

# Algebra Connections Overview

*Algebra Connections* is the first course in a five-year sequence of college preparatory mathematics courses that delivers traditionally rigorous algebraic content using a problem-based approach. It has strong threads woven throughout the course on multiple representations and the meaning of a solution. A major focus of the course is to develop multiple strategies to solve problems and to recognize multiple ways of understanding concepts.

Upon completing this course, students should be able to:

- Represent a function with a graph, table, rule, and context and should be able to find any representation when provided one of the others (for linear and quadratic relationships).
- Collect and analyze data and make predictions based on the trend of the data.
- Symbolically manipulate expressions in order to solve problems, such as factoring, distributing, multiplying polynomials, reducing rational expressions, expanding exponential expressions, etc.
- Solve simple and complex equations and inequalities using a variety of strategies, including rewriting (such as factoring, distributing, or completing the square), undoing (such as extracting the square root or subtracting a term from both sides of an equation), and looking inside (such as determining the possible values of the argument of an absolute value expression).
- Solve contextual word problems using multiple strategies, including making tables, looking for patterns, drawing diagrams, and creating “Guess and Check” tables to assist with writing and solving a variable equation.
- Analyze the slope of a line multiple ways, including graphically, numerically, contextually (as a rate of change), and algebraically.
- Solve a system of two linear or non-linear equations and inequalities with two variables using a variety of strategies, both graphically and algebraically.

The course is structured around problems and investigations that build the conceptual understanding of these algebraic topics and an awareness of connections between the different ideas. Students are encouraged to investigate, communicate their thinking, and generalize.

Lessons are structured for students to collaborate actively by working in study teams. During class time, students work in study teams on challenging problems that introduce new material. In several circumstances, an investigation or challenge will be presented with a Task Statement and Further Guidance structure. These activities are designed to provide teachers with the freedom of deciding how structured or open to leave a mathematical challenge.

The homework in the “Review & Preview” section of each lesson reinforces previously-learned skills and concepts and prepares students for new ones. The homework problems also allow students to apply previously-learned concepts and skills in new contexts and deepen their understanding by solving the same type of problem in different ways. CPM offers homework support through Hotmath ([www.hotmath.com](http://www.hotmath.com)) and also provides teachers with the answers to problems.

## **The Course Structure**

Chapters are divided into sections that are organized around core topics. Within each section, lessons include activities, challenging problems, investigations, and practice problems. Teacher notes for each lesson include a “suggested lesson activity” section with ideas for lesson *introduction*, specific tips and strategies for lesson *implementation* to clearly convey core ideas, and a means for bringing the lesson to *closure*.

Core ideas are synthesized in “Math Notes” boxes for students who are absent or who want additional review. These notes are placed in a purposeful fashion, often falling several lessons after the initial introduction of a concept. This allows students time to explore and build deeper understanding of an idea before they are presented with a formal definition or an algorithm. “Math Notes” include specific vocabulary definitions and instructions about notation, and occasionally interesting extensions or real-world applications of mathematical concepts.

Technology is integrated throughout the course to allow students to see and explore concepts in a dynamic way after they have developed some initial conceptual understanding. The course assumes that classes have access to at least one of these three technology setups: a full computer lab with computers that have graphing software for each student, a classroom computer with graphing software equipped with projection technology, or a set of graphing calculators (such as a TI-83+) and an overhead panel for the teacher. These dynamic investigations allow students to study functions, analyze data, and answer questions like, “In what year will the billionth customer attend a popular amusement park?”

Learning Log reflections appear periodically at the end of lessons to allow students to synthesize what they know and identify areas that need additional explanation.