**BOCES**
**Western Suffolk**

**Online Courses for High School Students**
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# Algebra I

In this course, students deepen their understanding of linear and exponential relationships by contrasting them with each other. Students also apply linear models to data that exhibit a linear trend. The course also covers analyzing, solving, and using quadratic functions.

**Prerequisite:** Math 8 (or equivalent)
**Course Length:** Two semesters
**Required Text:** Algebra 1: A Reference Guide (E-book is included within the course).
**Materials List:** Texas Instruments TI-84 Plus Graphics Calculator

# Course Outline

## Semester 1

### Unit 1: Expressions and Problem Solving
*Lesson Goals*
- Evaluate numerical expressions involving whole-number exponents.
- Determine where to place grouping symbols in an expression to get a specified value.
- Evaluate expressions involving rational numbers, using the order of operations.

### Unit 2: One-Variable Linear Equations and Inequalities
*Lesson Goals*
- Solve a one-step linear addition or subtraction inequality.
- Solve a one-step linear multiplication or division inequality.
- Solve a multistep linear inequality with variables on one side.
- Solve a multistep linear inequality with variables on both sides.

## Unit 3: Two-Variable Linear Equations and Inequalities
*Lesson Goals*
- Transform the equation of a line into a given form.
- Graph the equation of a line given in standard form.
- Graph the equation of a line given in point-slope form.
- Graph the equation of a line given in slope-intercept form.
- Represent real-world situations with a linear equation in two variables.
- Write the equation of a line, given two points on the line.
- Write the equation of a line, given the slope of the line and a point on the line.
- Write the equation of a line, given the slope of the line and the y-intercept.
- Identify the form of a linear equation.

## Unit 4: Working with Functions
*Lesson Goals*
- Sketch the graph of a linear function, given a description of the situation it represents.
- Graph a linear function, given its equation.

## Unit 5: Radicals and Exponents
*Lesson Goals*
- Simplify expressions using properties of exponents.
- Justify the meaning of a rational exponent.
- Convert between rational exponent form and radical form.

## Unit 6: Exponential Functions
*Lesson Goals*
- Determine ratios of outputs for an exponential function over a given interval.
- Determine whether a function is linear, exponential, or neither linear nor exponential, given a set or table of ordered pairs.
- Determine whether a situation can be modeled by a linear function or an exponential function.
- Determine differences in outputs for a linear function over a given interval.

## Unit 7: Sequences and Modeling with Functions
*Lesson Goals*
- Write an explicit rule for a geometric sequence.
- Use an explicit rule for a geometric sequence to find a given term in the sequence.
- Write a recursive rule for a geometric sequence.
- Use a recursive rule for a geometric sequence to find a given term in the sequence.
- Write the rule for a geometric sequence that models a real-world situation.

- Convert from a recursive rule for a geometric sequence to the explicit rule.
- Convert from an explicit rule for a geometric sequence to the recursive rule.
- Solve a real-world problem by writing and using an explicit rule for a geometric sequence.
- Determine the common ratio for a geometric sequence.

**Unit 8: Semester Exam**

## Semester 2

**Unit 1: Systems of Equations**
*Lesson Goals*
- Justify the linear combination method.
- Solve a system of two linear equations in two variables using the linear combination method (without multiplication).
- Solve a system of two linear equations in two variables using the linear combination method (with multiplication).

**Unit 2: Polynomials**
*Lesson Goals*
- Determine the roots of a quadratic equation by converting it to factored form.
- Determine the zeros of a quadratic function by converting it to factored form.

**Unit 3: Quadratic Equations**
*Lesson Goals*
- Derive the quadratic formula.
- Solve quadratic equations by using the quadratic formula.
- Determine whether the solutions of a quadratic equation are real or complex by evaluating the discriminant.
- Describe the solutions of a quadratic equation by evaluating the discriminant.

**Unit 4: Quadratic Functions**
*Lesson Goals*
- Determine the x-intercepts of a quadratic function, given a function equation that can be factored.
- Convert a quadratic function from standard form to vertex form.
- Determine the zeros of a quadratic function by converting it to factored form.
- Determine the maximum or minimum of a quadratic function by converting it to vertex form.
- Determine the number of zeros a quadratic function has given its equation.

- Convert a quadratic function from factored form to standard form.
- Convert a quadratic function from standard form to factored form.
- Convert a quadratic function from vertex form to standard form.

## Unit 5: Univariate Data
*Lesson Goals*
- Determine the range of a data set.
- Determine the interquartile range of a data set.
- Determine the standard deviation of a data set.

## Unit 6: Bivariate Data
*Lesson Goals*
- Explain the difference between correlation and causation.
- Explain a likely reason two variables are correlated.

## Unit 7: Algebra 1 Project
*Lesson Goals*
- Represent data with a histogram.
- Represent data with a box plot.
- Represent data with a frequency table.
- Determine the five-number summary of a data set.
- Interpret a histogram.
- Interpret a box plot.
- Determine a linear function equation to fit a data set.
- Interpret the slope of a linear model in the context of the data.
- Determine the correlation coefficient of a data set.
- Explain a likely reason two variables are correlated.
- Interpret a correlation coefficient.

## Unit 8: Semester Exam