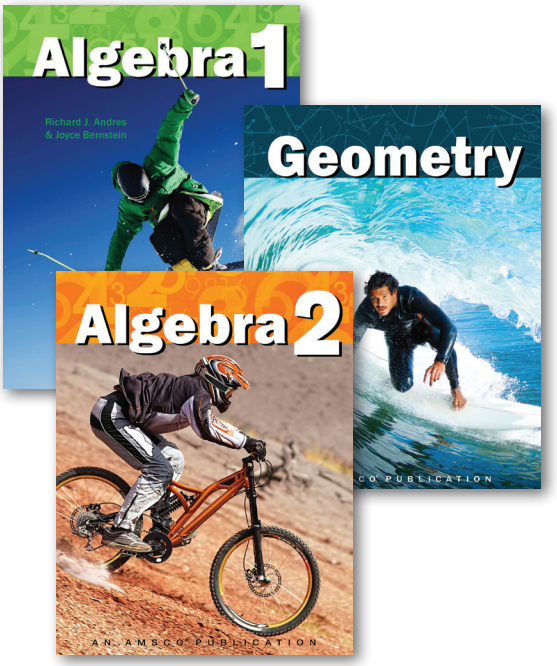
# Research-Based Mathematics Instruction

## *AMSCO® Math Algebra 1, Geometry,* and *Algebra 2*




**Mathematics instruction should include these instructional strategies**

- **lessons focused on specific concepts or skills that are standards based**
- **instructional activities that are learner centered and emphasize inquiry/problem solving**
- **the use of experience and prior knowledge as a basis for building new knowledge**
- **cooperative learning strategies**
- **real life connections**
- **scaffolding to make connections to concepts, procedures, and understanding**
- **probing questions which require students to justify their responses**
- **an emphasis on the development of basic computational skills**

*—The Education Alliance, 2006*

**"Lessons should connect to students' prior knowledge, demand higher-order thinking, and include meaningful real-world applications."**

*—National Catholic Education Association, 2009*

**"Teachers should present questions that stimulate students' curiosity and encourage them to investigate further."**

*—Protheroe, 2007*

Perfection Learning incorporated the latest educational research to create a standards-based high school math curriculum founded on effective mathematics instruction. All lessons are focused on specific concepts and skills that have clearly defined standards. Short, focused instructional lessons provide direct instruction, are to the point, and use experience and prior knowledge as a basis for building new knowledge. The instructional lesson is followed by model problems that use scaffolding. Some of the model problems address fluency and include detailed explanations of the process; others build in level of complexity as they address conceptual understanding and/or relevant application of the concepts and skills.

Many model problems are tagged with mathematical practices. They follow an inquiry-based model of instruction as teachers ask students probing questions. These questions are specific to each of the eight mathematical practices and are detailed in the teacher manual. Teachers are encouraged to use these questions consistently in whole group settings during the instructional phase of solving model problems.

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**"Research shows that students who work in groups on problems, assignments, and other mathematical investigations display increased achievement."**

*—Protheroe, 2007*

**"Current research suggests that discussion can increase student learning."**

*—National Council of Teachers of Mathematics, 2013*

**"Mathematics is a stimulating and interesting field generating new knowledge every day, and students should be exposed to this excitement and challenge, using real-world examples when possible."**

*—Protheroe, 2007*

**"Mastery experiences build confidence and develop intrinsic motivation."**

*—Guskey, 2010*

**"Activities should allow students to explore, explain, extend, and evaluate their progress."**

*—National Research Council, 1999*

The teacher manual also includes information on how each of the mathematical practices relates to a specific chapter and provides specific instructional strategies for each of the model and practice problems that are tagged with mathematical practices. Each of the practice exercises, chapter reviews, and cumulative reviews begin with lower level questions and ratchet up in level of difficulty, making it easy for teachers to tailor assignments to student needs. The problems tagged with mathematical practices are found throughout the student editions in model problems, practice problems, chapter reviews, and cumulative reviews. For these problems, the teacher manual also suggests ways for students to work cooperatively with others.

This provides a level of support for all, as students have the opportunity to discuss mathematics with one another, explore and explain their ideas and understandings to others, critique each other's reasoning, and apply mathematical practice standards to problem solving.

The wide-ranging contextual problems connect mathematics to other disciplines. They provide students the opportunity to engage in meaningful real world problems as they furrow their brow and become actively engaged rather than watching mathematics from the sidelines.

Our companion website, amscomath.com, provides instructional videos for students needing remediation. Our personalized assignment generator, Math$^X$, provides point-of-use support through the use of problem-specific short videos and stepped out interactive fill-in-the-blank problems. The *i-practice* assignment generator in Math$^X$ generates questions for those problems that students get wrong, allowing students to practice to mastery. The varied instructional supports ensure mastery experiences for all students.

The companion website and digital teacher manual provide interactive discovery activities. These concrete models provide students a pathway to the abstract understandings required in high school and provide feedback for self evaluation. Paper and pencil enrichment activities are available in the teacher manual and supplement the content of the applicable lesson. They are learner centered and emphasize inquiry/problem solving.

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## CASE STUDY

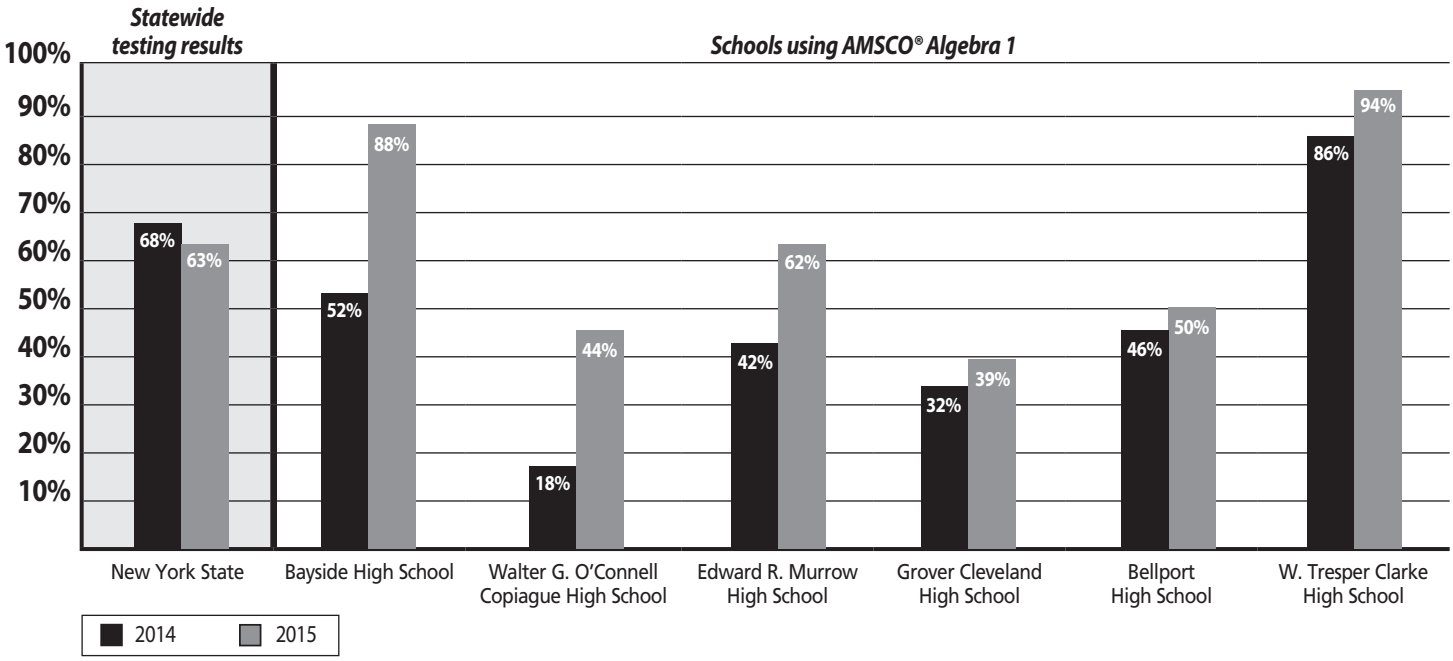
### New York Regents Test Scores Before and After Using AMSCO® Math

The chart reflects the percentage of students scoring level 3 and above on the New York Algebra 1 state assessment given in June 2014 and in June 2015. Student scores are reported as levels 1 to 5. Level 3 and above is considered "on or above grade level."

Statewide testing results reflected a drop, from 68% to 63%, for those students "on or above grade level."

The school specific data is for schools using AMSCO® Algebra 1 in the 2014–2015 school year. The chart reflects the positive change in the percentage of students scoring "on or above grade level" after using AMSCO® Algebra 1 versus before using AMSCO® Algebra 1.

*All data was pulled from the New York State Education Department (NYSED).*




| Demographics | African American | Latino | Asian | Caucasian | Other | Economically Disadvantaged |
|---|---|---|---|---|---|---|
| New York State | 18% | 25% | 9% | 45% | 3% | 54% |
| Bayside High School | 13% | 28% | 40% | 18% | 1% | 74% |
| Walter G. O'Connell Copiague High School | 28% | 53% | 2% | 17% | 1% | 70% |
| Edward R. Murrow High School | 22% | 22% | 27% | 27% | 2% | 63% |
| Grover Cleveland High School | 5% | 66% | 10% | 19% | 1% | 72% |
| Bellport High School | 25% | 28% | 2% | 43% | 2% | 56% |
| W. Tresper Clarke High School | 4% | 20% | 19% | 58% | 0% | 20% |

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