Colorado Common Core Mathematics Standards Raise the Bar

In 2010, Colorado adopted a more rigorous set of academic standards to ensure that students are ready for college or the workforce when they graduate from our public schools. These standards, the Common Core State Standards in English Language Arts and Math, create higher expectations for our students. They challenge students to read critically, write extensively and solve real-world math problems at greater capacity, raising the bar for *all* students and resulting in a more valuable education. As Colorado implements these new standards, it is important to understand how they will better prepare children for future academic and career challenges.

Higher Academic Standards in Math:

The Common Core State Standards for math are designed to ensure students fully understand the content of math: numbers, measurement, algebra, geometry, and the processes of math: problem solving, reasoning, and making connections. These are the fundamental math skills needed to succeed throughout elementary, middle and high school, college and beyond – regardless of career path. While the old standards focused on simply expecting students to work the problem, the new standards expect students to understand why the answer is the answer, and why there may be different ways to arrive at the correct answer. Students need to move beyond knowing how to plug numbers into a formula to arrive at the correct answer. They need to understand why the formula works, and show that they understand it. In order to do this, students must master early on the foundational skills of addition, subtraction, multiplication and division.

The implementation of Common Core State Standards began during the school year 2013-2014. Below are a few examples of how the Colorado Common Core Math standards raise the bar for Colorado students.

Comparison of past Colorado Standards to Colorado Common Core Mathematics Standards

Subject/ Grade	**THEN –** The past Colorado standards required students to:	**NOW –** The Colorado Common Core Standards require students to:	**Communication for the General Public**
Elementary	Kindergarten students were expected to: • Count objects by ones to 20 and represent the quantities. • Identify, read, and write	Kindergarten students are expected to: • Count to 100 by ones and by tens. • Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	The past standards expected kindergarten students simply to count by ones to 20 and write the corresponding numerals correctly. The Common Core standards expect kindergarten students to count to 100 by ones and tens as well as count on from any given number in that

	corresponding numerals.	• Write numbers from 0 to 20, and represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	sequence. Students are also expected to write numbers from 0-20.
	Fourth graders were expected to use flexible and efficient methods of computing including student generated strategies and standard algorithms to solve three or four digit by one-digit multiplication or division problems.	Fourth graders are expected to: • Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. • Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	The past standards expected 4th graders to solve three or four digit by one-digit multiplication and division problems. The Common Core standards expect this same skill of 4th graders, but in addition, expect students to multiply 2 two-digit numbers, and illustrate and explain all calculations.
	6th graders were expected to use a protractor to measure angles to the nearest degree.	4th graders are expected to measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	The past standards expected 6th graders to measure angles with a protractor. The Common Core standards expect 4th graders to master this same skill.
Middle School	7th graders were expected to read, write, locate on number line, compare and order integers and positive rational numbers.	6th graders are expected to: • Find and position integers and other rational numbers on a horizontal or vertical number line diagram. • Understand ordering and absolute value of rational numbers. • Find and position integers and other rational numbers on a horizontal or vertical number line diagram.	The past standards expected 7th graders to compare and order integers and positive rational numbers. This same skill is expected of 6th graders under the Common Core standards.
	8th graders were expected to solve	6th graders are expected to reason about and solve one-variable	The past standard expected 8th graders to solve inequalities in one

	inequalities in one variable (including negative coefficients) and graph the solution on a number line.	equations and inequalities by: • Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. • Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	variable and graph the solution on a number line. The Common Core standards expect this same skill of 6th graders. In addition, 6th graders are expected to understand the process that makes the inequality true.
Algebra	In high school, solve systems of linear equations and inequalities with two variables using algebraic methods (substitution and elimination) or graphing.	In 8th grade, solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.	The past standard required students in high school to solve systems of linear equations (two equations that have two variables). The Common Core standard requires students in 8th grade to solve systems of linear equations algebraically and graphically.
	In high school, perform operations (addition, subtraction, multiplication, and division) on numbers written in scientific notation with technology.	In 8th grade, perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	The past standard required students in high school to perform operations on numbers written in scientific notation (i.e. $3x10^6$) using technology only. The Common Core standard requires students in 8th grade to perform operations on numbers written in scientific notation using analytic methods. The standard then requires students to interpret numbers given in scientific notation generated by technology.
Geometry	In high school, justify, interpret, and apply the use of formulas for the area, surface area, and	In 8th grade, know the formulas for the volumes of cones, cylinders, and spheres; and use them to solve real-world and mathematical problems.	The past standard required students in high school to know and use the various formulas for three-dimensional figures such as cones and spheres to solve problems.

	volume of cones/pyramids, spheres, and cylinders/prisms.		The Common Core standard requires students in 8th grade to know and apply the formulas for volume of cones, cylinders, and spheres to solve real-world problems.