Grade 1 Mathematics, Quarter 1, Unit 1.1

Exploring Numbers—Counting to 120, Reading and Writing Numerals to 50

Overview

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

Content to be learned

- Rote count to 120 starting at any number.
- Read numerals 0 to 50.
- Write numerals 0 to 50.
- Represent a written numeral with objects up to 50.

Mathematical practices to be integrated

Make sense of problems and persevere in solving them.

- Explain correspondence between numerals and sets of objects.
- Use concrete objects or pictures to conceptualize numbers.

Look for and make use of structure.

- Use a number pattern while counting.
- Keep track of numbers while counting.

Essential questions

- How can you represent this number?
- When counting, how do you know what number comes next?
- How can you represent this set?

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.

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.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Clarifying the Standards

Prior Learning

In kindergarten, students learned to count to 100 by 1s and 10s, write numerals from 0 to 20, and represent numerals 0 to 20 with objects. They also learned to count on to 10 from any number between 1 and 9.

Current Learning

First graders reinforce their skills in counting to 100 and writing numerals to 20. They develop counting skills to 120 and writing numerals to 50. In addition, they learn to represent numerals from 0 to 120 with objects and relate addition to counting (e.g., counting-on activities). By the end of the year, first graders are expected to read, write, and represent numbers from 0 to 120. In the second and third quarter, students are expected to relate counting to subtraction.

Future Learning

In grade 2, students will fluently add and subtract within 20 using mental strategies and fluently add and subtract within 100. They will skip count by 5s, 10s, and 100s and read, count, and write numerals within 1,000.

Additional Findings

According to *Principles and Standards for School Mathematics*, first graders have difficulty counting on, writing numerals, and developing an understanding of number sense. They also have difficulty understanding the pattern of counting and lack an in-depth understanding of number sense beyond 100. A common misconception is a child saying, while counting, "77, 78, 79, seventy-ten."

To address these concerns, the research suggests that "concrete models can help students represent numbers and develop number sense. They can also help bring meaning to students' use of written symbols and can be useful in building place-value concepts." (p. 80)

Grade 1 Mathematics, Quarter 1, Unit 1.2

Work with Addition Equations

Overview

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

Content to be learned

- Solve addition word problems using objects.
- Develop counting-on strategies within 20.
- Develop an understanding of the equal sign.
- Determine if equations involving addition are true or false.

Mathematical practices to be integrated

Construct viable arguments and critique the reasoning of others.

- Use reasoning to determine if an addition equation is true or false.
- Communicate understanding of the equal sign.

Model with mathematics.

- Write addition equations.
- Determine whether results make sense.

Use appropriate tools strategically.

- Use objects to solve problems.

Essential questions

- How can you solve a problem using objects?
- What strategies can you use to combine two numbers?
- What does it mean to be equal?
- How can you determine if an addition equation is true or false?
- How can you use counting on when solving a problem?

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.

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

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.

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 solved addition word problems and added within 10 using objects, fingers, sounds, acting out situations, and verbal explanations. They fluently added within five.

Current Learning

Students develop an understanding of the meaning of an equal sign by determining if equations are true and false. They reinforce addition by counting on and use addition to solve word problems using objects. Later in grade 1, students use addition and subtraction within 20 to solve word problems. They work to demonstrate fluency adding numbers within 10.

Future Learning

In grade 2, students will use addition within 100 to solve word problems by using drawings and equations. They will fluently add and subtract within 20 using mental strategies.

Additional Findings

According to *Principles and Standards for School Mathematics*, "As students gain understanding of numbers and how to represent them, they have a foundation for understanding relationships among numbers." (p. 33)

According to *A Research Companion to Principles and Standards for School Mathematics*, when presented with a problem situation and given the opportunity to solve it with objects, students develop

"computation fluency and their acquisition of problem-solving skills are intertwined as both develop with understanding." (p. 68)

According to *Principles and Standards for School Mathematics*, as students directly model situations of adding and/or subtracting and develop counting strategies, they develop further understanding. "Practice needs to be motivating and systematic if students are to develop computation fluency, whether mentally, with manipulative materials, or with paper and pencil." (p. 87)

Grade 1 Mathematics, Quarter 1, Unit 1.3

Place Value, Grouping 10s

Overview

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

Content to be learned

- Understand that two-digit numbers represent amounts of tens and ones.
- Understand that 10 ones can be a "bundle" called a "ten."
- Understand that the numbers 11–19 are composed of a ten and some ones.
- Compare two 2-digit numbers.

Mathematical practices to be integrated

Attend to precision.

- Use reasoning to compare numbers.
- Use place value to compare numbers.

Look for and make use of structure.

- Look closely at patterns of numbers up to 19.
- Apply knowledge of number sequence to compare numbers.

Essential questions

- How do you know if a number is greater than or less than another number?
- How can you represent a two-digit number?
- How are 11 ones (or units) alike/different from 1 ten and 1 one (one bundle of 10 and 1 unit)?

Written Curriculum

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten	1.NBT

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:

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.

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 <~~.

Common Core Standards for Mathematical Practice

6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Clarifying the Standards

Prior Learning

In kindergarten, students compared two numbers between 1 and 10. They identified that a number of objects in a group is greater than, less than, or equal to the number of objects in another group. Students had not been introduced to the greater than and less than symbols. They composed and decomposed numbers from 11 to 19 to gain a foundational understanding of place value.

Current Learning

In grade 1, students develop the understanding that the two digits of a two-digit number represent amounts of tens and ones. They develop an understanding that 10 can be thought of as a bundle of 10 ones—called a "ten." Students compare two 2-digit numbers based on meanings of the tens and ones digits at the developmental level. Later in grade1, students compare numbers using the greater than, less than, and equal symbols.

Future Learning

Students will 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). They will learn that 100 can be thought of as a bundle of 10 tens—called a "hundred." Students will compare two 3-digit numbers based on meanings of the hundreds, tens, and ones digits using >, =, and < symbols to record the results of comparisons.

Additional Findings

According to *Principles and Standards for School Mathematics*, "Concrete models can help students represent numbers and develop number sense; they can also help bring meaning to students' use of written symbols and can be useful in building place value concepts." (p. 80)

According to *Curriculum Focal Points,* students think of "whole numbers between 10 and 100 in terms of groups of tens and ones (especially recognizing the numbers 11 to 19 as one group of ten and particular numbers of ones)." (p. 13)