Algebra II – HS/Part A

COURSE DESCRIPTION: This course builds upon algebraic concepts covered in Algebra. Students extend their knowledge and understanding by solving open-ended problems and thinking critically. Topics include functions and their graphs, quadratic functions, inverse functions, advanced polynomial functions, and conic sections. Students are introduced to rational, radical, exponential, and logarithmic functions; sequences and series; data analysis; and matrices.

PREREQUISITES: Successful completion of Algebra I and Geometry

COURSE LENGTH: One Semester

REQUIRED TEXT: No required textbook for this course.

MATERIALS LIST:

Algebra II: A Reference Guide and Problem Sets
NOTE: List subject to change

COURSE OUTLINE:

Unit 1: Numbers, Expressions, and Equations

In this unit, students review the order of operations, set definitions, properties of the real number system, and other symbols and terminology. Various strategies for solving linear and absolute value equations are introduced, as are strategies for using formulas to solve real-world applications

- Semester Introduction
- Foundations for Unit 1
- Sets of Numbers
- Number Lines and Absolute Value
- Number Properties
- Evaluating Expressions
- Solving Equations
- Solving Absolute Value Equations
- Applications: Formulas

Unit 2: Linear Equations and Systems

Representations and applications of linear relationships are the focus of this unit. Students interpret and create graphs, tables, and equations that represent linear relationships. In addition to simple linear equations, students also use systems of linear equations to solve real-world problems.

- Foundations for Unit 2
- Graphs of Lines
- Forms of Linear Equations
- Writing Equations of Lines
- Applications: Linear Equations
- Systems of Linear Equations
- Applications: Linear Systems

Unit 3: Functions

Students explore real-world situations regarding input and output, learn how to graph equations, and differentiate between functions and relations. Functions that are covered include some that are continuous, discontinuous, and discrete-valued. Step functions such as the least and greatest integer functions are introduced. Students learn to estimate and calculate domains and ranges of functions and to compose complicated functions from simpler ones. Students learn to express situations in function notation, calculate domains and ranges, and write sums, differences, products, quotients, and compositions of functions.

- Foundations for Unit 3
- Function Basics
- Function Equations
- Absolute Value Functions
- Piecewise Functions
- Step Functions
- Function Operations
- Function Inverses

Unit 4: Inequalities

In this unit, students solve and graph linear inequalities in one variable including conjunctions, disjunctions, and absolute value inequalities. Students also solve and graph inequalities in two variables and systems of inequalities in two variables.

- Foundations for Unit 4
- Inequalities in One Variable
- Compound Inequalities

- Absolute Value Inequalities
- Inequalities in Two Variables
- Systems of Linear Inequalities

Unit 5: Polynomials and Power Functions

Students learn to identify, evaluate, graph, and write polynomial functions. They review adding, subtracting, and multiplying polynomials as well as algebraic factoring patterns. Students use these patterns and the zero product property to solve polynomial equations. Additionally, students graph power functions and identify the end behavior of various members of the power function graph family.

- Foundations for Unit 5
- Working with Polynomials
- Multiplying Polynomials
- Factoring Patterns
- Solving Polynomial Equations
- Power Functions

Unit 6: Rational Equations

Students learn to add, subtract, multiply, and divide rational expressions. Students learn to simplify compound fractions and solve rational equations. They also explore graphs and end behavior of rational functions including asymptotes and zeros.

- Foundations for Unit 6
- Dividing Monomials and Polynomials
- Operations with Rational Expressions
- Compound Fractions
- Solving Rational Equations
- Reciprocal Power Functions
- Graphing Rational Functions

Unit 7: Radicals and Complex Numbers

Students learn to identify, add, subtract, multiply, and divide radicals, and to factor out perfect squares. Students solve real world problems involving applications of radical equations and convert between rational exponent and radical form of an expression. They learn to identify, graph, find the modulus of, add, subtract, multiply, and divide imaginary and complex numbers.

- Foundations for Unit 7

- Simplifying Radical Expressions
- Fractional Exponents and Higher Roots
- Solving Radical Equations
- Imaginary Numbers
- Complex Numbers

Unit 8: Quadratic Functions

Students learn how to graph quadratic functions and identify the equations of quadratic functions when given a graph. Students also use the zero product property, completing the square, and the quadratic formula to solve quadratic equations. They explore the Quadratic Formula and how factors of quadratic polynomials relate to x-intercepts of graphs of quadratic functions. Applications include projectile motion, geometry, and other areas.

- Foundations for Unit 8
- Graphing Quadratic Functions
- Properties of Quadratic Functions
- Solving Quadratic Equations
- Applications: Quadratic Functions

Unit 9: Semester Review and Test

- Semester Review
- Semester Test