A Look at…

Second Grade

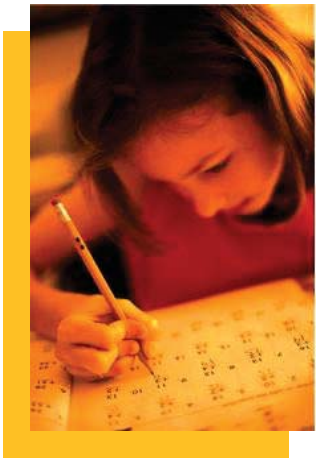
in California Public Schools

Including information about the new
Common Core State Standards

STANDARDS, CURRICULUM FRAMEWORKS AND INSTRUCTIONAL RESOURCES DIVISION
CURRICULUM, LEARNING AND ACCOUNTABILITY BRANCH
CALIFORNIA DEPARTMENT OF EDUCATION
Prepublication Edition: January 2011

Mathematics

Overview



Effective mathematics education provides students with a balanced instructional program. In such a program, students become proficient in basic computational skills and procedures, develop conceptual understandings, and become adept at problem solving. Standards-based mathematics instruction starts with basic material and increases in scope and content as the years progress. It is like an inverted pyramid, with the entire weight of the developing subject, including readiness for algebra, resting on the foundations built in the early grades.

California recently adopted new standards in mathematics, the Common Core California Standards (CCSS) with California additions. The CCSS are comprised of standards developed by the state-led Common Core State Standards Initiative and material taken from the 1997 California mathematics standards. California will implement these new standards gradually over the next several years as curriculum frameworks, instructional materials, and assessments based on the CCSS are adopted.

There are many similarities between the CCSS and the 1997 California mathematics standards, but there are also a few noteworthy differences. For instance, the CCSS are organized by "domains" which add grade-level focus and vary slightly by grade. The domains for second grade are Operations and Algebraic Thinking (OA), Number and Operations in Base Ten (NBT), Measurement and Data (MD), and Geometry (G). Also, the CCSS do not include "key standards" as in the 1997 California mathematics standards. Instead, the CCSS are designed to have a greater focus at each grade and to develop mathematics topics in depth. In the early grades, the CCSS continue to emphasize concepts necessary for the study of more advanced mathematics in later years. To ensure that students have adequate time to achieve mastery, some of the 1997 California mathematics standards familiar to California's second grade teachers will be taught in different grades after the CCSS are fully implemented.

This section provides an overview of the new CCSS for second grade mathematics, including some highlights of how the second grade curriculum, based on the 1997 California mathematics standards, change with the implementation of the new CCSS. It includes a review of the important mathematical concepts and skills from first grade (prerequisite skills) and guidance on areas of mathematics that may be challenging for some English learners. A complete listing of the grade two CCSS with California additions for mathematics can be found at the end of this section. A complete listing of the grade two 1997 California mathematics standards is located on the CDE Content Standards Web page at http://www.cde.ca.gov/be/st/ss/documents/mathstandard.pdf.

What Second Grade Students Should Know

Students entering second grade who have met the first grade CCSS for mathematics have an understanding of whole numbers and place value (within 100). They used objects, drawings, and symbols for the unknown number to solve addition and subtraction word problems (within 20) and are fluent with these operations (within 10). Entering second graders can add two-digit and one-digit numbers (or a two-digit number and a multiple of ten) within 100 using concrete models or drawings and a variety of strategies (e.g., place value or properties of operations). They learned to use mental math to find 10 more or 10 less than a two-digit number and can subtract multiples of 10 from multiples of 10 (for positive or zero differences and numbers in the range 10–90).

Students have worked with measurement, data, and shapes. They can measure the length of objects by indirect comparison and can organize, represent, and interpret data with up to three categories. Students have an initial understanding of how to describe, extend, and explain ways to get to a next element in simple repeating patterns. They can build two- and three-dimensional shapes and can partition circles and rectangles into fractional pieces and use the related vocabulary (halves, fourths, and quarters).

What Students Learn in Second Grade

Students in second grade extend their understanding of place value (within 1000), build fluency in addition and subtraction (within 100), and use simple concepts of multiplication and division. They measure the length of objects using appropriate tools and identify shapes and their attributes.

Operations and Algebraic Thinking

Both the 1997 California mathematics standards and the CCSS develop addition and subtraction knowledge and skills at second grade. Students in the second grade use addition and subtraction within 100 to solve one- and two-step word problems with unknowns in all positions. They represent problems using drawings and equations with a symbol for the unknown number, use mental strategies to add and subtract within 20, and know from memory all sums of two one-digit numbers (a topic in the 1997 California mathematics standards at grade one).

The 1997 California mathematics standards and the CCSS build upon the foundations of addition and subtraction to develop the concepts of multiplication and division.

The 1997 California mathematics standards and the CCSS build upon the foundations of addition and subtraction to develop the concepts of multiplication and division. Students use repeated addition and counting by multiples to demonstrate multiplication and use repeated subtraction and equal group sharing to demonstrate division.

With full implementation of the CCSS, use of the commutative and associative properties to solve addition and subtraction problems will be introduced in grade one, a grade two topic in the 1997 California mathematics standards. The memorization of multiplication tables for 2s and 5s, introduced at grade two in the 1997 California standards, will become a grade three topic.

Number and Operations in Base Ten

In second grade, students' growing understanding of whole numbers is a fundamental topic. Students extend their understanding of place value as they associate the digits of a three-digit number as amounts of hundreds, tens, and ones. They read, write, order, and compare whole numbers and skip count by 2s, 5s, 10s, and 100s within 1000. Skip counting to 100 is introduced at first grade in the 1997 California mathematics standards.

In both the 1997 California mathematics standards and the CCSS, students add and subtract within 1000, although the CCSS specify student fluency in addition and subtraction within 100. To foster a deep understanding of addition and subtraction, students use concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction to solve problems. Second grade students extend their addition skills as they add up to four two-digit numbers and mentally add and subtract 10 or 100 from numbers between 100 and 900 (the CCSS emphasize the use of operations with multiples of 10 to develop place value understanding) .

Second graders learn the basics of how to "carry" and "borrow" as addition and subtraction expands to include three-digit numbers (e.g., add or subtract numbers column by column—the ones and ones, tens and tens, and hundreds and hundreds). Students in these early grades often have trouble lining numbers up for addition or subtraction and may need to be reminded that it is essential to line up numbers in the correct position for their place value. Initially, limiting problems to those that require carrying or borrowing across only one column (e.g., 17 + 24, 43 – 7) will make this less confusing to students.

With full implementation of CCSS, how to recognize, name, and compare fractions will be addressed at grade three, a grade two topic in the 1997 California mathematics standards.

Measurement and Data

In second grade, both the 1997 California mathematics standards and CCSS introduce the concept of standard units of measure, with a few differences. Students estimate and measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes (selection of appropriate tools and units is a grade three topic in the 1997 California mathematics standards). Second grade students relate addition and subtraction to length as they represent positive whole numbers (from 0) and whole-number sums and differences within 100 on a number line diagram. The 1997 California mathematics standards introduce number line diagrams in grade four.

Students model and solve problems involving amounts of money (e.g., If you have 2 dimes and 3 pennies, how many cents do you have?).

Students model and solve problems involving amounts of money (e.g., If you have 2 dimes and 3 pennies, how many cents do you have?). Money problems provide second graders with a practical context to the concepts of addition and subtraction. Students also use picture graphs and bar graphs to represent and interpret data.

With full implementation of the CCSS, the identification of "range" as a feature of data sets will be introduced at grade six, a grade two topic in the 1997 California mathematics standards.

Geometry

Second grade students extend their understanding of plane and solid geometric shapes as they recognize and describe shapes by various attributes (e.g., the number of angles and equal faces). In the CCSS, second graders also learn to draw various shapes. Students are introduced to the early concept of area as they partition rectangles into rows and columns (and count the number of squares). They also partition circles and rectangles into two, three, and four equal shares and learn the associated fraction vocabulary (thirds, a third of).

With full implementation of the CCSS, the concept of "putting shapes together" will be part of the kindergarten and grade one curriculum (a grade two topic in the 1997 California mathematics standards). In addition, recognizing and describing arithmetic patterns will be a subject at grade three (a grade two topic in the 1997 California mathematics standards).

Support for English Learners

Students need to develop knowledge of mathematics as a language. However, the academic language of mathematics instruction and the specialized vocabulary of mathematics can create particular challenges for English learners.

The language of mathematics is very precise compared with the English used in common discourse. English learners need opportunities to develop their knowledge of the features of language that are used to teach mathematics, such as semantics (how to translate the words of a problem into a symbolic representation), syntax (the order of words and phrases), and mathematical discourse (writing or talking about mathematical terms, concepts, etc.). The specialized vocabulary of mathematics should be explicitly taught and reinforced throughout the year.

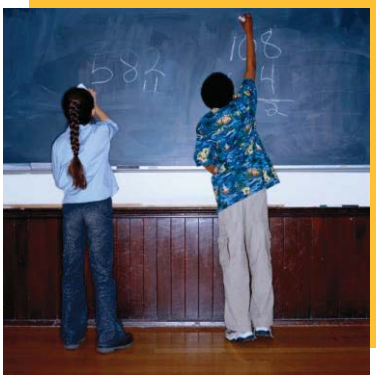
These areas can create special challenges for English learners in the early grades:

- At an early stage students may have difficulty with such English words as first, second, last, before, every, each, more, and equal. Students may be unfamiliar with sum, difference, solve, length, and value.

- The different meanings of multiple-meaning words should be explicitly taught. These words may have a meaning in common discourse that is different from the meaning in mathematics, such as table or face (as in the face of a clock).

- The place values of some of the numbers between 10 and 20 are not obvious from their names (e.g., the number 16 is called sixteen in English, but ten plus six in other languages).

- The narrative descriptions of a word problem can require language skills that students have not yet mastered, particularly when the language of a word problem is ambiguous or includes idioms (e.g., "a dime a dozen"), comparatives (greater than, less than, most often, least often), or position words (behind, below, in front of, to the right or left of).



Instruction in mathematics should be promoted despite low literacy or limited proficiency in the English language, along with critical thinking and analysis skills. Specially designed academic instruction in English (SDAIE) strategies can provide valuable instructional strategies to meet the needs of English learners. For additional resources to support the teaching of English learners, go to the CDE English Learners Web page at http://www.cde.ca.gov/sp/el/.

Transition to Common Core State Standards

The following chart highlights some of the more significant changes to be considered as California progresses toward full implementation of the grade two CCSS for mathematics. The chart includes the column heading "Overview of Standards." For the 1997 California mathematics standards, this information is from the "strands" (e.g., Number Sense) and the "overarching" standards (e.g., Number Sense 1.0) at second grade. For the CCSS, the column lists the "domains" (e.g., Operations and Algebraic Thinking) and the "cluster headings" for the standards (e.g., Represent and solve problems involving addition and subtraction) at second grade.

The chart does not, and is not intended to, illustrate all of the differences between the two sets of standards—it is merely a beginning point for more in-depth discussion by teachers and other educators on how instruction may change.

The transition chart is followed by a complete set of the CCSS with California additions for second grade and then a table of the CCSS domains for kindergarten through grade five.

A Quick Look: Transition to Common Core State Standards (CCSS)

Mathematics: Grade Two

Overview of Standards 1997 California Standards *	Overview of Standards CCSS	Highlights
Algebra and Functions ▪ Students model, represent, and interpret number relationships to create and solve problems involving addition and subtraction. **Number Sense** ▪ Students understand the relationship between numbers, quantities, and place value in whole numbers up to 1,000. ▪ Students estimate, calculate, and solve problems involving addition and subtraction of two- and three-digit numbers. ▪ Students model and solve simple problems involving multiplication and division. ▪ Students understand that fractions and decimals may refer to parts of a set and parts of a whole.	**Operations and Algebraic Thinking** ▪ Represent and solve problems involving addition and subtraction. ▪ Add and subtract within 20. ▪ Work with equal groups of objects to gain foundations for multiplication.	▪ Fluently add and subtract within 20, and memorize all sums of two one-digit numbers **(memorize addition facts to 20 moves from grade one to grade two in the CCSS)**. ▲ ** ▪ Use repeated addition and counting by multiples to demonstrate multiplication **(memorize multiplication tables for 2s, 5s, and 10s moves from grade two to grade three in the CCSS).** ▲ ▪ Use repeated subtraction and equal group sharing to demonstrate division.
	Number and Operations in Base Ten ▪ Understand place value. ▪ Use place value understanding and properties of operations to add and subtract.	▪ Understand a three-digit number represents amounts of hundreds, tens, and ones. ▪ Read, write and count within 1000; skip count by 2s, 5s, 10s, and 100s **(skip counting by 2s, 5s, and 10s to 100 moves from grade one to grade two in the CCSS).** ▲ ▪ Add up to four two-digit numbers **(a new emphasis in the CCSS)**. ▪ Fluently add and subtract within 100; add and subtract within 1000 (using concrete models, properties of operations, or other strategies). ▪ Mentally add or subtract 10 or 100 for numbers

* **Note:** The 1997 California mathematics standards will continue to be assessed through the STAR system (in grades 2–11) until at least 2014.

** The ▲ symbol indicates all or part of a concept in the 1997 California mathematics standards has moved to a higher grade in the CCSS; the ▼symbol indicates movement to a lower grade. No symbol indicates a concept will continue to be taught at the current grade level.

▪ Students model and solve problems by representing, adding, and subtracting amounts of money. ▪ Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, hundreds, and thousands places. **Measurement and Geometry** ▪ Students understand that measurement is accomplished by identifying a unit of measure, iterating (repeating) that unit, and comparing it to the item to be measured. ▪ Students identify and describe the attributes of common figures in the plane and of common objects in space. **Statistics, Data Analysis, and Probability** ▪ Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations. ▪ Students demonstrate an understanding of patterns and how patterns grow and describe them in general ways.		100–900. ▪ Fractions as numbers **(how to recognize, name and compare fractions moves from grade two to grade three in the CCSS). ▲**
	Measurement and Data ▪ Measure and estimate lengths in standard units. ▪ Relate addition and subtraction to length. ▪ Work with time and money. ▪ Represent and interpret data.	▪ Measure the length of an object using appropriate tools such as rulers and meter sticks **(selection of appropriate tools and units moves from grade three to grade two in the CCSS). ▼** ▪ Use a number line diagram to represent whole numbers as lengths (from 0) and whole-number sums and differences (within 100) **(the introduction of number lines moves from grade four to grade two in the CCSS). ▼** ▪ Represent and compare data by using bar graphs and picture graphs **(moves from grade one to grade two in the CCSS). ▲** ▪ Solve word problems involving the value of money **(introduction to the value of coins moves from grade one to grade two in the CCSS). ▲** ▪ "Range" of data sets **(how to identify the "range" moves from grade two to grade six in the CCSS). ▲**
	Geometry ▪ Reason with shapes and their attributes.	▪ Partition circles and rectangles into two, three and four equal shares, describe the shares using the words *halves, thirds, half of, etc.*, and describe the whole as two halves, three thirds, etc. ▪ Compose shapes **(putting shapes together moves from grade two to kindergarten and grade one in the CCSS).▼** ▪ Identify arithmetic patterns **(how to recognize and describe arithmetic patterns moves from grade**

		two to grade three in the CCSS).▲
Mathematical Reasoning ▪ Students make decisions about how to set up a problem. ▪ Students solve problems and justify their reasoning. ▪ Students note connections between one problem and another.	**Standards for Mathematical Practice** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning	▪ The CCSS include Standards for Mathematical Content (different at each grade) and Standards for Mathematical Practice (recurring throughout the grades). ▪ To master the grade level content, students will need to rely on their understanding of a concept, not only on procedures. Standards for Mathematical Practice define how students develop mathematical understanding as they make sense of a problem, reason abstractly, construct arguments, model with mathematics, use tools strategically, attend to precision, and look for structure and repeated reasoning. ▪ Standards for Mathematical Content that set an expectation of "understanding" are potential points of intersections between these standards and the Standards for Mathematical Practice. ▪ Standards for Mathematical Practice are similar to the 1997 California Mathematical Reasoning standards and should be evident throughout future curricula, assessments and professional development.

The Standards

The CCSS with California additions that follow are the pre-publication version of the standards prepared by the Sacramento County Office of Education (SCOE), updated on October 21, 2010. Content that is unique to California and was added to the multi-state common core standards is in bold typeface. The SCOE document is available online at http://www.scoe.net/castandards/agenda/2010/math_ccs_recommendations.pdf. These grade two CCSS for Mathematics were adopted by the California SBE on August 2, 2010.

A complete listing of the grade two 1997 California mathematics standards is located on the CDE Web page at http://www.cde.ca.gov/be/st/ss/documents/mathstandard.pdf.

Common Core State Standards with California Additions Mathematics – Grade Two	
Operations and Algebraic Thinking (2.OA)	
Represent and solve problems involving addition and subtraction.	
1.	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]
Add and subtract within 20.	
2.	Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers.
Work with equal groups of objects to gain foundations for multiplication.	
3.	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
4.	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
5.	**Use repeated addition and counting by multiples to demonstrate multiplication.**
6.	**Use repeated subtraction and equal group sharing to demonstrate division.**
Number and Operations in Base Ten (2.NBT)	
Understand place value.	

[1] See Glossary, Table 1.
[2] See standard 1.OA.6 for a list of mental strategies.

1.	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens—called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
2.	Count within 1000; skip-count by **2s**, 5s, 10s, and 100s.
3.	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
4.	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
Use place value understanding and properties of operations to add and subtract.	
5.	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
6.	Add up to four two-digit numbers using strategies based on place value and properties of operations.
7.	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
7.1	**Use estimation strategies in computation and problem solving with numbers up to 1000.**
7.2	**Make reasonable estimates when adding or subtracting.**
8.	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
9.	Explain why addition and subtraction strategies work, using place value and the properties of operations.[3]
Measurement and Data (2.MD)	
Measure and estimate lengths in standard units.	
1.	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
2.	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

[3] Explanations may be supported by drawings or objects.

3.	Estimate lengths using units of inches, feet, centimeters, and meters.
3.1	**Verify reasonableness of the estimate when working with measurements (e.g., closest inch). (CA-Standard NS 6.1).**
4.	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
Relate addition and subtraction to length.	
5.	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
6.	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
Work with time and money.	
7.	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. **Know relationships of time (e.g., minutes in an hour, days in a month, weeks in a year).**
8.	Solve word problems involving **combinations of** dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*
Represent and interpret data.	
9.	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
10.	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems[4] using information presented in a bar graph.
Geometry (2.G)	
Reason with shapes and their attributes.	
1.	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.[5] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
2.	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

[4] See Glossary, Table 1.
[5] Sizes are compared directly or visually, not compared by measuring.

3.	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of,* etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
	Standards for Mathematical Practice Integrated throughout the CCSS 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

CCSS Domains

The CCSS are organized by domains. The table lists the domains for grades kindergarten through grade eight. The table identifies which domains are addressed in kindergarten through grade five (an "X" indicates the domain addressed at a grade level). The shaded rows indicate domains to be covered at later grades.

Domains	Kindergarten	Grade One	Grade Two	Grade Three	Grade Four	Grade Five
Counting and Cardinality (CC)	X					
Operations and Algebraic Thinking (OA)	X	X	X	X	X	X
Number and Operations in Base Ten (NBT)	X	X	X	X	X	X
Measurement and Data (MD)	X	X	X	X	X	X
Geometry (G)	X	X	X	X	X	X
Number and Operations – Fractions (NF)				X	X	X
Ratios and Proportional Relationships (RP)						
The Number System (NS)						
Expressions and Equations (EE)						
Statistics and Probability (SP)						
Functions (F)						