Expressions

- Introduction to Variables
- Expressions with Variables
- Changing Expressions

Meeting 3: Ratios and Proportions

- Ratios
- Conversions
- Percents
- Proportions
- Rate

Meeting 4: One Variable Linear Equations

- Solving Linear Equations
- Word Problems with Linear Equations

Meeting 5: Multi-Variable Linear Equations

- Evaluation of Multi Variable Expressions
- Distribution and Factoring
- Fraction Expressions
- Equations

Meeting 6: Linear Inequalities

- Inequalities Background

- Linear Inequalities
- Graphing Inequalities
- Optimization Problems

#### Meeting 7: Quadratic Equations

- Introduction to Quadratics
- Factoring Quadratics
- Properties of Roots

#### Meeting 8: Advanced Quadratic Equations

- Squares of Binomials
- Completing the Square
- Quadratic Formula

#### Meeting 9: Graphs

- Lines and Cartesian Plane
- Linear Equations
- Slope and Intercepts
- Line Comparison
- Parabolas
- Circles

#### Meeting 9: More Inequalities

- Quadratic Inequalities
- Other Inequalities
- Trivial Inequality

#### Meeting 10: Expression Factorization

- Squares of Binomials
- Difference of Squares
- Sum and Difference of Cubes
- Rationalizing the Denominator
- Simon's Favorite Factoring Trick

#### Meeting 11: Functions

- Background: What is a Function?
- Function Combination
- Inverse Functions
- Function Operations

#### Meeting 12: Complex Numbers:

- Introduction
- Imaginary Numbers
- Complex Numbers

#### Meeting 12: Graphing Functions

- Introduction
- Transformations

- Inverse Functions

Meeting 13: Polynomials

- Introduction
- Addition and Subtraction
- Multiplication

Meeting 14: Exponents and Logarithms

- Exponents
- Logarithms
- Real Life Applications

Meeting 15: Special Functions

- Radicals
- Absolute Value
- Floor and Ceiling
- Rational Functions
- Piecewise Functions

Meeting 16: Sequences and Series

- Arithmetic Sequences and Series
- Geometric Sequences and Series
- Telescoping

Meeting 17: Special Techniques

- Exponentiating Equations
- Self Similarity
- Symmetry

Meeting 18: Finale and What's Next

- Short Summary of Course
- Discussion of Higher Math Levels