INSIDE ALGEBRA

Strategic Intervention for Grades 8–12

SUPPORTIVE, ENGAGING, and PROVEN to help students succeed in Algebra.

voyagersopris.com/insidealgebra
A Balanced Approach:
What is Inside Algebra?

A student’s performance in algebra has a strong correlation to their success.

Unfortunately, the highest failure rate in high school is Algebra I and this is among the leading indicators of high school drop out.

*Inside Algebra* provides a solid algebraic foundation designed to help all students, especially those who struggled to master prealgebra skills. Through its intentional, multisensory, hands-on approach, *Inside Algebra* helps students by working sequentially to build skills necessary to master each concept.

**Comprehensive Standards-Based Instruction**

From Foundational Skills to Basic Algebra to Advanced Algebra, students experience a consistent and comprehensive approach to master the skills they need to achieve grade-level success.

*Inside Algebra* is written with a scaffolded instructional approach that supports state standards and standards set forth by the National Council of Teachers of Mathematics (NCTM).

**Foundational Skills**

Chapters 1–2
Prealgebra Skills

- Using operations with rational numbers
- Locating, comparing, and ordering real numbers
- Finding the square root of a number
- Using variables to represent specific values
- Using variables to write general statements
- Using mathematical properties and order of operations
- Using proportions to solve problems
- Graphing ordered pairs and relations
- Finding the domain and range of a relation

**Basic Algebra**

Chapters 3–10
Basic Algebra Skills

- Writing and solving equations in one and two variables
- Graphing linear equations
- Identifying functions from a graph, table, or equation
- Writing equations in standard, point-slope, and slope-intercept form, and converting between forms
- Solving and graphing linear inequalities
- Solving systems of linear equations and inequalities
- Adding, subtracting, and multiplying polynomials
- Factoring polynomials
- Solving quadratic polynomial equations using a variety of methods

**Advanced Algebra**

Chapters 11–12
Additional Algebra Skills

- Using operations with rational expressions
- Simplifying rational expressions
- Solving rational equations
- Dividing polynomials
- Simplifying radical expressions
- Using operations with radical expressions
- Solving equations involving radicals
- Using the Pythagorean theorem to solve problems
- Using coordinate geometry to solve problems
Everything Teachers and Students Need to Succeed

STUDENT MATERIALS:
- Student Interactive Text
- Assessment Book
- Student Placement Test
- Access to Selected *Gizmos®* by ExploreLearning®

TEACHER MATERIALS:
- Teacher Guides (Two-volume set)
- Teacher Placement Guide
- VPORT® Online Data Management System
- Online Resources
- Algebra Skill Builders Blackline Masters
- Hands-on Manipulatives Class Set
Explicit, Objectives-Based Learning

For struggling students, *Inside Algebra* deconstructs complex algebra skills into smaller, more accessible activities. This is done through an **objectives-based approach**. *Inside Algebra’s* 12 chapters are broken into 60 objectives that consist of 500 activities.

The activities allow teachers to provide explicit, scaffolded instruction that clearly defines concepts and skills. They also help students learn to recognize relationships between those concepts and skills.

For an engaging classroom, *Inside Algebra* provides a variety of instructional models with whole-group, small-group, and individual activities.

**Why is the Objectives-based Approach Important?**

The objectives-based approach breaks down algebra skills into smaller, accessible components that are more suited to students who have struggled with math. For teachers, this approach maximizes the potential for differentiating instruction and adapting to the needs of students.

Each objective follows a four-step lesson design.

**CONCEPT-DEVELOPMENT ACTIVITIES** use pictorial representations, hands-on manipulatives, and digital simulations to connect abstract algebra concepts with real-world models.

**PRACTICE ACTIVITIES** provide more time on task and increased opportunities to master objectives through games, challenges, and small-group collaboration.

**PROBLEM-SOLVING ACTIVITIES** provide explicit, step-by-step guidance about how to solve multistep problems, justify reasoning skills, and communicate understanding in a teacher-led setting.

**PROGRESS-MONITORING ACTIVITIES** increase computational fluency, provide informal assessment opportunities, and support data-driven differentiation.
A Focus on Differentiation

Every student has unique instructional needs on the path to proficiency. For that reason, Inside Algebra is designed around the most critical instructional component for struggling students—differentiation.

From the objective pretests, teachers can choose between two distinct instructional plans to complete the objective—a streamlined path to move through activities at a faster pace and an intensive path to provide more instruction for students in need. Additional differentiation is embedded in each instructional plan to meet students’ ongoing needs.

1 After each Objective Pretest, teachers use data to SELECT AN APPROPRIATE INSTRUCTIONAL PLAN for the class.

2 Throughout each instructional plan, teachers use informal assessment data to IDENTIFY GROUPS FOR ACCELERATION OR DIFFERENTIATION.

3 With results of the Objective Posttest, teachers GROUP STUDENTS BASED ON THEIR INDIVIDUAL NEEDS.
CONCEPT DEVELOPMENT ACTIVITIES use manipulatives to develop algebraic thinking and provide concrete representations of abstract concepts.

CONSISTENT LESSON FORMAT provides explicit direction for teachers to present instruction to support student mastery.

PRACTICE ACTIVITIES use games and small-group interaction to strengthen conceptual understanding.

Important VOCABULARY is highlighted and reviewed at point of use to promote math language development.

### Instructional Walkthrough: Chapter 9 Using Factoring, Objective 3

Logical, consistent lesson design keeps students moving toward conceptual understanding and mastery.

**Objective 3 Concept Development Activities**

**CD 1 Using Algebra Tiles**

Use with 5-Day or 4-Day Instructional Plan. In this activity, students factor quadratic trinomials using algebra tiles.

**MATERIALS**

- Algebra tiles, one set for every two students
- Variation: Gizmos
- Modeling: For this activity, use the tiles in the Game, Modeling the Factorization of \( ax^2 + bx + c \), to model the factoring of these quadratic expressions.

**DIRECTIONS**

1. Review the following terms with students:
   - **factor**: A monomial that evenly divides a value
   - **quadratic trinomial**: A polynomial of the form \( ax^2 + bx + c \)

2. Distribute one copy of Blackline Master 38, 4 \( \times \) 4 Bingo Card, to each student. Have each student put the numbers \( x = 2 \) on the board and solve the following equation
   \[ x^2 + 2x = 1. \]

3. Discuss the following terms with students:
   - **factor**: A monomial that evenly divides a value
   - **quadratic trinomial**: A polynomial of the form \( ax^2 + bx + c \)

4. Now, show students how to find factors of a trinomial. They should make a rectangle out of the given trinomial. In other words, work backward from what is shown in Step 2. Write \( ax^2 + bx + c \) on the board, and use algebra tiles to factor the trinomial. Show students how to determine the dimensions of the area rectangle. (\( ax^2 + bx + c \))

5. Terminate the game by calling out, “Bingo!”

**PA 2 Finding the Solution Bingo**

Use with 5-Day or 4-Day Instructional Plan. In this activity, students factor quadratic trinomials.

**MATERIALS**

- Blackline Master 38
- Game markers to cover squares

**DIRECTIONS**

1. Review the following terms with students:
   - **factor**: A monomial that evenly divides a value
   - **quadratic trinomial**: A polynomial of the form \( ax^2 + bx + c \)

2. Distribute one copy of Blackline Master 38, 4 \( \times \) 4 Bingo Card, to each student. Have each student put the numbers \( x = 2 \) on the board and solve the equations in the bingo card. Point out that they will have to repeat some numbers to fill the 16 squares.

3. Write an equation on the board, select a random number from the list below. Tell students to solve the equations and cover the squares that have the solutions with their markers. Have students write the equations and solutions on a piece of paper to hand in at the end of the activity.

4. With a partner, students factor quadratic trinomials.

**Equations to Solve**

- \( x^2 + 2x + 1 = 0 \)
- \( x^2 + 2x + 3 = 0 \)
- \( x^2 + 2x + 4 = 0 \)
- \( x^2 + 2x + 5 = 0 \)

**Solutions**

- \( x = -1 \)
- \( x = -1 \)
- \( x = -1 \)
- \( x = -1 \)

**Variation:**

**GIZMOS** provide alternate presentations of concepts using interactive simulations and virtual manipulatives.

**NEXT STEPS**

- **Differentiate**
  - 5-Day Instructional Plan:
    - PM 4, page 817—All students, to assess progress
  - 4-Day Instructional Plan:
    - PM 5, page 818—Students who are on the accelerated path, to assess progress
    - PM 4, page 817—Students who are on the differentiated path, to assess progress
Progress-Monitoring Activities determine differentiation through alternate activities as they build fluency with basic algebra skills.

Informal assessment strategies such as Ask for, Watch for, and Listen for provide further insight into student progress.

Problem-Solving Activities reinforce strategies and reflective thinking as students synthesize cumulative skills.

Example: Teacher asks students to brainstorm possible solutions to a problem. Students then work in small groups to solve the problem using different methods and share their solutions with the class. This encourages students to think critically and communicate their ideas effectively.

Examples of student solutions showcase one possible strategy that students may use to solve the problem.
Relevant Technology

*Gizmos* are interactive simulations students can manipulate to visualize and learn important concepts. As a web-based technology, students have access to *Gizmos* wherever and whenever they have Internet access.

**Gizmos**

*Gizmos* engage and empower students to test and extend their conceptual understanding of complex algebra skills. As students work independently on fun activities, they self-discover connections between algebra and the real world.
Hands-on Manipulatives

Students respond well to multisensory learning. Each Inside Algebra kit comes with a class set of hands-on manipulatives used in whole-group, small-group, and independent activities. The manipulatives-based lessons engage students in multisensory learning experiences that can’t be replicated on paper.

Interactive Games and Competition

Many Inside Algebra activities employ small-group games to practice and reinforce instruction. These gaming activities fuel students’ competitive spirits and encourage them to engage, participate, and collaborate with others in a fun learning environment.
Comprehensive Assessment System
The Comprehensive Assessment System Tracks and Monitors Student Growth from Placement to Mastery

This user-friendly assessment system provides teachers with the measures they need to accurately place students and monitor their progress through the curriculum. It furnishes the teacher with the data necessary to inform instruction to ensure each student meets his or her goals.

Placement
Based on students’ demonstrated understanding of key mathematics concepts and skills, data from the Inside Algebra Placement Test accurately place students at one of the program’s two entry points.

Ongoing Assessments
Regular assessment of student mastery of concepts and skills taught in the program ensures teachers can adjust pacing or instruction to meet the needs of individual students.

VPORt
This user-friendly data management system allows teachers and administrators to record, track, and report student test results. Reports can be generated at the individual, class, building, and district levels.
Actionable Data & Reports: Data Drives Instruction

Inside Algebra includes VPORT, an online data management system that incorporates benchmark and progress-monitoring assessments with real-time data to:

- Identify individual instructional needs and goals
- Adjust instruction based on skill need
- Monitor progress against goals
- Communicate progress to the instructional team
- Generate parent reports in English and Spanish

Real-time reporting

The key to effective instruction is real-time data that tracks student progress throughout the year. The Inside Algebra Assessment System uses VPORT data to provide multiple reports to identify student needs, adjust instruction, monitor progress, and evaluate instructional effectiveness.
Proven Student Achievement

Systemwide Quantile Results

*Inside Algebra* students across the nation show dramatic gains when we compare initial and final assessments. *Inside Algebra* utilizes the Progress Assessment of Mathematics (PAM) powered by The Quantile® Framework for Mathematics to determine a student’s Quantile score. A Quantile represents that student’s range of skills and readiness for learning new skills. The PAM also is used to assess and track student growth and proficiency change for the school year.

Students show increases in Quantile scores from 238Q to 298Q with an average effect size for all students of 1.03, which is considered large and educationally meaningful.
**Inside Algebra is Proven Effective**

Each chapter outlines a set of objectives. Students are given a pretest to measure their knowledge prior to instruction and a posttest following instruction to measure mastery of the stated objectives. An example of average growth (or gain) in the percent correct by objective from pretest to posttest is shown below, but learning doesn’t end with testing—teachers use this data to differentiate and enrich instruction to accelerate students to mastery.

**Chapter 5: Analyzing Linear Equations**

The Objective Pretests provides baseline data to determine an appropriate instructional plan for the class. The Objective Posttests measure student growth in mastering the objective and identifies concepts that may need reinforcement.

- **Objective 1:** Determine the slope given a line on a graph or two points on a line
- **Objective 2:** Write the equation of a line in standard form given two points on the line
- **Objective 3:** Draw a best-fit line, and find the equation of the best-fit line for a scatter plot
- **Objective 4:** Write linear equations in slope-intercept form to find the slope, x-intercept, and y-intercept, and sketch the graph
- **Objective 5:** Use the slope of lines to determine if two lines are parallel or perpendicular

### **Inside Algebra Systemwide Results**

**Chapter 5 Objective Tests**

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<th>Objective</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Percent Correct</th>
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<tr>
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<td>5</td>
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</table>

Data from the Objective Tests represents students from 15 states and 35 districts. All types of students and implementations are represented.
Let Us Create a Custom Implementation Plan

The highest level of educator support leads to increased student achievement. That’s our primary goal. Service does not come in a box. It must be customized to meet the specific needs of districts, schools, administrators, and teachers. Firmly grounded in research, the Voyager Sopris Learning® approach is built around the Five Keys to Success, which form the foundation for a personalized strategy for planning, training, and ongoing support. Our team specializes in partnering with schools and districts to build custom Inside Algebra implementation support plans to ensure all stakeholders are prepared to implement and sustain Inside Algebra implementation.

Key stages of Inside Algebra implementation include:

Visit voyagersopris.com/insidealgebra to review training options and a comprehensive menu of services.
Read what teachers and students are saying...

“I really didn’t understand anything and then I got put in this program and it makes everything a lot easier to understand. I just think it is the way Inside Algebra works the problems out...because it is a lot more hands-on and visual.”

—Colleen
Student, NM

“I think it helps them see that algebra isn’t some unattainable skill; that they can learn it step-by-step without too much difficulty. The pretests and posttests give them verifiable proof that they are, in fact, learning. It has provided them with a level of instruction they wouldn’t otherwise have received through a resource setting.”

—Pam O’Day
Teacher, TN

“This program seems to get rid of [math anxiety]...and gets them completely engaged.”

—Danielle Neri
Teacher, NM

“I like the program and the activities it includes. I was able to pull out different activities and augment those activities as needed. The students seemed to like the program as well.”

—Ashley C. Mattin
Teacher, TN
Inside Algebra complements any core algebra program with key features that deliver:

- Concept development to build conceptual understanding through modeling experiences
- Practice to support new learning through games and small-group activities
- Problem solving to build skills through relevant, real-world connections
- Progress monitoring to reinforce computational fluency and student understanding
- Flexible grouping and provides multiple modeling activities
- Enhanced instruction for English language learners (ELLs)
- Support for teachers and students with relevant technology
- Flexible implementations to address credit-recovery needs

Contact us: info@voyagersopris.com
To download samples, visit voyagersopris.com/insidealgebra