Grade 2 Mathematics Standards

Critical Areas for COHERENCE in Mathematics in Grade 2

In Grade 2, instructional time should focus on four critical areas:

1. Extending understanding of base-ten notation. Students extend their understanding of the base-ten system. This includes ideas of counting in twos, fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones). Students extend this understanding to include decomposition of numbers to assist with later work in operations (e.g., 853 can also be decomposed into 85 tens and 3 ones OR 7 hundreds, 15 tens, and 3 ones OR 8 hundreds, 4 tens, and 13 ones, etc.)

2. Building fluency with addition and subtraction. Students use their understanding of addition to develop fluency (efficiency, accuracy, and flexibility) with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods (students are expected to use more than the traditional algorithm) to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations (e.g., Commutative Property and Associative Property). They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds. Students understand that a word problem can be represented with an equation based on the situation, but the solution may use a related equation that is easier to manipulate (e.g., a word problem may be represented with a situation equation such as 25+? = 62; and students understand that even though the word problem is a joining situation, it is easier to solve using a subtraction equation {62 − 25 =? }).

3. Using standard units of measure. Students recognize the need for standard units of measure (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.

4. Describing and analyzing shapes. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Standards for Mathematical Practice in Grade 2

The State Standards for Mathematical Practice are practices expected to be integrated into every mathematics lesson for all students Grades K-12. Below are a few examples of how these Practices may be integrated into tasks that Grade 2 students complete.

Practice	Explanation and Example
1) Make Sense and Persevere in Solving Problems.	Mathematically proficient students in Grade 2 examine problems, can make sense of the meaning of the task, and find an entry point or a way to start the task. Grade 2 students also develop a foundation for problem solving strategies and become independently proficient on using those strategies to solve new tasks. In Grade 2, students' work still relies on concrete manipulatives and pictorial representations as students solve tasks unless the CCSS refers to the word fluently, which denotes mental mathematics. Grade 2 students also are expected to persevere while solving tasks; that is, if students reach a point in which they are stuck, they can reexamine the task in a different way and continue to solve the task. Lastly, mathematically proficient students complete a task by asking themselves the question, "Does my answer make sense?"
2) Reason abstractly and quantitatively.	Mathematically proficient students in Grade 2 make sense of quantities and the relationships while solving tasks. This involves two processes- decontextualizing and contextualizing. In Grade 2, students represent situations by decontextualizing tasks into numbers and symbols. For example, in the task, "There are 25 children in the cafeteria and they are joined by 17 more children. Then, if 19 of those children then leave, how many are still there?" Grade 2 students are expected to translate that situation into the equation: 25+17−19= ? and then solve the task. Students also contextualize situations during the problem solving process. For example, while solving the task above, students can refer to the context of the task to determine that they need to subtract 19 since 19 children leave. The processes of reasoning also apply to Grade 2 as students begin to measure with standard measurement units by determining the length of quantities based on particular units of measure.
3) Construct viable arguments and critique the reasoning of others.	Mathematically proficient students in Grade 2 accurately use definitions and previously established solutions to construct viable arguments about mathematics. In Grade 2 during discussions about problem solving strategies, students constructively critique the strategies and reasoning of their classmates. For example, while solving 74+18−37, students may use a variety of strategies, and after working on the task, can discuss and critique each other's reasoning and strategies, citing similarities and differences between strategies.
4) Model with mathematics.	Mathematically proficient students in Grade 2 model real-life mathematical situations with a number sentence or an equation, and check to make sure that their equation accurately matches the problem context. Grade 2 students still will rely on concrete manipulatives and pictorial representations while solving problems, but the expectation is that they will also write an equation to model

Practice	Explanation and Example
	problem situations. Likewise, Grade 2 students are expected to create an appropriate problem situation from an equation. For example, students are expected to create a story problem for the equation 24+17−13=?.
5) Use appropriate tools strategically.	Mathematically proficient students in Grade 2 have access to and use tools appropriately. These tools may include place value (base ten) blocks, hundreds number boards, number lines, and concrete geometric shapes (e.g., pattern blocks, 3-d solids). Students should also have experiences with educational technologies, such as calculators and virtual manipulatives that support conceptual understanding and higher-order thinking skills. During classroom instruction, students should have access to various mathematical tools as well as paper, and determine which tools are the most appropriate to use. For example, while solving 58+27, students can explain why place value blocks are more appropriate than counters.
6) Attend to precision.	Mathematically proficient students in Grade 2 are precise in their communication, calculations, and measurements. In all mathematical tasks, students in Grade 2 communicate clearly, using grade-level appropriate vocabulary accurately as well as giving precise explanations and reasoning regarding their process of finding solutions. For example, while measuring objects iteratively (repetitively), students check to make sure that there are no gaps or overlaps. During tasks involving number sense, students check their work to ensure the accuracy and reasonableness of solutions.
7) Look for and make use of structure.	Mathematically proficient students in Grade 2 carefully look for patterns and structures in the number system and other areas of mathematics. While solving addition and subtraction problems students can apply the patterns of the number system to skip count by 10s off the decade. For example, Grade 2 students are expected to mentally reason that 33+21 is 33 plus 2 tens, which equals 53 and then an add one which equals 54. While working in the Numbers in Base Ten domain, students work with the idea that 10 ones equal a ten, and 10 tens equals 1 hundred. Further, Grade 2 students also make use of structure when they work with subtraction as missing addend problems, such as 50−33= ? can be written as 33+ ?=50 and can be thought of as how much more do I need to add to 33 to get to 50?
8) Look for and express regularity in repeated reasoning.	Mathematically proficient students in Grade 2 begin to look for regularity in problem structures when solving mathematical tasks. For example, after solving two digit addition problems by decomposing numbers by place (33+25=30+20+3+5), students may begin to generalize and frequently apply that strategy independently on future tasks. Further, students begin to look for strategies to be more efficient in computations, including doubles strategies and making a ten. Lastly, while solving all tasks, Grade 2 students accurately check for the reasonableness of their solutions during, and after completing the task.

Mathematics Content Standards in Grade 2

Operations and Algebraic Thinking 2.OA

(Counting and Cardinality and Operations and Algebraic Thinking Progression K-5 Pg. 18)

Represent and solve problems involving addition and subtraction.

2.OA.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 situation equations and/or solution equations with a symbol for the unknown number to represent the problem.) Refer to shaded section of Table 1 for specific situation types.*

For Example:

A clown had 20 balloons. He sold 8. Another clown came by and gave him more. He now has 24 balloons. How many did the clown give him?

Situation Equation: $20 - 8 = ?$

$? + \square = 24$

Solution Equation: $20 - 8 = ?$

$24 - ? = \square$

Add and subtract within 20.

2.OA.2. Fluently (efficiently, accurately, and flexibly) add and subtract within 20 using mental strategies (counting on, making a ten, decomposing a number, creating an equivalent but easier and known sum, and using the relationship between addition and subtraction) Work with equal groups of objects to gain foundations for multiplication.

Work with equal groups of objects to gain foundations for multiplication.

2.OA.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.

2.OA.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.

Number and Operations in Base Ten 2.NBT

(Numbers & Operations Base 10 Progression K-5 Pg. 8)

Understand place value.

2.NBT.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:

2.NBT.1a. 100 can be thought of as a bundle of ten tens—called a "hundred."

2.NBT.1b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds

2.NBT.1c. Show flexibility in composing and decomposing hundreds, tens and ones *(e.g. 207 can be composed from 2 hundreds 7 ones OR 20 tens 7 ones OR 207 ones OR 1 hundred 10 tens 7 ones OR 1 hundred 9 tens 17 ones, etc.)*

2.NBT.2. Count within 1000; skip-count by 2s, 5s, 10s, and 100s; explain and generalize the patterns.

2.NBT.3. Read and write numbers within 1000 using base-ten **numerals**, number names, expanded form, and unit form.

2.NBT.4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, <, =, and ≠ relational symbols to record the results of comparisons.

Use place value understanding and properties of operations to add and subtract.
(Numbers & Operations Base 10 Progression K-5 Pg. 8)

2.NBT.5. Fluently (efficiently, accurately, and flexibly) add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction *(e.g. composing/decomposing by like base-10 units, using friendly or benchmark numbers, using related equations, compensation, number line, etc.).*

2.NBT.6. Add up to four two-digit numbers using strategies based on place value and properties of operations.

2.NBT.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, like base-ten units such as hundreds and hundreds, tens and tens, ones and ones are used; and sometimes it is necessary to compose or **decompose** tens or hundreds.

2.NBT.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.9. Explain why addition and subtraction strategies work using place value and the properties of operations. The explanations given may be supported by drawings or objects.

Measurement and Data 2.MD

Measure and estimate lengths in standard units.

2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.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.
(Measurement and Data (measurement part) Progression K–5 Pg. 12.)

2.MD.3. Estimate lengths using whole units of inches, feet, centimeters, and meters.
(Measurement and Data (measurement part) Progression K–5 Pg. 14-15.)

2.MD.4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit (inches, feet, centimeters, and meters).

Relate addition and subtraction to length.

2.MD.5. Use addition and subtraction within 100 to solve one- and two-step 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.*

2.MD.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.

2.MD.7. Tell and write time from analog and digital clocks to the nearest five minutes.

2.MD.8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately (Do not use decimal point, if showing 25 cents, use the word cents or ¢). *For example: If you have 2 dimes and 3 pennies, how many cents do you have?*

2.MD.9. Identify coins and bills and their values.

Represent and interpret data.

2.MD.10. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object using different units. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

2.MD.11. 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 using information presented in a bar graph (See Table 1).

Geometry 2.G

Reason with shapes and their attributes

(Geometry Progression K-6 Pg. 10).

2.G.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

2.G.2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

2.G.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. *Note: fraction notation* $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ *is not expected at this grade level.* Recognize that equal shares of identical wholes need not have the same shape.