South Carolina College- and Career-Ready Standards for Mathematics

Support Document

1st Grade

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As support for implementing the *South Carolina College- and Career-Ready Standards for Mathematics*, the standards for each grade K-5 have been grouped into possible units. In the *Table of Contents* below, the titles for those possible units are listed in a column under each grade. To see which standards are addressed in each unit for this grade and to read a brief description of the focus for each unit for this grade, click on the *Overview of Units* in the *Table of Contents*. The completed units for this grade are hyperlinked from/to the *Table of Contents* and the *Overview of Units*. The purpose of this document is to provide guidance as to how all the standards at this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students.

Acknowledgments

"Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. *Gratitude is the memory of the heart.* Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness." It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by the following individuals who are making the K-5 Mathematics Support Document possible. (http://quotations.about.com/od/ThankYou/a/Gratitude-Quotes.htm)

Development Team:

Tami Broomall – Spartanburg 6

Floyd Dinkins – Lexington Two School District

Kristen Hahn – York 3 (Rock Hill)

Lindsay Ledbetter – York 2 (Clover)

Hilary Morgan – Lexington 1

Morgan Nolte – Anderson 4

Carol Sample – Richland 2

Dale Smith – Retired Educator

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	Table of Contents for Grades K-5					
	K	**1st**	**2nd**	**3rd**	**4th**	**5th**
	Overview of Units	**Overview of Units**	**Overview of Units**	**Overview of Units**	**Overview of Units**	**Overview of Units**
Unit 1	Counting and Cardinality	Composing and Decomposing Numbers Through 10	Place Value Concepts	Conceptual Understanding of Multiplication & Division	Place Value, Addition, & Subtraction with Whole Numbers	Expressions, Equations, & the Coordinate Plane
Unit 2	Understanding Relationship of Counting and Quantity	Addition and Subtraction Strategies	Developing Concepts of Addition and Subtraction	Place Value	Algebraic Thinking	Place Value
Unit 3	Count and Compare	Understanding Place Value	Application of Addition and Subtraction	Addition & Subtraction	Multiplication & Division of Whole Numbers	Operations with Whole and Decimal Numbers
Unit 4	Composing and Decomposing Numbers	Applying Place Value Concepts	Attributes Polygons and Fractional Parts	Application of Multiplication & Division	Fraction Equivalence	Adding and Subtracting Fractions
Unit 5	Addition and Subtraction	Comparisons and Data	Measurement: Length	Conceptual Understanding of Fractions	Adding, Subtracting, & Multiplying with Fractions	Multiplying with Fractions
Unit 6	Patterns and Positions	Geometry and Equal Shares	Measurement Time and Money	Data Analysis	Decimal Concepts	Dividing with Fractions
Unit 7	Two Dimensional and Three Dimensional Geometry	Measurement, Time and Money	Creating and Understanding Data	Identification and Classification of Geometric Shapes	Conversions & Problem Solving with Measurement	Classifying 2D Shapes
Unit 8	Foundations of Measurement			Problem Solving with Measurement	Geometric Classifications & Line Symmetry	Perimeter, Area, and Volume
Unit 9	Understanding Graphs and Data			Fluency with Multiplication & Division	Angle Measurement	Converting Measurements within a Single System

Grade One Overview of Units

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Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Composing & Decomposing Numbers through 10	**Addition and Subtraction Strategies**	**Understanding Place Value**	**Applying Place Value Concepts**	**Comparisons and Data**	**Geometry and Equal Shares**	**Measurement, Time and Money**
Standards	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**
1.ATO.1 1.ATO.3 1.ATO.5 1.ATO.6 1.ATO.9.b 1.NSBT.1.a	1.ATO.1 *1.ATO.2* 1.ATO.3 1.ATO.4 1.ATO.6 1.ATO.7 1.ATO.8 1.NSBT.1.(a,c,d)	1.NSBT.1 1.NSBT.2 1.NSBT.3 1.NSBT.5 *1.ATO.3* *1.ATO.5* *1.ATO.6.* *1.ATO.8*	1.NSBT.4 1.NSBT.6 *1.ATO.1* *1.ATO.2* *1.ATO.3* *1.ATO.5* *1.ATO.6* *1.ATO.8*	1.MDA.4 1.MDA.5 1.ATO.1 1.ATO.2 1.ATO.9.b	1.G.1 1.G.2 1.G.3 1.G.4 1.ATO.9	1.MDA.1 1.MDA.2 1.MDA.3 1.MDA.6
Unit Focus	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**
Unit 1 will focus on number concepts and relations by composing and decomposing numbers through 10. Students will develop a beginning understanding of addition and subtraction.	*Unit 2* will focus on representing, solving, and exploring addition and subtraction. Students will extend their understanding of addition and subtraction from *Unit 1* to developing strategies for adding and subtracting whole numbers through 20. Students will have an understanding of subtraction as an unknown addend problem and determine missing numbers in addition and subtraction equations within 20 using a variety of strategies.	*Unit 3* will focus on developing an understanding of whole number relationships and place value through 99, including "making a ten". Students will develop an understanding of the relative magnitude of numbers by comparing two-digit numbers based on the meanings of the tens and ones. They will use that number sense to solve problems.	*Unit 4* will focus on students developing, discussing, and using efficient, accurate, and generalizable methods to add within 99 and to subtract multiples of 10.	*Unit* 5 will focus and build on the K concepts of sorting and classifying by collecting, organizing and representing data with up to 3 categories using object graphs, picture graphs, t-charts, and tallies. Students will ask/answer questions and draw conclusions based on given graphs (object graphs, picture graphs, t-charts, tallies, bar graphs). Building on Unit 3 comparison knowledge, students will develop comparison statements for a set of data and draw and solve comparison problems.	*Unit 6* will focus on students identifying, naming, partitioning, and reasoning about attributes of two-dimensional and three-dimensional shapes. Students will compose and decompose plane or solid figures (e.g., combine two triangles to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes.	*Unit 7* will focus on an understanding of the meaning and processes of measurement, including an understanding of linear measurement as iterating length units. Students will work with both analog and digital clocks as they tell and record time to the nearest hour and half hour. Students will also identify coins and their values.

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1st Grade Math Unit 1	Return to Table of Contents Return to First Grade Overview

Composing and Decomposing Numbers Through 10

Content Standards with Clarifying Notes
Open Bullets Indicate Clarifying Notes

- **1.ATO.6** Demonstrate:
  a. addition and subtraction through 20;
  b. fluency with addition and related subtraction facts through 10.
    - Students should use strategies such as counting on, making 10, decomposing a number leading to a 10, using the relationship between addition and subtraction, creating equivalent but easier or known sums, doubles plus or minus one, counting back, and the commutative property. Understand the role of 0 in addition and subtraction. Fluency is defined as efficient, accurate, and flexible. Phases of operational understanding: construct operational meaning, develop reasoning strategies, and work toward quick recall.
    - Teacher Note: The NCTM Principles and Standards for School Mathematics defines **computational fluency** as having efficient, flexible, and accurate methods for computing. Computation fluency of "mathematical fluency" with whole numbers is an essential guide for school mathematics and forms the foundation for many higher level math concepts.
- **1.ATO.5** Recognize how counting relates to addition and subtraction.
  - Teachers will need to assist students in developing the relationship between counting and the operations of addition and subtraction. For example, skip counting forward or backward by 10. The teacher could use skip counting or counting on. May want to define counting on. The concept of missing addend may be used for subtraction. (Related to CC.1.OA.5 and CC1.NBT.6)
  - Teacher Note: Use number lines as a visual of the number sequence.
- **1.ATO.9** Create, extend, and explain using pictures and words for:
  a. Repeating patterns (e.g., AB, AAB, ABB, and ABC type patterns);
  b. Growing Patterns (between 2 and 3 terms/figures)
    - Teacher Note: Patterns can be found in physical and geometric situations as well as in numbers. Introduction to recognizing linear patterns through looking at the number sequence. A plus 1 growing pattern is found through decomposing numbers to find the combinations within.
- **1.NSBT.1** Extend the number sequence to:
  a. count forward by ones to 120 starting at any number;
  b. count by fives and tens to 100, starting at any number;

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c. read, write and represent numbers to 100 using concrete models, standard form, and equations in expanded form;
d. read and write in word form numbers zero through nineteen, and multiples of ten through ninety.
    - Individually and in sequence
    - One purpose for counting by groups ("unitizing") is to make counting more efficient.
    - Teacher Note: Standard to be thought of as ongoing. Start with number sequence through 10 within Unit 1

- **1.ATO.1** Solve real-world/story problems using addition (as a joining action and as a part-part-whole action) and subtraction (as a separation action, finding parts of the whole, and as a comparison) through 20 with unknowns in all positions.
    - Students should use spoken words, concrete objects, drawings such as tape diagrams, pictorial models, length-based models (i.e., connecting cubes), number lines, and number sentences to solve story problems involving strategies of adding to, taking from, putting together, taking apart, and comparing, with the unknown as any one of the terms . In the problem such as 2 + 4 = []; 3 + [] = 7; and 5 = [] -3. Students may use a variety of basic fact strategies such as composing a 10 and decomposing a number leading to 10. Students should explain the problem-solving strategy with spoken words, concrete objects, pictorial models, and number sentences.
    - Addition and subtraction have been separated into four categories; join problems, part-part-whole problems, separate problems, and compare problems. Each category has three numbers, and any one of the three numbers can be the unknown in a story problem.
    - Teacher Note: **Joining** action-involves three quantities; an initial amount, a change amount (the part being added or joined), and the resulting amount (the amount after the action is over). **Part-Part-Whole** action-involves two parts that are combined into one whole. There is no meaningful distinction between the two parts within a part-part-whole situation, so there is no need to have a different problem for each parts as the unknown. **Separation action** involves three quantities; the initial amount as the whole or the largest amount, a change, and result amounts. **Compare problems** involve the comparison of two quantities, and the third amount is the difference between the two amounts. (Adapted from Van de Walle)
    - Teacher Note: Unit 1 provides an introduction to the concepts within this standard.
- **1.ATO.3** Apply Commutative and Associative Properties of Addition to find the sum (through 20) of two or three addends.
    - Students should use concrete, pictorial, and verbal representations of the commutative property and associative property of addition when solving. It is not important that students know the property name, but the concept the property provides.
    - Teacher Note: This standard focuses primarily on *understanding* the properties to find sums (through 10) of two addends.

New Academic Vocabulary for This Unit

- 5-group
- extras
- partner houses
- switch the partners
- sum
- equal to
- plus 1, plus 2
- minus
- fact
- compare

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- break apart
- decompose
- symbol
- combinations
- partners
- addend
- set
- pair
- doubles
- equal
- equation
- number sentence
- expression
- plus sign
- plus
- take-away
- decrease
- counting on
- counting all
- counting back
- fewer
- less than
- more than
- greater
- represent

Prior Knowledge Required for This Unit

Students should be able to count groups of objects; telling how many in all (cardinality) and have an understanding of one-to-one correspondence. In Kindergarten students are introduced to the concepts of addition and subtraction and begin developing an understanding through modeling situations within 10 using objects, fingers, mental images, drawings, acting out situations, verbal explanations, expressions, and equations. Fluency within 5 was expected at the Kindergarten level.

Subsequent Knowledge Related to This Unit

In Grade 1, students begin to develop an understanding of place value as working with numbers to 10 continues from Kindergarten. Repeated Kindergarten experiences in Unit 1 extends the conceptual algebraic thinking bridging an understanding of subtraction as an unknown addend problem and determining missing numbers in addition and subtraction equations within 20 required in Unit 2. It takes time for children to build understanding of such problems, but this is crucial, and they need to see them for each number through 10. Later in Unit 2, students will extend their thinking to using strategies for adding and subtracting.

In Unit 1, students begin developing a deeper understanding of the concepts of addition and subtraction begun in Kindergarten. Through a variety of meaningful and engaging experiences, students develop an understanding of the number combinations working towards mastery of understanding the meaning of addition and subtraction and applying operations to solve problems in context.

Understanding the operations is essential, as well as understanding number concepts and relations. Decomposing and composing numbers to ten builds a foundation towards understanding number concepts and relations. At first children find the partner combinations embedded within one-digit numbers. Then in Unit 2 students build on understanding the partner combinations embedded within one-digit numbers, and begin to apply Commutative and Associative Properties of Addition to find the sum (through 20) of two addends.

Students will continue to apply the properties of addition to find the sum (through 20) in Units 2 and 4. Once students are able to understand and apply place value concepts, applying the Commutative and Associative Properties of Addition to find and the sum (through 20) with 3 addends will progress later on in Units 2 and 4 as well.

Once students have a foundational understanding of numbers and operations, Unit 3 moves on to understanding place value, finding the tens and ones in two-digit numbers. Students should progress quickly from subitizing and unit counting in kindergarten to visualizing numbers in groups of 5

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and 10. Visualizing quantities in groups of 5s and 10s prepares children to understand place value and helps them with mental computation which comes later in second grade.

It is essential for students to understand the operations before beginning to practice any math fact fluency. Unit 1 spends time breaking whole numbers apart into combinations working towards automaticity with math facts. As students progress to Unit 2 they will begin to apply strategies and are then ready to begin to commit those facts to memory later in second grade.

Teacher note: Commutative and Associative Properties of Addition to find the sum (through 20) of two or three addends is taught and applied in first grade. Second grade expectations are for students to use the properties to add and subtract within 99 fluently.

Relationship Among Standards in This Unit

The various indicators in the unit were combined to develop number concepts and understanding the operations of addition and subtraction through decomposing and composing numbers through 10. The standards in Unit 1 relate to the key concept Algebraic Thinking and Operations. The standards included in first grade are the ultimate goal for students to master by the end of the year. Units 1-2 set the foundation for understanding and applying place value concepts in Units 3 and 4. Within standard 1.ATO.1, Unit 1 will focus on understanding number concepts and relations as a foundation towards solving real-world story problems using addition and subtraction through *10*.

Unit 1 focuses on the 1-more and 1-less pattern, first with counting numbers, then with finding partners, and finally with addition and subtraction. Students in first grade are working with some of the same number concepts and operations within 10 from Kindergarten. However, in first grade they are progressing from modeling situations to solving and representing equations. Basic fact instruction for fluency begins with conceptual understanding and many opportunities to develop strategic thinking. Understanding the relationship between the operations; addition, and subtraction, is critical. A variety of practice methods build automaticity and quick recall. The foundation for conceptual understanding begins in Unit 1. The standards are intertwined within each other, students will develop an understanding of the 1-more and 1-less pattern first with counting numbers, then with finding partners, and finally with addition and subtraction computations.

As students decompose and compose numbers through 10, direct their focus on thinking about a number as a whole, with partners that form combinations within. When students find all possible combinations of numbers through 10, (e.g., 5 has 4 sets of combinations, 4+1, 3+2, 2+3, 1+4), they begin recognizing how counting relates to addition and subtraction (1.ATO.5), and then will begin to develop an understanding of how to apply that knowledge and use strategies to solving real-world/story problems using addition (*as a joining action* and as a *part-part-whole action*) and subtraction (as a separation action, finding parts of the whole, and as a comparison) through 20 with unknowns in all positions (1.ATO.1). The exploration of patterns and properties guides students towards demonstrating fluency with addition and related subtraction facts through 10. (1.ATO.6)

Students will discuss patterns as decomposition equations are recorded. Patterns across the decompositions will be recognized as well as recognizing growing patterns within the number sequence (Introduction to 1.ATO.9.b). Our Base Ten numeral system is a system of patterns, and these patterns become visible throughout the exploration of addition and subtraction facts. Math facts are predictable because of these

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patterns. ***Teacher Note:*** "Once students understand that our number system is a system of patterns, they begin to recognize patterns in math facts that will help them make sense of, and remember, the facts. Noticing patterns that emerge when observing the equations 6+4=10, 7+3=10, and 9+1=10 will lead to some interesting discussions as students attempt to explain their observations." *(Mastering the Basic Math Facts in Addition and Subtraction p. 16)*. ***Teacher Note:*** Numeric patterns are addressed when looking at the number sequence, understanding that when counting by ones the next number in the sequence is one more each time (plus 1), and when counting backwards by ones the next number in the sequence is one less each time (minus 1). ***Teacher Note:*** The number of combinations a whole number has is 1 less than the whole number. Knowing and understanding that concept will help students independently discover all combinations for a given whole number. For example the whole number 2 has 1 combination (1+1), the whole number 3 has 2 combinations (1+2, 2+1), the whole number 4 has 3 combinations (1+3, 2+2, 3+1). The number zero is to be thought of as a known partner which it's not included within the combinations.

Potential Instructional Strategies/Lessons

Through the continuous exploration of decomposing numbers, number combinations (facts) can be found within a given number (fact families). Once students are able to decompose and compose numbers, then their understanding extends to being able to see the parts of a whole and then they are able to think about the four categories and the three numbers within to understand strategies for finding unknowns in a story problem. For example, if I know that 6=2+4, then I can use that to solve the following problem: 6-4=[].

It is essential to spend time manipulating and representing numbers, and solving simple problems in which students gain a strong foundation of number sense. Having number sense and understanding numbers in the early years involves the understanding of quantity, comparing quantities, fluency and flexibility with counting, and the ability to perform simple operations with numbers. Students need to explore numbers, in a variety of ways, with a variety of materials. Learning experiences should take students from world experiences, to concrete materials, then to visual (and other) representations, before expecting abstract representations.

Students need to see and use equations in many forms. When children are comfortable representing quantities, encourage them to begin creating stories about the groupings. Encourage students to create story problems as well as solve story problems presented orally. (e.g., When decomposing numbers the teacher and students can present the task as a story problem; There were 7 children in the library. 6 children were reading. How many were writing?. Students can also tell stories about the number combinations and equations. (e.g., There are_____apples in the basket. ____are green and_____are red.) Over time students will become comfortable and flexible with mathematical language and can connect concepts and terminology with meaningful referents from their own lives. Modeling the use of simple real-world story problems within instruction from the beginning will scaffold students' thinking to making connections within the operations as well.

Create a mathematical classroom which encourages collaboration and builds community. A suggestion for developing World Class Skills a South Carolina student needs to be college and career ready is to: Provide settings within the mathematical classroom that promotes the use of ***Math Talk:***

- Frequently exchange mathematical ideas and problem solving strategies.

- Children listen to understand one another. This involves thinking about what a person is saying so that you can explain it yourself or to help them explain it more clearly. It is not just being quiet when someone else is talking. Also, children need to listen so that they can ask a question or help the explainer.
- Encourages critical thinking and problem solving, collaboration and teamwork, and knowing how to learn
- Teachers can stand back or to the side of the classroom to encourage Math Talk as students interact more directly with each other.
- Most common structures:
    - Solve and Discuss: 4 to 5 students solve, explain, question, and justify at the board, while the rest of the class works the problems at their seats. 2-3 students are teacher selected to explain their methods.
    - Solve and Discuss Small Group version: *(after whole group discussion has taken place)* Students solve a problem individually within a small group. 2-3 students explain their method and solution to the rest of the group while the others are encouraged to ask questions for clarification.
    - Student Pairs and Helping Pairs: Two students work together, learning from each other, particularly in applying and practicing concepts introduced in whole-class discussion. Helping pairs-More advanced students are matched with students who are struggling.
    - Scenarios- Students act out a particular mathematical situation
    - Small Groups: Students work in groups

<u>Introductory Lesson:</u>

<u>Discuss Numbers 1-10</u> *(adapted from Math Expressions)*

Lesson Focus: Visualize and represent numbers 1-10

Objectives:

The students will understand the 1-more and 1-less pattern by using *Stair Steps* to show 1-more and 1-less sequences for numbers 1-10.

The students will visualize and represent numbers as a group of 5 and extra ones using perceptual and conceptual subitizing.

Materials:

- 'Stair-Steps'. Each student will need a printed copy of the 'Stair Steps' on page 3 from the resource below:
    - https://www-k6.thinkcentral.com/content/hsp/math/hspmathmx/na/gr1/ete_9780547838717_/resource.html?Unit=1&Less=1&Type=Copymaster
    - Teacher Note: When cutting out the Stair-Steps, cut along the dashed lines, and NOT the solid lines.

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Whole Group:

1. **Discuss Stair Steps**
   - Introduce Stair-Steps as a 'math tool' that will be used to help them learn about numbers 1 through 10.
   - Ask for Ideas: Invite children to discuss what Stair Steps might be and how they could used to learn about number.
   - Provide each child with a set of Stair Steps. Allow a few minutes for student exploration.
   - The teacher should observe how children arrange their set of steps.
   - Ask children to share what they notice about the Stair Steps.

2. **Sequentially Arrange the Stair Steps**
   - Ask children to find Stair Step 1 and place it at the top of their work space. Then have them place Stair Step 2 under it, followed by Stair Step 3 and so forth.
   - Question Children as they work. (What do you notice about the Stair Steps? How are you lining them up? Are you making steps?)
   - Once the sequence is complete, guide children in reciting the 1-more sequence as they touch each step
     - 1 and 1 more is_____. 2
     - 2 and 1 more is_____. 3
     - 3 and 1 more is_____, and so on. 4
   - Then recite the sequence in reverse as they touch each step.
     - 1 less than 10 is____. 9
     - 1 less than 9 is____. 8
     - 1 less than 8 is____, and so on. 7
3. **See quantities as 5-groups: Use a 5-group and extra ones**
   - Ask children to find Stair Step 5 and center it on their workspace. Then have them put Stair Step 1 underneath. Help students express the total number of dots.
     - 5 and 1 more is___. 6
   - Then replace Stair Step 1 with Stair Step 2 and tell how many.
     - 5 and 2 more is____. 7
   - Then replace Stair Step 2 with Stair Step 3 and tell how many.
     - 5 and 3 more is____. 8
   - Then replace Stair Step 3 with Stair Step 4 and tell how many.
     - 5 and 4 more is____. 9
4. **Represent the 5-Group**

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- The teacher will use the finger rhyme, ”Five Crows in a Row,” to illustrate the 5-group and the extra ones in numbers 6 through 10. Children show the “crows” with their fingers and respond with the total.
    - The teacher shows 5 fingers on one hand and 2 fingers on the other hand and says the rhyme. The children each put up the same number of fingers and respond with the total. The teacher repeats the activity moving to 2 below, 3 below, and so on. Then try the numbers in random order. *For the first time the teacher should lead the activity but once students are familiar with the rhyme, you may want to invite a few children to act as Student Leaders.*
    - **Five Crows in a Row Rhyme:**

      5 crows in a row.

      And [1] below.

      How many crows? 6 crows
    - Teacher Note: The ability to form quick mental pictures of quantities by grouping the units is crucial to performing mathematical operations efficiently. Children benefit greatly from learning of visualize numbers without counting individual units. Visualizing numbers without counting is called perceptual subitizing. Perceptual subitizing develops into conceptual subitizing when children visualize two numbers and combine their value to find the total. Visualizing quantities in groups of fives and extra ones.

5. **Informal Assessment: Student Summary**
    - Ask children to use Stair Steps to show 9 as a 5-group and extra ones. Then have them use words to describe their arrangement. Responses should include that 5 and 4 more is 9.
        - Teacher Note: Students can record their responses in a Math Journal.

Possible Lessons within the Unit:

Daily Activity: Number of the Day Stretch:

- https://books.google.com/books?id=vQDOAwAAQBAJ&pg=PA39&lpg=PA39&dq=number+of+the+day+stretch&source=bl&ots=wkvMTBeu4R&sig=_YRGevESgrcZxoUPND6j74xDIS4&hl=en&sa=X&ved=0CB8Q6AEwAGoVChMI77DK_76UxgIVg5WACh1nfACx#v=onepage&q=number% 20of%20the%20day%20stretch&f=false

Activity: Representing Partners: Break-Aparts and Partners of a Number:

Objective: Building Number Concepts

- Children can break apart numbers using a ‘Break-Apart’ stick such as a pencil or a coffee stirrer. Children can use objects to represent

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numbers (e.g., color tiles or plastic counters). Children begin to learn about the embeddedness of numbers by breaking them into smaller components. Understanding how numbers can be broken apart (decomposed) and put back together (composed) helps build a foundation for understanding addition and subtraction.

- Teacher Note: As students decompose a given number, the teacher can write each decomposition with an equation such as 5=4+1, showing the total on the left and the two addends on the right. Record the equations in sequential order. Students can find patterns in all of the decompositions of a given number and eventually summarize the patterns for several numbers. (Adapted from *Progressions for the CCSS on Operations and Algebraic Thinking*)

Activity: Shake and Spill: http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/ShakeandSpill.pdf

- This activity has students use two sided counters to generate parts for a given whole.

Activity: Building Partners with Cubes

- Have students use the total number of cubes of one color to build a cube-train. Then have them replace one cube of the train with a cube of another color and record the partners. Continue replacing one cube at a time and recording the partners.
- Teacher Note: Tactile learners may benefit from using connecting cubes to find the sets of patterns for a given total.
- Teacher Note: Algebra: *Switching the partners* involves changing the order of the partners, or addends, within combinations embedded in a number. When the partners switch places, the total stays the same. This switching of partners demonstrate the Commutative Property of Addition.

Multisensory Part-Part-Whole Exploration: http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/PPWMS.pdf

- The four activities for using touch and sound instead of visual cues for PPW. The activities require the students to make mental representations of the relationships.

Lesson: Sample mini-lesson for Breaking Numbers Apart: http://www.mathsolutions.com/documents/0-941355-74-8_L.pdf

- This sample lesson offers two versions of an activity that focuses students on breaking numbers apart (decomposing), one version for kindergarten and first-grade students and another for second graders. Refer to *From a Kindergarten and First Grade Classroom.*
- The activity gives students an opportunity to reason numerically, and write addition equations. Variations and modifications should be taken into consideration based on individual student needs.

Lesson: https://www.engageny.org/resource/grade-1-mathematics-module-1-topic-lesson-1

- **Lesson Objective:** Analyze and describe embedded numbers (to 10) using 5-groups and number bonds.

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Lesson: Grade 1 Module 1: Sums and Differences to 10: 1.ATO.1, 1.ATO.5, 1.ATO.6,

- https://www.engageny.org/resource/grade-1-mathematics-module-1-topic-c
- "In this first module of Grade 1, students make significant progress towards fluency with addition and subtraction of numbers to 10 as they are presented with opportunities intended to advance them from counting all to counting on which leads many students then to decomposing and composing addends and total amounts."
- Refer to Lessons 1-8 within Module 1; Lessons 9-39 can be used in Unit 2

Lesson: More and More Buttons: http://illuminations.nctm.org/Lesson.aspx?id=290

- Students use buttons to create, model, and record addition sentences. They also explore commutativity in addition contexts.
- **Lesson Objective:** In this lesson students will model the addition of set, use the terms "addend" and "sum", create addition sentences, explore the commutativity of addition, and identify addends and sums on an addition chart.

Video: Visualizing Number combinations: https://www.teachingchannel.org/videos/visualizing-number-combinations

- This video is of a modeled Kindergarten lesson for using quick images to identify combinations of 8.
- This lesson can be modified for first grade students as a visual way for seeing combinations and that numbers can be seen in a variety of combinations.

Lesson: Numbers in Many Ways: http://illuminations.nctm.org/Lesson.aspx?id=293

- Students work with subtraction at the intuitive level as they explore number families and ways to decompose numbers to 10. They will also identify members of 'fact families.' [A fact family is a set of three (or two) numbers that can be related by addition and subtraction, for example: 7 = 4 + 3, 7 = 3 + 4, 7 - 4 = 3, and 7 - 3 = 4. When the number is a double, there are only two members of the fact family. An example would be 10 - 5 = 5, and 5 + 5 = 10.]
- **Lesson Objective:** In this lesson students will represent numbers in flexible ways, connect numerals to the quantities they represent, and identify the addition and subtraction sentences related to a specific sum and pair of addends.

Task: Making a Ten: https://www.illustrativemathematics.org/content-standards/1/OA/C/6/tasks/1169

- This task is designed to help students visualize where the 10's are on a single digit addition table and explain why this is so.

Culminating Lesson:

Use Patterns to add and subtract within 10 *(adapted from Math Expressions)*

Lesson Focus: Add and subtract within 1-10

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Objectives:

The students will discuss patterns with number partners.

The students will use patterns to add and subtract within 10.

The students will understand the role of 0 in addition and subtraction.

Materials:

- chart paper (1 large piece or 2 small pieces)
- markers
- Premade chart showing "Patterns with Zero"
- Premade chart showing "Patterns with Doubles"

Whole Group

1. **Patterns in Partners from 2 to 10.**
    - As a review, create a chart showing the patterns with partners. The teacher will write the total at the student and ask for volunteers to tell you the partners for each whole number as you record the combinations on the chart. Refer to the image, Patterns with Partners, above for how the chart should look.
    - Discuss the patterns observed. Include the following in the discussion:
        - The top row is the Plus 1 partners. Plus 1 partners go with the number just before the total.
        - We have doubles within 10: 1+1, 2+2, 3+3, 4+4, and 5+5.
        - You can make the partners of 10 from the partners of 9 by adding 1 to the first partners for 9: 8+1 becomes 9+1, 7+2 becomes 8+2, 6+3 becomes 7+3, and 5+4 becomes 6+4. Then there is the new double 5+5.
    - Generalize: Then guide children to generalize that you can make the partners for a new number from the partners for the number just before by adding 1 to the first partner. Remind children they need to determine if the new number also has partners that are doubles.

2. **Patterns with Zero:**
    - Using the chart "Patterns with Zero" discuss the patterns. Tell children to look at the first column of equations in the chart, and tell how all the equations are the same. *(They all add zero, which is not things at all*).
    - Ask children to tell a story about 10+0 and then tell the answer.
    - Encourage children to tell what the general pattern is for adding 0 to a number. *(The answer is the number that is not zero. That number does not change because you did not add anything to it.)*
    - Now look at the second column and ask, "How are all these equations the same?" *(They all subtract zero, which is no things at all)*
    - Ask children to tell a story about 10-0 and then tell the answer.

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- Ask, "What is the general pattern for subtracting a 0 from a number? *(The answer is the number that is not zero. That number does not change because you did not subtract anything from it.*
- Then look at the third column and tell how the equations are the same. *(They all subtract a number from itself, which leave zero because you took away all of the things.)*
- Ask children to tell a story about 10-10 and then tell the answer.
- Ask, "What is the general pattern for subtracting a number from itself?" *(The answer is 0.)*

3. Partner Work:

- Encourage students to discuss the equations in the Patterns with Doubles chart with a partner. Encourage them to share their observations and any connections they make with the Patterns with Partners chart.

4. Assessment Task: *1.ATO.1, 1.ATO.3, 1.ATO.5, 1.ATO.6*

- Ask students to solve the following problem:

  Student A is filing a bowl with apples and oranges. Student A puts 5 apples and 5 oranges in the bowl. Is there another way to fill the bowl with apples and oranges and have exactly 10 pieces of fruit in it? (Yes or No) Explain your answer. Write number sentences to show your thinking.
- Teacher Note: Questions to think about as students problem solve. Are students able to determine all of the ways in which two number can be combined by addition to give a sum of 10? To what extent do they apply understanding of quantity, part-part-whole relationship, and compensation. To what extent do they represent sums of ten by writing number sentences or combinations.

Resources

Teacher Resources:

- **Structures of Story Problems Part-Part-Whole** and examples of problems for K-6.
  - http://www.cbv.ns.ca/consultants/uploads/MathConsultant/Part-Part%20Whole.pdf
- **Part-Part-Whole Cards**: http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/ppwcards.pdf :
  - Printable cards that can be used to practice part-part-whole relationships
- **Three Printable Tens Frames:**
  - https://illustrativemathematics.s3.amazonaws.com/attachments/000/000/433/original/three_tenframe.pdf?AWSAccessKeyId=AKIAJFC4WL6K24MWHIRQ&Expires=1434465869&Signature=xoD8R1pPj70CwAXmRjQXv6K7lzU%3D
- **Math Literature:** http://www.the-best-childrens-books.org/math-for-kids.html
- **Building a Math Talk Community:** http://www.eduplace.com/math/mthexp/pdf/mathtalk.pdf
- **Math Talk 101:** http://www.scholastic.com/teachers/top-teaching/2014/01/math-talk-101
- **Math Talk: The importance; Why use it?**: http://mathsolutions.com/common-core-support/math-talk/

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- **Math Talk conversation starter posters.** http://mason.gmu.edu/~jsuh4/teaching/resources/Buildingmathideas.pdf
    - The last two pages include an explanation of how to use Math Talk to build mathematical ideas and discourse.
- **Explanation of a Math Mountain:** http://mllynch.blog.greenville.k12.sc.us/files/2012/09/Family-Letter-Math-Mountains-Snip.jpg
- **Introduction to Math Mountains:** Math Mountains show a total at the top and a set of partners for the total at the bottom. They are called 'Math Mountains' because they look like mountains.
    - **Story of the Tiny Tumblers:** "Tiny Tumblers live at the top of the Math Mountain. Every day some of them go to play on one side of the mountain, and the rest go to play on the other side." Children find the partners of the total at the top of the Math Mountain by drawing circles to show how many Tiny Tumblers they were putting on each side.
    - Tell students that the Total is at the top of the mountain (Total at the Top), and the partners roll down either side and are written there.
    - Teacher Note: Students can use Math Mountains as a math tool and then as a strategy to decompose numbers to find possible number partners and combinations. Also, Fact Families can be found using Math Mountains; 5=4+1, 5=1+4, 5-4=1, 5-1=4.

Teacher Resources for standard 1.ATO.6.b:

- Guided Math "Number Fluency Center: Materials: http://mrsspruiellatschool.weebly.com/fact-fluency-center-materials-k-1-2.html
    - This resource includes materials that can be used to differentiate number fluency centers for guided math.
- Basic Facts: http://www.carrollk12.org/instruction/instruction/elementary/math/curriculum/basicfacts/default.asp
    - This resource includes suggestions for ways to measure fact fluency.

Resources for Interactive Sites:

- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
    - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats), and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
- **Virtual Manipulative:** Number Blocks Freeplay. http://www.mathsisfun.com/numbers/number-block-freeplay.html
    - Suggestion: Use in whole group instruction to model decomposing and composing numbers through 10.
- **Interactive Counting Games:** http://jmathpage.com/JIMSNumbercounting.html
    - This Interactive site includes math activities from across the web that have been organized by topic to make math learning enjoyable and interesting.
- **Teaching Tool:** Beadstring:http://ictgames.com/brilliant_beadstring_with_colour.html
    - Choose one or two beadstrings. Practice bonds of 10 or 20, number facts to 10 or 20.
- **Interactive Whiteboard**: Triangular Cards: http://www.topmarks.co.uk/Flash.aspx?f=triangularcardsv4

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- Useful for demonstrating inverse operations and fact families. Select either Bonds within 10 or add to 10.

- **Interactive Addition Game:** http://www.sheppardsoftware.com/mathgames/earlymath/bugabalooShoes.htm
  - Five different levels to choose from to practice math facts.
- **Interactive Subtraction Games:** http://jmathpage.com/JIMSNumbersubtraction.html
- **Interactive Operations Games:** http://jmathpage.com/JIMSNumberoperations.html
- **Interactive Game**: http://illuminations.nctm.org/Activity.aspx?id=3563
  - Independent of partner game in which students match whole numbers, shapes, fractions, or multiplication facts to equivalent representations."
  - Teacher Note: Use the 1-6 or 1-10 number range within Units 1 and 2.
- **Interactive Game:** Making ten: http://illuminations.nctm.org/activitydetail.aspx?id=75
  - Making ten using the tens frame.

Sample Formative Assessment Tasks/Questions

Assessing decomposing through 10: Ask children to write the partners for a number (4-10), switch the partners, and describe a pattern noticed.

Assessing extending the number sequence to count forward by ones to 120 starting at any number:

- Provide pencil and paper to the student. Read the problem to the student: *Mrs. Ledbetter is counting students as they enter the classroom. She has just counted the 5th student. What numbers will Mrs. Ledbetter say for the next 5 students?*

Assessing extending the number sequence to read, write and represent numbers to 100 using concrete models, and standard form; and Assessing extending the number sequence to read and write in word form numbers zero through nineteen, and multiples of ten through ninety.

- **Number of the Day Stretch:** A way to assess students' number sense as well as their ability to represent numbers in multiple ways. Suggested questions to informally assess:
  - Why do you think it is important to be able to represent numbers in different ways? When do we usually use number words to represent numbers? When do we use numerals? When do we use pictures of diagrams? When do we use number sentences? Why do we sometimes choose one method of representation rather than another?
  - Teacher Note: This can also be assessed throughout the school year as the range of numbers increases within classroom instruction.

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Addition and Subtraction Strategies

Content Standards with Clarifying Notes

Open Bullets Indicate Clarifying Notes

- **1.ATO.7** Understand the meaning of the equal sign as a relationship between two quantities (sameness) and determine if equations involving addition and subtraction are true.
  - Students understand that the equal sign represents a relationship where expressions on each side of the equal sign represent the same value.
- **1.ATO.8** Determine the missing number in addition and subtraction equations within 20.
  - Students should use number sense as well as concrete and pictorial models such as number lines while identifying the missing whole number within at most a four term equation.
- **1.ATO.1** Solve real-world/story problems using addition (as a joining action and as a part-part-whole action) and subtraction (as a separation action, finding parts of the whole, and as a comparison) through 20 with unknowns in all positions.
  - Students should use spoken words, concrete objects, drawings such as tape diagrams, pictorial models, length-based models (i.e., connecting cubes), number lines, and number sentences to solve story problems involving strategies of adding to, taking from, putting together, taking apart, and comparing, with the unknown as any one of the terms . In the problem such as 2 + 4 = []; 3 + [] = 7; and 5 = [] -3. Students may use a variety of basic fact strategies such as composing a 10 and decomposing a number leading to 10. Students should explain the problem-solving strategy with spoken words, concrete objects, pictorial models, and number sentences.
  - Addition and subtraction have been separated into four categories; join problems, part-part-whole problems, separate problems, and compare problems. Each category has three numbers, and any one of the three numbers can be the unknown in a story problem.
  - Teacher Note: ***Joining*** action-*involves t*hree quantities; an initial amount, a change amount (the part being added or joined), and the resulting amount (the amount after the action is over). **Part-Part-Whole** action-involves two parts that are combined into one whole. There is no meaningful distinction between the two parts within a part-part-whole situation, so there is no need to have a different problem for each parts as the unknown. **Separation action** involves three quantities; the initial amount as the whole or the largest amount, a change, and result amounts. **Compare problems** involve the comparison of two quantities, and the third amount is the difference between the two amounts. (Adapted from Van de Walle)
- **1.ATO.2** Solve real-world/story problems that include three whole number addends whose sum is less than or equal to 20.
  - Teacher Note: Students should use concrete objects, pictorial models, and number sentences when solving problems.

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- **1.ATO.4** Understand subtraction as an unknown addend problem.
  - Support: Subtract 10-7 by finding the number that makes 10 when adding 7. This standard is laying the foundation for the inverse relationship between addition and subtraction. Whereas ATO.8 is finding the missing number using any strategy.
- **1.ATO.3** Apply Commutative and Associative Properties of Addition to find the sum (through 20) of two or three addends.
  - Students should use concrete, pictorial, and verbal representations of the commutative property and associative property of addition when solving. It is not important that students know the property name, but the concept the property provides.
  - Teacher note: Build on the concepts of number combinations explored in Unit 1. Students should begin to use symbols appropriately (i.e., +,-,=) within the combinations of the three quantities.
- **1.ATO.6** Demonstrate:

  a. addition and subtraction through 20

  b. fluency with addition and related subtraction facts through 10.
    - Students should use strategies such as counting on, making 10, decomposing a number leading to a 10, using the relationship between addition and subtraction, creating equivalent but easier or known sums, doubles plus or minus one, counting back, and the commutative property. Understand the role of 0 in addition and subtraction. Fluency is defined as efficient, accurate, and flexible. Phases of operational understanding: construct operational meaning, develop reasoning strategies, and work toward quick recall.
    - Teacher Note: The NCTM Principles and Standards for School Mathematics defines **computational fluency** as having efficient, flexible, and accurate methods for computing. Computation fluency of "mathematical fluency" with whole numbers is an essential guide for school mathematics and forms the foundation for many higher level math concepts.
- **1.NSBT.1** Extend the number sequence to:

  a. count forward by ones to 120 starting at any number;

  b. count by fives and tens to 100, starting at any number;

  c. read, write and represent numbers to 100 using concrete models, standard form, and equations in expanded form;

  d. read and write in word form numbers zero through nineteen, and multiples of ten through ninety.
    - Individually and in sequence
    - One purpose for counting by groups ("unitizing") is to make counting more efficient.
    - Teacher Note: Extend the number sequence as the year progresses.

New Academic Vocabulary for This Unit

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- unknown result
- unknown change
- unknown start
- equation
- difference
- doubles fact
- making ten
- doubles +1
- doubles -1

Prior Knowledge Required for This Unit

Before moving into Unit 2, students need to have a strong understanding of number concepts and relations begun in Kindergarten and repeated in 1st grade Unit 1. It is essential for students to know how to independently decompose and compose numbers through 10 before beginning Unit 2. Students need to have an understanding of the concepts of addition and subtraction and understand the meaning of the operations and the actions it takes to make a group larger, smaller, and on number relations.

Students will develop strategies for adding and subtracting whole numbers based on their prior work with small numbers in Kindergarten and in Unit 1. Students need to understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). Once students understand the meaning for the operations of addition and subtraction they are ready to extend their thinking and begin practicing math fact fluency.

Subsequent Knowledge Related to This Unit

In Unit 2 students will build on their understanding of number concepts and relations, extending their thinking to using strategies for adding and subtracting. They will use their understanding of the operations as a foundation to build-on as they continue to recognize connections within addition and subtraction. The focus of Unit 2 will be on taking students' understanding of numbers and applying concepts to extend their thinking and begin practicing math fact fluency. Once students recognize and understand the relationship between counting and addition and subtraction they will use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20 in Units 3 and 4. By comparing a variety of solution strategies in Unit 2, children build on their understanding of the relationship between addition and subtraction.

Unit 2 will be an introduction on addition and subtraction strategies. Unit 2 will connect new facts to previously discussed number concepts; providing opportunities for students to continually build mastery of addition and subtraction basic facts through 10 in first grade and through 20 in 2nd grade. As connections are made, and new facts/concepts are introduced students extend their understanding of strategies to use as they solve problems. Emphasis on 'making ten' is crucial because 10 is the foundation of our number system. Students should be provided with multiple experiences in exploring the different ways in which 2 addends result in a sum of 10. This knowledge becomes critical as they explore using tens as a strategy for finding unknown facts in Unit 4.

Students who understand the concepts of addition and subtraction are able to understand the connections between math facts and real situations (i.e., the flowers in a vase with 2 lilies and 9 tulips are represented by 2+9). These students are better equipped to effectively solve math problems by choosing the operation that makes sense (i.e., "If you put together the lilies and tulips, you get how many flowers are in the vase altogether, so you

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have to add 2+9 to find that out.”). They are able to make reasonable judgments about sums and differences (i.e., “It’s a little more than 10 because 2+8=10.”). And students who understand the concepts of addition and subtraction are better prepared to begin the task of memorizing math facts in later grades because they understand what they are being asked to memorize. It’s important to build understanding prior to focusing on fluency. (adapted from *Mastering the Basic Math Facts in Addition and Subtraction*)

Our goal is to continually reinforce the ideas related to math facts as we help students develop addition and subtraction strategies; providing a foundation for solving more complex facts in later units and grades. Continuation of providing a variety of meaningful and engaging experiences, students develop an understanding of the number combinations working towards mastery of understanding the meaning of addition and subtraction and applying operations to problem solving.

Relationship Among Standards in This Unit

The standards in this unit are clustered together with the intention of continuing to build a strong foundation of number sense, understanding numbers and the operations of addition and subtraction while developing strategies. This understanding takes time. Unit 2 is an extension from decomposing and composing numbers within 10 to relating the same concepts with applying properties of addition to add whole numbers and to creating and using strategies based on these properties to solve addition and subtraction problems of quantities within 20.

Standards are repeated with the intention of extending the range of numbers within as you progress through the year. Standards should not be taught in isolation nor are students expected to show mastery of the standard by the end of a given unit. Students need opportunities for investigations, discussions, hands-on explorations, visual models, stories problems, and time to explore concepts.

The standards in Unit 2 encourage students to begin recognizing addition and subtraction problems, write equations using symbols to represent addition and subtraction situations, use connected strategies to solve for unknowns. Discuss different types of equations, decide if they are true or false, and develop strategies for adding and subtracting within 20. The students will grasp an understanding of the procedural aspect and begin using symbols to represent different operations and facts. Strategies for adding and subtracting within 20 will be developed.

Teacher Note: Students need to attach meaning to the operations before there is any focus on fact fluency. The big Ideas about numbers that help students make sense of math facts should be at the center of teaching math facts are: our number system is a system of patterns, the order of the factors does not change the sum (commutative property), addition and subtraction are inverse operations (e.g., Fact Families), and numbers are flexible; they can be broke apart to more easily perform an operation. (adapted from *Mastering the Basic Math Facts in Addition and Subtraction*)

Potential Instructional Strategies

Learning experiences should take students from world experiences, to concrete materials, then to visual (and other) representations, before expecting abstract representations. Once students explore strategies and have a strong understanding move towards applying strategies in order to problem solve story problems.

“Provide opportunities for students to participate in shared problem solving activities to solve word problems. Use a variety of models such as

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drawings, words, and equations with symbols for the unknown numbers to find the solutions. Additionally students need the opportunity to explain, write and reflect on their problem-solving strategies. Students need the opportunity of writing and solving story problems involving three addends with a sum that is less than or equal to 20. Literature is a wonderful way to incorporate problem-solving in a context that young students can understand. Many literature books that include mathematical ideas and concepts have been written in recent years. For Grade 1, the incorporation of books that contain a problem situation involving addition and subtraction with numbers 0 to 20 should be included in the curriculum. As the teacher reads the story, students use a variety of manipulatives, drawings, or equations to model and find the solution to problems from the story." (http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf) ***Teacher Note:*** Students need to analyze word problems and avoid using keywords to solve them.

Teacher Note: 1.ATO.1: Teachers should be aware of the three types of problems; Result Unknown, Change Unknown, and Start Unknown, and provide multiple experiences for their students solving ALL three types of problems as strategies are developed. The unknown symbols should include boxes or pictures, and not letters. Use informal language (add, minus/subtract, the same as) to describe joining (putting together) and separating situations (breaking apart). (http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf)

Create a mathematical classroom which encourages collaboration and builds community. A suggestion for developing World Class Skills a South Carolina student needs to be college and career ready is to:

Provide settings within the mathematical classroom that promotes the use of ***Math Talk:***

- Frequently exchange mathematical ideas and problem solving strategies.
- Children listen to understand one another. This involves thinking about what a person is saying so that you can explain it yourself or to help them explain it more clearly. It is not just being quiet when someone else is talking. Also, children need to listen so that they can ask a question or help the explainer.
- Encourages critical thinking and problem solving, collaboration and teamwork, and knowing how to learn
- Teachers can stand back or to the side of the classroom to encourage Math Talk as students interact more directly with each other.
- Most common structures:
    - Solve and Discuss: 4 to 5 students solve, explain, question, and justify at the board, while the rest of the class works the problems at their seats. 2-3 students are teacher selected to explain their methods.
    - Solve and Discuss Small Group version: *(after whole group discussion has taken place)* Students solve a problem individually within a small group. 2-3 students explain their method and solution to the rest of the group while the others are encouraged to ask questions for clarification.
    - Student Pairs and Helping Pairs: Two students work together, learning from each other, particularly in applying and practicing concepts introduced in whole-class discussion. Helping pairs-More advanced students are matched with students who are struggling.
    - Scenarios- Students act out a particular mathematical situation
    - Small Groups: Students work in groups

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Introductory Lesson:

1.ATO.1, 1.ATO.5, 1.ATO.6

Lesson: Ways to Make 10

In this lesson, students will count-on from embedded numbers. Students will use the strategy of counting on from the first addend. This lesson is a continuation of the concepts from Unit 1. It is important for students to have multiple experiences with finding two addends whose sum equals 10.

Objective: Represent all the number pairs of 10 as number bond diagrams from a given scenario and generate all expressions equal to 10.

Lesson Plan: (Download the Module 1, Topic B, lesson 8.) https://www.engageny.org/resource/grade-1-mathematics-module-1-topic-b-lesson-8

Possible Lessons within the Unit:

Lesson: Grade 1 Module 1: Sums and Differences to 10: 1.ATO.1, 1.ATO.5, 1.ATO.6,

- https://www.engageny.org/resource/grade-1-mathematics-module-1-topic-c
- "In this first module of Grade 1, students make significant progress towards fluency with addition and subtraction of numbers to 10 as they are presented with opportunities intended to advance them from counting all to counting on which leads many students then to decomposing and composing addends and total amounts."
- Refer to Lessons 9-39

Lessons: Grade 1 Module 2: Introduction to Place Value Through Addition and Subtraction Within 20

- https://www.engageny.org/resource/grade-1-mathematics-module-2-topic
- Module 2 serves as a bridge from students' prior work with problem solving within 10 to work within 100 as students begin to solve addition and subtraction problems involving teen numbers. Students go beyond the Level 2 strategies of counting on and counting back as they learn Level 3 strategies informally called "make ten" or "take from ten."
- Teacher Note: Module 2 Topics A-C, Lessons 1-25 can be used within this Unit.

Task: Making a ten: https://www.illustrativemathematics.org/content-standards/1/OA/C/6/tasks/1169

- This task is designed to help students visualize where the 10's are on a single digit addition table and explain why this is so.

Task: Solving a real-world story problem: 20 Tickets: https://www.illustrativemathematics.org/content-standards/tasks/1152

- The purpose of the task is for students to add and subtract within 20 and represent complex addition problems with an equation to increase their understanding of and flexibility with the equals sign.

Lesson/Task: Fact Families: https://www.illustrativemathematics.org/content-standards/1/OA/B/tasks/1214

- "The purpose of this task is for students to identify and write sets of related addition and subtraction equations; these are often known as "fact families" because the equations are related by the same underlying relationship between the numbers. This task reinforces the commutative property of addition and using the relationship between addition and subtraction. It is best given after the students have had quite a bit of experience adding and subtracting within 10."

Lesson/Task: Domino Addition: https://www.illustrativemathematics.org/content-standards/tasks/1219

- "The purpose of this task is to help students understand the commutative property of addition. Because the total number of dots is the same regardless of how a domino is oriented, the domino reinforces the idea that the addends can be written in any order."

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Task: Equality Number Sentences: https://www.illustrativemathematics.org/content-standards/tasks/475

- This task helps students understand the meaning of the equal sign and to use it appropriately.

Daily Activity: Number of the Day Stretch:

- https://books.google.com/books?id=vQDOAwAAQBAJ&pg=PA39&lpg=PA39&dq=number+of+the+day+stretch&source=bl&ots=wkvMTBeu4R&sig=_YRGevESgrcZxoUPND6j74xDIS4&hl=en&sa=X&ved=0CB8Q6AEwAGoVChMI77DK_76UxgIVg5WACh1nfACx#v=onepage&q=number% 20of%20the%20day%20stretch&f=false

Culminating Lesson:

Lesson: Creating Story Problems: http://gadoe.georgiastandards.org/mathframework.aspx?PageReq=MathProblems

In this activity, student will focus on reading/ listening comprehension skills as they apply to mathematics story problems, as well as on written and verbal mathematics communication skills. Using classic literature as inspiration children will apply their understanding of addition and subtraction situations and operations to create, describe, and solve story problems.

Objective:

Students will write and solve story problems involving a variety of situations, choosing strategies including- part-part- whole, comparing, grouping, doubling, counting on and counting back situations. Students will use drawings, equations, and written responses to solve single story problems.

Lesson Plan: http://gadoe.georgiastandards.org/DMGetDocument.aspx/Lesson-plan.pdf?p=6CC6799F8C1371F69A35A3B787E603C58D358EDDDB47CE5FDCDC021EC00DA6E8&Type=D

Resources

Below is a suggested teaching sequence from *Mastering the Basic Math Facts in Addition and Subtraction (p.12)* suggests beginning with simpler facts and then connect each new set of facts to students' previous experiences rather than asking students to memorize 121 combinations of addition and 121 combinations of subtractions.

FOUNDATION FACTS:	
+1/+2	Students build on their understanding of counting by exploring 1 or 2 more and 1 or 2 less.
+0 facts	Using their knowledge of the concept of addition, students explore what happens when they add or subtract nothing from a quantity.

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+10 facts	Adding 10 to a single-digit number results in a 2-digit sum. Students explore adding 10 in order to build understanding and automaticity that will be needed later when exploring the using-ten strategy.
Doubles	Students explore the concept of doubling and what it means to add 2 groups of equal size.
Making ten facts	Students need many opportunities to explore ways to combine numbers to form 10. It builds a strong foundation for students to build mastery of other facts.
Building on the Foundation (Facts)	
Using 10s	Now that students know combinations of addends that have a sum of 10, they use their understanding of the flexibility of numbers to find way to break apart addends to create simpler facts by using tens (e.g., 9+7 is changed to 10+6). I know 8+2+10. So 8+3+11. 3 is 1 more than 2 and 8+2=10, so 8+3=11
Using doubles	Students' knowledge of doubles facts is now put to use to find unknown facts that are near doubles (e.g., 4+5 might be thought of as 4+4+1).

Teacher Resources:

- **KATM Grade 1 Flipbook**: http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf
  - Common Core Standards for Mathematics Flip Book Grade 1
- **Part-Part-Whole Cards**: http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/ppwcards.pdf :
  - Printable cards that can be used to practice part-part-whole relationships
- **Math Literature:** http://www.the-best-childrens-books.org/math-for-kids.html
- **Building a Math Talk Community:** http://www.eduplace.com/math/mthexp/pdf/mathtalk.pdf
- **Math Talk 101:** http://www.scholastic.com/teachers/top-teaching/2014/01/math-talk-101
- **Math Talk: The importance; Why use it?**: http://mathsolutions.com/common-core-support/math-talk/
- **Math Talk conversation starter posters:** http://mason.gmu.edu/~jsuh4/teaching/resources/Buildingmathideas.pdf
  - The last two pages include an explanation of how to use Math Talk to build mathematical ideas and discourse.
- **Structures of Story Problems Part-Part-Whole:**http://www.cbv.ns.ca/consultants/uploads/MathConsultant/Part-Part%20Whole.pdf
- http://www.k-5mathteachingresources.com/support-files/add-and-subtract-to-20.pdf

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Teacher Resources for standard 1.ATO.6.b:

- Guided Math "Number Fluency Center: Materials: http://mrsspruiellatschool.weebly.com/fact-fluency-center-materials-k-1-2.html

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- This resource includes materials that can be used to differentiate number fluency centers for guided math.
- Basic Facts: http://www.carrollk12.org/instruction/instruction/elementary/math/curriculum/basicfacts/default.asp
  - This resource includes suggestions for ways to measure fact fluency.

Resources for Interactive Sites:

- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
  - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats), and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
- **Virtual Manipulative:** Number Blocks Freeplay. http://www.mathsisfun.com/numbers/number-block-freeplay.html
  - Suggestion: Use in whole group instruction to model decomposing and composing numbers through 10.
- **Teaching Tool:** Beadstring:http://ictgames.com/brilliant_beadstring_with_colour.html
  - Choose one or two beadstrings. Practice bonds of 10 or 20, number facts to 10 or 20.
- **Interactive Modeling Tool:** Thinking Blocks Jr.:http://www.mathplayground.com/tb_addition_jr/thinking_blocks_junior.html
  - Model and Solve Word Problems
  - Addition and Subtraction Practice with small numbers (options for biggest number being 10 or 20)
- **Interactive Modeling Tool:** Thinking Blocks: http://www.mathplayground.com/ThinkingBlocks/thinking_blocks_modeling%20_tool.html
- **Interactive Game:** Sum Sense: http://resources.oswego.org/games/SumSense/sumadd.html
  - Single digit addition. Drop and drag cards to make 'sum' sense.
- **Interactive Game:** Sum Sense: Single digit subtraction: http://resources.oswego.org/games/SumSense/sumsub.html
  - Drop and drag cards to make 'sum' sense.
- **Interactive Operations Games:** http://jmathpage.com/JIMSNumberoperations.html
- **Interactive Game**: http://illuminations.nctm.org/Activity.aspx?id=3563
  - Independent of partner game in which students match whole numbers, shapes, fractions, or multiplication facts to equivalent representations."
  - Teacher Note: Use the 1-6 or 1-10 number range within Units 1 and 2.
- **Interactive Game:** Number Bonds 10**:** http://www.mathplayground.com/number_bonds_10.html

Sample Formative Assessment Tasks/Questions

Assessing 1.ATO.1: The following links include a task for students to solve. https://www.illustrativemathematics.org/content-standards/1/OA/A/1

Assessing 1.ATO.2: https://www.illustrativemathematics.org/1.OA.A.2

Assessing Sums and Differences to 10: https://www.engageny.org/resource/grade-1-mathematics-module-1

- Click on Mid-Module Assessment or End-of-Module Assessment under Downloadable Resources for samples

Assessing extending the number sequence to read, write and represent numbers to 100 using concrete models, and standard form; and

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Assessing extending the number sequence to read and write in word form numbers zero through nineteen, and multiples of ten through ninety.

- **Number of the Day Stretch:** A way to assess students' number sense as well as their ability to represent numbers in multiple ways. Suggested questions to informally assess:
- Why do you think it is important to be able to represent numbers in different ways? When do we usually use number words to represent numbers? When do we use numerals? When do we use pictures of diagrams? When do we use number sentences? Why do we sometimes choose one method of representation rather than another?
- Teacher Note: This can also be assessed throughout the school year as the range of numbers increases within classroom instruction.

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Understanding Place Value

Content Standards with Clarifying Notes

Open Bullets Indicate Clarifying Notes

- **1.NSBT.1** Extend the number sequence to:
  - a. count forward by ones to 120 starting at any number;
  - b. count by fives on multiples of 5 and 10, and tens to 100, starting at any number;
  - c. read, write and represent numbers to 100 using concrete models, standard form, and equations in expanded form;
  - d. read and write in word form numbers zero through nineteen, and multiples of ten through ninety.
    - Individually and in sequence
    - One purpose for counting by groups ("unitizing") is to make counting more efficient.
    - Teacher Note: Extend the number sequence as the year progresses.
- **1.NSBT.2** Understand place value through 99 by demonstrating that:
  - a. ten ones can be thought of as a bundle (group) called a "ten";
    - Students need ample experiences with a variety of groupable materials that are proportional (e.g., groupable counters, unifix cubes, links, beads) and ten frames allow students opportunities to create tens and break apart tens, rather than "trade" one for another. Since students' first learning about place value concepts primarily rely on counting, the physical opportunity to build tens helps them to "see" that a "ten stick" has "ten items" within it. Pre-grouped materials (e.g., base ten blocks, bean sticks) are not introduced or used until a student has a firm understanding of composing and decomposing tens. (Van de Walle & Lovin, 2006)
  - b. the tens digit in a two-digit number represents the number of tens and the ones digit represents the number of ones;
    - e.g., the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 refer to one, two, three, four, five, six, seven, eight, nine and ten tens (and 0 ones)
  - c. two-digit numbers can be decomposed in a variety of ways (e.g., 52 can be decomposed as 5 tens and 2 ones or 4 tens and 12 ones, etc.) and record the decomposition as an equation.
    - Teacher Note: The respective equations recorded could be 52 = 50 + 2 or 52 = 40 + 12. Teachers may want to have students represent the decomposition with concrete models and drawings.
- **1.NSBT.3** Compare two two-digit numbers based on the meanings of the tens and ones digits, using the words *greater than, equal to, or less than.*

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- Students are not expected to use symbols in first grade (>, <, =).
- Teacher Note: Identify between which two tens any number within 100 falls. Use an open number line to plot any two-digit number in order to explain between which two tens the number falls. To integrate measurement, include temperature examples with comparison of two-digit numbers, in which the temperatures are provided by the teacher since students have not learned to read a thermometer – perhaps the teacher takes the temperature daily and applies in context.

- **1.NSBT.5** Determine the number that is 10 more or 10 less than a given number through 99 and explain the reasoning verbally and with multiple representations, including concrete models.
  - Teacher Note: Teachers may want to begin by using concrete models as well as linear models such as a number line or a hundreds board to assist students as they learn the number pattern relationships. There are pitfalls of using a horizontal hundreds board, such as when you add 10, the value goes **up** but you move **down** on the board. As the students learn the relationship, they should be able to mentally determine the number without physical models. Students should be encouraged to share their process and strategy in finding the number.
- **1.ATO.3** Apply Commutative and Associative Properties of Addition to find the sum (through 20) of two or three addends.
  - Students should use concrete, pictorial, and verbal representations of the commutative property and associative property of addition when solving. It is not important that students know the property name, but the concept the property provides.
  - Teacher note: Build on the concepts of number combinations explored in Unit 1. Students should begin to use symbols appropriately (i.e., +,-,=) within the combinations of the three quantities.
- **1.ATO.5** Recognize how counting relates to addition and subtraction.
  - Teachers will need to assist students in developing the relationship between counting and the operations of addition and subtraction. For example, skip counting forward or backward by 10. The teacher could use skip counting or counting on. May want to define counting on. The concept of missing addend may be used for subtraction. (Related to CC.1.OA.5 and CC1.NBT.6)
  - Teacher Note: Use number lines as a visual of the number sequence.
- **1.ATO.6** Demonstrate:

  a. addition and subtraction through 20
    - Students should use strategies such as counting on, making 10, decomposing a number leading to a 10 using the relationship between addition and subtraction, creating equivalent but easier known sums, doubles plus or minus one, counting back, and the commutative property. Understand the role of zero in addition and subtraction.

  b. fluency with addition and related subtraction facts through 10.
    - Fluency is defined as efficient, accurate, and flexible. Phases of operational understanding: construct operational meaning, develop reasoning strategies, and work toward quick recall.
    - Teacher Note: The NCTM Principles and Standards for School Mathematics defines **computational fluency** as having efficient, flexible, and accurate methods for computing. Computation fluency of "mathematical fluency" with whole numbers is an essential guide for school mathematics and forms the foundation for many higher level math concepts.

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- **1.ATO.8** Determine the missing number in addition and subtraction equations within 20.
  - Students should use number sense as well as concrete and pictorial models such as number lines while identifying the missing whole number within at most a four term equation.

New Academic Vocabulary for this Unit

- ones
- tens
- bundle
- place
- value
- digit
- equal to
- less than
- greater than
- unitize
- multiple
- hundred
- teen
- decade
- number

Prior Knowledge Required for This Unit

In Kindergarten, students develop concepts of how numbers can be composed and decomposed in a variety of ways, forming a foundation for number sense in base ten. Kindergarten students composed and decomposed numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and recording each composition or decomposition by a drawing; understanding that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Students were asked to unitize those ten individual ones as a whole unit: "one ten". Students in Kindergarten explored the idea that the teen numbers (11 to 19) can be expressed as one ten and some leftover ones. Ample experiences with a variety of groupable materials that are proportional (e.g., cubes, links, beans, beads) and ten frames help students develop this concept. First graders will extend this concept in understanding place value through 99 demonstrating that two-digit numbers can be decomposed in a variety of ways and record the decomposition as an equation.

Subsequent Knowledge Related to This Unit

In Unit 3, students will develop conceptual understanding of place value through 99; this understanding will lead to students developing strategies for addition and subtraction based on place value in the next unit, Unit 4.

In first grade, students use concrete models to represent numbers up to 100 in expanded form. First graders also demonstrate that ten ones are thought of as a bundle. In second grade, students will use the correct terminology that 100 ones or 10 tens = one hundred (100).

First graders also learn to count forward by ones to 120; starting at any number as well as by 5's on multiples of 5 and 10, and 10's to 100, starting at any number. In second grade students will extend this knowledge in Unit 1 and are required to count by 10's or 100's starting at any number to 1,000.

It is essential that children develop a solid understanding of the base ten numeration system and place value concepts by the end of second grade. In third grade, students will then use knowledge of place value to round numbers to nearest 10's and 100's. They will also learn to multiply one-digit numbers by multiples of 10 using knowledge of place value. It is important that students develop place value concepts to use in rounding as well as for addition and subtraction because students are not expected to use addition and subtraction standard algorithms until fourth grade.

Students will *determine the number that is 10 more or 10 less than a given number through 99 and explain the reasoning verbally and with multiple representations, including concrete models* ***(1.NSBT.5).*** Using concrete models for 10 more and 10 less leads up to **1.NSBT.4.b** and

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1.NSBT.6 in which students will add a two-digit number and a multiple of ten, and subtract a multiple of 10 from a larger multiple of 10 in the next unit, Unit 4.

Relationship Among Standards in This Unit

In Unit 3 students will build on their understanding of number concepts and relations, expanding their thinking towards place value concepts. The standards in this unit are clustered together with the intention of building a strong foundation of the base ten numeration system and place value concepts. Unit 3 will focus on developing an understanding of whole number relationships and place value through 99, including "making a ten" (grouping in tens and ones). Students will compare two-digit numbers (through 99) based on the meanings of the tens and ones to develop understanding of and solving problems involving their relative sizes. Students think of whole numbers between 10 and 100 in terms of tens and ones. They will understand the order of the counting numbers and their relative magnitudes while building number sense. Students will model 2-digit addition using concrete models, drawings, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **Teacher Note:** *In order for students to develop an understanding of place value concepts they will need ample opportunities to explore tens and ones groupings using concrete models and math drawings. Students need repeated experiences in building 2-digit numbers with strong visual support before extended place value concepts to add with 1-and 2-digit numbers.*

Potential Instructional Strategies

Create a mathematical classroom which encourages collaboration and builds community. A suggestion for developing World Class Skills a South Carolina student needs to be college and career ready is to:

Provide settings within the mathematical classroom that promotes the use of ***Math Talk:***

- Frequently exchange mathematical ideas and problem solving strategies.
- Children listen to understand one another. This involves thinking about what a person is saying so that you can explain it yourself or to help them explain it more clearly. It is not just being quiet when someone else is talking. Also, children need to listen so that they can ask a question or help the explainer.
- Encourages critical thinking and problem solving, collaboration and teamwork, and knowing how to learn
- Teachers can stand back or to the side of the classroom to encourage Math Talk as students interact more directly with each other.
- Most common structures of *Math Talk*:
    - Solve and Discuss: 4 to 5 students solve, explain, question, and justify at the board, while the rest of the class works the problems at their seats. 2-3 students are teacher selected to explain their methods.
    - Solve and Discuss Small Group version: *(after whole group discussion has taken place)* Students solve a problem individually within a small group. 2-3 students explain their method and solution to the rest of the group while the others are encouraged to ask questions for clarification.
    - Student Pairs and Helping Pairs: Two students work together, learning from each other, particularly in applying and practicing concepts introduced in whole-class discussion. Helping pairs-More advanced students are matched with students who are struggling.

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- Scenarios- Students act out a particular mathematical situation
- Small Groups: Students work in groups

Introductory Lesson:

Activity: Counting in Groups *(Van de Walle, p. 129)*

Find a collection of things that children might be interested in counting--perhaps the number of eyes in the classroom or the number of shoes, a mystery jar of buttons or cubes, a long chain of plastic links, or the number of crayons in the crayon box.

The quantity should be countable, somewhere between 25 and 100.

Pose the question, "How could we count our shoes in some way that would be easier than counting by ones?"

Whatever suggestions you get, try to implement them.

After trying several methods, you can have a discussion of what worked well and what did not.

If no one suggests counting by tens, you might casually suggest that as possibly another idea.

Possible Lessons within the Unit:

Lessons: Grade 1 Module 2, Topic D: Varied Problems Decompositions of Teen Numbers as 1 ten and Some Ones: Lessons 26-29

- **1.NSBT.2, 1.NSBT.5, 1.ATO.1, 1.ATO.6**
- https://www.engageny.org/resource/grade-1-mathematics-module-2-topic-d
- Lesson 26: Identify 1 ten as a unit by renaming representations of 10
- Lesson 27: Solve addition and subtraction problems decomposing and composing teen numbers as 1 ten and some ones.
- Lesson 28: Solve addition problems using ten as a unit, and write two-step solutions.
- Lesson 29: Solve subtraction problems using ten as a unit, and write two-step solutions.

Lessons: Grade 1 Module 4, Topic A: Tens and Ones: Lessons 1-6; 1.NSBT.1, 1.NSBT.2, 1.NSBT.5

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-a
- Lesson 1: Compare the efficiency of counting by ones and counting by tens.
- Lesson 2: Use the place value chart to record and name tens and ones within a two-digit number.
- Lesson 3: Interpret two-digit numbers as either tens and some ones or as all ones.
- Lesson 4: Write and interpret two-digit numbers as addition sentences that combine tens and ones.
- Lesson 5: Identify 10 more, 10 less, 1 more, 1 less than a two-digit number.
- Lesson 6: Use dimes and pennies as representations of tens and ones.

Lessons: Grade 1 Module 4, Topic B: Comparison of Pairs of Two-Digit Numbers: Lessons 7-8; 1.NSBT.3, 1.NSBT.2,

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-b

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- Lesson 7: Compare two quantities, and identify the greater or lesser of the two given numerals.
- Lesson 8: Compare quantities and numerals from left to right.

Lesson: Understanding Place Value

- https://www.georgiastandards.org/Georgia-Standards/Frameworks/1st-Math-Unit-5.pdf
- Refer to Tasks 1, 2, 4, and 5.

Lesson: Building sets of 19 and 20

- http://illuminations.nctm.org/Lesson.aspx?id=1788

Lesson: Fish Food, More or Less

- http://illuminations.nctm.org/Lesson.aspx?id=2657

Lesson: Skip Counting With Counting Collections

- https://www.teachingchannel.org/videos/skip-counting-with-kindergarteners
- Record strategies when skip counting by 5s and 10s

Daily Activity: Flash Tens and Ones:

- **Goal:** Show tens and ones
- Write a 2-digit number on the board. Direct the class in showing this number by flashing ten fingers for each 10-group while counting by tens. Say, "freeze," and then count by ones to show ones on fingers. Repeat several times with different numbers.

Daily Activity: Number of the Day Stretch:

- https://books.google.com/books?id=vQDOAwAAQBAJ&pg=PA39&lpg=PA39&dq=number+of+the+day+stretch&source=bl&ots=wkvMTBeu4R&sig=_YRGevESgrcZxoUPND6j74xDIS4&hl=en&sa=X&ved=0CB8Q6AEwAGoVChMI77DK_76UxgIVg5WACh1nfACx#v=onepage&q=number% 20of%20the%20day%20stretch&f=false

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Culminating Lesson:

Comparing Numbers: https://www.illustrativemathematics.org/content-standards/1/NBT/B/3/tasks/1102

Where Do I Go?: https://www.illustrativemathematics.org/content-standards/1/NBT/B/3/tasks/682

Resources

Teacher Resources:

- **KATM Grade 1 Flipbook**: http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf
  - Common Core Standards for Mathematics Flip Book Grade 1
- **Math Literature:** http://www.the-best-childrens-books.org/math-for-kids.html

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- **Building a Math Talk Community:** http://www.eduplace.com/math/mthexp/pdf/mathtalk.pdf
- **Math Talk 101:** http://www.scholastic.com/teachers/top-teaching/2014/01/math-talk-101
- **Math Talk: The importance; Why use it?**: http://mathsolutions.com/common-core-support/math-talk/
- **Math Talk conversation starter posters:** http://mason.gmu.edu/~jsuh4/teaching/resources/Buildingmathideas.pdf
    - The last two pages include an explanation of how to use Math Talk to build mathematical ideas and discourse.

Teacher Resources for 1.NSBT. 5

- Vertical 120 chart: https://www.eduplace.com/math/mthexp/g1/visual/pdf/vs_g1_23.pdf
    - Teachers may want to use this hundreds board along with connecting cubes to assist students as they learn the number pattern relationships.

Teacher Resources for 1.ATO.6.b:

- Guided Math "Number Fluency Center: Materials: http://mrsspruiellatschool.weebly.com/fact-fluency-center-materials-k-1-2.html
    - This resource includes materials that can be used to differentiate number fluency centers for guided math.
- Basic Facts: http://www.carrollk12.org/instruction/instruction/elementary/math/curriculum/basicfacts/default.asp
    - This resource includes suggestions for ways to measure fact fluency.

Resources for Interactive Sites:

- **Interactive Game:** Understand Place Value: http://www.mathchimp.com/1.2.2.php
- **Interactive:** Counting with Base 10 Blocks: http://www.learningbox.com/base10/baseten.html
    - (K-3) - An interactive website where students build a specified number using 100s, 10s, and 1s. The site incorporates auditory, symbolic, base 10 and number line representations.
- **Interactive Game:** Shark Numbers: http://www.ictgames.com/sharkNumbers/sharkNumbers_v5.html
    - Count the base 10 blocks and identify the number. You can choose the magnitude of the numbers.
- **Interactive Game:** Sum Sense: http://resources.oswego.org/games/SumSense/sumadd.html
    - Single digit addition. Drop and drag cards to make 'sum' sense.
- **Interactive Game:** Sum Sense: Single digit subtraction: http://resources.oswego.org/games/SumSense/sumsub.html
    - Drop and drag cards to make 'sum' sense.
- **Interactive Operations Games:** http://jmathpage.com/JIMSNumberoperations.html
- **Interactive Game**: http://illuminations.nctm.org/Activity.aspx?id=3563
    - Independent of partner game in which students match whole numbers, shapes, fractions, or multiplication facts to equivalent

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representations."

- **Math Spinner:** http://www.senteacher.org/worksheet/13/Fractions.html
  - This is a website where you can make exactly what you need.
- **Interactive Manipulative:** Splat squares: http://www.oswego.org/ocsd-web/games/SplatSquares/splatsq99.html
  - Interactive Hundred Grid
- **Virtual Manipulative:** http://www.ictgames.com/numberlineJumpMaker/index.html
  - An interactive number line
  - Students can practice using a jump strategy to find the distance between two numbers.
- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
  - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats), and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
- **Virtual Manipulative:** Number Blocks Freeplay. http://www.mathsisfun.com/numbers/number-block-freeplay.html
  - Suggestion: Use in whole group instruction to model decomposing and composing numbers through 10.
- **Teaching Tool:** Beadstring: http://ictgames.com/brilliant_beadstring_with_colour.html
  - Choose one or two beadstrings. Practice bonds of 10 or 20, number facts to 10 or 20.
- **Interactive Modeling Tool:** Thinking Blocks Jr.:http://www.mathplayground.com/tb_addition_jr/thinking_blocks_junior.html
  - Model and Solve Word Problems
  - Addition and Subtraction Practice with small numbers (options for biggest number being 10 or 20)
- **Interactive Modeling Tool:** Thinking Blocks: http://www.mathplayground.com/ThinkingBlocks/thinking_blocks_modeling%20_tool.html
- **Interactive Modeling Tool:** http://www.ictgames.com/partition.html
  - Begin to recognize that 2 digit numbers are made up of tens and units.

Sample Formative Assessment Tasks/Questions

First Grade Math Performance Task: https://melrosecurriculum.wikispaces.com/First+Grade+Math+Performance+Tasks

- Download the tasks in Numbers and Operations in Base Ten

Formative Instructional and Assessment Tasks: http://commoncoretasks.ncdpi.wikispaces.net/1.NBT.2-1.NBT.3+Tasks

Formative and Summative Assessments: http://ccgpsmathematicsk-5.wikispaces.com/K-5+Formative+Assessment+Lessons+%28FALs%29

- Refer to Unit 5 for example questions

Assessing understanding of place value: https://www.engageny.org/resource/grade-1-mathematics-module-2

- Click on Mid-Module Assessment or End-of-Module Assessment under Downloadable Resources for samples

Assessing extending the number sequence to read, write and represent numbers to 100 using concrete models, and standard form; and Assessing extending the number sequence to read and write in word form numbers zero through nineteen, and multiples of ten through

ninety.

- **Number of the Day Stretch:** A way to assess students' number sense as well as their ability to represent numbers in multiple ways. Suggested questions to informally assess:
- Why do you think it is important to be able to represent numbers in different ways? When do we usually use number words to represent numbers? When do we use numerals? When do we use pictures of diagrams? When do we use number sentences? Why do we sometimes choose one method of representation rather than another?
- Teacher Note: This can also be assessed throughout the school year as the range of numbers increases within classroom instruction.

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1st Grade Math Unit 4	Return to Table of Contents	Return to First Grade Overview

Applying Place Value Concepts

Content Standards with Clarifying Notes

Open Bullets Indicate Clarifying Notes

- **1.NSBT.4** Add through 99 using concrete models, drawings, and strategies based on place value to:
  a. add a two-digit number and a one-digit number, understanding that sometimes it is necessary to compose a ten (regroup)
  b. add a two-digit number and a multiple of 10.
- **1.NSBT.6** Subtract a multiple of 10 from a larger multiple of 10, both in the range 10 to 90, using concrete models, drawings, and strategies based on place value.
- **1.ATO.2** Solve real-world/story problems that include three whole number addends whose sum is less than or equal to 20.
  - Teacher Note: Students should use concrete objects, pictorial models, and number sentences when solving problems.

New Academic Vocabulary for This Unit

- group
- regroup
- place value
- two-digit
- counting on
- make-a-ten

Prior Knowledge Required for This Unit

Before moving into Unit 4, students need to have a strong understanding of number concepts and relations begun in Kindergarten and repeated in first grade Unit 1. It is essential for students to know how to independently decompose two-digit numbers through 99 and record the decomposition as an equation before beginning Unit 4. Students need to have an understanding of the concepts of addition and subtraction and understand the meaning of the operations and the actions it takes to make a group larger, smaller, and on number relations and comparisons.

Students will develop strategies for adding whole numbers through 99 and subtracting multiples of 10 based on their prior work with smaller numbers in Units 1-3. Students need to understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two, adding 10 is the same thing as counting by tens). Students will continue to develop and extend the strategies they have learned for unknowns-(result, change, start) in addition and subtraction problems. Problem types, models, and drawings are all intertwined together in this unit so students can access prior knowledge as they work with greater numbers and quantities. (**As a means of support and for reference during this unit 4, standards 1.ATO.1, 1.ATO.2, 1.ATO.3, 1.ATO.5, 1.ATO.6, 1.ATO.8 are repeated in italics within the list of standards on the overview page**

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for this unit because, prior to beginning this unit 4, students should have addressed those standards which require adding and subtracting within 20 and use of the commutative and associate properties when adding.)

In Kindergarten, students were introduced to composing and decomposing numbers 11-19 separating tens and ones from the remaining ones using objects and drawings **(K.NSBT.1)**. In Unit 3, first graders extended this concept in understanding place value through 99 demonstrating that two-digit numbers can be decomposed in a variety of ways and recorded the decomposition as an equation **(1.NSBT.2.c)**. Students also continued to develop a conceptual understanding of whole number relationships and place value through 99, including "making a ten" (grouping in tens and ones) in Unit 3 **(1.NSBT.2)**. Students compared two-digit numbers (through 99) based on the meanings of the tens and ones developing an understanding of and solving problems involving their relative sizes **(1.NSBT.3)**. Students were introduced to thinking of whole numbers between 10 and 99 in terms of tens and ones. They developed an understanding of the order of the counting numbers and their relative magnitudes while continuing to build number sense **(1.NSBT.1)**. Students should be able to determine the number that is 10 more or 10 less than a given number through 99 and explain the reasoning verbally and with multiple representations, including concrete models **(1.NSBT.5)**.

Subsequent Knowledge Related to This Unit

It is essential that children develop a solid understanding of the base ten numeration system and place value concepts by the end of second grade. In third grade, students will then use knowledge of place value to round numbers to nearest 10's and 100's. They will also learn to multiply one-digit numbers by multiples of 10 using knowledge of place value. It is important that students develop place value concepts to use in rounding as well as for addition and subtraction because students are not expected to use addition and subtraction standard algorithms until fourth grade.

Relationship Among Standards in This Unit

Unit 4 will focus on students developing, discussing, and using efficient, accurate, and generalizable methods to add through 99 using concrete models, drawings, and strategies based on place value to add a two-digit number and a one-digit number, understanding that sometimes it is necessary to compose a ten (regroup) (**1.NSBT.4.a)**, and to add a two-digit number and a multiple of 10 (**1.NSBT.4.b).** Students will subtract a multiple of 10 from a larger multiple of 10, both in the range 10 to 90, using concrete models, drawings, and strategies based on place value **(1.NSBT.6**).

Standards are repeated with the intention of extending the range of numbers within as you progress through the year. Standards should not be taught in isolation nor are students expected to show mastery of the standard by the end of a given unit. Students need opportunities for investigations, discussions, hands on explorations, visual models, stories problems, and time to explore concepts. Students will continue to develop and extend the strategies they have learned for unknowns-(result, change, start) in addition and subtraction problems. Problem types, models, and drawings are all intertwined together in this unit so students can access prior knowledge (sums and differences less than 20) as they work with greater numbers and quantities. Those sums and differences less than 20 are addressed in the following standards which will be referenced as support and prerequisites to the standards in this unit that require sums and differences greater than 20:

- Solve real-world/story problems using addition (as a joining action and as a part-part-whole action) and subtraction (as a separation

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action, finding parts of the whole, and as a comparison) through 20 with unknowns in all positions. **(1.ATO.1)**

- Students will solve real-world/story problems that include three whole number addends whose sum is less than or equal to 20. **(1.ATO.2)**
- Apply Commutative and Associative Properties of Addition to find the sum (through 20) of two or three addends. **(1.ATO.3)** *Students should use concrete, pictorial, and verbal representations of the commutative property and associative property of addition when solving. It is not important that students know the property name, but the concept the property provides.*
- Recognize how counting relates to addition and subtraction. **(1.ATO.5)**
- Demonstrate addition and subtraction through 20. **(1.ATO.6.a)** *Students should use strategies such as counting on, making 10, decomposing a number leading to a 10 using the relationship between addition and subtraction, creating equivalent but easier known sums, doubles plus or minus one, counting back, and the commutative property. Understand the role of zero in addition and subtraction.*
- Demonstrate fluency with addition and related subtraction facts through 10. **(1.ATO.6.b)**
- Determine the missing number in addition and subtraction equations within 20. **(1.ATO.8)**

Potential Instructional Strategies

Create a mathematical classroom which encourages collaboration and builds community. A suggestion for developing World Class Skills a South Carolina student needs to be college and career ready is to:

Provide settings within the mathematical classroom that promotes the use of ***Math Talk:***

- Frequently exchange mathematical ideas and problem solving strategies.
- Children listen to understand one another. This involves thinking about what a person is saying so that you can explain it yourself or to help them explain it more clearly. It is not just being quiet when someone else is talking. Also, children need to listen so that they can ask a question or help the explainer.
- Encourages critical thinking and problem solving, collaboration and teamwork, and knowing how to learn
- Teachers can stand back or to the side of the classroom to encourage Math Talk as students interact more directly with each other.
- Most common structures of *Math Talk*:
    - Solve and Discuss: 4 to 5 students solve, explain, question, and justify at the board, while the rest of the class works the problems at their seats. 2-3 students are teacher selected to explain their methods.
    - Solve and Discuss Small Group version: *(after whole group discussion has taken place)* Students solve a problem individually within a small group. 2-3 students explain their method and solution to the rest of the group while the others are encouraged to ask questions for clarification.
    - Student Pairs and Helping Pairs: Two students work together, learning from each other, particularly in applying and practicing concepts introduced in whole-class discussion. Helping pairs-More advanced students are matched with students who are struggling.
    - Scenarios- Students act out a particular mathematical situation
    - Small Groups: Students work in groups

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Introductory Lesson:

Lessons: Grade 1 Module 4, Topic C: Addition and Subtraction of Tens: Lessons 11-12; 1.NSBT.4, 1.NSBT.6

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-c
- Lesson 11: Add and subtract tens from a multiple of 10.
- Lesson 12: Add tens to a two-digit number.

Possible Lessons within the Unit:

Lessons: Grade 1 Module 4, Topic D: Addition of Tens or Ones to a Two-Digit Number: Lessons 13-18; 1.NSBT.4, 1.NSBT.6

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-d
- Lessons 13-14: Use counting on and the make ten strategy when adding across a ten
- Lesson 15: Use single-digit sums to support solutions for analogous sums to 40.
- Lessons 16-17: Add ones and ones or tens and tens.
- Lesson 18: Share and critique peer strategies for adding two-digit numbers.

Lessons: Grade 1 Module 4, Topic E: Lessons 19-22; 1.NSBT.4, 1.NSBT.6, 1.ATO.1

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-e
- Lesson 19: Use tape diagrams as representations to solve put together/take apart with total unknown and add to with result unknown word problems.
- Lessons 20-21: Recognize and make use of part-whole relationship within tape diagrams when solving a variety of problem types.
- Lesson 22: Write word problems of varied types.

Lessons: Grade 1 Module 4, Topic F: Lessons 23-27; 1.NSBT.4, 1.NSBT.2, 1.NSBT.6, 1.ATO.1

- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-f
- Lesson 23: Interpret two-digit numbers as tens and ones, including cases with more than 9 ones.
- Lessons 24-25: Add a pair of two-digit numbers when the ones digits have a sum less than or equal to 10
- Lessons 26-27: Add a pair of two-digit numbers when the ones digits have a sum greater than 10.

Lessons: Understanding Place Value: 1.NSBT.4, 1.NSBT.2, 1.NSBT.3, 1.NSBT.6, 1.ATO.1, 1.ATO.2

- https://www.georgiastandards.org/Georgia-Standards/Frameworks/1st-Math-Unit-5.pdf
- Refer to Tasks 3, 6, 7, 9, 10, 11, 12, 13, 14, 15

Lesson: Sugar, Sugar!: 1.NSBT.4

- http://betterlesson.com/lesson/568903/sugar-sugar
- Students explore how they could arrange their cubes to solve story problems with numbers on the decade.

Activity: Make Ten: 1.NSBT.4, 1.NSBT.2

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- http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/Make10FlashCards.pdf
- Represent ten facts using counters, bingo dabbers ,or dot stickers. The cards show two ten frames and a fact, such as 9+8, where the make 10 strategy is efficient.

Activity: Bridging Scaffold

- http://teachmath.openschoolnetwork.ca/wp-content/uploads/grade1/documents/bridgingscaffold.pdf
- The following sheet scaffolds students adding two digit numbers that compose a ten (regroup). They first need to recognize how many more are needed to build the first number to 10,and then split that number from the second number given.

Daily Activity: Number Talk: Rename That Number

- http://www.insidemathematics.org/classroom-videos/number-talks/1st-grade-math-rename-number/number-talk
- Find different number sentences that represent a given two-digit number in as many ways as possible.

Daily Activity: Flash Tens and Ones:

- **Goal:** Show tens and ones
- Write a 2-digit number on the board. Direct the class in showing this number by flashing ten fingers for each 10-group while counting by tens. Say, "freeze," and then count by ones to show ones on fingers. Repeat several times with different numbers.

Daily Activity: Number of the Day Stretch:

- https://books.google.com/books?id=vQDOAwAAQBAJ&pg=PA39&lpg=PA39&dq=number+of+the+day+stretch&source=bl&ots=wkvMTBeu4R&sig=_YRGevESgrcZxoUPND6j74xDIS4&hl=en&sa=X&ved=0CB8Q6AEwAGoVChMI77DK_76UxgIVg5WACh1nfACx#v=onepage&q=number% 20of%20the%20day%20stretch&f=false

Number Senses Routine: Choral Counting Activities:

- https://drive.google.com/file/d/0B51D5rAdKSXUMFpLYm1MSVpzSGc/edit
- Whole-class choral counting activities include counting by ones, tens, fives, twos starting at zero and then starting at other numbers, counting by tens starting from 53 or 320, counting backwards by ones or tens.

Leprechaun Traps: Addition Within 100

- https://www.teachingchannel.org/videos/grade-1-math
- Use multiple strategies to solve addition problems

Culminating Lesson:

Lessons: Grade 1 Module 4, Topic F: Lessons 29; 1.NSBT.4, 1.NSBT.2, 1.NSBT.6, 1.ATO.1, 1.ATO.6

- Lesson 29: Add a pair of two-digit numbers with varied sums in the ones.
- https://www.engageny.org/resource/grade-1-mathematics-module-4-topic-f-lesson-29

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Resources

Teacher Resources:

- **Number Sense Routines by Shumway:** https://www.stenhouse.com/sites/default/files/public/legacy/pdfs/numbersense_ch2.pdf
  - Chapter 2: Improving Number Sense
- **Choral Counting Activities:** https://drive.google.com/file/d/0B51D5rAdKSXUMFpLYm1MSVpzSGc/edit
- **Number Talks and Other Multi Grade Resources:** http://ccgpsmathematicsk-5.wikispaces.com/Number+Talks+and+other+Multi+Grade+Resources
  - Refer to the resources under *Resources From Number Talks Webinars* and *Building Fact Fluency*.
- **KATM Grade 1 Flipbook**: http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf
  - Common Core Standards for Mathematics Flip Book Grade 1
- **Building a Math Talk Community:** http://www.eduplace.com/math/mthexp/pdf/mathtalk.pdf
- **Math Talk 101:** http://www.scholastic.com/teachers/top-teaching/2014/01/math-talk-101
- **Math Talk: The importance; Why use it?**: http://mathsolutions.com/common-core-support/math-talk/
- **Math Talk conversation starter posters:** http://mason.gmu.edu/~jsuh4/teaching/resources/Buildingmathideas.pdf
  - The last two pages include an explanation of how to use Math Talk to build mathematical ideas and discourse.

Resources for 1.ATO.2

- **Three addend story problem cards:** http://www.k-5mathteachingresources.com/support-files/three-addends-to-20-word-problems.pdf

Resources for 1.NBST.6

- **Subtract 10:** http://www.k-5mathteachingresources.com/support-files/subtract-ten.pdf
- **Subtract multiples of 10:** http://www.k-5mathteachingresources.com/support-files/subtract-multiples-of-10.pdf
- **Howard County Schools Resources 1.NSBT.6:** https://hcpss.instructure.com/courses/9414/pages/1-dot-nbt-dot-c-6-print-resources-and-lesson-seeds?module_item_id=211224
  - This page includes lesson plans, print resources, LearnZillion video links, and web resources.

Resources for 1.NSBT. 4:

- **Sums of 90**: http://www.k-5mathteachingresources.com/support-files/sums-of-90.pdf
- **Counting Collections to 100 Video:** https://www.teachingchannel.org/videos/counting-by-ten-lesson
- **Lucky Six:** http://www.k-5mathteachingresources.com/support-files/lucky-six.pdf

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- **Add a Multiple of 10:** http://www.k-5mathteachingresources.com/support-files/adding-a-multiple-of-10-ver.1.pdf
- **120 chart (Vertical):** https://www.eduplace.com/math/mthexp/g1/visual/pdf/vs_g1_23.pdf
    - Teachers may want to use this hundreds board along with connecting cubes to assist students as they learn the number pattern relationships.

Resources for Interactive Sites:

- **Virtual Manipulative:** Number Line Arithmetic: http://nlvm.usu.edu/en/nav/frames_asid_156_g_1_t_1.html
    - This resource can be used for to picture whole number operations; addition, subtraction, ~~multiplication, division~~ carried out on a number line.
- **Interactive Game:** Understand Place Value: http://www.mathchimp.com/1.2.2.php
- **Interactive:** Counting with Base 10 Blocks: http://www.learningbox.com/base10/baseten.html
    - (K-3) - An interactive website where students build a specified number using 100s, 10s, and 1s. The site incorporates auditory, symbolic, base 10 and number line representations.
- **Interactive Game:** Shark Numbers: http://www.ictgames.com/sharkNumbers/sharkNumbers_v5.html
    - Count the base 10 blocks and identify the number. You can choose the magnitude of the numbers.
- **Interactive Game:** Sum Sense: http://resources.oswego.org/games/SumSense/sumadd.html
    - Single digit addition. Drop and drag cards to make 'sum' sense.
- **Interactive Game:** Sum Sense: Single digit subtraction: http://resources.oswego.org/games/SumSense/sumsub.html
    - Drop and drag cards to make 'sum' sense.
- **Interactive Game**: http://illuminations.nctm.org/Activity.aspx?id=3563
    - "Independent of partner game in which students match whole numbers, shapes, fractions, or multiplication facts to equivalent representations."
- **Math Spinner:** http://www.senteacher.org/worksheet/13/Fractions.html
    - This is a website where you can make exactly what you need.
- **Interactive Manipulative:** Splat squares: http://www.oswego.org/ocsd-web/games/SplatSquares/splatsq99.html
    - Interactive Hundred Grid
- **Virtual Manipulative:** http://www.ictgames.com/numberlineJumpMaker/index.html
    - An interactive number line
    - Students can practice using a jump strategy to find the distance between two numbers.
- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
    - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats),

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and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)

- **Virtual Manipulative:** Number Blocks Freeplay: http://www.mathsisfun.com/numbers/number-block-freeplay.html
    - Suggestion: Use in whole group instruction to model decomposing and composing numbers through 10.
- **Teaching Tool:** Beadstring: http://ictgames.com/brilliant_beadstring_with_colour.html
    - Choose one or two beadstrings. Practice bonds of 10 or 20, number facts to 10 or 20.
- **Interactive Modeling Tool:** Thinking Blocks Jr.: http://www.mathplayground.com/tb_addition_jr/thinking_blocks_junior.html
    - Model and Solve Word Problems
    - Addition and Subtraction Practice with small numbers (options for biggest number being 10 or 20)
- **Interactive Modeling Tool:** Thinking Blocks: http://www.mathplayground.com/ThinkingBlocks/thinking_blocks_modeling%20_tool.html
- **Interactive Modeling Tool:** http://www.ictgames.com/partition.html
    - Begin to recognize that 2 digit numbers are made up of tens and units.

Sample Formative Assessment Tasks/Questions

Formative Instructional and Assessment Tasks https://melrosecurriculum.wikispaces.com/First+Grade+Math+Performance+Tasks

- First Grade Math Performance Task: Download the tasks in Numbers and Operations in Base Ten in one document
- Refer to pages 19-39; **(1.NSBT.4, 1.NSBT.5, 1.NSBT.6)**

Formative Instructional and Assessment Tasks: http://commoncoretasks.ncdpi.wikispaces.net/1.NBT.4-1.NBT.6+Tasks

- Same assessments as above. Click and download individual Instruction Assessment Tasks by standard

Formative and Summative Assessments: http://ccgpsmathematicsk-5.wikispaces.com/K-5+Formative+Assessment+Lessons+%28FALs%29

- Refer to 1st grade Unit 6 for example questions
- Problems 3 and 7 will need to be modified. Students are not expected to know the symbols >,<. Suggestion: Omit the top two options which include < and > symbols in Number 3.
- Unit 6 PDF Summative Assessment: http://ccgpsmathematicsk-5.wikispaces.com/file/view/First%20Grd%20Unit%206%20assess.pdf/437817806/First%20Grd%20Unit%206%20assess.pdf
- Rubric: http://ccgpsmathematicsk-5.wikispaces.com/file/view/Unit6assessmentrubric.pdf/437817902/Unit6assessmentrubric.pdf

Assessing understanding of place value: https://www.engageny.org/resource/grade-1-mathematics-module-4

- Click on Mid-Module Assessment or End-of-Module Assessment under Downloadable Resources for samples

Assessing extending the number sequence to read, write and represent numbers to 100 using concrete models, and standard form; and Assessing extending the number sequence to read and write in word form numbers zero through nineteen, and multiples of ten through ninety.

- **Number of the Day Stretch:** A way to assess students' number sense as well as their ability to represent numbers in multiple ways. Suggested questions to informally assess:

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- Why do you think it is important to be able to represent numbers in different ways? When do we usually use number words to represent numbers? When do we use numerals? When do we use pictures of diagrams? When do we use number sentences? Why do we sometimes choose one method of representation rather than another?
- Teacher Note: This can also be assessed throughout the school year as the range of numbers increases within classroom instruction.

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1st Grade Math Unit 5	Return to Table of Contents Return to First Grade Overview
Comparisons and Data	
Content Standards with Clarifying Notes *Open Bullets Indicate Clarifying Notes*	

- **1.MDA.4** Collect, organize, and represent data with up to 3 categories using object graphs, picture graphs, t-charts and tallies.
  - *Object graphs* use the actual objects being graphed. Each item can be placed in a square so that comparisons and counts are easily made. Examples include types of shoes, seashells, and books. (Teaching Student-Centered Mathematics Grades K-3 John Van de Walle, 2006)
  - *Picture graphs* use drawings that represent what is being graphed. Students can make their own drawings, or you can duplicate drawings to be colored or cut out to suit particular needs. (Teaching Student-Centered Mathematics Grades K-3 John Van de Walle, 2006)
  - Teacher Note: The teacher will create graphs at the beginning of the year and move to group creations of graphs. By the end of the school year, students should be able to create graphs on their own. The teacher will provide the framework for data organization.
- **1.MDA.5** Draw conclusions from given object graphs, picture graphs, t-charts, tallies, and bar graphs.
  - Ask and answer questions: how many in each category, how many more or less in one category than another. Bar graphs are included, but students are not expected to create their own.
- **1.ATO.1** Solve real-world/story problems using addition (as a joining action and as a part-part-whole action) and subtraction (as a separation action, finding parts of the whole, and as a comparison) through 20 with unknowns in all positions.
- **1.ATO.2** Solve real-world/story problems that include three whole number addends whose sum is less than or equal to 20.
  - Teacher Note: Students should use concrete objects, pictorial models, and number sentences when solving problems.
- **1.ATO.9** Create, extend and explain using pictures and words for:

  ~~a. repeating patterns (e.g., AB, AAB, ABB, and ABC type patterns);~~

  b. growing patterns (between 2 and 4 terms/figures).

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New Academic Vocabulary for this Unit

- sort
- alike
- different
- after
- unit
- compare
- tally
- before
- data
- organize
- order
- most
- order
- data
- organize
- least
- short
- shorter
- tall
- taller

Prior Knowledge Required for This Unit

In kindergarten students were introduced to counting quantities and comparing quantities. First grade units 1-4 build on the foundation set in kindergarten. Students will continue to build on their knowledge of representing and analyzing data. In kindergarten, students created picture graphs from which they drew conclusions. (*K.MDA.4 Represent data using object and picture graphs, and draw conclusions from the graphs*.)
In first grade, students move to collecting and representing data with up to 3 categories. (*1.MDA.4 Collect, organize, and represent data with up to 3 categories using object graphs, picture graphs, t-charts and tallies.).*

Subsequent Knowledge Related to This Unit

In second grade, students will collect, organize, and represent data in 4 categories, as well as generate data about measurements, and represent their findings on a line plot.

Relationship Among Standards in This Unit

Unit 5 will focus on students organizing, representing, interpreting, and comparing data. Unit 5 will build on what students know about comparing numbers to develop comparison statements for a set of data and solve comparison story problems.

Potential Instructional Strategies

Introductory Lesson:

Lesson: LearnZillion: 1.MDA.4, 1.MDA.5

- https://hcpss.learnzillion.com/lesson_plans/3553-1-organize-and-represent-data-into-categories-c#fndtn-lesson

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- *Students bring prior knowledge of classifying objects from Kindergarten. This prior knowledge is extended to organizing and representing data as students are given a set of objects that can be organized into categories and displayed in visual ways that represent the data. A conceptual challenge students may encounter is believing that there is only one way to organize data into categories when there may be multiple options.*
- **Lesson objective**: Organize and represent data into categories.
  - ***Key Vocabulary:***
    - *data*
    - *data point*
    - *organize*
    - *picture graph*
    - *represent*

Possible Lessons within the Unit:

Lessons: Grade 1 Module 6, Topic A: Lessons 1-2; 1.ATO.1

- https://www.engageny.org/resource/grade-1-mathematics-module-6-topic
- Lesson 1: Solve *compare with difference unknown* problem types. https://www.engageny.org/resource/grade-1-mathematics-module-6-topic-lesson-1
- Lessons 2: Solve *compare with bigger or smaller unknown* problem types. https://www.engageny.org/resource/grade-1-mathematics-module-6-topic-lesson-2
-

Lessons: Grade 1 Module 3, Topic D: Data Interpretation : **Lessons 10-11; 1.ATO.1, 1.MDA.4, 1.MDA.5**

- https://www.engageny.org/resource/grade-1-mathematics-module-3-topic-c
- Lesson 10-11: Collect, sort, and organize data; then ask and answer questions about the number of data points.

Lessons: LearnZillion units: 1.MDA.4, 1.MDA.5

- https://hcpss.learnzillion.com/lesson_plans/3947-3-our-favorite-pets-interpret-a-visual-representation-fp
- *"This lesson helps to build procedural skills with interpreting data. A picture graph with organized data is used here because it supports students in focusing on understanding how the data was organized and what they can learn from interpreting the data set. This work also develops students' understanding that data can be collected by answering questions that relate to everyday life."*
- **Lesson objective:** Answer questions about a set of data by interpreting a visual representation.
  - **Key vocabulary:**

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- data
- record
- organize
- interpret
- picture graph

Lesson: LearnZillion: https://hcpss.learnzillion.com/lesson_plans/3946-2-collect-organize-and-represent-data-fp#fndtn-lesson **1.MDA.4,**

- *"This lesson helps to build procedural skills with organizing and representing data. Modeling with two-sided counters is used here because it supports students as they collect data and create a visual representation of data in an organized manner. This work develops students' understanding that data can be organized into groups of like traits and recorded to show how many data points are within a group in the set."*
- **Lesson objective**: Collect, organize, and represent data based on like traits.
  - **Key vocabulary:**
    - data
    - organize
    - picture graph
    - record
    - tally mark
  - **Special materials needed:**
    - cups
    - recording sheet
    - two-sided counters (yellow and red)

Lesson: Favorite Ice Cream Flavor; 1.MDA.4, 1.MDA.5

- https://www.illustrativemathematics.org/content-standards/1/MD/C/4/tasks/506
- *"The purpose of this task is for students to represent and interpret categorical data."*

Culminating Activities:

- http://www.k-5mathteachingresources.com/support-files/which-has-fewer-ver.1.pdf

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- http://www.k-5mathteachingresources.com/support-files/duck-rabbit.pdf#page=1&zoom=auto,-321,630

Resources

Teacher Resources:

- **KATM Grade 1 Flipbook**: http://www.katm.org/flipbooks/1%20FlipBook%20Final%20CCSS%202014.pdf
  - Common Core Standards for Mathematics Flip Book Grade 1
- **Number Talks:** https://hcpss.instructure.com/courses/9414/pages/grade-1-additional-resources

Resources for 1.MDA.4, 1.MDA.5

- **Interactive Game:** Interpreting data: http://www.bbc.co.uk/bitesize/ks2/maths/data/interpreting_data/play/
  - This activity will show you how to interpret data.
- **Interactive Game:** Bar Graph Sorter: http://www.shodor.org/interactivate/activities/BarGraphSorter/
- **Learn Zillion: Using data to add and subtract to 20:** https://hcpss.learnzillion.com/resources/64121-using-data-to-add-and-subtract-to-20
- **Create a Graph:** http://nces.ed.gov/nceskids/createagraph/default.aspx?ID=5cfc5f8e9e4345108c22d60c40ba6072

Resources for Interactive Sites:

- **Interactive Modeling Tool:** Thinking Blocks Jr.: http://www.mathplayground.com/tb_addition_jr/thinking_blocks_junior.html
  - Model and Solve Word Problems
  - Addition and Subtraction Practice with small numbers (options for biggest number being 10 or 20)
- **Interactive Modeling Tool:** Thinking Blocks: http://www.mathplayground.com/ThinkingBlocks/thinking_blocks_modeling%20_tool.html
- **Math Spinner:** http://www.senteacher.org/worksheet/13/Fractions.html
  - This is a website where you can make exactly what you need.
- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
  - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats), and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
- **Virtual Manipulative:** Number Blocks Freeplay: http://www.mathsisfun.com/numbers/number-block-freeplay.html

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Sample Formative Assessment Tasks/Questions
Measurement and Data Assessment Tasks: https://hcpss.instructure.com/courses/9414/pages/1-dot-md-dot-c-4-assessment-tasks **Formative Instructional and Assessment Tasks:** https://melrosecurriculum.wikispaces.com/First+Grade+Math+Performance+Tasks ● First Grade Math Performance Task: Download the tasks in measurement and data in one document **Formative Instructional and Assessment Tasks**: http://commoncoretasks.ncdpi.wikispaces.net/First+Grade+Tasks ● Click and download individual Instruction Assessment Tasks by standard **Formative and Summative Assessments:** http://ccgpsmathematicsk-5.wikispaces.com/K-5+Formative+Assessment+Lessons+%28FALs%29 ● Refer to 1st grade Unit 6 for example questions **Example of comparison problems:** ● *Tamra has 12 coins. Willie has 8 coins. How many more coins does Tamra have than Willie?* ● *16 coins are on the table. 11 of them are pennies and the rest are dimes. How many dimes are there?* ● *Peter has 6 fewer coins than Niki. Niki has 9 coins. How many coins does Peter have?*

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Geometry and Equal Shares

Content Standards with Clarifying Notes
Open Bullets Indicate Clarifying Notes

- **1.G.1** Distinguish between a two-dimensional shape's defining (e.g., number of sides) and non-defining attributes (e.g., color).
  - Two-Dimensional Shapes - Defining Attributes for 1st grade:
    - Closed figure, straight sides/edges, number of sides/edges, number of corners/vertices, and relationship between length of edges (all equal edges; all unequal edges; some equal and some unequal edges)
  - Circle - Defining Attributes for 1st grade:
    - No corner/vertex (vertices)
  - ***Teacher Note:*** *Students should use attributes such as equal sides, side lengths, angles, number of faces, and shapes of faces. Identify closed and non-closed (open)shapes. Non-defining attributes might include color, size, thickness, and orientation. Know that a corner is where two sides meet in a two-dimensional figure. Students should use attribute blocks. Students should continue to draw and build shapes to possess defining attributes*
- **1.G.2** Combine two-dimensional shapes (i.e., square, rectangle, triangle, hexagon, rhombus, and trapezoid) or three-dimensional shapes (i.e., cube, rectangular prism, cone, and cylinder) in more than one way to form a composite shape.
  - This means to put together 2-D shapes to form different 2-D shapes or put together 3-D shapes to form different 3-D shapes without naming the new shape but simply focusing on what shapes were combined, what were the defining attributes of the original compared to the defining attributes of the new shape - the defining attributes listed under 1.G.1 above.
  - A "composite shape" is a shape made up of several different shapes.
  - A rectangular prism is a solid with two identical rectangular bases.
- **1.G.3** Partition two-dimensional shapes (i.e., square, rectangle, circle) into two or four equal parts.
  - This is the beginning development of the concept of fractions. The concepts of halves or fourths do not appear in any other strands in this grade level. So this standard deserves special attention since it is the first exposure to fractions. The emphasis here is on the idea of equal shares/parts. The formal idea and symbolism of fractions are introduced in grade 3.
- **1.G.4** Identify and name two-dimensional shapes (i.e., square, rectangle, triangle, hexagon, rhombus, trapezoid, and circle).
  - rhombus: A rhombus at this point is a shape with 4 sides and all sides the same length. Use the blue pattern block or diamond shape as an example , not the square.
  - rectangle: a closed shape with four sides and four square corners

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- square: a rectangle that has four equal sides
- trapezoid: a four-sided closed shape with only two opposite sides that are parallel. (Rectangles have 4 square corners and trapezoids do not) A trapezoid at this point is a shape with 4 sides and not all of them are the same length (the red one).

- **1.ATO.9** Create, extend and explain using pictures and words for:
  a. repeating patterns (e.g., AB, AAB, ABB, and ABC type patterns);
  b. growing patterns (between 2 and 4 terms/figures).
  - Students do not need to use the letters. Students just need to create, extend, and explain something like red, blue, (AB), red, red, blue (AAB), or red, blue green (ABC)- Or the patterns could be pictures such as shapes.
  -

New Academic Vocabulary for This Unit

- defining attributes
- non-defining attributes
- rhombus
- trapezoid
- rectangular prism
- prism
- hexagon

Prior Knowledge Required for This Unit

In Kindergarten, the main focus was on identifying 2-D versus 3-D shapes. Students analyzed and compared two- and three dimensional shapes of different sizes and orientation using informal language.

Kindergarten students developed an understanding of repeating patterns. Kindergarteners *described* simple repeating patterns using AB, AAB, ABB, and ABC type patterns. Unit 6 extends understanding of a repeating pattern as well as introduces growing patterns. Students will *create, extend,* and *explain* using pictures and words for repeating patterns and growing patterns. **(1.ATO.9)**

Subsequent Knowledge Related to This Unit

Students combining two-dimensional shapes (i.e., square, rectangle, triangle, hexagon, rhombus, and trapezoid) or three-dimensional shapes (i.e., cube, rectangular prism, cone, and cylinder) in more than one way to form a composite shape ***(*1.G.2)** sets foundation for later development of conservation ideas and spatial reasoning.

In second grade, students will partition squares, rectangles, and circles into two or four equal parts and describe the parts using the words *halves, fourths, a half of,* and *a fourth of*. They will develop an understanding that when partitioning these shapes, the parts become smaller as the number of parts increases. **(2.G.3)**

In third grade, students will identify a rule for an arithmetic pattern (e.g., patterns in the addition table or multiplication table). **(3.ATO.9)**. In

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fourth grade, students will generate a number or shape pattern that follows a given rule and determine a term that appeals later in the sequence.**(4.ATO.5)**

Relationship Among Standards in This Unit

Unit 6 focuses on reasoning about attributes of, and composing and decomposing geometric shapes. In Unit 6 students will identify, name, distinguish between defining and non-defining attributes, combine, and partition geometric shapes.

Potential Instructional Strategies

Students in 1st grade are working with some of the same shapes as in Kindergarten (triangle, square, rectangle, hexagon, circle, cone, cube, cylinder and sphere). However, they are adding the rhombus and trapezoid. The Kindergarten shapes are repeated and additional shapes added because the emphasis in first grade is on distinguishing between defining and non-defining attributes. To help students focus on defining versus non-defining attributes, students should be given the opportunity to partition 2-D shapes into two or four equal parts and to combine 2-D and 3-D shapes to form a composite shape. Again, the goal for partitioning and combining is to encourage students to focus on the shapes' attributes. When composing shapes, the sides of all the shapes should align. Composing shapes helps students form visual images of all kinds of shapes they can create with defining attributes. In addition, it is important that students recognize the equality of parts when partitioning shapes

Teacher Note: Describe the whole as two or four of the parts. Understand for these examples that decomposing into more equal parts creates smaller parts. This is the beginning development of fractions. The emphasis should be on equal shares. **1.G.3**

Introductory Lesson:

Lesson: Attributes of Shapes (1.G.1, 1.G.2, 1.G.4)

- https://www.engageny.org/resource/grade-1-mathematics-module-5-topic
- **Grade 1 Mathematics Module 5, Topic A; lessons 1-3**
- *In Module 5 students build on their exploration and knowledge of shapes from kindergarten. In Topic A, students identify the defining attributes of individual shapes.*
    - Objective 1: Classify shapes based on defining attributes using examples, variants, and non-examples. (lesson 1).
    - Objective 2: Find and name two-dimensional shapes including trapezoid, rhombus, and a square as a special rectangle, based on defining attributes of sides and corners. (lesson 2)
    - Objective 3: Find and name three-dimensional shapes including cone and rectangular prism, based on defining attributes of faces and points. (lesson 3)

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Possible Lessons within the Unit:

Lesson: *Student, Student, What Do You See?*

- http://betterlesson.com/lesson/522131/student-student-what-do-you-see
- Possible introductory lesson for a geometry unit. The teacher and students participate in a 'Shape Talk' discussion prior to beginning a unit on shapes.

Lessons: Part-Whole Relationships Within Composite Shapes (1.G.1, 1.G.2, 1.G.4)

- https://www.engageny.org/resource/grade-1-mathematics-module-5-topic-b
- **Grade 1 Module 5, Topic B: lessons 4 and 6**
- In Topic B, students combine shapes to form composite shapes, which in turn get larger as they add yet more shapes. As students work toward the objectives within the topic, they informally explore relationships between parts and wholes.

Lessons: LearnZillion units: https://hcpss.learnzillion.com/resources/76916-1-g-a-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.

Lessons: Unit 6: Understanding Shapes and Fractions (1.G.1, 1.G.2, 1.G.3, 1.G.4)

- https://www.georgiastandards.org/Georgia-Standards/Frameworks/1st-Math-Unit-6.pdf
- Refer to Tasks 1-7

Lesson: *More Than One Way*:

- In this lesson, students use concrete manipulatives to practice forming composite shapes (1.G.2).
- http://betterlesson.com/lesson/543673/more-ways-than-one

Lesson: Peppermint Parts: 1.G.3

- The below lesson will need to be modified. Students do not need to partition shapes into three equal parts.
- http://www.lakeshorelearning.com/media/images/free_resources/teachers_corner/lesson_plans/1_2/lessonPeppermintPartsFractionFull.pdf?ASSORTMENT%3C%3East_id=1408474395181113&bmUID=1456023160505

Activity: Math Read Aloud Task: 1.G.1, 1.G.2, 1.G.4

- Materials: copy of Mouse Shapes by Ellen Stoll Walsh, pattern blocks or precut shapes
- Math Read aloud task card: http://www.k-5mathteachingresources.com/support-files/mouse-shapes.pdf

Activity: Putting Shapes together: http://www.k-5mathteachingresources.com/support-files/putting-shapes-together.pdf

- Students will combine pattern blocks in more than one way to form a composite shape. Students will write about the new shape they composed.

Lessons and Assessments: Growing Patterns: How Do They Grow? **1.ATO.9**

- https://www.nsa.gov/academia/_files/collected_learning/elementary/patterns/growing_patterns_06.pdf
- Students will engage in hands on experiences to build a concrete understanding of growing patterns.

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Interactive Activity: Patch Tool: http://illuminations.nctm.org/Activity.aspx?id=3577 **1.ATO.9**

- Quilters and other designers sometimes start by producing square patches with a pattern on them. These square patches are then repeated and connected to produce a larger pattern. Create your own patch using the shapes in the tool below.

Culminating Lesson:

Lessons: Grade 1 Module 5 , Topic C: Lesson 7

- https://www.engageny.org/resource/grade-1-mathematics-module-5-topic-c-lesson-7
- Students will name and count shapes as part of a whole, recognizing relative sizes of the parts.

Resources

Teacher Resources:

- Linking the van Hiele Theory to Instruction by Tashana D. Howse and Mark E. Howse, NCTM Teaching Children Mathematics December 2014
  - http://www.nctm.org/Publications/teaching-children-mathematics/2014/Vol21/Issue5/Linking-the-Van-Hiele-Theory-to-Instruction
  - This article describes the van Hiele progression of spatial sense and reasoning and links it to classroom instruction.
- **Kindergarten Unit 7**: *Two Dimensional and Three Dimensional Geometry*
- **Activities: Resources for 2D Geometry:** http://teachmath.openschoolnetwork.ca/grade-1/geometry/2d-geometry/
- **Stair-Step Pattern for Growing patterns.**
  - http://www.eduplace.com/math/mthexp/g1/mathbkg/pdf/mb_g1_u1.pdf
  - http://www.eduplace.com/math/mthexp/g1/visual/pdf/vs_g1_17.pdf

Children's Literature:

- http://catalog.mathlearningcenter.org/catalog/other-resources/childrens-literature
  - includes a list of children's books
- MLC Virtual Bookshelf: http://astore.amazon.com/thematleace01-20?node=12&page=1

Resources for 1.ATO.9

- **Investigating Growing Patterns:** http://www.mathwire.com/algebra/growingpatterns.html
- **Lessons and Activities:** http://www.kindergartenkindergarten.com/patterns/
  - Five activities

Resources for 1.G.2

- **Interactive Modeling Tool:** Pattern Blocks: http://www.mathplayground.com/patternblocks.html

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- Build patterns, create and solve critical thinking problems, and explore geometric shapes.

- **Interactive Modeling Tool:** Geoboard: http://www.mathlearningcenter.org/web-apps/geoboard/
  - "Geoboard is a tool for exploring a variety of mathematical topics introduced in the elementary and middle grades. Learners stretch bands around the pegs to form line segments and polygons and make discoveries about perimeter, area, angles, congruence, fractions, and more."
- **Howard County Schools Resources: Geometry**
- https://hcpss.instructure.com/courses/9414/pages/1-dot-g-a-dot-1-print-resources-and-lesson-seeds?module_item_id=211182
  - This page includes lesson plans, print resources, LearnZillion video links, and web resources.

Resources for Interactive Sites:

- **Virtual Manipulative: Math Spinner:** http://www.senteacher.org/worksheet/13/Fractions.html
  - This is a website where you can make exactly what you need.
- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
  - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats), and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
- **Virtual Manipulative:** Number Blocks Freeplay: http://www.mathsisfun.com/numbers/number-block-freeplay.html
  - Make nice patterns: pyramids, squares, rectangles ... even shapes like cats.
  -

Sample Formative Assessment Tasks/Questions

https://hcpss.instructure.com/courses/9414/pages/1-dot-g-a-dot-1-assessment-tasks?module_item_id=211184

- 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.

Formative Instructional and Assessment Tasks https://melrosecurriculum.wikispaces.com/First+Grade+Math+Performance+Tasks

- First Grade Math Performance Task: Refer to the tasks in Geometry

Summative Assessments: https://hcpss.learnzillion.com/resources/75437

- This is the summative unit assessment for Grade 1, Unit 7 in the LearnZillion math curriculum.

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1st Grade Math Unit 7 Return to Table of Contents Return to First Grade Overview

Measurement, Time and Money

Content Standards with Clarifying Notes

Open Bullets Indicate Clarifying Notes

- **1.MDA.1** Order three objects by length using indirect comparison.
  - Compare the lengths of two objects indirectly by using a third object.
- **1.MDA.2** Use nonstandard physical models to show the length of an object as the number of same size units of length with no gaps or overlaps.
  - Teachers should ensure that students have units laid end-to-end with no gaps or overlaps and reach from one end of the object to be measured to the other end.
- **1.MDA.3** Use analog and digital clocks to tell and record time to the hour and half hour.
  - Students should be using terms morning, night, today, tomorrow, yesterday, now later, a.m, p.m.
  - Teachers should not expect students to draw clocks. Having first grade students draw clocks is developmentally inappropriate.
- **1.MDA.6** Identify a penny, nickel, dime and quarter and write the coin values using a ¢ symbol
  - This aligns with first grade counting by ones, fives, and tens and working with one and two digit numbers.

New Academic Vocabulary for This Unit

- length
- measure
- nickel
- gap, overlap
- analog clock
- dime
- digital clock
- hour
- quarter
- half hour
- before, after
- cents
- measurable attribute
- penny

Prior Knowledge Required for This Unit

In kindergarten, students explored measurable attributes and developed measurement sense to help solidify what the measurement process truly is and how it works. Students must remember that the measurement includes both the number and the same size units. Now students are using nonstandard physical models to produce a number called a *measure*.

Students should be able to explore length comparisons both directly and indirectly. In kindergarten, students made direct comparisons. Unit 7 will build and expand upon the direct comparison, extending their prior knowledge to make comparisons through the use of a third object.

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Subsequent Knowledge Related to This Unit

In first grade students will begin to estimate lengths and explore why the same unit must be applied when measuring an object using nonstandard units. Students will begin measuring using standard units in second grade. In grades 2-5 students will interact with measuring in both customary and metric units.

Students will be introduced to dollar bills and their value in second grade. In second grade students will build on their understanding of telling and recording time to the nearest hour and half hour. In second grade, the time intervals are identified as five minute intervals, and they will add A.M. and P.M. when recording time.

Relationship Among Standards in This Unit

Unit 7 will focus on students developing an understanding of linear measurement and measuring lengths as iterating length units. Students will develop an understanding of the meaning and processes of measurement. Students will work with both analog and digital clocks as they tell and record time to the nearest hour and half hour. Students will identify coins and their values.

Potential Instructional Strategies

1.MDA.2 Use nonstandard physical models to show the length of an object as the number of same size units of length with no gaps or overlaps.

"It is useful to measure the same object with different sized units. Results should be predicted in advance and discussed afterward. This will help students understand that the unit used is as important as the attribute being measured. The fact that smaller units produce larger numeric measures, and vice versa, is hard for young children to understand. This inverse relationship can only be constructed by reflecting on measurements with varying-sized units. Predictions and discussions of results add to the reflective nature of activities." *(Teaching Student-Centered Mathematics Grades K-3 John Van de Walle, 2006)*

Introductory Lesson:

Indirect Comparison in Length Measurement

Lessons: Grade 1 Module 3, Topic A: Lessons 1-3; 1.MDA.1

- https://www.engageny.org/resource/grade-1-mathematics-module-3
- *Module 3 extends students' Kindergarten experiences with direct length comparison to the new learning of indirect comparison whereby the length of one object is used to compare the lengths of two other objects*
    - Lesson 1: Compare length directly and consider the importance of aligning endpoints. https://www.engageny.org/resource/grade-1-

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mathematics-module-3-topic-lesson-1

- Lesson 2: Compare length using indirect comparison by finding objects *longer than*, *shorter than,* and *equal in length to* that of a string. https://www.engageny.org/resource/grade-1-mathematics-module-3-topic-lesson-2
- Lesson 3: Order three lengths using indirect comparison. https://www.engageny.org/resource/grade-1-mathematics-module-3-topic-lesson-3

Possible Lessons within the Unit:

Lessons: Grade 1 Module 3, Topic B: Standard Length Units; **Lessons 4-6; 1.MDA.1, 1.MDA.2**

- https://www.engageny.org/resource/grade-1-mathematics-module-3-topic-b
- *"In Topic B, students are introduced to the idea of a length unit. The objects being measured by students include many of the same objects measured in Topic A so that students can add greater precision to their measurements as they specify the number of units equal to the length of the objects being compared"*
  - Lesson 4: Express the length of an object using centimeter cubes as length units to measure with no gaps or overlaps.
  - Lesson 5: Rename and measure with centimeter cubes, using their standard unit name of centimeters.
  - Lesson 6: Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving *compare with difference unknown* word problems.

Lessons: Grade 1 Module 3, Topic C: Non-Standard and Standard Length Units**: Lessons 7-9; 1.ATO.1, 1.MDA.2**

- https://www.engageny.org/resource/grade-1-mathematics-module-3-topic-c
- *"Topic C gives students a chance to explore the usefulness of measuring with similar units. The topic opens with Lesson 7, where students measure the same objects from Topic B using two different non-standard length units simultaneously, such as toothpicks and small paper clips."*
  - Lesson 7: Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit.
  - Lesson 8: Understand the need to use the same units when comparing measurements with others.
  - Lesson 9: Answer *compare with difference unknown* problems about lengths of two different objects measured in centimeters.

Lessons: Grade 1 Module 5, Topic D: Application of Halves to Tell Time; **Lessons 10-13; 1.MDA.3**

- https://www.engageny.org/resource/grade-1-mathematics-module-5-topic-d
- *Topic D builds on students' knowledge of parts of circles to tell time.*
  - Lesson 10: Construct a paper clock by partitioning a circle and tell time to the hour.
  - Lessons 11-13: Recognize halves within a circular clock face and tell time to the half hour.

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Lessons: Grade 1 Module 6, Topic E: Coins and Their Values; **Lessons 20-24; 1.MDA.6**

- https://www.engageny.org/resource/grade-1-mathematics-module-6-topic-e
- *"Through Topic E, students learn about the four most predominant U.S. coins in circulation, the penny, the nickel, the dime, and the quarter. Students identify and use the coins based on their image, name, and/or value."*
    - Lesson 2O: Identify pennies, nickels, and dimes by their image, name, or value. Decompose the values of nickels and dimes using pennies and nickels.
    - Lesson 21: Identify quarters by their image, name, or value. Decompose the value of a quarter using pennies, nickels, and dimes.
    - Lesson 22: Identify varied coins by their image, name, or value. Add one cent to the value of any coin.
    - Lesson 23: Count on using pennies from any single coin.
    - Lesson 24: Use dimes and pennies as representations of numbers to 120.

Lesson: LearnZillion: Compare length directly; understand importance of aligning endpoints

https://hcpss.learnzillion.com/lesson_plans/3734-1-compare-length-directly-understand-importance-of-aligning-endpoints-c

- **Lesson objective:** Extend prior knowledge about comparing two objects and developing the understanding that comparing lengths of objects requires taking both endpoints into account.

Lessons: Unit 4: Sorting, Comparing, and Ordering

- https://www.georgiastandards.org/Georgia-Standards/Frameworks/1st-Math-Unit-4.pdf
- In this unit students will:
    - Develop an understanding of linear measurement.
    - Measure lengths as iterating length units.
    - Tell and write time to the hour and half hour.
    - Represent and interpret data

Lessons and Assessments: Telling and writing time to the hour and half hour

- https://hcpss.learnzillion.com/resources/64124-telling-and-writing-time-to-the-hour
- https://hcpss.learnzillion.com/resources/64129-telling-and-writing-time-to-the-half-hour

Culminating Lesson:

Lesson: Compare length using indirect comparison

- https://hcpss.learnzillion.com/lesson_plans/3851-5-compare-length-using-indirect-comparison-a
- Students will explore length comparisons both directly and indirectly.

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Resources

Children's Literature:
• http://catalog.mathlearningcenter.org/catalog/other-resources/childrens-literature
  ○ includes a list of children's books
• MLC Virtual Bookshelf: http://astore.amazon.com/k5matteares-20?_encoding=UTF8&node=13
 	
Resources for 1.ATO.9
• **Investigating Growing Patterns:** http://www.mathwire.com/algebra/growingpatterns.html
• **Lessons and Activities:** http://www.kindergartenkindergarten.com/patterns/
  ○ Five activities
• **Lessons and Assessments:** Growing Patterns: How Do They Grow? **1.ATO.9**
  ○ https://www.nsa.gov/academia/_files/collected_learning/elementary/patterns/growing_patterns_06.pdf
• **Stair-Step Pattern for Growing patterns.**
  ○ http://www.eduplace.com/math/mthexp/g1/mathbkg/pdf/mb_g1_u1.pdf
  ○ http://www.eduplace.com/math/mthexp/g1/visual/pdf/vs_g1_17.pdf
• **Interactive Activity: Patch Tool:** http://illuminations.nctm.org/Activity.aspx?id=3577 **1.ATO.9**
  ○ Quilters and other designers sometimes start by producing square patches with a pattern on them. These square patches are then repeated and connected to produce a larger pattern. Create your own patch using the shapes in the tool below.
 	
Resources for 1.MDA.3
• Interactive: **Stop the Clock:** http://www.oswego.org/ocsd-web/games/StopTheClock/sthec1.html
  ○ Identify time to the ½ hour
Resources for 1.MDA.1 & 1.MDA.2
• **Lesson: LearnZillion: Ordering and comparing lengths;** https://hcpss.learnzillion.com/resources/64122-ordering-and-comparing-lengths
• **Interactive Modeling Tool:** Geoboard: http://www.mathlearningcenter.org/web-apps/geoboard/
Resources for Interactive Sites:
• **Time to Move:** http://www.pbs.org/parents/education/math/games/first-second-grade/time-to-move/
  ○ This is a measurement game.

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- **Virtual Manipulative: Math Spinner:** http://www.senteacher.org/worksheet/13/Fractions.html
  - This is a website where you can make exactly what you need.
- **Virtual Manipulatives:** http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html
  - This resource can be used a variety of ways. Options to select: Grade, Backgrounds (i.e.,Game Boards, Story Boards, Workmats),
    and Manipulatives (e.g., attribute blocks, attribute buttons, color tiles, connecting cubes, spinner, two-color counters)
  -

Sample Formative Assessment Tasks/Questions

Formative Instructional and Assessment Tasks: http://commoncoretasks.ncdpi.wikispaces.net/First+Grade+Tasks

- Click and download individual Instruction Assessment Tasks by standard

Assessment Tasks: https://hcpss.instructure.com/courses/9414/pages/1-dot-md-dot-a-1-assessment-tasks

Summative Assessment: https://hcpss.learnzillion.com/resources/75392

Formative Instructional and Assessment Tasks: https://melrosecurriculum.wikispaces.com/First+Grade+Math+Performance+Tasks

- First Grade Math Performance Task: Refer to the tasks in Measurement and Data

Example Assessment: http://ccgpsmathematicsk-5.wikispaces.com/file/view/First%20Grd%20Unit%204%20assess.pdf/437811038/First%20Grd%20Unit%204%20assess.pdf

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