

LIVE Online Math Algebra II Scope and Sequence

The course is broken down into units. The units, and lessons that make up each unit, are below.

Note: If there is a specific concept/technique that is not listed, please [contact us](#) to see if it is part of the course. Specific content is not always readily identifiable simply from the title of a lesson.

Unit 1: Equations and Inequalities

The primary purpose of Unit 1 is to re-orient students with algebraic thinking that was a large part of Algebra 1. Since most students take Geometry in between Algebra 1 and Algebra II, this unit serves as a necessary review. Topics covered include algebraic properties, solving equations/inequalities techniques, and working with absolute value equations and inequalities.

Lesson 1: Math Fundamentals

Lesson 2: Measures of Central Tendency and Weighted Average

Lesson 3: Solving Equations

Lesson 4: Solving and Graphing Inequalities

Lesson 5: Absolute Value Equations

Lesson 6: Compound Inequalities and Absolute Value Inequalities

Unit 2: Linear Equations and Functions

Unit 2 continues to connect to Algebra 1 content by refreshing students on the basics of linear equations. Foundational concepts such as slope, $y = mx + b$, and reading/writing graphs will be covered. New content (such as "step functions") is introduced as well. One area of emphasis for this unit is using mathematical tools to model real life situations.

Lesson 1: Functions Basics (Part 1)

Lesson 2: Functions Basics (Part 2)

Lesson 3: Linear Equations

Lesson 4: Scatter Plots

Lesson 5: Piecewise Functions

Lesson 6: Linear and Absolute Value Inequalities

Unit 3: Systems of Linear Equations and Inequalities

Linear Systems is the next logical topic after working with linear equations (Unit 2) and the traditional methods of solving Linear Systems are explored. Students also gain practice with graphing linear equations through graphically solving systems of linear equations. The second half of the unit focuses on a technique called "Linear Programming" which has several real life applications. The unit ends with lessons on solving systems of equations in three variables and 3D graphing.

Lesson 1: Linear Systems Basics

Lesson 2: Substitution and Elimination

Lesson 3: Systems of Linear Inequalities

Lesson 4: Linear Programming

Lesson 5: Applications of Linear Programming

Lesson 6: 3D Graphing

Lesson 7: Solving Systems of Equations in Three Variables

Unit 4: Polynomial Basics, Factoring, and Introduction to Matrices

Most of the work in Unit 4 is aimed at giving students various skills that will be applicable in other units later in the course. Specifically, factoring is a vital skill to have that will pop up several times in the future. Several ways of factoring are reviewed from Algebra 1 and a couple new ways are introduced as well. Introductory concepts related to matrices will happen as time permits.

Lesson 1: Exponent Laws

Lesson 2: Dividing Polynomials

Lesson 3: Factoring (part 1)

Lesson 4: Factoring (part 2)

Additional Lesson: Matrices Basics (see below for more information about matrices)

Unit 5: Radicals and Exponents

There is an intrinsic link between radicals and exponents that is discovered and worked with during this unit. Students will get a thorough grounding in radical expressions, rational exponents, complex numbers, and more. The value i will be introduced and students will begin to think beyond the bounds of the real number system.

Lesson 1: Indices of Radicals and n^{th} Root

Lesson 2: Operations with Radicals and Simplifying Radicals

Lesson 3: Fractional Exponents

Lesson 4: Solving Radical Equations

Lesson 5: Imaginary and Complex Numbers

Lesson 6: Working with and Graphing Complex Numbers

Unit 6: Quadratic Functions and Inequalities

All of the concepts related to quadratics that were introduced in Algebra 1 are revisited in this unit. However, they are explored in more depth. New ideas related to quadratics (such as the "directrix" and the "sum and product of roots") are introduced as well giving students a complete understanding of quadratic equations, inequalities, and their respective graphs.

Lesson 1: Quadratic Basics and Parabolas

Lesson 2: Solving Quadratics by Factoring

Lesson 3: Solving Quadratics by Completing the Square

Lesson 4: Solving Quadratics Using the Quadratic Formula and the Discriminant

Lesson 5: Sums and Products of the Roots of Quadratics

Lesson 6: Completed Square/Vertex Form and Writing Quadratic Equations

Lesson 7: Quadratic Inequalities in One and Two Variables

Unit 7: Polynomial Functions

Working with various kinds of polynomials as an essential part of Algebra II and that is what Unit 7 is all about. Several concepts related to polynomial functions are introduced including the "Remainder and Factor Theorems", composition of functions, and inverse functions. Students will also discover the relationship between the degree of a polynomial and how many "zeros" it has. This is one of the heaviest (and most important) units in the course.

Lesson 1: Composition of Functions

Lesson 2: Inverse Functions/Relations

Lesson 3: Square Root Functions and Inequalities

Lesson 4: Polynomial Functions and Their Roots (Zeros)

Lesson 5: The Remainder Theorem and Finding Zeros (Part 1)

Lesson 6: Finding Zeros (Part 2) and Writing Polynomial Functions

Lesson 7: Applying Quadratic Techniques to Polynomials

Unit 8: Rational Expressions, Rational Equations, and Normally Distributed Data

In Unit 8, students will get a thorough treatment of applying the four main arithmetic operations to rational expressions. They will also investigate the relationship between a given rational expression and *why* the graph of the expression looks the way it does. Direct, Inverse, and Joint Variation are also explored. The unit ends with a couple lessons on concepts related to statistics: Standard deviation and the "Bell Curve".

Lesson 1: Graphing and Interpreting Rational Functions

Lesson 2: Direct, Inverse and Joint Variation

Lesson 3: Rational Expressions: Simplifying, Multiplying, and Dividing

Lesson 4: Rational Expressions: Adding and Subtracting

Lesson 5: Solving Rational Equations and Solving Systems of Rational Equations by Graphing

Lesson 6: Bell Curves, Standard Deviation, and Normal Distribution of Data

Unit 9: Conic Sections

Conic sections are one of the coolest (my opinion, of course) parts of Algebra II. Parabolas, circles, ellipses and hyperbolas will all be explored in an introductory fashion. While this is usually a Pre-Calculus topic, it is valuable to give students exposure to this content now. It is also a nice change of pace at this point in the course. Additionally, students will learn why they are called "Conic Sections" and the unit wraps up with a lesson on solving systems of Conic Sections.

Lesson 1: Conic Section Introduction and Parabolas

Lesson 2: Circles

Lesson 3: Ellipses (centers at $(0, 0)$)

Lesson 4: Hyperbolas (centers at $(0, 0)$)

Lesson 5: Shape Shifters (how changing parts of an equation effect the look/position/orientation of a graph) and Hyperbolas and Ellipses with Centers Not on $(0, 0)$

Lesson 6: Solving Complex Systems of Equations

Unit 10: Exponential and Logarithmic Functions

Logarithms are an essential part of Algebra II and a complete introduction to logarithms and their properties occurs in Unit 10. The natural connection to exponential functions is also discovered and worked with. Common topics such as logarithm properties, natural logarithms and "e", and solving exponential functions are all covered in full. The unit ends with a lesson on "Logistics Growth Model" which tends to be a more practical model of growth than the exponential growth model.

Lesson 1: Introduction to Exponential Functions

Lesson 2: Introduction to Logarithms and Converting Logarithms to Exponents (and vice versa)

Lesson 3: Properties of Logarithms

Lesson 4: Common and Natural Logarithms ("e") and Change of Base Formula

Lesson 5: Solving Exponential Functions Using Logarithms

Lesson 6: Exponential Growth and Decay

Lesson 7: Logistics Growth Model

Unit 11: Sequences, Series, and Discrete Mathematics

Unit 11 is broken into two main parts. The first part focuses on Arithmetic and Geometric Sequences and Series. Lesson 4 specifically focuses on the Binomial Theorem, which has applications in various other parts of math. The second part focuses on concepts such as combinations and permutations. Probability is also incorporated into the second half of the unit in a way that allows students to solve real life problems that require the use of a variety of skills.

Lesson 1: Arithmetic Sequences and Series

Lesson 2: Geometric Sequences and Series

Lesson 3: Infinite Geometric Series

Lesson 4: The Binomial Theorem

Lesson 5: Permutations and Combinations

Lesson 6: Complex Probability

Additional Matrices Content

Beyond the additional lesson in Unit 4, other lessons about matrices will be added in throughout the course. Covered concepts will include adding and subtracting matrices, multiplying matrices, and determinants. Additional concepts may be covered as time permits.

Optional Content

After Unit 11, if there is time at the end of the year, some optional content may be covered. These topics would include some introductory Trigonometry concepts and possibly some SAT prep work.