Syllabus

# Algebra 2, Semester A

## Course Overview

Algebra 2, Semester A, is a single-semester course designed to cultivate and periodically assess your subject-matter knowledge while strengthening your mathematical skills. This course includes lessons that focus on the interpretation of polynomial and rational expressions. You'll learn to create, graph, and solve equations and inequalities. You'll also identify the key features of different types of functions and analyze them with tables, graphs, and equations.

## Course Goals

By the end of this course, you will be able to do the following:

- Rewrite polynomial expressions to prove identities and theorems.
- Create and solve formulas for geometric series.
- Apply properties of complex numbers to quadratic solutions and polynomial identities.
- Solve rational and radical equations in one variable and create systems of equations and inequalities to determine the validity of solutions.
- Create equations in two or more variables and graph the equations to display their relationship.
- Solve polynomial, rational, and radical equations by using graphs and tables.
- Analyze polynomial functions, apply the remainder theorem, and identify zeros and factorizations in real and complex forms.
- Interpret the key features of polynomial, radical, and logarithmic functions with tables and graphs.

## Math Skills

Algebra 1 is a prerequisite for Algebra 2, Semester A. Before beginning this course, you should be able to do the following:

- Solve problems involving arithmetic operations with real numbers.
- Know the properties of expressions and equations and use those properties to solve problems.
- Collect, analyze, and display data to solve problems.

## General Skills

To participate in this course, you should be able to do the following:

- Understand the basics of spreadsheet software, such as Microsoft Excel or Google Spreadsheets, but having prior computing experience is not necessary.
- Communicate through email and participate in discussion boards.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Student Orientation document, found at the beginning of this course.*

## Credit Value

High School Algebra 2, Semester A, is a 0.5-credit course.

## Course Materials

- Notebook
- Computer with Internet connection and speakers or headphones
- Microsoft Excel or equivalent

# Course Pacing Guide

This course description and pacing guide is intended to help you keep on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

## Unit 1: Manipulating and Interpreting Expressions

**Summary**
This unit begins with a Course Activity designed to reintroduce you to the rigors of algebraic thinking. In this unit, you will identify the parts of polynomial and rational expressions and rewrite these expressions to prove identities and theorems. Additionally, you will simplify expressions and solve problems by applying the properties of arithmetic and complex numbers.

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 1 day: 1 | **Syllabus and Student Orientation**<br>*Review the Student Orientation and Course Syllabus at the beginning of this course.* | Course Orientation |
| 4 days: 2–5 | **Introduction to Algebra 2**<br>*Understand the rigors of algebraic thinking.* | Course Activity |
| 4 days: 6–9 | **Interpreting Polynomial and Rational Expressions**<br>*Identify the parts of polynomial and rational expressions and interpret what each part represents in context.* | Lesson |
| 4 days: 10–13 | **Polynomial Arithmetic and Structure**<br>*Compare polynomial arithmetic with integer arithmetic and write polynomials in equivalent forms.* | Lesson |
| 4 days: 14–17 | **Proving and Applying Polynomial Identities and Theorems**<br>*Rewrite polynomial expressions to prove identities and theorems.* | Course Activity |
| 4 days: 18–21 | **Rewriting Rational Expressions**<br>*Compare arithmetic with rational expressions to arithmetic with rational numbers and write rational expressions in equivalent forms.* | Lesson |

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 4 days: 22–25 | **Creating and Solving Formulas for Geometric Series**<br>*Create and solve formulas for geometric series.* | Lesson |
| 4 days: 26–29 | **Operations with Complex Numbers**<br>*Identify complex numbers and apply properties of arithmetic to simplify expressions that contain complex numbers.* | Lesson |
| 4 days: 30–33 | **Solving and Reasoning with Complex Numbers**<br>*Apply properties of complex numbers to quadratic solutions and polynomial identities.* | Lesson |
| 4 days: 34–37 | **Unit Activity and Discussion—Unit 1** | Unit Activity/ Discussion |
| 1 day: 38 | **Posttest—Unit 1** | Assessment |

# Unit 2: Equations and Inequalities

**Summary**
In this unit, you will create one- and two-variable equations and inequalities and use them to solve problems. You will solve polynomial, rational, and radical equations by creating tables, and you'll approximate solutions by graphing. At the end of this unit, you will create systems of equations and inequalities to determine the viability of solutions.

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 4 days: 39–42 | **Solving Rational and Radical Equations**<br>*Solve rational and radical equations in one variable and determine the validity of solutions.* | Lesson |
| 4 days: 43–46 | **Creating One-Variable Equations and Inequalities**<br>*Create equations and inequalities in one variable and use them to solve problems.* | Lesson |
| 4 days: 47–50 | **Creating Two-Variable Equations**<br>*Create equations in two or more variables and graph them to display the relationship.* | Lesson |

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 4 days: 51–54 | **Solving Equations by Graphing**<br>*Use graphing, tables, and successive approximation to solve polynomial, rational, absolute value, and radical equations.* | Lesson |
| 4 days: 55–58 | **Creating Systems of Equations and Inequalities**<br>*Create systems of equations and inequalities that represent boundaries from a context and determine the viability of solutions.* | Lesson |
| 4 days: 59–62 | **Unit Activity and Discussion—Unit 2** | Unit Activity/ Discussion |
| 1 day: 63 | **Posttest—Unit 2** | Assessment |

# Unit 3: Function Representations

**Summary**

In this unit, you will analyze polynomial, radical, and logarithmic functions and interpret their important features with tables and graphs. You will also convert exponential and logarithmic models and rewrite them in equivalent forms.

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 4 days: 64–67 | **Identifying Polynomial Factors and Graphing Zeros**<br>*Analyze polynomial functions, apply the remainder theorem, and identify zeros and factorizations in real and complex forms.* | Lesson |
| 4 days: 68–71 | **Key Features of Polynomial Functions**<br>*Interpret key features of polynomial functions through tables and graphs.* | Lesson |
| 4 days: 72–75 | **Key Features of Radical Functions**<br>*Interpret key features of radical functions through tables and graphs.* | Lesson |
| 4 days: 76–79 | **Exponential and Logarithmic Models**<br>*Convert between exponential and logarithmic models and rewrite these models in equivalent forms.* | Lesson |

| Day | **Activity**/*Objective* | Type |
|---|---|---|
| 4 days: 80–83 | **Key Features of Logarithmic and Piecewise Functions**<br>*Interpret key features of logarithmic and piecewise functions through tables, graphs, and equations.* | Lesson |
| 4 days: 84–87 | **Unit Activity and Discussion—Unit 3** | Unit Activity/ Discussion |
| 1 day: 88 | **Posttest—Unit 3** | Assessment |
| 1 day: 89 | **Semester Review** | |
| 1 day: 90 | **End-of-Semester Exam** | Assessment |