

Understanding the K-12 Common Core State Standards in Mathematics

The K–12 Common Core State Standards in Mathematics are the result of a collaborative effort between state departments of education, teachers, experts in a wide array of fields, and professional organizations. The standards allow students to become increasingly more proficient in understanding and using mathematics with a steady progression leading to college and career readiness by the end of high school.

In grades K-8 the grade-level standards are organized by domains and in high school (grades 9-12) they are organized by conceptual categories. These standards include skills and knowledge – what students need to know and be able to do as well as mathematical practices – and habits of mind that students should develop to foster mathematical understanding and expertise. An organizational framework illustrating this blend is found at the beginning of each grade and each conceptual category in the standards.

The standards are grounded in evidence, including the best work of states and high-performing nations, frameworks developed for the National Assessment of Educational Progress (NAEP), academic research, curriculum surveys, assessment data on college- and career-ready performance, and input from educators at all levels and from a variety of subjects. High points include:

K-5 Expectations

- ✓ The K-5 standards are organized in domains: counting and cardinality; operations and algebraic thinking; number and operations in base ten; number and operations – fractions; measurement and data; and geometry. The domains vary by grade-level as appropriate; counting and cardinality is a key domain in kindergarten, while number and operations – fractions is introduced in third grade.
- ✓ The grade-by-grade K-5 standards provide students with a solid foundation in whole numbers, addition, subtraction, multiplication, division, fractions and decimals—which taken together provide students with a strong foundation for learning and applying more demanding math concepts and procedures, and for moving into robust applications.
- ✓ For example, in kindergarten, the standards follow the practices of high-performing countries, and the recommendations of our own National Research Council’s Early Math Panel report by focusing kindergarten work on the number core: learning how numbers correspond to quantities, and learning how to put numbers together and take them apart (the beginnings of addition and subtraction). These are complicated ideas that take time to learn—and research suggests that without these critical building blocks in place, math performance will suffer in later years.
- ✓ The K-5 standards provide guidance to teachers on how to navigate their way through knotty topics such as fractions, negative numbers, and geometry, and do so by maintaining a continuous progression from grade to grade. Today’s best state standards as well as international models, education research, and the insights of professional mathematicians informed these grade-by-grade progressions.
- ✓ By drawing on the best lessons from high-performing countries, the standards provide the foundation for redesigning and focusing the math curriculum—in an attempt to move away from the “mile wide and inch deep” curricula currently in place throughout the U.S.
- ✓ The focus in the K-5 standards is comparable to that seen in high-performing countries. It allows students time to master topics by developing procedural fluency as well as conceptual understanding—rather than the current practices by which many students learn enough to get by on the next test, but forget it shortly thereafter, only to review again the following year.

Middle School Expectations

- ✓ The 6-8 standards are organized in domains: ratios and proportional relationships, the number system, expressions and equations, functions, geometry, and statistics and probability.
- ✓ Having built a strong foundation in K-5, students are prepared for robust learning in geometry, Algebra, and probability and statistics in middle school.
- ✓ Students who have completed 7th grade and mastered the content and skills of the K-7 standards will be well prepared for algebra in grade 8 or after.
- ✓ The middle school standards provide a coherent and rich preparation for high school mathematics.

High School Expectations

- ✓ The high school standards are organized around five conceptual categories: number and quantity, algebra, functions, geometry, and statistics and probability.
- ✓ The high school standards call on students to practice applying mathematical ways of thinking to real world issues and challenges; they prepare students to think and reason mathematically.
- ✓ The high school standards set a rigorous definition of college and career readiness, not by piling topic upon topic, but by demanding that students develop a depth of understanding and an ability to apply mathematics to novel situations, as college students and employees regularly do. Standards indicated with a (+) are beyond the college and career readiness level but are necessary to take advanced mathematics courses such as calculus, advanced statistics, or discrete mathematics.
- ✓ The high school standards emphasize mathematical modeling—the use of mathematics and statistics to analyze empirical situations, understand them more fully, and make better decisions. For example, the standards state: “Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.”
- ✓ Model course pathways for mathematics are being developed, and will be released by the end of June. The pathways organize the content of the high school standards into possible courses. Both pathways (one more typical in the U.S., the other more typical internationally) require completion of the core in the third year while preparing students for a menu of fourth-year courses. The pathways illustrate two possible approaches – they are not mandates nor prescriptions for course organization, curriculum, or pedagogy.

Achieve is a bipartisan, nonprofit education reform organization that has worked with states, individually and through the 35-state American Diploma Project, for over a decade to ensure that state K-12 standards, graduation requirements, assessments and accountability systems are calibrated to graduate students from high school ready for college, careers and life. Achieve has partnered with NGA and CCSSO on the Common Core State Standards Initiative and a number of its staff and consultants served on writing and review teams. For more information about Achieve, visit www.achieve.org