

# Algebra I

## 1. INTRODUCTION

Algebra I is the first college preparatory course in mathematics for ninth graders. Students who take this course will develop the ability to think, reason, and communicate mathematically. They will gain skills that are needed to succeed in college and in the workplace of the twenty-first century.

Students in this course will begin to appreciate the application of mathematics to the real world by examining where and how algebraic concepts are used in everyday life. (4.5)

Note: References to the New Jersey Core Curriculum Content Standards appear as a numeral in parentheses.

## 2. OBJECTIVES

### A. Skills

The student will be able to:

1. Understand the significance of variables in order to evaluate formulae and expressions. (4.3)
2. Understand and appreciate the structure of the real number system. (4.1)
3. Perceive the role of deductive and inductive reasoning in algebra. (4.2)
4. Solve linear equations with one or two variables. (4.3)
5. Develop “an understanding attitude of mind” through the ability to:
  - a. recognize and formulate mathematical problems
  - b. collect and analyze data relevant to the solution of problems
  - c. analyze and interpret data relevant to the solution of problems
  - d. obtain and verify solutions to problems
  - e. verbalize the sequence of steps needed to obtain solutions. (4.4)
6. Appreciate the historic growth of mathematics, through a study of the development of numerals, symbols, and the real number system. (4.5)
7. Understand mathematical concepts and principles through student discovery. (4.5)

## B. Content

The student will be able to:

1. Investigate data and numerical relationships by: (4.1,4.4)
  - a. Interpreting and analyzing bar and circle graphs.
  - b. Performing numerical operations with integers.
  - c. Organizing and utilizing mathematical representations of data to derive conclusions.
  - d. Solving application problems involving per cents and probability.
2. Interpret and apply ideas about related quantities and how they change by: (4.1, 4.3,4.5)
  - a. Gaining awareness of constant and variable quantities.
  - b. Describing how changes in one value are related to changes in another.
  - c. Using algebraic notation to write expressions that represent variable quantities.
  - d. Evaluating numeric and algebraic expressions according to the Order of Operations.
  - e. Recognizing equivalent expressions and using properties of algebra to transform one form to another.
3. Identify and represent functions by: (4.3)
  - a. Using tables and graphs to express relationships between quantities.
  - b. Graphing relationships between quantities.
  - c. Solving problems involving two related quantities.
  - d. Investigating functional relationships in problem situations.
  - e. Understanding characteristics of linear relationships between two quantities and identifying their equations.
  - f. Choosing an appropriate representation of linear functions in a variety of situations.
4. . Solve linear equations and inequalities by: (4.3, 4.5)
  - a. Modeling and solving linear equations by using algebra tiles.
  - b. Simplifying and then using properties of equality.
  - c. Graphing and interpreting solutions.
  - d. Applying ideas about expressions, equations, and inequalities in practical situations.
5. Analyze linear functions and their graphs by: (4.3, 4.4, 4.5)
  - a. Finding slopes of lines.
  - b. Connecting the concept of slope to a variety of situations.
  - c. Graphing a line given various information about it.
  - d. Using trend lines and linear functions to interpret data in a practical situation.
6. Investigate and solve systems of equations and inequalities by: (4.2,4.3)
  - a. Using slopes and y-intercepts to determine whether pairs of lines are parallel, intersecting, or perpendicular.
  - b. Using methods of graphing, substitution, or linear combination.

- c. Identifying a region that represents the solution of inequalities.
  - d. Choosing an appropriate method for solution.
7. Perform various operations with polynomials by: (4.1,4.3)
- a. Learning the terminology associated with polynomial expressions and functions.
  - b. Performing operations with polynomial expressions.
  - c. Factoring various types of polynomials.
  - d. Recognizing special forms of polynomials
8. Discover relationships with lines and distances by: (4.1, 4.2,4.3)
- a. Evaluating the absolute values of numbers.
  - b. Solving equations and inequalities involving absolute value.
  - c. Determining how changes in parameters affects the graphs of absolute value functions.
  - d. Evaluating square roots of numbers.
  - e. Solving and graphing radical equations.
  - f. Approximating roots using a geometric model.
  - g. Discovering and using the Pythagorean Theorem.
  - h. Using the distance formula to find distance in the coordinate plane.
9. Solve a variety of application problems relating to each topic to realize the use of algebra in the real world. (4.5)
10. Use technology, where appropriate, to reinforce the concepts taught.

### 3. PROFICIENCY LEVELS

The course in Algebra I is appropriate for all ninth grade students.

### 4. METHODS OF ASSESSMENT

Students will be evaluated by a variety of assessment tools and strategies, which include teacher-made tests and quizzes, homework, notebooks, portfolios, computer labs, projects, presentations, and a final exam.

Students will also be encouraged to assess their own work in order to strive for the highest level of achievement they can attain. Through perseverance, a strong work ethic, and regular participation, students can gain self-confidence in their ability to do mathematics and often improve their overall marking period grade.

It should be noted that in accordance with the district homework policy, homework is twenty per cent of the student's overall grade.

The teacher will provide the subject area supervisor with suggestions for changes to the curriculum or assessment procedures.

## 5. GROUPING

Students in Algebra I should have successfully completed a course in Pre Algebra in the eighth grade. This should enable them to see the connections between numerical and algebraic operations and relationships.

## 6. ARTICULATION/SCOPE & SEQUENCE/TIME FRAME

Algebra I is intended to be a full year course. It provides the framework necessary for students to continue their mathematics coursework in Geometry and in Algebra 2, and ultimately in PreCalculus.

## 7. RESOURCES

### a. Text

Larson, Ron, Boswell, Laurie, Kanold, Timothy, and Stiff, Lee, Algebra 1. Evanston, Illinois: McDougal Littell, 2001.

### b. References

Pine, Dr. Charles, The Algebra Project. Rutgers, The State University of New Jersey, 1985.

Serra, Michael. Discovering Geometry. Berkeley: Key Curriculum Press, 1997.

Dolciani, Berman and Freilich. Modern Algebra I Structure and Method. New York: Houghton Mifflin Publishing Company, 1983.

Charles, Randall I., et.al. Focus on Algebra. Menlo Park: Addison-Wesley Publishing Company, 1996.

### c. Software

Appleworks 6.0  
MacBestGrapher  
Tools of Math - Algebra  
Green Globs  
Algebra Xpresser  
Geometer's Sketchpad

d. Supplies

Algebra Tiles

Spinners, dice, coins, and cards

Tangrams

Student-created models

## 8. METHODOLOGIES

Students in this course will use technology on a daily basis in the form of the TI-80 or the Casio fx-7400G Graphing Calculator. Through discovery exercises and laboratory explorations they will discover many of the concepts for themselves. They will take an active part in using various algebraic manipulatives in cooperative learning situations, thus applying teamwork to the learning process.

## 9. SUGGESTED ACTIVITIES

- a. Collaborative projects with appropriate level science course.
- b. Portfolio work
- c. Oral Presentations
- d. Use of appropriate software programs to reinforce concepts

## 10. INTERDISCIPLINARY CONNECTIONS

Connections are made to science, particularly earth science, by means of collaborative projects coordinating topics in the two subject areas. Connections are also made by means of formulas used in Computer Programming classes. Writing assignments and portfolios strengthen the connection between mathematics and language arts literacy and fine arts.

## 11. PROFESSIONAL DEVELOPMENT

As per the PIP/100 hour statement: the teacher will continue to improve through participation in a variety of professional development opportunities.