Algebra 1, Part 2
Course Outline & Objectives

Course Description:

In Algebra 1 Part 2, students will learn to work with exponents and polynomials. They will learn factoring techniques and will solve for and graph quadratic functions. They will also learn to identify and solve rational functions and equations, as well as radical and exponential functions. Students will learn the basics of statistics and data analysis.

Credits - One Semester (0.5 Carnegie unit / CA: 5 credits) | Prerequisites: Algebra 1, Part 1

Course Outline

Unit 1: Exponents and Polynomials

1.1 Integer Exponents
1.2 Powers of 10 and Scientific Notation
1.3 Multiplication Properties of Exponents
1.4 Division Properties of Exponents
1.5 Fractional Exponents
1.6 Polynomials
1.7 Adding and Subtracting Polynomials
1.8 Multiplying Polynomials
1.9 Special Products of Binomials

Common Core Standards

In Unit 1 students will learn:
To explore and study integer exponents, including both positive and negative exponents, and how to recognize growth and decay patterns for each.
How to recognize the power of a negative exponent to result in the inverse of its base and the implications of a graph of both positive and negative exponents.
How to understand powers of 10 and how to use and understand scientific notation, applying scientific notation to figures from real life scenarios.
How to understand and exercise multiplication and division properties of exponents, and how to readily exchange fractional exponents into root form and simplify them.
How to simplify like terms, and how to add and subtract polynomials as well as how to multiply polynomials.
How to find special products of binomials.
[N-RN, A-SSE, A-APR, A-CED, F-LE]

Unit 2: Factoring Polynomials

2.1 Factors and Greatest Common Factors
2.2 Factoring by Greatest Common Factor (GCF)
2.3 Factoring $x^2 + bx + c$
2.4 Factoring Special Products
2.5 Choosing a Factoring Method

In Unit 2 students will learn:
How to incorporate the understanding of multiplying and dividing polynomials into factoring polynomials, and how to master the reverse process of "undoing" the FOIL method, as well as other factoring techniques.
How to identify the greatest common factors and factor using the GCF.
To become fluent in identifying and factoring trinomials as well as special products, including the difference of square, difference and sum of cubes.
How to quickly and efficiently determine the appropriate factoring method for the various factoring problems.
[A-SSE A-APR]

Course Outline

Unit 3: Quadratic Functions and Equations

3.1 Quadratic Equations and Functions
3.2 Characteristics of Quadratic Functions
3.3 Graphing Quadratic Functions
3.4 Solving Quadratic Equations by Graphing
3.5 Solving Quadratic Equations by Factoring
3.6 Solving Quadratic Equations by Using Square Roots
3.7 Solving Quadratic Equations by Completing the Square
3.8 The Quadratic Formula
3.9 The Discriminant

Common Core Standards

In Unit 3 students will learn:

To recognize the symmetric trends of quadratic functions and how to solve quadratic equations.

How to analyze and comprehend the characteristics of quadratic functions, including the identification of the vertex, the axis of symmetry, and the x and y intercepts.

How to identify graphs of quadratic functions from their key characteristics and how to graph them using only the equation.

How to solve quadratic equations using the graphing, factoring, square roots, and completing the square methods.

To understand that there are three alternatives to quadratic equations; one solution, two solutions, and no solutions.

How to use the quadratic formula to solve quadratics, and how to use the discriminant to identify the nature of the roots.

[N-Q, A-SSE, A-CED, A-REI , F-IF, F-BF, F-LE]

Unit 4: Rational Functions and Equations

4.1 Inverse Variation
4.2 Graphing Rational Functions
4.3 Simplifying Rational Expressions
4.4 Multiplying and Dividing Rational Expressions
4.5 Adding and Subtracting Rational Expressions
4.6 Dividing Rational Polynomials
4.7 Solving Rational Equations

In Unit 4 students will learn:

To identify the types of variation from real life scenarios, including both direct and inverse variation, and how to master writing variation equations to use for modeling outcomes.

To solve rational functions and how to become fluent at simplifying rational expressions.

How to multiply and divide rational expressions and use these skills, as well as how to add and subtract rational expressions to solve for solutions.

How to divide rational polynomials and how to solve rational expressions involving complex polynomials.

[N-Q, A-SSE, A-APR, A-REI , F-IF, S-ID]

Unit 5: Radical and Exponential Functions

5.1 Square-Root Functions
5.2 Radical Expressions
5.3 Computations with Radical Expressions
5.4 Solving Radical Equations
5.5 Geometric Sequence
5.6 Exponential Functions
5.7 Comparing Exponential Models to Linear and Quadratic Models

In Unit 5 students will learn:

The fundamental characteristics of square root functions, including domain and range restrictions.

To recognize basic functions of radical expressions, including how to simplify, add, and subtract them.

How to solve radical equations by performing reverse operations to isolate the variable.

To recognize geometric sequences, including their growth or decay patterns, and their graphs.

To understand exponential functions and how to differentiate between linear, quadratic, and exponential models.

[N-Q, A-CED, A-REI, F-IF, F-LE, S-ID]

Course Outline

Unit 6: Statistics and Data Analysis

6.1 Mean, Median, Mode, Range, and Standard Deviation

6.2 Box and Whisker Plot

6.3 Distributions-Right, Left and Zero Skewed

6.4 Quantitative vs. Qualitative Data

6.5 Scatter Plots and Trend Lines

Common Core Standards

In Unit 6 students will learn:

Some of the basic concepts of statistics and data analysis, including the mean, median, mode, range and standard deviation. These measures of central tendency will be used to analyze data. Students will learn when which measure is appropriate to use. Students will use distribution tables and graphs to analyze data to determine how data is skewed. Students will learn the different categories of data and how to use graphical analysis to look for trends in data and make predictions.

[ID - A, CED-A, LE - A]