THEME: ADDITION WITHIN 100 / LENGTH & SHAPES

NUMBER AND OPERATIONS IN BASE TEN (NBT)

Understand place value understanding and properties of operations to add and subtract.

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: 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.NBT.2 Count forward and backward within 1,000 by ones, tens, and hundreds starting at any number; skip-count by 5s starting at any multiple of 5.

2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, expanded form, and equivalent representations, e.g., 716 is 700 + 10 + 6, or 6 + 700 + 10, or 6 ones and 71 tens, etc.

2.NBT.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.

2.NBT.5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

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, 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.

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. Explanations may be supported by drawings or objects.

MEASUREMENT AND DATA (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.

2.MD.3. Estimate lengths using units of inches, feet, centimeters, and meters.

MEASUREMENT AND DATA (MD)

Measure and estimate lengths in standard units.

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.

Work with time and money.

2.MD.8 Solve problems with money.

a. Identify nickels and quarters by name and value.

b. Find the value of a collection of quarters, dimes, nickels, and pennies.

c. Solve word problems by adding and subtracting within 100, dollars with dollars and cents with cents (not using dollars and cents simultaneously) using the $ and ¢ symbols appropriately (not including decimal notation). Represent and interpret data.

2.MD.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 creating a line plot, where the horizontal scale is marked off in whole-number units.

GEOMETRY (G)

Reason with shapes and their attributes.

2.G.1 Recognize and identify triangles, quadrilaterals, pentagons, and hexagons based on the number of sides or vertices. Recognize and identify cubes, rectangular prisms, cones, and cylinders.

Commentary:

Students extend their understanding of place value to hundreds and to thousands by bundling 10 tens to make a hundred and later extend that understanding to bundling 10 hundreds to make 1 thousand. It is important to scaffold the work of this cluster so that students understand the concept of 1 hundred and then multiple hundreds. Conceptual understandings and skills built in previous grades should be explicitly connected to the new ideas in Grade 2 including place value, counting, and comparing numerals to 1,000.

As students work with numbers to 1,000 they count on within a range of numbers from 1 to 1,000 and skip count building on earlier experience with place value. Skip counting lays the foundation for future work with multiplication by forming groups of a given size.

Once students experience making 1 hundred from 10 tens using concrete representations, they connect the physical representation by writing the appropriate digit under each place on the place value chart, identifying the place value name for each digit, writing the number in expanded form, and then saying the number name. Scaffolding this work with numbers from 100 and extending to 200, 300,..is important for struggling students.

Once students show an understanding of place value through hundreds, they begin to compare two numbers by determining the number of hundreds in each number. Begin with experiences comparing concrete representations, place value charts, and moving to number lines. Students generalize that the number with the most hundreds is greater. If the number of hundreds is the same, the number with more tens is greater. If the number of hundreds and tens is the same, the number with more ones is greater.

In first grade, students used various representations to add with sums to 100 and to subtract multiples of 10 from multiples of 10. In second grade, they review these models and focus on computing mentally or in writing using various strategies. Previous work with place value and physical models can be extended to include more examples with composing tens in addition and decomposing tens in subtraction. Note the careful scaffolding of examples in Table 3. Include problems that provide a context for adding or subtracting as often as possible. Equations should be written both horizontally and vertically. Students use number sense and a variety of strategies that make sense to them to add and subtract. Encourage students to make estimates before adding or subtracting to determine if their answers are reasonable. Note that students are not expected to use the standard algorithm for addition and subtraction until Grade 4.

Building on students' work with place value and requires them to understand and apply the concept of ten and hundred by mentally adding or subtracting 10 or 100.

Students demonstrate their understanding using place value materials, hundreds charts and extended hundred charts, and open number lines.

Commentary:

Students will recognize the need for standard units of measure and use rulers, yardsticks, meter sticks, measuring tapes, and other measuring tools. Second graders will understand that linear measure involves an iteration of units with the idea that the smaller the unit, the more iterations they need to cover a given length.

Second graders will solve word problems involving dollars or cents. Second graders will first need to identify coin values and be able to add and subtract money before solving word problems.

Second graders will learn about data through the study of line plots. Students will pose questions, collect data, and analyze and interpret the results. Students will also solve simple word problems about data.

Students will reason with shapes and their attributes by identifying shapes such as triangles, quadrilaterals, pentagons, hexagons, and cubes and drawing these shapes with specified attributes such as given number of angles or faces.

Instructional Resources

Math Expressions: Unit 2 (Sections: 2.1-2.15) Unit 3 (Sections: 3.1-3.9)

Manipulatives: Student Math White Boards, Hundreds Chart, two-color counters, ten frames, double ten frames, hundreds chart, number line to 20, open number line, part-part whole chart, place value chart, spinners, greater than, less than = cards, student analog clocks, whole class digital clock, measurement tools, such as rulers, yard sticks, measuring tapes, concrete manipulatives, such as counting cubes to represent word problems.

Achieve The Core Fluency Resource

Digital: Think Central – Soar to Success for Below Level and Mega Math for On Level

Differentiated Instructional Activities: Pages: 167, 175, 183, 191, 199, 207, 215, 221, 227, 233, 241, 251, 257, 265, 271, 285, 293, 299, 305, 313, 321, 339, 337 and 343

Assessment Resources

Unit 2: Quick Quiz 1, 2 and 3

Unit 2: Assessment Form A and Form B

Unit 3: Quick Quiz 1, 2 and 3

Unit 3: Assessment Form A and Form B

Formative: "Check for Understanding embedded in each lesson.

Addressing Student Misconceptions and Common Errors

2.NBT.1

Although students may correctly place concrete representations on the hundreds chart and be able to read the number represented accurately, they may become confused when writing the numeral since there are no objects in the tens oar ones place, as in the number 405 or 450. Provide students with numerical cards that include the digit 0 so that students can put the 0 in the tens place and ones place to represent that there are no objects in those places. This should help them transition between the concrete representation and the written numeral.

Watch for students who reverse digits. These students need additional opportunities to decompose numbers into groups of hundreds, tens, and ones and put them in the correct place on a place value chart.

Addressing Student Misconceptions and Common Errors

2.NBT.2

Students who have difficulty counting within 1,000 need more experience counting on with concrete, pictorial, and number line representations. Begin with lesser numbers in the range of 100-200. Point out patterns in the ones and ten places. Watch for students who confuse the next number in the tens place. For example, counting 127, 128, 129….1?? An extended hundreds chart with counts from 100 to 200 (use a hundreds chart and add 1 to the hundreds place in each numbers) will also be helpful.

2.NBT.3

Watch for students who do not have the conceptual understanding that the place in which a digit is located determines the value of that digit. For example, a student reads 134 as one hundred thirty-four but when writing it in expanded form writes 1+3+4, or when asked the value of each digit, responds that the values are 1,3, and 4. Provide these students with expanded numeral cards, including hundreds, tens, and ones, and place those cards in appropriate places under the physical models on the place value chart.

2.NBT.4

Watch for students who can read and write three-digit number but do not understand that the position of the digit determines its value. These students need more experience with concrete representations and may need to begin with review of the value of places in two-digit numbers. Students should relate numerals to their concrete representations, determining the greater (or lesser) number-based explicit work with concrete representations, beginning in the greatest place value and, if necessary, moving to tens and ones. Students who say, for example, that 78 is greater than 125 because 7 and 8 are greater than 1,2, or 5 need more work with comparing physical models emphasizing the value of each place.

It is important for students to associate the symbols < and > with their real meaning. It may help students who confuse the symbols to remember that the open end is always closest to the greater number and the closed end is always closer to the lesser number. It is also important to give students opportunities to change the order of the numbers to see how it impacts the symbols and their meaning.

Example: 335 < 365 365 > 335

2.NBT.5

Second-grade students do not need to have facility using the standard algorithm adding and subtracting. They should focus their work on developing and using efficient strategies that make sense. Although some students may be ready to write equations, composing tens when regrouping in addition and decomposing tens when regrouping in subtracting may be challenging to other students. Concrete representations, number lines, and hundreds charts will help students to develop a deeper understanding of the process of regrouping than only following rote procedures.

Addressing Student Misconceptions and Common Errors Cont.

2.NBT.6

Students who struggle with adding strings of numbers should begin with three addends with no regrouping. If necessary, they can use physical models to help keep track of the sums. Move to examples using four addends with no regrouping. As students are ready, include examples with regrouping. Encourage students to use strategies that make sense to them. Help students using inefficient strategies to make connections to more efficient strategies. Note that some strategies are more difficult to follow when written out and make more sense when explained orally.

2.NBT.7

Students who do not know basic facts may be inaccurate in computation. Although those students should continue to work on facts, physical models will help in accurate addition and subtraction. Be sure that all students have ample experience with adding physical models on place value charts, using benchmark numbers (hundreds, tens, and ones) on an open number line. Make explicit connections from written physical models and strategies to written formats.

Although regrouping (composing hundreds from tens and tens from ones) when adding two 3-digit numbers and (decomposing from hundreds to tens and from tens to ones) when subtracting two 3-digit numbers is included in this standard, it is appropriate for students to use physical models for these examples and explain their reasoning. Explicit connections to written equations will help students make the transition from concrete and pictorial representations to symbolic notation.

2.NBT.8

Second graders should see the pattern of adding (or subtracting) 1 to the digit in the tens place when adding (or subtracting) 10. A similar pattern of adding (or subtracting) 1 to the digit in the hundreds place occurs when adding (or subtracting) 100. Students may find this confusing when they are adding 10 to numbers that have the digit 9 in the tens place or subtracting 10 from numbers that have the digit 0 in the tens place. Using a number line or portions of a hundreds chart will help them to visualize what happens when they are working with these numbers. If necessary, composing (to add) and decomposing (to subtract) with concrete materials will also help students to understand the concept.

2.NBT.9

Some students may still struggle with solving word problems in a variety of situations. Support their thinking by asking what they know, what they want to find out, and how they might solve the problem. It is really important for these students to ask themselves if their answer is reasonable. You may want to help by reversing the situation for them. Giving students opportunities to explain their thinking even when incorrect, provides opportunities for them to self-correct.

Addressing Student Misconceptions and Common Errors Cont.

2.MD.1

Some students may begin to measure starting with "1" on a ruler, yardstick, or meter stick. The teacher can use a large number line on the floor to demonstrate where the student must begin before "one" and relate this to all measuring done with linear measurement tools.

2.MD.2

Describing how two measurements relate to the size of the unit chosen is a very difficult concept for second graders to articulate. To address this, provide ongoing experiences and activities for students to learn to predict and measure. Allow students to talk about what they are noticing.

2.MD.3

Some students will estimate with "wild" estimate statements like, "I estimate our classroom to be one million yards long." Some children may estimate with a number that is not a close estimate and become frustrated to not give a correct answer. The teacher should provide additional estimating experiences along with a discussion about the purpose of estimation.

2.MD.4

Some second graders may think that the numbers of a ruler or yardstick are for counting the marks instead of the units or spaces between the marks. Some students might think that they can only measure length with a ruler starting at the left edge. To address this, engage students in discussions about measuring devices and demonstrate how to measure. Provide additional experiences for the students to use measuring devices correctly. Observe as students measure objects to determine specific measurement errors that may occur.

2.MD.8

When counting coins, some second graders may ignore the coin values and want to count each coin as an individual object, such as a dime and a penny are two coins. These students may not think about the coins value of 11 cents. Some students may believe the value of a coin is directly related to its size, such as a nickel is bigger than a dime and is worth more. To address these misconceptions, students may use a hundred chart and coins. For example, using a penny and a dime, have students place a dime on the ten spot of a hundred chart and the penny next to the dime on the chart to represent one more that a dime or 11 cents. Some students may inappropriately use the $ symbol such as 39$. Students can learn to use the symbols correctly through discussion about the symbols.

Addressing Student Misconceptions and Common Errors Cont.

2.MD.9

Some students may mark Xs on the line plot as different sizes, some small and some large. Talk with students to help them understand that different sizes of Xs on the plot may make it difficult to analyze and interpret.

Source:

2.G.1

Some second graders may believe a shape can be changed by its orientation. To help with this misconception, it is critical to have primary learners touch and feel shapes. As they touch the shapes, students will discover the shape will not change regardless of the orientation.

The Common Core Mathematics Companion: The Standards Decoded (What They Say, What They Mean, How to Teach Them) Authors: Ruth Harbin Miles and Lois A. Williams, 2016 NCTM