

## **FOURTH GRADE MATHEMATICS**

### **UNIT 1 STANDARDS**

Dear Parents,

We want to make sure that you have an understanding of the mathematics your child will be learning this year. Below you will find the standards we will be learning in Unit One. Each standard is in bold print and underlined and below it is an explanation with student examples. Your child is not learning math the way we did when we were in school, so hopefully this will assist you when you help your child at home. Please let your child's teacher know if you have any questions. ☺

**MGSE.4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that  $700 \div 70 = 10$  by applying concepts of place value and division.**

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. Students should be given opportunities to reason and analyze the relationships of numbers that they are working with.

Example:

How is the 2 in the number 582 similar to and different from the 2 in the number 528?

**MGSE.4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using  $>$ ,  $=$ , and  $<$  symbols to record the results of comparisons.**

This standard refers to various ways to write numbers. Students should have flexibility with the different number forms. Traditional expanded form is  $285 = 200 + 80 + 5$ . Written form is two hundred eighty-five. 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.

Students should also be able to compare two multi-digit whole numbers using appropriate symbols.

#### **Common Misconceptions:**

There are several misconceptions students may have about writing numerals from verbal descriptions. Numbers like one thousand two causes problems for students. Many students will understand the 1000 and the 2 but instead of placing the 2 in the ones place, students will write the numbers as they can hear them, 10002 (ten thousand two). There are multiple strategies that can be used to assist with this concept, including place-value boxes and vertical-addition methods.

Students often assume that the first digit of a multi-digit number indicates the "greatness" of a number. The assumption is made the 954 is greater than 1002 because students are focusing on the first digit instead of the number as a whole.

Students need to be aware of the greatest place value. In this example, there is one number with the lead digit in the thousands and another number with its lead digit in the hundreds.

Development of a clear understanding of the value of the digits in a number is critical for the understanding of and using numbers in computations. Helping students build the understanding that 12345 means one ten thousand or 10,000, two thousands or 2000, three hundreds or 300, four tens or 40, and 5 ones or 5. Additionally, the answer is the sum of each of these values  $10,000 + 2000 + 300 + 40 + 5$ .

**MGSE.4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.**

This standard refers to place value understanding, which extends beyond an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line and a hundred chart as tools to support their work with rounding.

Example:

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 3 packs with 6 bottles in each container. Sarah wheels in 6 packs with 6 bottles in each container. About how many bottles of water still need to be collected?

<b>Student 1</b> First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 plus 36 is about 50. I'm trying to get to 300. 50 plus another 50 is 100. Then I need 2 more hundreds. So, we still need 250 bottles.	<b>Student 2</b> First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 is about 20 and 36 is about 40. $40 + 20 = 60$ . $300 - 60 = 240$ , so we need about 240 more bottles.
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Example:

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 total miles did your family travel?

Some typical estimation strategies for this problem:

<b>Student 1</b> I first thought about 276 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.	<b>Student 2</b> 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.	<b>Student 3</b> 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 about 530.
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Round 368 to the nearest hundred.

This will either be 300 or 400, since those are the two hundreds before and after 368. Draw a number line, subdivide it as much as necessary, and determine whether 368 is closer to 300 or 400. Since 368 is closer to 400, this number should be rounded to 400.



**CLUSTER #2: USE PLACE VALUE UNDERSTANDING AND PROPERTIES OF OPERATIONS TO PERFORM MULTI-DIGIT ARITHMETIC.** *Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients*

involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context. Mathematically proficient students communicate precisely by engaging in discussion about their reasoning using appropriate mathematical language. The terms students should learn to use with increasing precision with this cluster are: **partition(ed), fraction, unit fraction, equivalent, multiple, reason, denominator, numerator, comparison/compare, <, >, =, benchmark fraction.**

**MGSE4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.**

Students build on their 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.

This standard refers to fluency, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using a variety strategies such as the distributive property). 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.

When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works.

Example:        3892  
                  + 1567

Student explanation for this problem:

1. Two ones plus seven ones is nine ones.
2. Nine tens plus six tens is 15 tens.
3. I am going to write down five tens and think of the 10 tens as one more hundred. (*Denotes with a 1 above the hundreds column*)
4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds.
5. I am going to write the four hundreds and think of the 10 hundreds as one more 1000. (*Denotes with a 1 above the thousands column*)
6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand.

Example:        3546  
                  - 928

Student explanations for this problem:

1. There are not enough ones to take 8 ones from 6 ones so I have to use one ten as 10 ones. Now I have 3 tens and 16 ones. (*Marks through the 4 and notates with a 3 above the 4 and writes a 1 above the ones column to be represented as 16 ones.*)
2. Sixteen ones minus 8 ones is 8 ones. (*Writes an 8 in the ones column of answer.*)
3. Three tens minus 2 tens is one ten. (*Writes a 1 in the tens column of answer.*)
4. There are not enough hundreds to take 9 hundreds from 5 hundreds so I have to use one thousand as 10 hundreds. (*Marks through the 3 and notates with a 2 above it. Writes down a 1 above the hundreds column.*) Now I have 2 thousand and 15 hundreds.
5. Fifteen hundreds minus 9 hundreds is 6 hundreds. (*Writes a 6 in the hundreds column of the answer.*)
6. I have 2 thousands left since I did not have to take away any thousands. (*Writes 2 in the thousands place of answer.*)

Students should know that it is mathematically possible to subtract a larger number from a smaller number but that their work with whole numbers does not allow this as the difference would result in a negative number.

### Common Misconceptions

Often students mix up when to “carry” and when to “borrow”. Also students often do not notice the need of borrowing and just take the smaller digit from the larger one. Emphasize place value and the meaning of the digits.

If students are having difficulty with linking up similar place values in numbers as they are adding and subtracting, it is sometimes helpful to have them write their calculations on the grid paper. This assists the student with lining up the numbers more accurately.

If students are having a difficult time with a standard addition algorithm, a possible modification to the algorithm might be helpful. Instead of the “shorthand” of “carrying,” students could add by place value, moving left to right placing the answers down below the “equals” line. For example:

$$\begin{array}{r} 249 \\ + 372 \\ \hline 500 \\ 110 \\ \underline{11} \\ 621 \end{array}$$

(Start with  $200 + 300$  to get the 500  
then  $40 + 70$  to get 110  
and  $9 + 2$  to get 11.)

**MGSE4.OA.3 Solve multistep word problems with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a symbol or letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.**

**MGSE4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.**