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

5th 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 5th 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

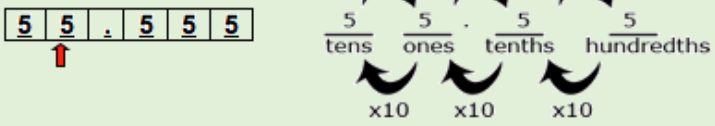
Practice	Explanation and Example
1. Make sense of problems and persevere in solving them.	Mathematically proficient students in grade 5 should solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?".
2. Reason abstractly and quantitatively.	Mathematically proficient students in grade 5 should recognize that a number represents a specific quantity. They connect quantities 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 that record calculations with numbers and represent or round numbers using place value concepts.
3. Construct viable arguments and critique the reasoning of others.	In fifth grade mathematical proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. 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 students in grade 5 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. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.
5. Use appropriate tools strategically.	Mathematically proficient fifth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data.
6. Attend to precision.	Mathematically proficient students in grade 5 continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units.
7. Look for and make use of structure.	In fifth grade mathematically proficient students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. They examine numerical patterns and relate them to a rule or a graphical representation.
8. Look for and express regularity in repeated reasoning.	Mathematically proficient fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. Students explore operations with fractions with visual models and begin to formulate generalizations.

Return to Standards

Understand the place value system.

NC.5.NBT.1 Explain the patterns in the place value system from one million to the thousandths place.

- Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- Explain patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100.

Clarification	Checking for Understanding
In this standard, students extend their understanding of the base-ten system and the magnitude of digits in a number to the relationship between adjacent places. This standard also extends student understanding of the relationships of digits in whole numbers to the relationship of decimal fractions. Students should work with the idea that the tens place is ten times as much as the ones place, and the ones place is 1/10 the size of the tens place. **For example:** In the number 55.55, each digit is 5, but the value of the digits is different because of the placement. The 5 that the arrow points to is 1/10 of the 5 to the left and 10 times the 5 to the right. The 5 in the ones place is 1/10 of 50 and 10 times five tenths.  	Danny and Delilah were playing a game where they drew digits and placed them on a game board. Danny built the number 247. Delilah built the number 724. • How much bigger is the 2 in Danny's number than the 2 in Delilah's number? • How much smaller is the 4 in Delilah's number than the 4 in Danny's number? • Write a sentence explaining how the size of the 7 in Danny's number compares to the size of the 7 in Delilah's number. In class Veronica told her teacher that when you multiply a number by 10, you just always add 0 to the end of the number. Think about her statement (conjecture), then answer the following questions. • When does Veronica's statement (conjecture) work? • When doesn't Veronica's statement (conjecture) work? • Is the opposite true? When you divide a number by 10, can you just remove a 0 from the end of the number? When does that work? When doesn't that work?

Return to Standards

Understand the place value system.

NC.5.NBT.3 Read, write, and compare decimals to thousandths.

- Write decimals using base-ten numerals, number names, and expanded form.
- Compare two decimals to thousandths based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Clarification

In this standard, students build on their previous understandings of reading and writing whole numbers in various forms to reading, writing, and comparing decimals to thousandths.

Written form or number name refers to writing out a number in words like "two thousand, eight hundred fifty-six." Traditional expanded form is 2,856 = 2,000 + 800 + 50 + 6. However, students should explore the idea that 2856 could also be 28 hundreds + 5 tens + 6 ones or 1 thousand + 18 hundreds + 56 ones. They should also show understanding by expanding a number by place value such as (2 x 1,000) + (8 x 100) + (5 x 10) + (6 x 1).

Students read decimals using fractional language and write decimals in fractional form, as well as in expanded notation. The number 361.248 would be read three hundred sixty-one and two hundred forty-eight thousandths. In expanded form this number would be written 300 + 60 + 1 + 0.2 + 0.04 + 0.008. Just as with whole numbers, students should be comfortable with various forms of numbers and with expanding number by place value such as (3 x 100) + (6 x 10) + (1 x 1) + (2 x 0.1) + (4 x 0.01) + (8 x 0.001). Students are expected to use decimal, as well as, fraction notation for tenths, hundredths, and thousandths.

Also, in this standard, students use their understanding of value of digits to compare two numbers by examining the value of each digit. Building on their understanding of comparing whole numbers, students would compare tenths to tenths, hundredths to hundredths, and thousandths to thousandths.

Students are expected to be able to compare numbers presented in various forms. 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.

Checking for Understanding

Mike's teacher asked him to write 987.654 in expanded notation. Mike wrote 900 + 80 + 7 + .6 + .50 + .400

What is Mike's misconception? How would you explain expanded notation to help Mike understand expanded notation?

The table below shows the results of the Men's 100 Meter Freestyle Final at the London 2012 Olympics.

Country	Time (in seconds)
Australia	45.53
Brazil	47.92
Canada	47.8
Cuba	48.04
France	47.84
Netherlands	47.88
Russia	48.44
United States	47.52

Put the countries in order from first to last place.

Mackenzie said that if Michael Phelps had swum this race with a time of 48.5 seconds, he would have gotten the gold medal. What misconception does Mackenzie have? Explain.

Using the times above, write 5 expressions comparing the various times. Use symbols for greater than or less than in your expressions. Write a sentence to go with each expression.

Return to Standards

Represent and interpret data.

NC.5.MD.2 Represent and interpret data.

- Collect data by asking a question that yields data that changes over time.
- Make and interpret a representation of data using a line graph.
- Determine whether a survey question will yield categorical or numerical data, or data that changes over time.

Clarification

In this standard, students will interact with data through data collection, creation of a line graph, and interpretation of data. Students have previously formulated survey questions that yield categorical or numerical data. In third grade, students collected data by asking a question that yielded categorical data, which is data that can be grouped into categories. Students in fourth grade learned to also ask questions that provide numerical data, which is data that is measurable such as time, height, weight, temperature, etc.

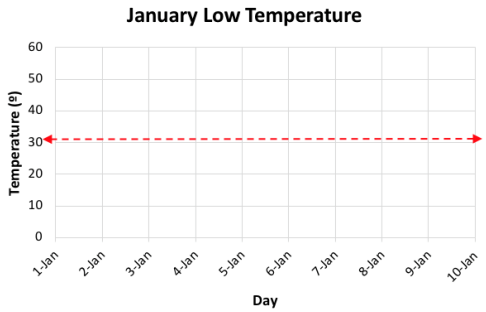
This standard calls for students to be able to formulate questions that provide them with data that changes over time. Once data is collected, students will be able to create a line graph to represent the data. Once graphs are created, students should be able to solve one and two-step problems using the information in the graphs.

Checking for Understanding

Mrs. Smith's class wanted to track the daily low temperatures during the first 10 days in January. The data that the class collected is below.

a. Graph the data on the chart.

January	Temp
1st	4°
2nd	16°
3rd	29°
4th	43°
5th	41°
6th	56°
7th	29°
8th	21°
9th	17°
10th	20°



b. The dashed is the normal low. Approximately what was that temperature?
c. When were the low temperatures above the normal low?
d. What were the coldest 3 days?
e. During the 10 days, how long was the temperature above normal?

Teacher: I am going to give you a cup of room temperature water. You are going to put 6 ice cubes in the cup. You are going to record the water temperature every 30 seconds for 5 minutes. After you collect the data you are going to make a line graph and then write 3 descriptive sentences about your data.

Write 2 survey questions. One should yield numerical data that can be represented on a bar graph. One should yield data that changes over time that can be represented on a line graph.

Possible responses:

Numerical data: *How many times does the pitcher strike out the batter in nine innings of baseball?*

Changes over time: *What is the average wind speed every day in April?*