Mathematics | Grade 2

The descriptions below provide an overview of the mathematical concepts and skills that students explore throughout the 2nd grade.

Operations & Algebraic Thinking
Students solve one- and two-step addition and subtraction contextual problems within 100 with an unknown in any position. Students should solve a variety of problem types in order to make connections among contexts, equations, and strategies (See Table 1 - Addition and Subtraction Situations). Students also represent these problems with objects, drawings, and/or equations. Students build upon previously taught strategies to mentally add and subtract within 30. Students know from memory all sums of two one-digit numbers and related subtraction facts.

Numbers & Operations in Base Ten
Students extend their understanding of the base-ten place value system to 1,000. This includes counting by ones, fives, tens, and hundreds. Students write numbers using standard form, word form, and expanded form. They deepen their understanding of different ways a number can be composed and decomposed. Students extend their understanding of place value, properties of operations, and the relationship between addition and subtraction to add and subtract within 1,000 and fluently add and subtract within 100 (See Table 3 - Properties of Operations). They add up to four two-digit numbers. They should also be able to explain why these strategies work. Students mentally add and subtract 10 or 100 from a given number 100-900.

Measurement & Data
In previous grades, students measured with non-standard units. Students in 2nd grade measure with standard units (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length. Students use addition and subtraction to solve contextual problems involving lengths in the same units and represent lengths on a number line.

Geometry
Students describe and analyze shapes by examining their sides and angles. Students recognize and draw shapes based on given attributes, such as draw a shape with 3 vertices. Students also are able to partition circles and rectangles into two, three, and four equal shares and rectangles into rows and columns, laying the foundation for fractions and area.

Standards for Mathematical Practice

Being successful in mathematics requires the development of approaches, practices, and habits of mind that need to be in place as one strives to develop mathematical fluency, procedural skills, and conceptual understanding. The Standards for Mathematical Practice are meant to address these areas of expertise that teachers should seek to develop in their students. These approaches, practices, and habits of mind can be summarized as "processes and proficiencies" that successful mathematicians have as a part of their work in mathematics. Additional explanations are included in the main introduction of these standards.

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.

Literacy Standards for Mathematics

Communication in mathematics employs literacy skills in reading, vocabulary, speaking and listening, and writing. Mathematically proficient students communicate using precise terminology and multiple representations including graphs, tables, charts, and diagrams. By describing and contextualizing mathematics, students create arguments and support conclusions. They evaluate and critique the reasoning of others, analyze, and reflect on their own thought processes. Mathematically proficient students have the capacity to engage fully with mathematics in context by posing questions, choosing appropriate problem-solving approaches, and justifying solutions. Further explanations are included in the main introduction.

Literacy Skills for Mathematical Proficiency
1. Use multiple reading strategies. 2. Understand and use correct mathematical vocabulary. 3. Discuss and articulate mathematical ideas. 4. Write mathematical arguments.

Operations and Algebraic Thinking (OA)

Cluster Headings	Content Standards
A. Represent and solve problems involving addition and subtraction. (See Table 1 - Addition and Subtraction Situations)	**2.OA.A.1** Add and subtract within 100 to solve one- and two-step contextual problems, with unknowns in all positions, involving situations of *add to*, *take from*, *put together/take apart*, and *compare*. Use objects, drawings, and equations with a symbol for the unknown number to represent the problem.
B. Add and subtract within 30.	**2.OA.B.2** Fluently add and subtract within 30 using mental strategies. By the end of 2nd grade, know from memory all sums of two one-digit numbers and related subtraction facts.
C. Work with equal groups of objects to gain foundations for multiplication.	**2.OA.C.3** Determine whether a group of objects (up to 20) has an odd or even number of members by pairing objects or counting them by 2s. Write an equation to express an even number as a sum of two equal addends. **2.OA.C.4** Use repeated 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.

Number and Operations in Base Ten (NBT)

Cluster Headings	Content Standards
A. Understand place value.	**2.NBT.A.1** Know that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (e.g., 706 can be represented in multiple ways as 7 hundreds, 0 tens, and 6 ones; 706 ones; or 70 tens and 6 ones). **2.NBT.A.2** Count within 1000. Skip-count within 1000 by 5s, 10s, and 100s, starting from any number in its skip counting sequence. **2.NBT.A.3** Read and write numbers to 1000 using standard form, word form, and expanded form. **2.NBT.A.4** Compare two three-digit numbers based on the meanings of the digits in each place and use the symbols >, =, and < to show the relationship.
B. Use place value understanding and properties of operations to add and subtract. (See Table 3 - Properties of Operations)	**2.NBT.B.5** Fluently add and subtract within 100 using properties of operations, strategies based on place value, and/or the relationship between addition and subtraction. **2.NBT.B.6** Add up to four two-digit numbers using properties of operations and strategies based on place value.

Cluster Headings	Content Standards
B. Use place value understanding and properties of operations to add and subtract. (See Table 3 - Properties of Operations)	**2.NBT.B.7** Add and subtract within 1000 using concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to explain the reasoning used. **2.NBT.B.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100– 900. **2.NBT.B.9** Explain why addition and subtraction strategies work using properties of operations and place value. (Explanations may include words, drawing, or objects.)

Measurement and Data (MD)

Cluster Headings	Content Standards
A. Measure and estimate lengths in standard units.	**2.MD.A.1** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. **2.MD.A.2** Measure the length of an object using two different units of measure and describe how the two measurements relate to the size of the unit chosen. **2.MD.A.3** Estimate lengths using units of inches, feet, yards, centimeters, and meters. **2.MD.A.4** Measure to determine how much longer one object is than another and express the difference in terms of a standard unit of length.
B. Relate addition and subtraction to length.	**2.MD.B.5** Add and subtract within 100 to solve contextual problems involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown to represent the problem. **2.MD.B.6** Represent whole numbers as lengths from 0 on a number line and know that the points corresponding to the numbers on the number line are equally spaced. Use a number line to represent whole number sums and differences of lengths within 100.
C. Work with time and money.	**2.MD.C.7** Tell and write time in quarter hours and to the nearest five minutes (in a.m. and p.m.) using analog and digital clocks. **2.MD.C.8** Solve contextual problems involving dollar bills, quarters, dimes, nickels, and pennies using ¢ and $ symbols appropriately.

Cluster Headings	Content Standards
D. Represent and interpret data.	**2.MD.D.9** Generate measurement data by measuring lengths of several objects to the nearest whole unit. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. **2.MD.D.10** Draw a pictograph and a bar graph (with intervals of one) to represent a data set with up to four categories. Solve addition and subtraction problems related to the data in a graph.

Geometry (G)

Cluster Headings	Content Standards
A. Reason about shapes and their attributes.	**2.G.A.1** Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. Draw two-dimensional shapes having specified attributes (as determined directly or visually, not by measuring), such as a given number of angles or a given number of sides of equal length. **2.G.A.2** Partition a rectangle into rows and columns of same-sized squares and find the total number of squares. **2.G.A.3** Partition circles and rectangles into two, three, and four equal shares, describe the shares using the words *halves, thirds, fourths, half of, a third of, and a fourth of*, and describe the whole as *two halves, three thirds, four fourths*. Recognize that equal shares of identical wholes need not have the same shape.

Major content of the grade is indicated by the light green shading of the cluster heading and standard's coding.

	Major Content		Supporting Content

Table 1 Common addition and subtraction situations

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ? **(K)**	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5 **(1st)**	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5 **One-Step Problem** **(2nd)**
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ? **(K)**	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3 **(1st)**	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3 **One-Step Problem** **(2nd)**
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[2]**
Put Together/ Take Apart[3]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ? **(K)**	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ? **(K)**	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2 **(1st)**
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare[4]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? **(1st)**	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? **One-Step Problem** **(1st)**	(Version with "more"): Julie has 3 more apples than Lucy. Julie has five apples. How many apples does Lucy have? 5 – 3 = ? ? + 3 = 5 **One-Step Problem** **(2nd)**
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ? **(1st)**	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ? **One-Step Problem** **(2nd)**	(Version with "fewer"): Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have? **One-Step Problem** **(1st)**

K: Problem types to be mastered by the end of the Kindergarten year.

1st: Problem types to be mastered by the end of the First Grade year, including problem types from the previous year. However, First Grade students should have experiences with all 12 problem types.

2nd: Problem types to be mastered by the end of the Second Grade year, including problem types from the previous years.

Table 3 The properties of operations

Here a, b and c stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number system.

Associative property of addition	$(a + b) + c = a + (b + c)$
Commutative property of addition	$a + b = b + a$
Additive identity property of 0	$a + 0 = 0 + a = a$
Associative property of multiplication	$(a \times b) \times c = a \times (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property of 1	$a \times 1 = 1 \times a = a$
Distributive property of multiplication over addition	$a \times (b + c) = a \times b + a \times c$