Grade 1 Mathematics, Quarter 2, Unit 2.1

Exploring Numbers: Understanding Place Value (Tens and Ones), Reading and Writing Numerals to 80

Overview

Number of instructional days: 10 (1 day = 45 minutes)

Content to be learned

- Read and write numerals 50–80.
- Represent a written numeral with objects up to 80.
- Recognize the number of tens in a two-digit number.
- Recognize that a group of 10 ones is a 10.
- Compare two 2-digit numbers using symbols <, >, and =.
- Find and explain what is 10 more or 10 less than a given number.

Mathematical practices to be integrated

Construct viable arguments and critique the reasoning of others.

- Use concrete objects to demonstrate understanding of place value.
- Use reasoning to explain 10 more or 10 less than a given numeral.
- Compare and explain why two 2-digit numbers are <, >, or =.

Look for and express regularity in repeated reasoning.

- Demonstrate mental shortcut to add or subtract 10 from a given number.
- Identify a repeated pattern when adding or subtracting tens.
- Explain reasoning when identifying the tens in a given two-digit number.

Essential questions

- How can you represent this number?
- How can you represent this set?
- How can you use counting on as a strategy when adding 10 to a given number?
- How can you show that a number is greater than, less than, or equal to another number?
- When counting by tens, how do you know what number comes before or after a given number?

Written Curriculum

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten	1.NBT

Extend the counting sequence.

1.NBT.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.

1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

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).

1.NBT.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.

1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

Common Core Standards for Mathematical Practice

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way

terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifying the Standards

Prior Learning

In kindergarten, students learned to count to 100 by ones and tens, write numerals 0–20, and represent numerals 0–20 using objects. They also learned to count on to 10 from any number between 1 and 9. They learned to compare two numbers between 1 and 10. Students composed and decomposed numbers between 11 and 19 using objects and drawings.

Current Learning

First graders reinforce the counting sequence to 120. They extend reading, writing, and representing numbers from 0 to 80, using ones and tens. Students understand place value using tens and ones and mentally add and subtract multiples of 10. They compare two 2-digit numbers based on the meanings of the tens and ones digits. Students develop their ability to use the greater than, less than, and equal symbols when making comparisons.

Future Learning

Second graders will extend their understanding of the base-10 system. This will include multiples of ones, tens, and hundreds. Students will understand and compare numbers up to 1,000, explaining the numeral that represents hundreds, tens, and ones. They will read and write numbers to 1,000 using base-10 numerals, number names, and expanded form. Students will mentally add 10 or 100 to a given number and mentally subtract 10 or 100 from a given number in the range 100–900.

Additional Findings

According to *Principles and Standards for School Mathematics*, it is absolutely essential that students develop a solid understanding of the base-10 numeration system and place value concepts (p. 81).

"Using only the 10 digits, every number can be represented by a string of digits, where each digit represents a value that depends on its place in the string" (p. 2, CommonCoreTools.wordpress.com). "Grade 1 students use their base-ten work to help them recognize that the digit in the tens place is more important for determining the size of a two-digit number. They use this understanding to compare 2 two-digit numbers, indicating the results with the symbols <, =, >" (Page 6, CommonCoreTools.wordpress.com).

Grade 1 Mathematics, Quarter 2, Unit 2.2

Work with Addition and Subtraction Equations

Overview

Number of instructional days: 15 (1 day = 45 minutes)

Content to be learned

- Solve word problems using addition, within 20, utilizing objects and drawings.
- Develop an understanding of addition and subtraction equations.
- Solve word problems using subtraction, within 20, utilizing objects and drawings.
- Develop an understanding of subtraction as an unknown addend.
- Relate counting to addition and subtraction by using patterns of numbers (counting by twos).
- Understand the meaning of the equal sign.
- Determine if addition and subtraction equations are true or false.

Mathematical practices to be integrated

Make sense of problems and persevere in solving them.

- Use concrete objects or pictures to help conceptualize in order to solve a problem.
- Add or subtract, check for accuracy, and then make changes if necessary.
- Given a story problem, determine whether to add or subtract.

Reason abstractly and quantitatively.

- Create a coherent representation of the story problem presented.
- Use objects to solve equations.
- Use the relationship between addition and subtraction to solve problems.

Essential questions

- What does it mean to be equal?
- How can you determine if an addition and subtraction equation is true or false?
- How can you solve an addition or subtraction problem using concrete objects and or drawings?
- What strategies can you use to solve a subtraction problem?
- How can you solve the problem a different way?

Written Curriculum

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking	1.OA

Represent and solve problems involving addition and subtraction.

1.OA.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~~.[2]

[2] See Glossary, Table 1.

Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.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.

1.OA.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

Work with addition and subtraction equations.

1.OA.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.*

Common Core Standards for Mathematical Practice

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

Clarifying the Standards

Prior Learning

Kindergarten students were exposed to addition and subtraction equations. They were encouraged to write equations; however, it was not a requirement. When adding and subtracting, students used a variety of concrete strategies to solve problems (e.g., drawings, objects, kinesthetic movements). They developed fluency in adding and subtracting within 5 and were exposed to composing and decomposing numbers within 10.

Current Learning

First graders use addition and subtraction to solve word problems within 20. They develop an understanding of the relationship between addition and subtraction. Students use equations with unknowns in all positions. They use the equal sign to determine whether an equation is true or false.

Future Learning

Second graders will use mental strategies to fluently add and subtract within 20. They will use addition and subtraction within 100 to solve word problems. Students will develop grouping and counting strategies and use repeated addition to gain a foundation for multiplication.

Additional Findings

According to commoncoretools.wordpress.com, Progressions K–5 Operations and Algebraic Thinking, "First graders put together/take apart problems with addends unknown afford students the opportunity to see subtraction as the opposite of addition in a different way than reversing the action, namely as finding the unknown addend." (1OA.4, p. 13)

Exposure to repeated situations with numbers in various contexts enables students to develop an ease for solving problems. Students who understand the relationship between addition and subtraction will be flexible in using various strategies when solving problems. "In developing the meaning of addition and subtraction with whole numbers, students should also encounter the properties of operations," such as the Commutative Property of Addition. (*Principles and Standards for School Mathematics*, p. 83)

Grade 1 Mathematics, Quarter 2, Unit 2.3

Organizing and Comparing Shapes and Their Attributes

Overview

Number of instructional days: 15 (1 day = 45 minutes)

Content to be learned

- Distinguish between defining attributes versus nondefining attributes.
- Compose two-dimensional shapes.
- Organize, represent, and interpret given data.
- Ask and answer questions about data.
- Compare categories of data results.
- Identify more and less in a category.
- Answer questions regarding data points.

Mathematical practices to be integrated

Model with mathematics.

- Relate survey data to an everyday situation.
- Write addition equations to show interpretation of survey results.
- Create graphs and tables to show survey results.
- Determine an appropriate method to represent data.

Use appropriate tools strategically.

- Identify and use appropriate tools and resources to aid in data collection.
- Create tables or graphs using mathematical tools.
- Use technology to aid in representation of data results.

Essential questions

- Can you sort these shapes in more than one way?
- How are these shapes alike and different?
- What does the data show?
- How can you make a ____ (two-dimensional shape)?
- How do you know this figure is a ____?
- How can you organize and represent these data?
- What can you tell by looking at the data?

Written Curriculum

Common Core State Standards for Mathematical Content

Geometry	**1.G**

Reason with shapes and their attributes.

1.G.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~~.

1.G.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~~.[4]

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

Measurement and Data	**1.MD**

Represent and interpret data.

1.MD.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.

Common Core Standards for Mathematical Practice

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their

limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Clarifying the Standards

Prior Learning

In kindergarten, students learned to describe objects in their environment using names of shapes. They identified, named, and described basic two- and three-dimensional shapes. Students learned how to compare two- and three-dimensional shapes using similarities, differences, and other attributes. Kindergarteners manipulated shapes to construct objects in their environment and used vocabulary to describe the positions of these objects in relation to each other.

In terms of data, kindergarteners classified and sorted objects into categories based on a specific attribute. They counted and compared the number of objects in categories and determined which group had more or less objects (up to 10).

Current Learning

In grade 1, students learn to distinguish between defining attributes (triangles are three-sided)) versus nondefining attributes (color, size, etc.). They learn to compose two-dimensional shapes (rectangle, square, trapezoid, triangle, half-circle, quarter-circle). In the next unit, students compose three-dimensional shapes. In this unit, students organize, represent, and interpret data using two categories. They ask and answer questions about data (how many more, how many less).

Future Learning

In grade 2, student will describe and analyze shapes by the number of sides, faces, and angles. They will develop a foundation for understanding area, volume, congruency, and symmetry through building and drawing with two- and three-dimensional shapes. Second graders will create picture and bar graphs to represent data with up to four categories.

Additional Findings

According to *Curriculum Focal Points*, “Students will describe their geometric attributes and properties and determine how they are alike and different.” (p. 13)

According to *Principles and Standards for School Mathematics*, “Class discussions should focus on what the graph representation conveys and whether the data help answer the specific questions that were posed. Teachers should encourage students to compare parts of the data and make statements of the data as a whole.” (p. 113)