A Look at…

First Grade
in California Public Schools

Including information about the new
Common Core State Standards
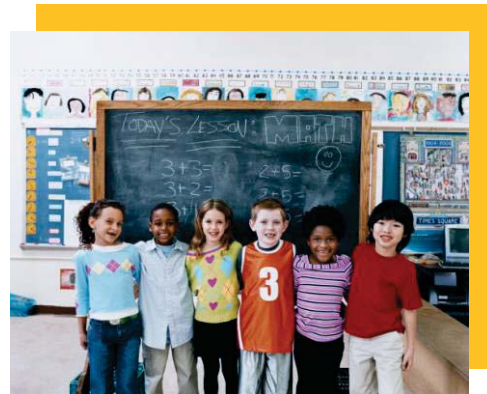
Mathematics

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 State 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. These new standards will be implemented 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 first 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 first grade teachers will be taught in different grades after the CCSS are fully implemented.

This section provides an overview of the new CCSS for first grade mathematics, including some highlights of how the first 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 kindergarten (prerequisite skills) and guidance on areas of mathematics that may be challenging for some English learners. A complete listing of the grade one CCSS for mathematics can be found at the end of this section. A complete listing of the grade one 1997 California mathematics standards is located on CDE Web page at http://www.cde.ca.gov/be/st/ss/documents/mathstandard.pdf.

What First Grade Students Should Know

Students entering first grade, who have met the kindergarten CCSS for mathematics, understand the relationship between numbers and quantities and have built a foundation for understanding place value. They can group and compare sets of concrete items and recognize whether there are more, fewer, or an equal number of items in different sets. They learned to count to 100 by ones and tens and can count forward starting from any number within this range.

Students can write numbers from 0-20 and can represent a number of objects with a written numeral. They are able to recognize, represent, name, and order a number of objects and have developed a clear sense of what

a number is by using concrete objects to determine the answers to addition and subtraction. They can decompose the number 10 into pairs in several ways, using drawings or equations to record these decompositions, and can compose and decompose numbers from 11 to 19 into tens and ones. They added and subtracted within 5 fluently.

Students entering first grade can identify and describe both two- and three-dimensional geometric shapes as well as their relative positions. They can compose simple shapes to make larger shapes and analyze and compare shapes by parts and attributes.

What Students Learn in First Grade

First grade students will extend their knowledge of mathematics as they learn to add and subtract within 20, develop an understanding of whole numbers and place value within 100, measure and order objects by length, interpret data (with up to three categories) and work with shapes to compose new shapes and partition shapes to create "equal shares" (decompose shapes).

Operations and Algebraic Thinking

Both the 1997 California mathematics standards and the CCSS emphasize addition and subtraction of small numbers at first grade. First grade students develop arithmetic skills as they use addition and subtraction (within 20) to solve word problems and become fluent with these operations (within 10). Students use objects, drawings, and equations with symbols for unknowns to write and solve addition problems within 20 (with three whole numbers). Students work with addition and subtraction equations and demonstrate the meaning of an equal sign as they determine whether an equation is true or false. The CCSS foster understanding as students employ a variety of strategies (e.g., counting on, building or decomposing to ten, applying knowledge of the inverse relationship between addition and subtraction) and apply the properties of operations (e.g., commutative and associative properties) to addition and subtraction tasks.

Students use objects, drawings, and equations with symbols for unknowns to write and solve addition problems…

With implementation of the CCSS, work with the value of coins, a grade one topic in the 1997 California mathematics standards, will now be introduced in grade two.

Number and Operations in Base Ten

Both the 1997 California mathematics standards and the CCSS focus on whole numbers and place value at first grade. Students use concrete models to deepen their understandings about place value and know that the digits of a two-digit number represent amounts of tens and ones. They add two-digit and one-digit numbers (or a two-digit number and a multiple of ten) within 100 and know that to add two-digit numbers, tens are added to tens, ones are added to ones, and that during the process sometimes a new ten is composed. They compare and order two-digit whole numbers by using the symbols for less than, equal to, or greater than ($<$, $=$, $>$).

First graders expand their understanding of addition and subtraction by using mental math to find 10 more or 10 less than a two-digit number. They also subtract multiples of 10 from multiples of 10 (for positive or zero differences and numbers in the range 10-90). In the 1997 California mathematics standards, addition and subtraction at first grade was focused on problems with one- and two-digit numbers (e.g., 5+58= __), and the sum of three one-digit numbers.

1.17

With full implementation of the CCSS, entering first graders will already know how to count to 100 by ones and tens, a grade one topic in the 1997 standards. First graders will extend counting by ones from 100 to 120 and will read and write whole numbers to 120. Skip counting by 2s and 5s (a grade one topic in the 1997 standards, for numbers to 100) will be introduced at grade two for numbers to 1,000.

Measurement and Data

First graders develop their measurement skills as they compare the lengths of three objects by using direct comparison or a nonstandard unit. By the end of first grade, students understand that the measured length of an object can be represented by the number of length units that span it with no gaps or overlaps. They read and record time to the nearest half hour on both analog and digital clocks. Students organize, represent, and interpret data with up to three categories and evaluate and discuss collected data points.

Both the 1997 California mathematics standards and the CCSS have first graders describe, extend, and explain ways to get to a next element in simple repeating patterns (e.g., rhythmic, numeric, color, and shape). As students work with patterns in sorting they learn to reason about the most likely next term.

With implementation of the CCSS, the concept of weight (a grade one topic in the 1997 California mathematics standards) will be introduced in kindergarten but not studied in depth until grade three, when volume is also introduced. Also, the use of picture graphs and bar graphs to represent data will be covered in grade two, a grade one topic in the 1997 California mathematics standards.

Geometry

In both the 1997 California mathematics standards and the CCSS, first graders study the attributes of geometric shapes. The CCSS emphasize differences between defining (e.g., triangles are closed and three-sided) and non-defining (e.g., color, orientation, size) attributes as students actively build and draw shapes to match defining attributes. Students build composite shapes from two- and three-dimensional shapes, and are able to compose new shapes from the composite shape. First graders also partition circles and rectangles into fractional pieces and learn the associated vocabulary (halves, fourths, and quarters).

With implementation of the CCSS, concepts of "putting shapes together and taking them apart" introduced in the 1997 California mathematics standards in grade two will be developed at grade one. Fractional parts will be introduced at grade one instead of grade two 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 a few topics that will continue to be addressed at the grade level and some of the changes to be considered as California progresses toward full implementation of the grade one 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 first 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 first 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 for first 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 One

Overview of Standards 1997 California Mathematics Standards*	Overview of Standards CCSS	Highlights
Algebra and Functions • Students use number sentences with operational symbols and expressions to solve problems. **Number Sense** • Students understand and use numbers up to 100. • Students demonstrate the meaning of addition and subtraction and use these operations to solve problems. • Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, and hundreds places.	**Operations and Algebraic Thinking** • Represent and solve problems involving addition and subtraction. • Understand and apply properties of operations and the relationship between addition and subtraction. • Add and subtract within 20. • Work with addition and subtraction equations.	• Continue a focus on addition and subtraction within 20, but develop fluency with sums and difference within 10 (**fluency with numbers from 11 to 20 moves from grade one to grade two in CCSS**). ▲ ** • Introduce the properties of operations as strategies to add and subtract (**moves from grade two to grade one in CCSS**). ▼ • Use objects, drawings and equations with symbols for unknowns to solve addition and subtraction problems (within 20), including word problems. • Work with the value of coins (**moves from grade two to grade one in CCSS**). ▲
Number and Operations in Base Ten • Extend the counting sequence. • Understand place value. • Use place value understanding and properties of operations to add and subtract.		• Begin counting to 100 in kindergarten --counting by 1s and 10s (**counting by 1s from 31 to 100 and skip counting moves from grade one to kindergarten in CCSS**). ▼ • Extend counting, reading, and writing whole numbers from 100 to 120 (**work with numbers from 100 to 120 moves from grade two to grade one in the CCSSS**). ▼ • Use concrete models or drawings to reinforce

- understanding of topics such as place value, addition and subtraction.
- Add within 100 (two-digit and a one-digit number). Extend to a two-digit number and a multiple of 10.
- Subtract multiples of 10 for numbers in the range 10-90.

Measurement and Geometry

- Students use direct comparison and nonstandard units to describe the measurements of objects.
- Students identify common geometric figures, classify them by common attributes, and describe their relative position or their location in space.

Statistics, Data Analysis, and Probability

- Students organize, represent, and compare data by category on simple graphs and charts.
- Students sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, or colors.

- Measure the length of objects using indirect comparison and by iterating length units (**a focus on weight and volume moves from grade one to grade three in CCSS**). ▲
- Organize, represent, and interpret data, with up to three categories (**specific use of picture graphs and bar graphs moves from grade one to grade two in CCSS**). ▲
- Describe, extend, and explain simple repeating patterns.

Measurement and Data

- Measure lengths indirectly and by iterating length units.
- Tell and write time.
- Represent and interpret data.

- Build and draw shapes that possess certain attributes (**understanding attributes remains at grade one with an added focus on actively building and drawing in CCSS**).
- Compose and decompose two- or three-dimensional shapes to create a composite shape (**putting shapes together and taking them apart moves from grade two to grade one in CCSS**). ▼
- Partition circles and rectangles into equal shares to introduce "part-whole" relationships and fractional terms, for example, halves, fourths, and quarters (**fractional parts moves from grade two to grade one in CCSS**). ▼
- Describe the relative positions of objects, for example, above or behind (**moves from grade one**

Geometry

- Reason with shapes and their attributes.

- The CCS 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 and 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 previous 1997 California Mathematical Reasoning standards and should be evident throughout future curricula, assessments, and professional development.

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

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.

The Standards

The mathematics CCSS with California additions 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 (Outside Source). These grade one CCSS for Mathematics were adopted by the California State Board of Education on August 2, 2010.

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

Common Core State Standards Mathematics – Grade One	
Operations and Algebraic Thinking (1.OA)	
Represent and solve problems involving addition and subtraction.	
1.	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.[1]
2.	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
Understand and apply properties of operations and the relationship between addition and subtraction.	
3.	Apply properties of operations as strategies to add and subtract.[2] *Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known. (Commutative property of addition.) To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$. (Associative property of addition.)*
4.	Understand subtraction as an unknown-addend problem. *For example, subtract $10 - 8$ by finding the number that makes 10 when added to 8.*
Add and subtract within 20.	
5.	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
6.	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).

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[1] See Glossary, Table 1
[2] Students need not use formal terms for these properties.

1.23

Work with addition and subtraction equations.	
7.	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 − 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*
7.1	**Write and solve number sentences from problem situations that express relationships involving addition and subtraction within 20.**
8.	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = □ − 3, 6 + 6 = □.*

Number and Operations in Base Ten (1.NBT)	
Extend the counting sequence.	
1.	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
Understand place value.	
2.	Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones – called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
3.	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
Use place value understanding and properties of operations to add and subtract.	
4.	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, 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 and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
5.	Given a two-digit number, mentally find 10 or more or 10 less than the number, without having to count; explain the reasoning used.
6.	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), 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 and explain the reasoning used.
Measurement and Data (1.MD)
Measure lengths indirectly and by iterating length units.
1.	Order three objects by length; compare the lengths of two objects indirectly by using a third object.
2.	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
Tell and write time.
3.	Tell and write time in hours and half-hours using analog and digital clocks.
3.1	**Relate time to events (e.g., before/after, shorter/longer).**
Represent and interpret data.
4.	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
4.1	**Describe, extend, and explain ways to get to a next element in simple repeating patterns (e.g., rhythmic, numeric, color, and shape). (CA-Standard SDAP 2.1)**
Geometry (1.G)
Reason with shapes and their attributes.
1.	Distinguish between defining attributes (e.g., triangles, are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
2.	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[3]
3.	Partition circles and rectangles into two and four equal shares, describe the shares using words *halves, fourths,* and *quarters,* and use the phrases *half of, fourth of,* and *quarter of.* Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.
	Standards for Mathematical Practice Integrated throughout the CCSS

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[3] Students do not need to learn formal names such as "right rectangular prism."

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)						