California Common Core State Standards
Introduction to the Mathematics Content K-8

OVERVIEW

The Common Core State Standards (CCSS) define what students should understand and be able to do in the study of mathematics. Students who master the CCSS for mathematics will be prepared for college-level courses and possess the skills necessary for success in today's workforce.

There are two types of Mathematical Standards

- Eight Mathematical Practices - describe a set of skills and processes that all students should develop as part of their study of mathematics
- Content Standards - the mathematics students are expected to learn

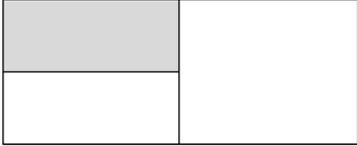**Three major shifts encompass the new Mathematics Standards**

- FOCUS: Teaching fewer topics more deeply; emphasis on big ideas and key concepts
- COHERENCE: Making connections between ideas within and across grade levels
- RIGOR: Increased depth of knowledge and the ability to justify/explain reasoning; apply and generalize to real world situations

The following section is a summary snapshot of the changes highlighted in the Common Core State Standards (CCSS). The left column represents topics new or highlighted in the CCSS and the right column represents a sample problem a student might encounter at each grade level. While not an exhaustive list, this chart should help familiarize you with many of the CCSS and allow you to communicate with parents about their student's grade level content.

Common Core Standards for California
Mathematics Content Snapshot

Grade	Standards that are new or highlighted at this grade level	Sample Problem
K	- Count to 100 by ones and tens - Write numbers from 0-20 - Explicit standard for one-to-one correspondence - Knowing that the last number counted is the total - Compose and decompose numbers from 11-19 into ten ones and some further ones - Decompose numbers less than or equal to 10 into pairs - Fluently add and subtract within 5 - Arrange and describe objects in space - Identify shapes as either two- or three-dimensional - Counting and Cardinality domain unique to Kindergarten	Kindergarten students will be able to identify shapes as a two-dimensional (flat) or three-dimensional (solid) shape. A _____ is a flat shape. A _____ is a solid shape.

1	• Count to 120 starting at any number less than 120 • Apply properties of operations as strategies to add and subtract • Partition circles and rectangles into two and four equal shares and describing those shares using fractional language • Tell time to the nearest hour, half-hour using analog and digital clocks • Organize, represent and interpret data with up to three categories	First graders will be able to count to 120 starting at any number less than 120. |	97			100
		103	104	105
	107			
111			114	115
		118		120	
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2	• Skip count by 2s, 5s, 10s and 100s within 1000 • Commit to memory all sums of two one-digit numbers • Write an equation to express an even number as a sum of two equal addends • Estimate lengths using inches, feet, centimeters and meters • Measure to determine how much longer one object is than another • Represent whole-number sums and differences within 100 on a number line diagram • Know the value of coins and solve word problems involving combinations of coins and dollar bills	Second graders will be able to solve word problems involving dollar bills, quarters, dimes, nickels and pennies using $ and ¢ symbols appropriately. Jim has 3 dimes and 2 pennies. His big sister has a dollar bill and a nickel. How much money do they have in all?

3	• Generalize place value understanding for multi-digit whole numbers • Model and solving multiplication and division problems • Understand multiplication and division and the relationship between the two • Apply properties including the distributive property as strategies to multiply and divide • Fluently multiply and divide with numbers within 100 • Know from memory all products of two one-digit numbers • Develop an understanding of fractions as numbers • Locate fractions on a number line: knowing that on a number line 1/8 and another 1/8 end at a spot identified as 2/8 • Understand elapsed time • Measure and estimating liquid volume • Understand concepts of area measurement	Third graders will develop an understanding of fractions as numbers. Write a fraction to show how much of the shape is shaded. Explain your reasoning.
4	• Generalize place value understanding by knowing that a digit in one place represents ten times what it represents in the place to its right • Multi-digit multiplication and division beyond 100 • Generate number or shape patterns that follow a given rule • Understand addition and subtraction of fractions with like denominators • Multiply fractions by a whole number • Use decimal notation for fractions with denominators of 10 or 100 • Know relative sizes of measurement units within one system including km, m, cm; kg, g; l, ml; hr, min, sec. • Recognize angles as geometric shapes	4th graders will understand the addition and subtraction of fractions with like denominators. Ben and Jan share a whole pizza. The pizza is cut into 6 equal slices and put on two separate plates. What fraction of the pizza could be on each plate? Model 3 different ways Ben and Jan could share the pizza. Write an equation for each model.
5	• Read, write, compare and round decimals to the thousandths • Fluently multiply multi-digit whole numbers using the standard algorithm • Add, subtract, multiply and divide decimals to hundredths using models, drawings, strategies, properties • Use equivalent fractions as a strategy to add and subtract fractions with unlike denominators • Interpret multiplication as scaling • Solve real world problems involving multiplication and division of fractions and mixed numbers • Use parentheses in numeric expressions	5th graders will use equivalent fractions to add and subtract fractions with unlike denominators. Lia ran 2/3 of a marathon. Julia ran 5/6 of a marathon. Who ran farther? How much farther?

	• Write and interpret simple expressions without evaluating them • Graph points on the coordinate plane to solve real-world and mathematical problems • Convert among different-sized standards measurement units with a given measurement system • Identify properties of two-dimensional figures	

6	• Use ratios and rates to:
	    ○ Compare quantities within and between measurement systems
	    ○ Relate the change of scale in measurements with the change of scale to units used
	• Solve problems involving percent; finding the whole, when given a part and the percent
	• Understand positive and negative numbers
	• Work with all four quadrants is included in graphing concepts
	• Absolute value concepts are developed and applied
	• Add and subtract negative integers
	• Write and evaluate expressions involving whole-number exponents
	• Use a letter to represent an unknown number
	• Represent solutions of inequalities on number line diagrams
	• Analyze the relationship between dependent and independent variables
	• Use of composition and decomposition to find area of geometric shapes
	• Draw polygons in the coordinate plane
	• Compute surface area
	• Know various forms of display for data sets
	• Understand the meaning of and be able to compute, the minimum, the lower quartile, the median the upper quartile and the maximum of a data set
		<u>Examples of writing variable expressions:</u>
		
		1) Maria has three more than twice as many crayons as Elizabeth. Write an algebraic expression to represent the number of crayons that Maria has.
		
		2) An amusement park charges $28 to enter and $0.35 per ticket. Write an algebraic expression to represent the total amount spent.

7	• Recognize and represent proportional relationships between quantities • Identify unit rate in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships • Represent proportional relationships by equations • Explain what a point (x , y) on a graph of the proportional relationship means in terms of the situation • Draw geometric shapes from given information • Use facts about supplementary, complementary, vertical angles to solve simple equations for an unknown angle in a figure • Find surface area and volume of cones and spheres • Use sampling techniques to draw inferences about a population • Determine the likelihood of an event occurring • Use data to estimate the probability of future events • Find theoretical and experimental probabilities • Understand the difference between independent and compound events • Determine the probability of compound events	Example of proportional relationships: A student is making trail mix. Create a graph to determine if the quantities of nuts and fruit are proportional for each serving size listed in the table. If the quantities are proportional, what is the constant of proportionality or unit rate that defines the relationship? Explain how you determined the constant of proportionality and how it relates to both the table and graph. | Serving size	1	2	3	4
Cups of nuts (x)	1	2	3	4
Cups of fruit (y)	2	4	6	8	
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8	• Know that there are numbers that are not rational, and approximate them by rational numbers • Work with radicals and integer exponents • Understand the connection between proportional relationships, lines, and linear equations • Analyze and solve linear equations and pairs of simultaneous linear equations • Define, evaluate, and compare functions • Use functions to model relationships between quantities • Understand congruence using physical models, transparencies, or geometry software • Understand similarity using physical models, transparencies, or geometry software • Understand and apply the Pythagorean Theorem • Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres • Investigate patterns of association in bivariate data *Please see appendix for more information on 8th grade math.*	Example of bivariate data: Data for 10 students' Math and Science scores are provided in the chart. Describe the association between the scores. | Student	Math	Science
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1	64	68
2	50	70
3	85	83
4	34	33
5	56	60
6	24	27
7	72	74
8	63	63
9	42	40
10	93	96	

APPENDIX

Middle School Math
Under the 1997 CA standards, there were no grade level standards for 8th grade. Students were expected to either take Algebra 1 in 8th grade or be considered below grade level and placed in "Algebra Readiness." With the implementation of Common Core, grade level standards are now in place for 8th grade, and encompass a robust set of topics. The standards are a collection of what was previously thought of as Pre-Algebra topics, some topics from the '97 High School Geometry standards, and approximately half the topics from the '97 Algebra 1 standards.

This year (2013-14) we implemented CCSS aligned courses in middle school for Course 1 (6th grade), Course 2 (7th grade), and Course 3 (8th grade). We are supplementing missing content in grades 6 and 7, while also providing on-going professional development to teachers on the content shifts. For 8th grade, we are piloting a new curriculum from the Center for Math and Teaching (CMAT) out of UCLA, called *Mathlinks*. We have also been offering training to the 8th grade teachers on the new curriculum provided by CMAT and training will continue throughout the year.

More information on content shifts

Grade	California State Standards that have been moved or are no longer included
K	Moved to Grade 1 • Time (telling and writing) • Data collection and basic graphing Statistics and probability standards are no longer included.
1	Moved to Kindergarten • Identification of two- and three-dimensional shapes • Arrange and describe objects in space • Counting by 10s to 100 Moved to Grade 2 • Knowing the value of coins • Commit addition and subtraction facts (to 20) to memory • Counting by 5s Moved to Grade 3 • Measuring and estimating liquid volume Statistics and probability standards are no longer included.
2	Moved to Grade 3 • Commit the multiplication tables of 2s, 5s, and 10s to memory • Modeling and solving simple multiplication and division problems • Basic fraction concepts • Measurement concepts of elapsed time Statistics and probability standards are no longer included.
3	Moved to Grade 4 • Multi-digit multiplication and division beyond 100 • Adding and subtracting fractions with like denominators • Using decimal notation for fractions

	• Work with angles as geometric shape Moved to Grade 5 • Unit conversions Moved to Grade 7 • Probability standards Statistics and probability standards are no longer included.
4	Moved to Grade 5 • Addition, subtraction and rounding of decimals • Using the standard algorithm for multiplication • Use of parentheses in numeric expressions • Coordinate graphing Moved to Grade 6 • Concept of negative numbers • Evaluating algebraic expressions and graphing linear functions • Knowing mode, median and outliers Statistics and probability standards are no longer included.
5	Moved to Grade 6 • Finding decimal and percent equivalents and computing a given percent of a whole number • Understanding and computing positive integer powers of nonnegative integers • Use a letter to represent an unknown number • Derive and use the formula for area of a triangle • Compute surface area Statistics and probability standards are no longer included.
6	Moved to Grade 5 • Identifying properties of two-dimensional figures Moved to Grade 7 • Use proportions to solve problems • Identify angles as vertical, adjacent, complementary or supplementary and provide descriptions of these terms • Use properties about supplementary and complementary angles and the sum of the angles of a triangle to solve problems • Draw triangles and quadrilaterals from given information • Sampling techniques • Theoretical and experimental probability • Understand the difference between independent and compound events • Determine the likelihood of an event occurring • Use data to estimate the probability of future events Moved to Grade 8 • Understand how the inclusion or exclusion of outliers affects measures of central tendency
7	Moved to Grade 6 • Solve problems using percents • Absolute value concepts are developed and applied

	- Represent solutions of inequalities on a number line diagram - Write and evaluate expressions using whole-number exponents - Use a letter to represent an unknown number - Work with all four quadrants is included in graphing concepts - Analyze the relationship between dependent and independent variables - Use ratios and rates to compare quantities within and between measurement systems - Use ratios and rates to relate the change of scale in measurements with a change of scale to the units used - Use of composition and decomposition to find area of geometric shapes - Compute surface area - Draw polygons in the coordinate plane - Know various forms of display for data sets - Understand the meaning of and be able to compute the minimum, the lower quartile, the median, the upper quartile and the maximum of a data set Moved to Grade 8 - Graph and interpret linear and nonlinear functions - Plot the values of quantities whose ratios are always the same. Fit a line to the plot and understand that the slope of the line equals the quantities - Slope of a line - Radicals and integer exponents, including rules for working with exponents - Pythagorean theorem - Congruency of geometric figures - Transformational geometry - Scientific notation Moved to Algebra 1 - Graph functions of the form $y = nx^2$ and $y = nx^3$