Integrated Math 2, Part 1
Course Outline & Objectives

Course Description:
This Integrated Math course builds on students' understanding of the foundations of Algebra and Geometry. In Integrated Math 2 Part 1, students explore characteristics of various types of functions, including absolute value, quadratic, and exponential functions. They learn how to perform operations on polynomials, and they apply it to solving quadratic equations. Lastly, students apply algebraic skills to the context of modeling Geometric relationships.

Credits - One Semester (0.5 Carnegie unit / CA: 5 credits) | Prerequisites: Integrated Math 1

Course Outline

Unit 1 – Characteristics of Functions

1.1 Absolute Value Functions
1.2 Direct and Inverse Variation Functions
1.3 Inverse Functions
1.4 Properties of Exponents
1.5 Radical and Rational Exponents
1.6 Exponential Functions

Common Core Standards

In this unit:
Students will learn about a variety of functions and methods for identifying them. The absolute value function is a function where all the output values are positive. They will use variation functions to describe either a direct proportional relationship between variables or an inverse relationship, that as one increases, the other decreases by a constant proportion. An inverse function is a function that "undoes" the original function. Students will explore functions with positive, negative and rational exponents as well as exponential functions.

N.RN.1, N.RN.2, A.SSE.2, A.SSE.3, A.CED.1, F.IF.1, F.IF.4

Unit 2 – Polynomial Operations

2.1 Adding/Subtracting Polynomials
2.2 Multiplying Polynomials
2.3 Special Polynomials
2.4 Factor $x^2 + bx + c$
2.5 Factor $ax^2 + bx + c$
2.6 Factoring Special Products
2.7 Factoring Polynomials Completely
2.8 Solving Polynomial Equations

In this unit:
Students will explore polynomial functions and equations. Polynomial expressions have similar properties to the real numbers and can be added, subtracted, multiplied and divided. When solving polynomial equations, students will learn to factor special polynomials, simple and complex quadratic equations, and apply special formulas.

A.SSE.2, A.APR.1, A.APR.3, A.SSE.2, A.APR.1

Course Outline

Unit 3 – Graphing Quadratic Functions

3.1 Graphing Parabolas Standard Form
3.2 Graphing Parabolas with Vertical Shifts and in Vertex Form
3.3 Graphing Parabolas in factored form: $f(x) = a(x – p)(x – q)$
3.4 Comparing Linear, Exponential, and Quadratic Functions

Common Core Standards

In this unit:
Students will learn that a quadratic function has a special shape, and the leading coefficient determines if the quadratic opens upward or downward. The unit will explore graphing the parent function and graphing a quadratic in different forms. Students will transform parent functions using vertical and horizontal shifts in quadratics and use vertex and focus to write functions. Students will revisit functions and compare linear, quadratic and exponential functions with the new information they have acquired.

A.SSE.3, F.IF.3,F.IF.5, F.IF.7, F.IF.8, F.LE.1

Unit 4 – Solving Quadratic Equations

4.1 Properties of Radicals
4.2 Solving Quadratic Equations by Graphing
4.3 Solving Quadratic Equations by Using Square Roots
4.4 Solving Quadratic Equations by Completing the Square
4.5 Solving Quadratic Equations by Using the Quadratic Formula
4.6 Solving Quadratic Equations with Complex Solutions

In this unit:
Students will focus on solving quadratic equations that can not be factored. They will learn simplification and operations with radicals as a foundation to solving equations by completing the square and the quadratic formula. Students will learn to derive the quadratic formula and use it to solve equations with complex solutions.

A.REI.4, A.APR.1, A.APR.3, A.CED.1, A.SSE.3

Unit 5 – Relationship within Triangles

5.1 Proving Geometric Relationships
5.2 Perpendicular Bisectors and Circumcenter
5.3 Angle Bisectors and Incenter
5.4 Medians and Altitudes of Triangles
5.5 The Triangle Mid Segment Theorem
5.6 Indirect Proof and Inequalities in One Triangle
5.7 Inequalities in Two Triangles

In this unit:
Students will learn about the triangle, a foundational polygon in Geometry. They will study geometric relationships of triangles such as perpendicular bisectors, circumcenter, medians, altitudes and more. Students will apply the Triangle Midsegment Theorem and other theorems and relationships to create models of real-world problems.

A.CED.4, G.CO.9, G.CO.10, G.SRT.4, G.SRT.5