

Introduction

The Spirit of Archimedes

Mathematics exists both as a timeless truth woven into the fabric of our universe and as a practical tool that helps us understand and improve our world. It reveals itself in nature's patterns and provides structure to countless human endeavors, from science and commerce to art and leisure.

Archimedes, the great mathematician of antiquity, perfectly embodied this dual nature of mathematics. He was deeply committed to mathematical discovery, deriving an early approximation of π and developing methods that would later influence calculus. Yet he also applied these abstract principles to practical challenges, designing machines like the Archimedes' screw and creating ingenious defensive systems for his city of Syracuse. He understood that mathematics was both a worthy subject of contemplation and a powerful tool for solving real-world problems.

The Archimedes Standards are designed in this same spirit. They encourage students to develop a deep understanding of mathematical principles while also learning to apply these concepts to practical situations. These standards help students build the mathematical foundation they need to think critically, solve problems effectively, and prepare for success in college, career, and civic life. Like Archimedes himself, these standards embrace both the theoretical beauty and practical utility of mathematics, valuing this discipline both for its timeless truths and for the good its application can bring to our world.

A Vision for Universal Excellence

State education standards are important guideposts for K-12 instruction in America's schools. They describe what should be taught at each grade level, providing tangible guidance for the content learned in the classroom while leaving teachers significant leeway in the methods of instruction. State standards ought to serve a variety of educational institutions, providing public schools (both charter and non-charter), private schools, and homeschools with a framework to promote quality mathematics education for all students.

Education standards should possess two goals: achievement and accessibility. On the one hand, standards must be made up of the best and most lasting ideas and methods, setting a

high bar that challenges teachers and students to excellence. This commitment to achievement is the only way to ensure that students will be thoroughly prepared for college, career, and civic participation. On the other hand, standards must be achievable for all students, whatever their background, culture, or level of preparation. A solid foundation in mathematics will serve 100% of American students, regardless of whether they graduate from high school or go on to college. A proper set of standards, therefore, should lay out a clear and realistic path to excellence at every grade level that can be implemented across the country, in a wide variety of classrooms and contexts.

Finding the right balance between ambition and accessibility is key to effective mathematics standards. The Archimedes Standards achieve this balance by providing clear, straightforward learning objectives that maintain high expectations while being attainable for all students. They are carefully designed to be neither too complex (which can overwhelm students and teachers) nor too simplified (which can leave students unprepared for future challenges). Instead, they offer a thoughtfully sequenced progression of mathematical knowledge that builds confidence and competence step by step. By focusing on essential mathematical concepts presented clearly and logically, the Archimedes Standards create a pathway that helps every student develop the mathematical foundation they need for future success. This approach ensures that parents can understand what their children are learning, teachers can implement the standards effectively, and students of all backgrounds can achieve mathematical proficiency.

The Need for New State Mathematics Standards

Mathematics education in the United States presents both challenges and opportunities. Recent data from national and international assessments indicate areas where we can strengthen our approach to teaching mathematics. The Archimedes Standards offer a fresh perspective designed to address these opportunities and help all American students achieve their full mathematical potential.

Recent assessment data shows room for growth in American students' mathematics achievement. The National Assessment of Educational Progress (NAEP) has tracked changes in mathematics performance over time, with particular concerns about supporting students who struggle most with mathematics. Similarly, international comparisons through assessments like the Programme for International Student Assessment (PISA) suggest that American students would benefit from standards that effectively balance both rigor and accessibility.

- The U.S. spends the most on education, yet ranks 34th in math performance globally.
- Nationally, 73% of 8th-grade students fall below the targeted Math Proficiency level.
- All states have 37% or fewer 8th-grade math students meeting the proficiency target.
- Over 70% of states base their standards on a single model that is low in content, lacks clarity, and produces low results.

These performance patterns extend to college preparation as well. Between 2019 and 2022, the percentage of high school graduates prepared for undergraduate mathematics courses decreased from 39% to 31%. This preparation gap creates real obstacles for students pursuing advanced education in technical and mathematical fields.

The Archimedes Math Standards Benefits

The Archimedes Standards respond to these opportunities by providing a coherent, accessible framework for mathematics education. Their design emphasizes:

- 1. **Clarity and directness**: Standards written in straightforward language that teachers, parents, and students can easily understand and implement.
- 2. **Mathematical focus**: Core mathematical concepts presented in a logical, developmentally appropriate sequence.
- 3. **Balanced approach**: From Pre-K-12, the Archimedes Math Standards emphasize building strong fundamentals and number fluency through achievable steps that foster student confidence and competence with content-rich, rigorous standards.
- 4. **Practical application**: Mathematical knowledge connected to real-world contexts and problems with a simple style, key terms, symbols and age-appropriate vocabulary, and a glossary.
- 5. **Teacher support**: Clear expectations that help teachers plan effective mathematics instruction.

By addressing these elements, the Archimedes Standards create a pathway for mathematical excellence that can benefit all American students. Their thoughtful design can help schools maximize the return on their educational investment, allowing students to develop the strong mathematical foundation they need for future success.

