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, Radicals, and Rational Expressions

1.1 Multiplication Properties of Exponents
1.2 Division Properties of Exponents
1.3 Zero and Negative Exponents
1.4 Perfect Squares and Cubes
1.5 Simplifying Radical Expressions
1.6 Rational and Radical Multiplication and Division
1.7 Rational and Radical Addition and Subtraction

Common Core Standards

In Unit 1 students will:
Apply the rules of exponents to simplify expressions with positive, zero, and negative exponents.
Simplify perfect squares, cubes, and radical expressions using various methods.
Convert between radical and rational exponent forms and perform operations with both.
Multiply, divide, add, and subtract radical and rational expressions, including binomials and conjugates.
Use exponent and radical rules to simplify and evaluate complex algebraic expressions.
[A-APR, N-RN]

Unit 2: Exponential Functions

2.1 Rates of Change in Exponential Functions
2.2 Writing and Graphing Exponential Models
2.3 Exponential Growth
2.4 Exponential Decay
2.5 Linear vs Exponential
2.6 Arithmetic Sequences
2.7 Geometric Sequences

In Unit 2 students will:
Identify, write, and graph exponential functions representing growth and decay.
Calculate rates of change and compare linear and exponential relationships.
Solve real-world problems using exponential models and formulas.
Analyze arithmetic and geometric sequences and write explicit formulas for each.
Distinguish between additive and multiplicative patterns in tables, graphs, and contexts.
[A-CED, A-SSE, F-IF, F-BF, F-LE]

Course Outline

Unit 3: Polynomials

3.1 Adding and Subtracting Polynomials
3.2 Multiplying Polynomials
3.3 Special Products of Binomials
3.4 Factoring by Greatest Common Factor (GCF)
3.5 Factoring Quadratic Trinomials
3.6 Factoring Special Products
3.7 Dividing Rational Polynomials

Common Core Standards

In Unit 3 students will:
Add, subtract, and multiply polynomial expressions, including using the FOIL method and special products.
Apply factoring techniques such as factoring out the GCF, factoring trinomials, and recognizing special products like perfect square trinomials and differences of squares.
Solve geometric problems involving area using polynomial expressions.
Divide polynomials by monomials and binomials, including factoring and simplifying rational expressions.
Identify standard form, degree, leading coefficient, and classification of polynomials by terms and degree.
[A-APR, A-SSE]

Unit 4: Quadratic Functions and Equations

4.1 Introduction to Quadratic Functions and Equations
4.2 Graphing Quadratic Functions
4.3 Solving Quadratic Equations by Graphing
4.4 Solving Quadratic Equations by Factoring
4.5 Solving Quadratic Equations by Using Square Roots
4.6 Solving Quadratic Equations by Completing the Square
4.7 The Quadratic Formula
4.8 The Discriminant
4.9 Systems of Linear-Quadratic Equations
4.10 Comparing Linear, Quadratic, and Exponential Models

In Unit 4 students will:
Explore quadratic functions in different forms—standard, vertex, and factored—and learn to identify key features such as vertex, axis of symmetry, and direction of opening.
Graph quadratic functions and describe transformations from the parent function.
Solve quadratic equations using graphing, factoring, square roots, completing the square, and the quadratic formula.
Use the discriminant to determine the number of real solutions to a quadratic equation.
Analyze and solve systems that include linear and quadratic equations and compare quadratic models with linear and exponential ones.
[A-SSE, A-CED, A-REI, F-IF, F-LE]

Unit 5: Statistics and Data Analysis

5.1 Quantitative and Qualitative Data
5.2 Measures of Center and Spread
5.3 Representing Univariate Data
5.4 Two-Way Frequency Tables
5.5 Scatterplots and Linear Relationships
5.6 Trend Lines and Interpreting Linear Models
5.7 Line of Best Fit and Evaluating Linear Models

In Unit 5 students will:
Classify data as quantitative or qualitative, and understand concepts like sample, population, and types of variables.
Calculate and interpret measures of center and spread, including mean, median, mode, range, IQR, and standard deviation.
Represent and analyze univariate data using visual tools such as dot plots, box plots, histograms, bar graphs, and pie charts.
Create and interpret two-way frequency tables and calculate joint, marginal, and conditional relative frequencies.
Analyze scatterplots, fit and interpret linear models, assess model accuracy using residuals, and distinguish between correlation and causation.
[S-ID]