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

4th 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 4th 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!

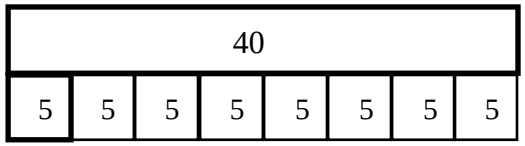
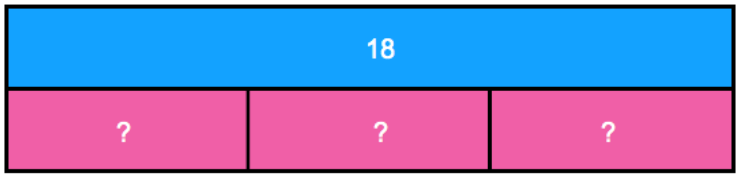
Just want the standards alone?
You can find the standards alone at http://www.ncpublicschools.org/curriculum/mathematics/scos/.

Standards for Mathematical Practice

Practice	Explanation and Example
1. Make sense of problems and persevere in solving them.	Mathematically proficient students in grade 4 know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
2. Reason abstractly and quantitatively.	Mathematically proficient fourth grade students should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.
3. Construct viable arguments and critique the reasoning of others.	In fourth grade mathematically proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
4. Model with mathematics.	Mathematically proficient fourth grade students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
5. Use appropriate tools strategically.	Mathematically proficient fourth grader students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.
6. Attend to precision.	As fourth grader students develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot.
7. Look for and make use of structure.	In fourth grade mathematically proficient students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the multiplication principal of counting. They generate number or shape patterns that follow a given rule.
8. Look for and express regularity in repeated reasoning.	Students in fourth grade should notice repetitive actions in computation to make generalizations Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.

Return to Standards

Represent and solve problems involving multiplication and division.
NC.4.OA.1 Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.

Clarification	**Checking for Understanding**
A *multiplicative comparison* is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "*a* is *n* times as much as *b*"). In a multiplicative comparison, the underlying question is *what factor would multiply one quantity* in order to result in the other. Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times. Students should be able to translate comparative situations into equations with an unknown and solve. Many opportunities to solve contextual problems and write and identify equations and statements for multiplicative comparison should be provided.	Sally is five years old. Her mom is eight times older. How old is Sally's Mom? *Possible response:* *5 x 8 = 40.*  A book costs $18. That is 3 times more than a DVD. How much does a DVD cost? *Possible response:* *18 ÷ △ = 3* *or 3 x △ = 18* 

Return to Standards

Use the four operations with whole numbers to solve problems.

NC.4.OA.3 Solve two-step word problems involving the four operations with whole numbers.

- Use estimation strategies to assess reasonableness of answers.
- Interpret remainders in word problems.
- Represent problems using equations with a letter standing for the unknown quantity.

Clarification

The focus in this standard is to have students use and discuss various strategies for solving word problems using all four operations. Students should build on the problem solving strategies they developed in earlier grades and apply those strategies to multi-step problems.

Students should be introduced to a variety of estimation strategies. Estimation strategies include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies include, but are not limited to:

- front-end estimation with adjusting (using the highest place value and estimating from the front end, making adjustments to the estimate by taking into account the remaining amounts),
- clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate),
- rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values),
- using friendly or compatible numbers such as factors (students seek to fit numbers together - e.g., rounding to factors and grouping numbers together that have round sums like 100 or 1000),
- using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate).

Problems should be structured so that all acceptable estimation strategies will arrive at a reasonable answer. The assessment of estimation strategies should only have one reasonable answer (500 or 530), or a range (between 500 and 550).

This standard also references interpreting remainders. Remainders should be put into context for interpretation. Ways to address remainders:

- Remain as a left over
- Partitioned into fractions or decimals
- Discarded leaving only the whole number answer
- Increase the whole number answer up one
- Round to the nearest whole number for an approximate result

Checking for Understanding

On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many miles did they travel total? How do you know your answer is reasonable?

Possible responses:

Student 1	Student 2	Student 3
I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500.	I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundreds that I already had, I end up with 500.	I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530.

Your class is collecting bottled water for a service project. The goal is to collect 300 bottles of water. On the first day, Max brings in 6 packs with 6 bottles in each container. About how many bottles of water still need to be collected?

Possible responses:

Student 1	Student 2
First, I multiplied 6 and 6 which equals 36. I'm trying to get to 300. 36 is close to 40, and 40 plus 60 is 100. Then I need 2 more hundreds. So, we still need about 260 bottles.	*First, I multiplied 6 and 6 which equals 36. I know 36 is about 40 and 300-40 = 260, so we need about 260 more bottles.*

Use the four operations with whole numbers to solve problems.

NC.4.OA.3 Solve two-step word problems involving the four operations with whole numbers.

- Use estimation strategies to assess reasonableness of answers.
- Interpret remainders in word problems.
- Represent problems using equations with a letter standing for the unknown quantity.

Clarification	**Checking for Understanding**
	Write different word problems involving 44 ÷ 6 = ? where the answers are best represented as: Problem A: 7 Problem B: 7 r 2 Problem C: 8 Problem D: 7 or 8 Problem E: $7\ \frac{2}{6}$ *Possible responses:* Problem A: 7. *Mary had 44 pencils. Six pencils fit into each of her pencil pouches. How many pouches did she fill? 44 ÷ 6 = p; p = 7 r 2. Mary can fill 7 pouches completely.* Problem B: 7 r 2. *Mary had 44 pencils. Six pencils fit into each of her pencil pouches. How many pouches could she fill and how many pencils would she have left? 44 ÷ 6 = p; p = 7 r 2; Mary can fill 7 pouches and have 2 left over.* Problem C: 8. *Mary had 44 pencils. Six pencils fit into each of her pencil pouches. What would the fewest number of pouches she would need in order to hold all of her pencils? 44 ÷ 6 = p; p = 7 r 2; Mary needs 8 pouches to hold all of the pencils.* Problem D: 7 or 8. *Mary had 44 pencils. She divided them equally among her friends before giving one of the leftovers to each of her friends. How many pencils could her friends have received? 44 ÷ 6 = p; p = 7 r 2; Some of her friends received 7 pencils. Two friends received 8 pencils.* Problem E: *7* $\frac{2}{6}$***.*** *Mary had 44 pencils and put six pencils in each pouch. What fraction represents the number of pouches that Mary filled? 44 ÷ 6 = p; p =* ***7*** $\frac{2}{6}$ There are 1,128 students going on a field trip. If each bus held 30 students, how many buses are needed? *1,128 ÷ 30 = b; b = 37 R 6; They will need 38 buses because 37 buses would not hold all of the students.*

Return to Standards

Generalize place value understanding for multi-digit whole numbers. **NC.4.NBT.1** Explain that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right, up to 100,000.	
Clarification	**Checking for Understanding**
This standard calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10. In this standard, students should reason about the magnitude of digits in a number. In the base-ten system, the value of each place is 10 times the value of the place to the immediate right. Students should reason and analyze the relationships of numbers that they are working with.	Part 1: Gina said, "In my pocket I have 25 of the same amount of dollar bills. What is the value of Gina's money if she has: **a)** 25 one dollar bills **b)** 25 ten dollar bills **c)** 25 hundred dollar bills Part 2: Gina reasoned, "The value of the 2 when I have ten dollar bills is 200, but the value of the 2 when I have one dollar bills is only 20." Is Gina correct? Why or why not? Part 3: If you had 260 of each of the kinds of dollar bills in parts a, b, and c above; what would the value of each kind of bill be? Explain how you found your answer.

Generalize place value understanding for multi-digit whole numbers. **NC.4.NBT.2** Read and write multi-digit whole numbers up to and including 100,000 using numerals, number names, and expanded form.	
Clarification	**Checking for Understanding**
This standard asks for students to write numbers in various forms. Students should have flexibility with the different forms of a number. Written form or number name is to write out a number in words like "two hundred eighty-five." Traditional expanded form is 285 = 200 + 80 + 5. However, students should have opportunities to explore the idea that 285 could also be 28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones. They should also be comfortable with expanding a number by place value such as (2 x 100) + (8 x 10) + (5 x 1). To read numerals between 1,000 and 100,000, students need to understand the role of commas. Each section between commas is read a hundreds, tens, and ones followed by the appropriate unit (thousands). 97,345 would be read ninety-seven thousand, three hundred forty-five.	Juice pouches are packaged in different ways. A box holds 10 pouches. A case holds 10 boxes. A crate holds 10 cases. Some students bring in juice boxes for Field Day. The information is below. Miguel- 1 crate, 12 cases, 3 boxes and 6 pouches. Aaron- 1 crate, 13 cases, 17 boxes, and 2 pouches. Sarah- 1 crate, 12 cases, 2 boxes and 17 pouches. Vicky- 1 crate, 14 cases, 6 boxes, and 9 pouches. 1) If each person were going to reorganize their drink pouches to use as many of the larger containers as possible, how many of each container would each of them need? 2) How many total drink pouches does each student have?

Return to Standards

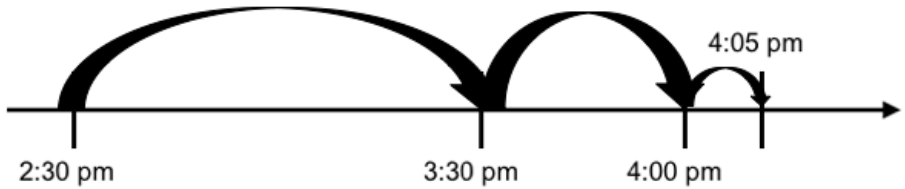
Generalize place value understanding for multi-digit whole numbers.
NC.4.NBT.7 Compare two multi-digit numbers up to and including 100,000 based on the values of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Clarification	**Checking for Understanding**	
In this standard, students use their understanding of groups and value of digits to compare two numbers by examining the value of the digits. Students are expected to be able to compare numbers presented in various forms. Students should have ample experiences communicating their comparisons in words before using symbols. Students were introduced to the symbols greater than (>), less than (<) and equal to (=) in First Grade and continue to use them. While students may have the skills to order more than 2 numbers, this standard focuses on comparing two numbers and using reasoning about place value to support the use of the various symbols.	Compare these two numbers. 75,452 __ 75,455 *Possible responses:*	
	Student A *Place Value* *75,452 has 75 thousands, 4 hundreds, 5 tens, and 2 ones. 75,455 has 75 thousands, 4 hundreds, 5 tens, and 5 ones. They have the same number of thousands, hundreds and the same number of tens, but 455 has 5 ones and 75,452 only has 2 ones. 75,452 is less than 455.* 75,452 < 75,455	Student B *Counting* *75,452 is less than 75,455. I know this because they have the same thousands. So, I'm going to compare 452 and 455. When I count up I say 452 before I say 455. 75,452 is less than 75,455.* 75,452 < 75,455 .

Return to Standards

Use place value understanding and properties of operations to perform multi-digit arithmetic. **NC.4.NBT.4** Add and subtract multi-digit whole numbers up to and including 100,000 using the standard algorithm with place value understanding.	
Clarification	**Checking for Understanding**
In this standard, students build on their conceptual understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. Students are expected to explain their thinking to show understanding of the algorithm. This is the first grade level in which students are expected to be proficient at using the standard algorithm to add and subtract. However, other previously learned strategies are still appropriate for students to use. In mathematics, an algorithm is defined by its steps and not by the way those steps are recorded in writing. With this in mind, minor variations in methods of recording standard algorithms are acceptable. Students may ask if it is possible to subtract a larger number from a smaller number. While it is not the focus or expectation of this standard in this grade, students should know that it is mathematically possible, and they will be learning more about that concept in later grades. If the misconception that larger numbers cannot be subtracted from smaller numbers is confirmed or reinforced, students may struggle to make the transition to negative numbers in later grades.	The following amounts of juice were in separate containers after the school's parent breakfast. • Container 1: 750 mL • Container 2: 1,450 mL • Container 3: 2,087 mL • Container 4: 299 mL • Container 5: 476 mL If all of the liquid was put into one large container how much liquid would be in the large container? On a field trip, three different schools send their fourth graders across town to the high school for a math competition. Each school sends between 120 and 170 students each. There are 417 students total. 1. How many students could have come from each school? Show your thinking. 2. Find another possible solution to this task. Show your thinking. 3. If the number of students from each school was the same, how many students came from each school? Explain how you found your solution.

Return to Standards

Solve problems involving measurement. **NC.4.MD.8** Solve word problems involving addition and subtraction of time intervals that cross the hour.	
Clarification	**Checking for Understanding**
In this standard, students apply addition and subtraction strategies to find an end time, amount of time passed, or a start time. In third grade, students determined elapsed time within an hour. This standard calls for students to be able to cross over the hour. Students should use tools such as clocks, time lines, and tables to solve problems.	The movie started at 2:30 pm and lasted for 1 hour and 35 minutes. What time did the movie end? *Possible response:* 

Return to Standards