North Carolina Department of Public Instruction
INSTRUCTIONAL SUPPORT TOOLS
FOR ACHIEVING NEW STANDARDS

1st Grade Mathematics ● Unpacked Contents
For the new Standard Course of Study that will be effective in all North Carolina schools in the 2018-19 School Year.

This document is designed to help North Carolina educators teach the 1st Grade Mathematics Standard Course of Study. NCDPI staff are continually updating and improving these tools to better serve teachers and districts.

What is the purpose of this document?
The purpose of this document is to increase student achievement by ensuring educators understand the expectations of the new standards. This document may also be used to facilitate discussion among teachers and curriculum staff and to encourage coherence in the sequence, pacing, and units of study for grade-level curricula. This document, along with on-going professional development, is one of many resources used to understand and teach the NC SCOS.

What is in the document?
This document includes a detailed clarification of each standard in the grade level along with a *sample* of questions or directions that may be used during the instructional sequence to determine whether students are meeting the learning objective outlined by the standard. These items are included to support classroom instruction and are not intended to reflect summative assessment items. The examples included may not fully address the scope of the standard. The document also includes a table of contents of the standards organized by domain with hyperlinks to assist in navigating the electronic version of this instructional support tool.

How do I send Feedback?
Please send feedback to us at feedback@dpi.state.nc.us and we will use your input to refine our unpacking of the standards. Thank You!

Just want the standards alone?
You can find the standards alone at http://www.ncpublicschools.org/curriculum/mathematics/scos/.

Standards for Mathematical Practice

Practice	Explanation and Example
1. Make sense of problems and persevere in solving them.	Mathematically proficient students in First Grade continue to develop the ability to focus attention, test hypotheses, take reasonable risks, remain flexible, try alternatives, exhibit self-regulation, and persevere (Copley, 2010). As the teacher uses thoughtful questioning and provides opportunities for students to share thinking, First Grade students become conscious of what they know and how they solve problems. They make sense of task-type problems, find an entry point or a way to begin the task, and are willing to try other approaches when solving the task. They ask themselves, "Does this make sense?" First Grade students' conceptual understanding builds from their experiences in Kindergarten as they continue to rely on concrete manipulatives and pictorial representations to solve a problem, eventually becoming fluent and flexible with mental math as a result of these experiences.
2. Reason abstractly and quantitatively.	Mathematically proficient students in First Grade recognize that a number represents a specific quantity. They use numbers and symbols to represent a problem, explain thinking, and justify a response. For example, when solving the problem: "*There are 60 children on the playground. Some children line up. There are 20 children still on the playground. How many children lined up?"* first grade students may write 20 + 40 = 60 to indicate a Think-Addition strategy. Other students may illustrate a counting-on by tens strategy by writing 20 + 10 + 10 + 10 + 10 = 60. The numbers and equations written illustrate the students' thinking and the strategies used, rather than how to simply compute, and how the story is decontextualized as it is represented abstractly with symbols.
3. Construct viable arguments and critique the reasoning of others.	Mathematically proficient students in First Grade continue to develop their ability to clearly express, explain, organize and consolidate their math thinking using both verbal and written representations. Their understanding of grade appropriate vocabulary helps them to construct viable arguments about mathematics. For example, when justifying why a particular shape isn't a square, a first grade student may hold up a picture of a rectangle, pointing to the various parts, and reason, "It can't be a square because, even though it has 4 sides and 4 angles, the sides aren't all the same size." In a classroom where risk-taking and varying perspectives are encouraged, mathematically proficient students are willing and eager to share their ideas with others, consider other ideas proposed by classmates, and question ideas that don't seem to make sense.
4. Model with mathematics.	Mathematically proficient students in First Grade model real-life mathematical situations with a number sentence or an equation, and check to make sure that their equation accurately matches the problem context. They also use tools, such as tables, to help collect information, analyze results, make conclusions, and review their conclusions to see if the results make sense and revising as needed.
5. Use appropriate tools strategically.	Mathematically proficient students in First Grade have access to a variety of concrete (e.g. 3-dimensional solids, ten frames, number balances, number lines) and technological tools (e.g., virtual manipulatives, calculators, interactive websites) and use them to investigate mathematical concepts. They select tools that help them solve and/or illustrate solutions to a problem. They recognize that multiple tools can be used for the same problem- depending on the strategy used. For example, a child who is in the counting stage may choose connecting cubes to solve a problem. While, a student who understands parts of number, may solve the same problem using ten-frames to decompose numbers rather than using individual connecting cubes. As the teacher provides numerous opportunities for students to use educational materials, first grade students' conceptual understanding and higher-order thinking skills are developed.
6. Attend to precision.	Mathematically proficient students in First Grade attend to precision in their communication, calculations, and measurements. They are able to describe their actions and strategies clearly, using grade-level appropriate vocabulary accurately. Their explanations and reasoning regarding their process of finding a solution becomes more precise. In varying types of mathematical tasks, first grade students pay attention to details as they work. For example, as students' ability to attend to position and direction develops, they begin to notice reversals of numerals and self-correct when appropriate. When measuring an object, students check to make sure that there are not any gaps or overlaps as they carefully place each unit end to end to measure the object (iterating length units). Mathematically proficient first grade students understand the symbols they use (=, >,<) and use clear explanations in discussions with others. For example, for the sentence 4 > 3, a proficient student who is able to attend to precision states, "Four is more than 3" rather than "The alligator eats the four. It's bigger."

7. Look for and make use of structure.	Mathematically proficient students in First Grade carefully look for patterns and structures in the number system and other areas of mathematics. For example, while solving addition problems using a number balance, students recognize that regardless whether you put the 7 on a peg first and then the 4, or the 4 on first and then the 7, they both equal 11 (commutative property). When decomposing two-digit numbers, students realize that the number of tens they have constructed 'happens' to coincide with the digit in the tens place. When exploring geometric properties, first graders recognize that certain attributes are critical (number of sides, angles), while other properties are not (size, color, orientation).
8. Look for and express regularity in repeated reasoning.	Mathematically proficient students in First Grade begin to look for regularity in problem structures when solving mathematical tasks. For example, when adding three one-digit numbers and by making tens or using doubles, students engage in future tasks looking for opportunities to employ those same strategies. Thus, when solving 8+7+2, a student may say, "I know that 8 and 2 equal 10 and then I add 7 more. That makes 17. It helps to see if I can make a 10 out of 2 numbers when I start." Further, students use repeated reasoning while solving a task with multiple correct answers. For example, in the task "There are 12 crayons in the box. Some are red and some are blue. How many of each could there be?" First Grade students realize that the 12 crayons could include 6 of each color (6+6 = 12), 7 of one color and 5 of another (7+5 = 12), etc. In essence, students repeatedly find numbers that add up to 12.

Return to Standards

Operations and Algebraic Thinking

Represent and solve problems.

NC.1.OA.1 Represent and solve addition and subtraction word problems, within 20, with unknowns, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem, when solving:

- Add to/Take from-Change Unknown
- Put together/Take Apart-Addend Unknown
- Compare-Difference Unknown

Clarification

In this standard, students extend their work from NC.K.OA.1 to solve addition and subtraction problems within 20. In addition to continuing work with the problem types introduced in Kindergarten, standard NC.1.OA.1 calls for first graders to work additional problem types, including:

- add to/take from – change unknown
- put together/take apart – addend unknown
- compare – difference unknown

	Result Unknown	Change Unknown
Add To	Two birds sat in a tree. Three more birds fly to the tree. How many birds are in the tree now? 2 + 3 = ? K	Two birds sat in a tree. Some more birds flew there. Then there were five birds in the tree. How many birds flew over to the first two? 2 + ? = 5 1
Take From	Five birds were in a tree. Two birds flew away. How many birds are in the tree now? 5 – 2 = ? K	Five birds were in a tree. Some flew away. Then there were three birds in the tree. How many birds flew away? 5 - ? = 3 1

	Total Unknown	Addend Unknown	Both Addends Unknown
Put Together/ Take Apart	Three red birds and two blue birds are in a tree. How many birds are in the tree? 3 + 2 = ? K	Five birds are in a tree. Three are red and the rest are blue. How many birds are blue? 3 + ? 5 5 – 3 = ? 1	Five birds are in a tree. They could either be blue birds or red birds. How many birds could be red and how many could be blue? 5 = 0 + 5 5 = 5 + 0 5 = 1 + 4 5 = 4 + 1 5 = 2 + 3 5 = 3 + 2 K

As students develop strategies for solving a variety of problem situations, they build meaning for the operations of addition and subtraction.

Checking for Understanding

Nine bunnies were sitting on the grass. Some more bunnies hopped there. Now, there are 13 bunnies on the grass. How many bunnies hopped over there?

Possible response:

Counting On: *Niiinnneee…. holding a finger for each next number counted 10, 11, 12, 13. Holding up her four fingers, 4! 4 bunnies hopped over there."*

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13 apples are on the table. 6 of them are red and the rest are green. How many apples are green?

Possible response:

Doubles +/- 1 or 2: *I know that 6 and 6 is 12. So, 6 and 7 is 13. There are 7 green apples.*

Represent and solve problems.

NC.1.OA.1 Represent and solve addition and subtraction word problems, within 20, with unknowns, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem, when solving:

- Add to/Take from-Change Unknown
- Put together/Take Apart-Addend Unknown
- Compare-Difference Unknown

Clarification	**Checking for Understanding**
Change unknown and addend unknown problems allow students to begin to see subtraction as the opposite of addition. Developing the understanding of subtraction as an unknown addend addition problem is an essential goal for later mathematics. As students work with change unknown and addend unknown problems, they will record situation equations (equations in which the operation and order of numbers matches the situation of the problem). Eventually, students notice that a problem may be solved with other solution equations (equations that lead to the answer, but do not match the situation of the story). In a Compare situation, two amounts are compared to find “How many more” or “How many less/fewer”. Students build on their understanding of equal to, more than, and less than for two groups of objects or two numbers. Strategies for determining which the difference in quantities include matching and counting.	

	Difference Unknown
Compare	***“How many more?” version:*** Lara has two stickers. Jade has five stickers. How many more stickers does Jade have than Lara? ***“How many less?” version:*** Lara has two stickers. Jade has five stickers. How many fewer stickers does Lara have than Jade? 2 + ? = 5 5 - 2 = ? [1]

As First Graders work with a variety of problem types, they extend the sophistication of addition and subtraction methods used in Kindergarten (counting). Now, students use methods of counting on, making ten, and doubles +/- 1 or +/- 2 to solve problems. Students also use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths).

In order for students to read and use equations to represent their thinking, they need extensive experiences with addition and subtraction situations in order to connect the experiences with symbols (+, -, =) and equations (5=3+2). In Kindergarten, students demonstrated the understanding of how objects can be joined (addition) and separated (subtraction) by representing addition and subtraction situations using objects, pictures and words. In First Grade, students extend this understanding of addition and subtraction situations to use the addition symbol (+) to represent joining situations, the subtraction symbol (-) to represent separating situations, and the equal sign (=) to represent a relationship regarding quantity between one side of the equation and the other. When solving comparison problems, students may write various equations to represent comparisons.

Return to Standards

Represent and solve problems.

NC.1.OA.2 Represent and solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, by using objects, drawings, and equations with a symbol for the unknown number.

Clarification

Students solve multi-step word problems by adding (joining) three numbers whose sum is less than or equal to 20, using a variety of mathematical representations.

Standard NC.1.OA.2 builds the groundwork for NC.1.OA.6, where students develop computation strategies such as near doubles (e.g., 5+6 can be solved by adding 5+5+1) and making ten (e.g., 9+6 can be solved by adding 1 to 9, then adding 5.

Explicit connections to the properties of addition (commutative and associative properties) should be made to provide students with opportunities to develop strategies for addition including making 10, using open number lines, and counting up.

Students should have numerous experiences with concrete models and pictures before moving to writing equations.

Checking for Understanding

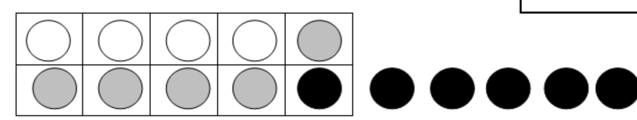
Mrs. Smith has 4 oatmeal raisin cookies, 5 chocolate chip cookies, and 6 gingerbread cookies. How many cookies does Mrs. Smith have?

Possible responses:

Student A:

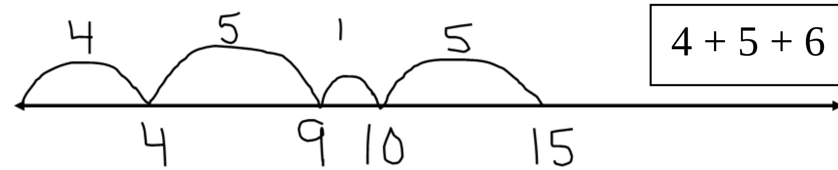
I put 4 counters on the Ten Frame for the oatmeal raisin cookies. Then, I put 5 different color counters on the ten frame for the chocolate chip cookies. Then, I put another 6 color counters out for the gingerbread cookies. Only one of the gingerbread cookies fit, so I had 5 leftover. Ten and five more makes 15 cookies. Mrs. Smith has 15 cookies.

$4 + 5 + 6 =$



Student B:

I used a number line. First, I jumped to 4, and then I jumped 5 more. That's 9. I broke up 6 into 1 and 5 so I could jump 1 to make 10. Then, I jumped 5 more and got 15. Mrs. Smith has 15 cookies.



$4 + 5 + 6 =$

Student C:

I wrote: 4 + 5 + 6 = ▱. I know that 4 and 6 equals 10, so the oatmeal raisin and gingerbread equals 10 cookies. Then I added the 5 chocolate chip cookies. 10 and 5 is 15. So, Mrs. Smith has 15 cookies.

Return to Standards

Understand and apply the properties of operations.

NC.1.OA.3 Apply the commutative and associative properties as strategies for solving addition problems.

Clarification

This standard calls for students to notice properties of operations as they work with numbers, and apply their understandings of the commutative and associative property to solve addition problems. Students use mathematical tools and representations (e.g., cubes, counters, number balance, number line, 100 chart) to model these ideas.

Students in first grade do not use the formal terms "commutative" and "associative".

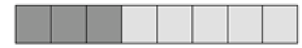
Commutative Property of Addition	Associative Property of Addition
The order of the addends does not change the sum. For example, if 8 + 2 = 10 is known, then 2 + 8 = 10 is also known.	The grouping of the 3 or more addends does not affect the sum. For example, when adding 2 + 6 + 4, the sum from adding the first two numbers first (2 + 6) and then the third number (4) is the same as if the second and third numbers are added first (6 + 4) and then the first number (2). The student may note that 6+4 equals 10 and add those two numbers first before adding 2. Regardless of the order, the sum remains 12.

Checking for Understanding

Commutative Property Examples**:**

Cubes:

A student uses 2 colors of cubes to make as many different combinations of 8 as possible. When recording the combinations, the student records that 3 green cubes and 5 blue cubes equals 8 cubes in all. In addition, the student notices that 5 green cubes and 3 blue cubes also equals 8 cubes.

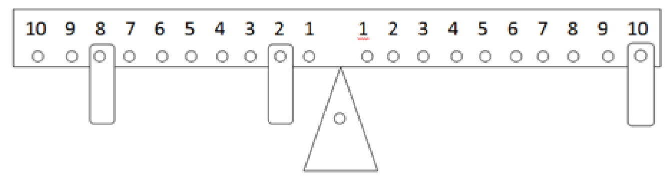


3 + 5 = 8

5 + 3 = 8

Number Balance:

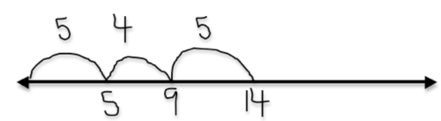
A student uses a number balance to investigate the commutative property. "If 8 and 2 equals 10, then I think that if I put a weight on 2 first this time and then on 8, it'll also be 10."



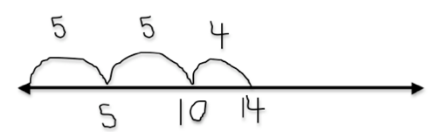
Associative Property Examples: There are 5 red jelly beans, 4 green jelly beans, and 5 black jelly beans. How many jelly beans are there in all?

Number Line:

Student A: *First I jumped to 5. Then, I jumped 4 more, so I landed on 9. Then, I jumped 5 more and landed on 14.*



Student B: *I got 14, too, but I did it a different way. First, I jumped to 5. Then, I jumped 5 again. That's 10. Then, I jumped 4 more. See, 14!*



Mental Math:

Student: *I started by adding 5 and 5 because I know that makes 10. Then, I added 49. That's 14.*

Return to Standards

Understand and apply the properties of operations.

NC.1.OA.4 Solve an unknown-addend problem, within 20, by using addition strategies and/or changing it to a subtraction problem.

Clarification

In this standard, students find the solution to a problem based on the meaning in the story. Therefore, when faced with an unknown addend problem, students may associate the problem with either addition or subtraction, depending on the context.

This standard calls for students to make sense of unknown addend problems and demonstrate flexibility in solving. Through experiences, students will notice the relationship between addition and subtraction, and apply this relationship when problem solving (i.e., by changing an unknown addend problem so a subtraction problem).

Additionally, students should develop flexibility when solving unknown addend problems, using strategies such as:

- direct modeling
- count on/count back
- use derived facts
- make a ten
- think addition
- think subtraction
- subtract through ten

Checking for Understanding

Francisco was making cards for his 12 friends. He already made 4 cards. How many cards does Francisco still need to make?

Student A: *I started at 4 and added up to 12 (4 + __ = 12)*
Student B: *I thought about subtraction problem (12 – 4 = __).*

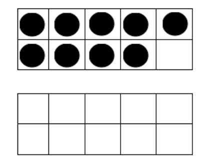
<u>Think Addition</u>
2 + □ = 10
10 – 2 = □

Student: *2 and what make 10? I know that 8 and 2 make 10. So, 10 – 2 = 8.*

<u>Build Up Through 10</u>
15 – 9 = □

Student A: *I'll start with 9. I need one more to make 10. Then, I need 5 more to make 15. That's 1 and 5- so it's 6. 15 – 9 = 6.*

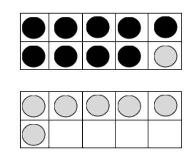
Student B: *I put 9 counters on the 10 frame. Just looking at it I can tell that I need 1 more to get to 10. Then I need 5 more to get to 15. So, I need 6 counters.*



<u>Back Down Through 10</u>
16 – 7 = □

Student A: *I'll start with 16 and take off 6. That makes 10. I'll take one more off and that makes 9. 16 – 7 = 9.*

Student B: *I used 16 counters to fill one ten frame completely and most of the other one. Then, I can take these 6 off from the 2nd ten frame. Then, I'll take one more from the first ten frame. That leaves 9 on the ten frame.*



Return to Standards

Add and subtract within 20. **NC.1.OA.9** Demonstrate fluency with addition and subtraction within 10.	
Clarification	**Checking for Understanding**
In this standard, students learn about and use a variety of strategies to solve addition and subtraction problems (See strategies listed in NC.1.OA.6). As these strategies are repeatedly used in ways that make sense to the students, they begin to understand and internalize the relationships that exist between and among numbers. This leads to fluency. When students develop fluency within 10, they display *accuracy*, *efficiency*, and *flexibility*. First Graders then apply similar strategies for solving problems within 20, building the foundation for fluency to 20 in Second Grade. Traditional flash cards or timed tests have not been proven as effective instructional strategies for developing fluency. Often, when children think of each "fact" as an individual item that does not relate to any other "fact", they are attempting to memorize separate bits of information that can be easily forgotten. Numerous experiences with breaking apart actual sets of objects and developing relationships between numbers help children internalize parts of number and develop efficient strategies for fact retrieval.	Two frogs were sitting on a log. 6 more frogs hopped there. How many frogs are sitting on the log now? *Possible responses:* Counting- On: *I started with 6 frogs and then counted up, Sixxxx…. 7, 8. So there are 8 frogs on the log.* *6 + 2 = 8* Internalized Fact: *There are 8 frogs on the log. I know this because 6 plus 2 equals 8.* *6 + 2 = 8*

Return to Standards

Add and subtract within 20. **NC.1.OA.6** Add and subtract, within 20, using strategies such as: • Counting on • Making ten • Decomposing a number leading to a ten • Using the relationship between addition and subtraction • Using a number line • Creating equivalent but simpler or known sums.	
Clarification	**Checking for Understanding**
In this standard, students develop increasingly sophisticated strategies to become more efficient with addition and subtraction. Students are flexible as they decide when each strategy is the most efficient. Students should be able to explain their thinking and the strategy they have chosen to use. **Examples of Strategies:**	Sam has 8 red marbles and 7 green marbles. How many marbles does Sam have in all? *Possible responses:*

Add and subtract within 20.

NC.1.OA.6 Add and subtract, within 20, using strategies such as:

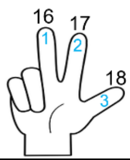
- Counting on
- Making ten
- Decomposing a number leading to a ten
- Using the relationship between addition and subtraction
- Using a number line
- Creating equivalent but simpler or known sums.

Clarification

Counting On

Counting on can be used to add (find a total) or subtract (find an unknown addend). Students see the first addend as part of the total and count on the find the other part. This may be accompanied with fingers or mental images. Counting on is meant to be a thinking strategy, not a rote method.

Example: 15 + __ = 18

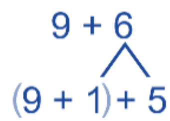


"I put 15 in my head and counted on until I got to 18. I said 3 numbers so I know the missing part is 3."

Making Ten

This strategy makes a problem friendlier by taking 1 or more from one addend and adding it to the other addend, making 10.

Example:
When solving 9+6, a student moves 1 from the 6 to the 9. The new problem becomes 10+5.



Decomposing a Number Leading to Ten

Here, part of the subtrahend is subtracted, getting a difference of 10. Then, the remaining part of the subtrahend is subtracted.

Example:

"Instead of subtracting 6, I started by subtracting 4, getting a difference of 10. Then, I still had to subtract 2. That's 8."

Using the Relationship Between Addition and Subtraction

When students understand that any addition or subtraction equation has several related equations (i.e., fact families), this relationship may be used to solve problems.

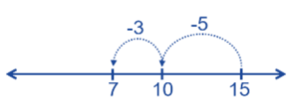
Example: 19 – 11 = __

"I know the sum of 11 and 8 is 19. That helps me know that if I take away 11 from 19, I'm left with 8."

Using a Number Line

A number line may be used to help keep track of work, especially when a student adds or subtracts in chunks.

Example:
15 – 8



Here, the student first subtracts 5 to get to 10, then he subtracts the remaining 3.

Creating an Equivalent Sum

Students recognize a close, easy fact to help them solve a trickier problem

Example:
"6+5 is tricky. Instead, I'll start with 5+5, then add 1 more."

Checking for Understanding

<u>Make 10 and Decompose a Number</u>

I know that 8 plus 2 is 10, so I broke up (decomposed) the 7 up into a 2 and a 5. First, I added 8 and 2 to get 10, and then added the 5 to get 15.

7 = 2 + 5
8 + 2 = 10
10 + 5 = 15

<u>Create an Easier Problem with Known Sums</u>

I broke up (decomposed) 8 into 7 and 1. I know that 7 and 7 is 14. I added 1 more to get 15.

8 = 7 + 1
7 + 7 = 14
14 + 1 = 15

There were 14 birds in the tree. 6 flew away. How many birds are in the tree now?

Possible responses:

<u>Decomposing a Number Leading to Ten</u>

I know that 14 minus 4 is 10. So, I broke the 6 up into a 4 and a 2. 14 minus 4 is 10. Then I took away 2 more to get 8.

6 = 4 + 2
14 – 4 = 10
10 – 2 = 8

<u>Relationship between Addition & Subtraction</u>

I thought, '6 and what makes 14?'. I know that 6 plus 6 is 12 and two more is 14. That's 8 altogether. So, that means that 14 minus 6 is 8.

6 + 8 = 14
14 – 6 = 8

Return to Standards

Build understanding of time and money. **NC.1.MD.5** Identify quarters, dimes, and nickels and relate their values to pennies.	
Clarification	**Checking for Understanding**
In this standard, students should be able to name coins as penny, dime, nickel, and quarter. Students will be expected to tell the value of each coin and explain how many pennies are equal to that value. For example, a student should be able to say that a quarter is 25 cents and is made up of 25 pennies. Students are not expected to compose values from combinations of coins. The expectation is only to relate coin values to pennies.	Give the students a handful of pennies, nickels, dimes, and quarters. Possible questions to ask: • Can you hand me the nickel? • Can you hand me the coin that has a value of 5 cents? • Can you hand me the coin that has the same value as 10 pennies?

Return to Standards