

## Common Core State Standards – Mathematics - Deepening Core Academic Content and Strengthening Critical Skills

### *Brief Summary*

The Common Core State Standards (CCSS) in mathematics - developed in 2010 and voluntarily adopted by 45 states, the District of Columbia, four U.S. territories, and the Department of Defense Education Activity – establish a high bar of learning objectives for students as they matriculate through states' K-12 education systems. The intent of these objectives is for students to be college- and career-ready upon high school graduation and have the necessary skills – critical-thinking, communication, and collaboration – to help businesses continue to innovate and compete in the global economy. Most states are on track to implement their more rigorous standards by school year 2014-2015 and are developing/implementing their aligned assessment systems, curricula, instructional materials, and teacher/leader professional development systems.

Below are key concepts and grade level expectations for mathematics that have implications for other core subject areas, such as science.

### *Mathematics – Concepts*

- *K-5 Standards* – The standards are organized into the following domains: counting and cardinality; operations and algebraic thinking; number and operations in base ten; number and operations – fractions.
  - The domains will vary by grade level with counting and cardinality starting in kindergarten and number and operations with fractions in the *third grade*; and
  - *Kindergarten* – students will learn how numbers correspond to quantities
- *Middle School* – The standards for *grades 6-8* are organized in the following domains: ratios and proportional relationships; the number system; expressions and equations; functions; geometry; and statistics and probability.
  - Students build upon their learning during the *K-5 grades* with deeper exposure to geometry, algebra, and probability and statistics in middle school; and
  - Expectations will be for students to master these areas and skills in *seventh grade* and be prepared for additional algebra in *eighth grade* and later.
- *High School* – The standards are organized in the following domains: number and quantity; algebra; functions; geometry; and statistics and probability.
  - Students will be able to apply mathematical concepts to real-world challenges and continue to think critically and reason mathematically; and
  - Emphasize mathematical modeling – the use of mathematics and statistics to analyzes empirical situations

### *Mathematics – Grade Level Expectations*

Below are expectations of what students need to learn and know by key grade levels (**not an all-inclusive list**).

- *Kindergarten*
  - Count to 100 by ones and by tens;

- Write numbers 0 to 20;
- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds, verbal explanations, expressions, or equations;
- Solve addition and subtraction word problems and add and subtract within 10 (e.g. by using objects or drawings to represent the problem);
- Describe measurable attributes of objects such as length and weight; and
- Correctly name shapes regardless of their orientations or overall size.
- *Third Grade*
  - Interpret products of whole numbers;
  - Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities;
  - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division;
  - Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction;
  - Tell and write time to the nearest minute and measure time intervals in minutes; and
  - Solve word problems involving addition and subtraction of time intervals in minutes.
- *Eighth Grade*
  - Understand and apply the Pythagorean Theorem ( $a^2 + b^2 = c^2$ );
  - Analyze and solve linear equations; and
  - Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
- *High School*
  - Use units as a way to understand problems and to guide the solution of multi-step problems, choose and interpret units consistently in formulas, choose and interpret the scale and origin in graphs and data displays;
  - Solve quadratic equations with real coefficients that have complex solutions;
  - Know the Fundamental Theorem of Algebra;
  - Construct and compare linear, quadratic, and exponential models and solve problems;
  - Use modeling to solve real problems (e.g. estimating how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed); and
  - Represent data with plots on the real number line.

## References

*Achieving the Common Core: Understanding the K-12 Common Core State Standards in Mathematics* by Achieve

*Achieving the Common Core: Understanding the K-12 Common Core State Standards in English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects* by Achieve

*Old Standards v. Common Core: A Side-By-Side Comparison of English Language Arts* by Foundation for Excellence in Education

*Common Core State Standards Initiative Website* by National Governors Association and Council for Chief State School Officers - <http://www.corestandards.org/>