Course Title: Algebra 2

Course #: 1431-1432

Course Description: Algebra 2 completes the CCHS Algebra requirement. Students learn to solve polynomial equations utilizing the Fundamental Theorem of Algebra, rational, exponential, and logarithmic functions, and introductory trigonometry. This course is designed to prepare students for Pre-Calculus (not Honors Pre-Calculus).

UC/CSU Approval: “C” approved

Grade Level: 9-12

Estimated Homework Per Week: 1-3 hours per week

Prerequisite: Completion of Geometry H, Geometry or Geometry B with a grade of “C” or higher

Recommended Prerequisite Skills:

Solving linear equations including
- Order of Operations
- Distributive Property
- Evaluating Algebraic Expressions
- Simplifying Algebraic Expressions
- Solving Equations with Distributive Property
- Fractions, and Solving Equations with Variables on Both Sides
- Analyze and solve systems of linear equations in two variables.

Graphing and writing equations of lines
- Graphing Using a Table of Values
- Calculating and graphing slope
- Using Slope Intercept and Point slope Form
- Writing Equations in Slope-Intercept Form
- Writing Equations in Standard Form

Exponents
- Laws of Exponents
● Multiplying and Dividing Monomials

Quadratic Equations
● Square Roots - Simplifying square roots into simplest form
● Solving Quadratic Equations by Factoring
● Solving Quadratic Equations using Quadratic Formula

Standards for Mathematical Practice
● Make sense of problems and persevere in solving them.
● Reason abstractly and quantitatively.
● Construct viable arguments and critique the reasoning of others.
● Model with mathematics
● Use appropriate tools strategically.
● Attend to precision.
● Look for and make use of structure.
● Look for and express regularity in repeated reasoning

Course Grade Scale:
● Homework: 15%
● Quizzes: 25%
● Tests: 40%
● Final: 20%

Major Assessments:
Students are assessed with one or two quizzes and a test each Chapter. Each semester concludes with a cumulative final exam.

Units/Topics:

1st Semester
Review of Algebra 1 Topics: Algebra 1 fundamentals are reviewed. It is assumed the students have learned these topics in Algebra 1, but we review solving linear equations, graphing linear functions using slope and intercept, x and y-intercepts, or a table of values. Students are expected to write the equation of straight lines in slope-intercept form given a point and the y-intercept, a point and the slope, or two points. Systems of linear equations are solved by graphing, substitution, and elimination. Students are introduced to the graphs of absolute value functions in vertex form.

Chapter 2: Quadratics Lessons 2.1-2.7, Complex Number Operations Lessons 2.9
Students will graph and identify the vertex of quadratic function in vertex and standard form. Quadratic equations will be solved by factoring, square roots, completing the square, and the Quadratic Formula.
Chapter 3: Polynomials Lessons 3.1.-3.7
Students will add, subtract, multiply and divide polynomials. Students will solve polynomial equations by factoring and using synthetic division. Students will apply the Fundamental Theorem of Algebra and its corollary to understand the number and nature of the roots. Students will understand the basic shape and end behavior of both odd degree and even degree functions.

Chapter 5: Rational and Radical Functions Lessons 5.1 – 5.5
Students will simplify, multiply, divide, add and subtract rational expressions. Rational equations will be solved and extraneous roots identified. Graphs of rational functions will be created by finding horizontal and vertical asymptotes and any holes in the graph.

2nd Semester
Chapter 5: Rational Functions Lessons 5.6 – 5.8
Students will graph radical functions (square root and cube root). Radical equations will be solved and students will also solve radical equations with rational exponents.

Chapter 4: Exponentials/Logs Lessons 4.1-4.7
Students will understand the differences between exponential growth and decay, model situations with algebraic functions, and graph each. Students will understand how to express exponential relationships as logarithms. Logarithmic expressions will be expanded and compressed. Exponential and Logarithmic equations will be solved by using inverse operations or re-expressing the exponential as a logarithm or vice versa.

Mathematical Modeling: Lessons 2.8, 3.9, 4.8, 6.7
Students will look at real data sets and model relationships with lines of best fit using linear regression. Non-linear modelling will allow students to model relationships with power functions or exponential functions. Students will have to understand how to determine which model is best, explain why they chose to model the relationship with a particular type of function, and interpret values within the functions.

Chapter 9: Sequences/Series Lessons 9.1-9.5
Students will look for patterns in sequences and model the pattern with an algebraic function if the pattern displays an arithmetic or geometric sequence. Students will calculate partial sums of arithmetic and geometric series and calculate sums of infinite geometric series if the series converges.

Chapter 10: Trigonometry Lessons 10.1-10.4
Students will use the sine, cosine, and tangent ratios (and their reciprocals) to solve right triangles. Students will use the unit circle or reference triangles to find exact trig function values for all angles that are multiples of 30-degree and 45-degree angles. Students will use the Law of Sines and the Law of Cosines to solve triangles that are not right triangles.