

Greensburg Community School Corporation
Algebra I Curriculum

Algebra I

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Greensburg Community Schools

Algebra I

Mission Statement

The mission of the Greensburg Community School Corporation is to provide and promote lifelong learning through its commitment to quality educational programs that prepare the students to be effective, successful, and responsible citizens. This is to be accomplished in a financially prudent manner.

**Greensburg Community Schools
Algebra I**

Narrative Description

The state of Indiana has established the following mathematics standards to make clear to teachers, students, and parents what knowledge, understanding, and skills students should acquire in Algebra I:

Operations with Real Numbers

Students deepen their understanding of real numbers by comparing expressions involving square roots and exponents. They use the properties of real numbers to simplify algebraic formulas, and they convert between different measurement units using dimensional analysis.

Linear Equations and Inequalities

Students solve linear equations to find the value of the variable and they rearrange formulas. They solve linear inequalities by using order properties of the real numbers, and they solve word problems involving linear equations, inequalities, and formulas.

Relations and Functions

Students draw and interpret graphs of relations. They understand the concept of a function, find domains and ranges, and link equations to functions.

Graphing Linear Equations and Inequalities

Students draw graphs of straight lines and relate their equations to their slopes and intercepts. They model situations with linear equations and use them to make predictions, and they graph linear inequalities in two variables.

Pairs of Linear Equations and Inequalities

Students solve pairs of linear equations in two variables using both graphs and algebraic methods. They use pairs of linear equations to solve word problems, and they use graphs to solve pairs of linear inequalities in two variables.

Polynomials

Students operate with polynomials, adding, subtracting, multiplying, dividing, and raising to powers. They find factors of polynomials, learning special techniques for factoring quadratics. They understand the relationship among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial.

Algebraic Fractions

Students simplify algebraic fractions, using what they have learned about factoring polynomials. They solve algebraic proportions.

Quadratic, Cubic, and Radical Equations

Students draw graphs of quadratic, cubic, and radical functions. They derive the formula for solving quadratic equations and solve these equations by using the formula, by factoring, and by completing the square. They also solve equations that contain radical expressions and use graphing calculators to find approximate solutions of equations.

Mathematical Reasoning and Problem Solving

In a general sense, mathematics is problem solving. In all of their mathematics, students use problem-solving skills: they choose how to approach a problem, they explain their reasoning, and they check their results. At this level, students apply these skills to justify the steps in simplifying functions and solving equations and to deciding whether algebraic statements are true. They also learn about inductive and deductive reasoning and how to use counterexamples to show that a general statement is false.

Course Concepts and Generalizations

1. Operations with real numbers
2. Linear equations and inequalities
3. Relations and functions
4. Graphing linear equations and inequalities
5. Pairs of linear equations and inequalities
6. Polynomials
7. Algebraic fractions

8. Quadratic, cubic, and radical equations
9. Mathematical reasoning and problem solving

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Units of Study

UNITS/AREA OF STUDY	LENGTH OF TIME
1. Operations with real numbers	6 Weeks and ongoing
2. Linear Equations and inequalities	8 Weeks and ongoing
3. Relations and functions	2 Weeks and ongoing
4. Graphing linear equations and inequalities	5 Weeks and ongoing
5. Pairs of linear equations and inequalities	5 Weeks and ongoing
6. Polynomials	4 Weeks and ongoing
7. Quadratic, cubic, and radical equations	4 Weeks and ongoing
8. Mathematical reasoning and problem solving	2 Weeks and ongoing

Unit numbers correspond to the Unit numbers on the State Standard Chart.

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Unit 1 Plan

Operations with real numbers (Unit 1)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Do real number computation.
2. Simplify numerical and algebraic expressions using order of operations.
3. Use the properties of real numbers.
4. Compare real numbers.
5. Simplify radical expressions.
6. Use the laws of rational exponents.
7. Use the Pythagorean Theorem.

Unit 1 Outline

I. Real numbers

- A. Comparing / number line
- B. Absolute value
- C. Opposites
- D. Computation

II. Expressions

- A. Order of operations
- B. Simplify numerical expressions
- C. Simplify algebraic expressions

III. Properties

- A. Associative
- B. Commutative
- C. Distributive
- D. Zero, one, identity

IV. Rational / Irrational numbers

- A. Define / identify rational and irrational numbers
- B. Compare real number expressions

- C. Simplify radical expressions using factors
- D. Add, subtract, multiply radical expressions
- E. Rational exponents / Laws of exponents
- F. Pythagorean Theorem

V. Dimensional (unit) analysis

- A. Conversions
- B. Computations

Unit 2 Plan

Linear equations and inequalities (Unit 2)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Solve linear equations in one variable.
2. Use formulas.
3. Transform formulas.
4. Solve word problems using algebra equations and inequalities.
5. Solve linear inequalities.
6. Solve combined linear inequalities.

Unit 2 Outline

- I. Solve linear equations with one variable
 - A. Solve linear equations using inverse operations
 - B. Solve linear equations with variables on both sides
 - C. Solve linear equations with absolute value expressions
 - D. Use formulas
 - E. Solve an equation for one variable in terms of the other variables
 - F. Use algebra equations to solve word problems
- II. Linear inequalities
 - A. Find solution sets for linear inequalities
 - B. Solve linear inequalities using properties of order
 - C. Solve combined linear inequalities
 - D. Solve word problems using linear inequalities

Unit 3 Plan

Relations and functions (Unit 3)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Determine whether a set of data is a function.
2. Find the domain and range of a relation.
3. Interpret a graph representing a given situation.
4. Sketch a reasonable graph for a given relationship.

Unit 3 Outline

I. Relations and functions

- A. Define functions
- B. Find domain and range of a relation
- C. Determine if data are behaving in a linear fashion

II. Graphs

- A. Sketch a reasonable graph for a given relationship
- B. Interpret a graph representing a given situation

Unit 4 Plan

Graphing linear equations and inequalities (Unit 4)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Define, calculate, interpret, and use slope.
2. Graph linear equations given: two points, one point and the slope, the equation, or one point and the equation of a line that is parallel or perpendicular to the graph.
3. Write the equation for a line given: two points, one point and the slope, or one point and the equation of a line that is parallel or perpendicular to the graph.
4. Use the slope-intercept form of an equation to graph a line.

5. Use an equation that models a given situation to make predictions.

Unit 4 Outline

I. Graphs

- A. Define / calculate slope
- B. Slope is rate of change / interpret meaning of slope
- C. Slopes of parallel and perpendicular lines
- D. Graph linear equations given: 2 points, an equation, or 1 point and slope
- E. Graph a linear inequality
- F. Determine the x and y-intercepts
- G. Use slope-intercept form

II. Writing linear equations in slope-intercept form

- A. Given two points
- B. Given 1 point and the slope
- C. Through a given point and parallel or perpendicular to a given equation
- D. That models a given situation / use line to make predictions

Unit 5 Plan

Pairs (systems) of linear equations and inequalities (Unit 5)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Solve pairs of linear equations by graphing, substitution, addition, or multiplication (elimination) method.
2. Solve pairs of linear inequalities by graphing.
3. Use pairs of linear equations to solve word problems.

Unit 5 Outline

I. Solving pairs of equations in two variables

- A. Solve by graphing
- B. Solve by substitution
- C. Solve by the addition or subtraction method (elimination method)
- D. Solve by multiplication with the addition or subtraction method
- E. Use pairs of linear equations to solve word problems

II. Solving pairs of linear inequalities with two variables

- A. Solve by graphing

Unit 6 Plan

Polynomials (Unit 6)

INDIVIDUAL LEARNER OBJECTIVES

The Algebra I student will be able to do the following:

1. Add, subtract, multiply, and divide monomials and polynomials.
2. Find powers and roots of monomials.
3. Factor binomials and trinomials.
4. Simplify algebraic fractions.
5. Add, subtract, multiply, and divide algebraic fractions.
6. Solve algebraic proportions.

Unit 6 Outline

I. Operations with polynomials

- A. Add and subtract polynomials
- B. Multiply and divide monomials
- C. Find powers and roots of monomials
- D. Multiply polynomials
- E. Divide polynomials by monomials

II. Factoring

- A. Find and factor out the greatest common monomial factor in a polynomial
- B. Factor quadratic trinomials
- C. Factor perfect-square trinomial
- D. Factor difference of squares

III. Application

- A. Relationship among solutions, x-intercepts, and zeros of a function

IV. Algebraic fractions

- A. Simplify fractions by factoring
- B. Computation with fractions

- C. Solve algebraic proportions

Unit 7 Plan

Quadratic, Cubic, and Radical Equations (Unit 7)

INDIVIDUAL LEARNER OBJECTIVES

The Algebra I student will be able to do the following:

1. Graph quadratic equations and inequalities
2. Graph cubic and radical equations.
3. Solve quadratic equations by factoring or using the quadratic formula.
4. Solve equations with radical expressions.
5. Solve word problems using quadratic equations.

Unit 7 Outline

I. Graphing equations

- A. Graph quadratic equations and inequalities
- B. Graph cubic equations
- C. Graph radical equations
- D. Use graphing technology to find approximate solutions of quadratic and cubic equations

II. Solving quadratic equations

- A. Solve by factoring
- B. Solve when a perfect square expression equals a constant
- C. Solve by completing the square
- D. Derive the quadratic formula by completing the square
- E. Solve using the quadratic formula
- F. Solve word problems using quadratic equations
- G. Solve equations with radical expressions

Unit 8 Plan

Mathematical Reasoning and Problem Solving (Unit 8)

Individual Learner Objectives

The Algebra I student will be able to do the following:

1. Solve word problems using a variety of methods.
2. Write equations to solve word problems.
3. Determine the reasonableness of an answer.
4. Identify and use inductive and deductive reasoning, hypothesis and conclusion, and counterexamples.

Unit 8 Outline

I. Methods of solving word problems

- A. Diagrams / charts
- B. Guess and check
- C. Solve a simpler problem
- D. Work backwards
- E. Writing equations
- F. Use properties of numbers and order of operations to justify steps used to solve

II. Solutions for word problems

- A. Determine reasonableness of answer
- B. Logic of equation solving
- C. Determine whether a given algebraic statement is true always, sometimes, or never

III. Mathematical reasoning

- A. Identify inductive and deductive reasoning
- B. Identify hypothesis and conclusion in a logical deduction
- C. Use counterexamples to show that statements are false

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Modifications

Modifications of instructional content in this course may include, but are not limited to, the following:

- Modified pace
- Modified homework assignments
- Modified tests (as to length or type of problems)
- Adaptive equipment
- Use of a calculator
- Use of Resource Staff
- Addition of more challenging material (for gifted / interested students)
- Other modifications as specified in a student's IEP