

Clarification of Standards for Parents

Grade 4 Mathematics Unit 1

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 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 numbers 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 hundreds chart as tools to support their work with rounding.

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?

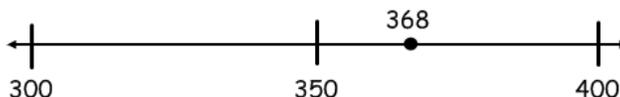
Some typical estimation strategies for this problem:

Student 1 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.	Student 2 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.	Student 3 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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Example:

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.



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:
$$\begin{array}{r} 3892 \\ + 1567 \\ \hline \end{array}$$

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.

- 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*)
- Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand.

Example: 3546
 - 928

Student explanations for this problem:

- 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.*)
- Sixteen ones minus 8 ones is 8 ones. (*Writes an 8 in the ones column of answer.*)
- Three tens minus 2 tens is one ten. (*Writes a 1 in the tens column of answer.*)
- 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.
- Fifteen hundreds minus 9 hundreds is 6 hundreds. (*Writes a 6 in the hundreds column of the answer.*)
- 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:

249	
+ 372	
500	(Start with 200 + 300 to get the 500
110	then 40 + 70 to get 110
<u>11</u>	and 9 + 2 to get 11.)
621	

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.

The focus in this standard is to have students use and discuss various strategies. It refers to estimation strategies, including using compatible numbers (numbers that sum to 10 or 100) or rounding. Problems should be structured so that all acceptable estimation strategies will arrive at a reasonable answer. Students need many opportunities solving multistep story problems.

In unit one, students focus on solving multistep word problems with addition and subtraction.

Example 1:

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. About how many miles did they travel total?

Some typical estimation strategies for this problem are shown below.

Student 1

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.

Student 2

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.

Student 3

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.

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

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.

This standard includes multi-step word problems related to expressing measurements from a larger unit in terms of a smaller unit (e.g., feet to inches, meters to centimeter, dollars to cents). Students should have ample opportunities to use number line diagrams to solve word problems.

In unit one, students focus on solving measurement word problems that involve the operations of addition and subtraction. Students also use diagrams (such as number line diagrams) to solve problems.

Example:

Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran?

Students can add the times to find the total number of minutes Mason ran. 40 minutes plus another 25 minutes would be 65 minutes, or an hour and 5 minutes. Then, an hour and five minutes can be added to an hour and 15 minutes to see that Mason ran 2 hours and 20 minutes in all.

Example:

A pound of apples costs \$1.20. Rachel bought a pound and a half of apples. If she gave the clerk a \$5.00 bill, how much change will she get back?

Possible student solution: If Rachel bought a pound and a half of apples, she paid \$1.20 for the first pound and then 60¢ for the other half a pound, since half of \$1.20 is 60¢. When I add \$1.20 and 60¢, I get a total of \$1.80 spent on the apples. If she gave the clerk a five dollar bill, I can count up to find out how much change she received.

$$\$1.80 + 20¢ = \$2.00$$

$$\$2.00 + 3.00 = \$5.00$$

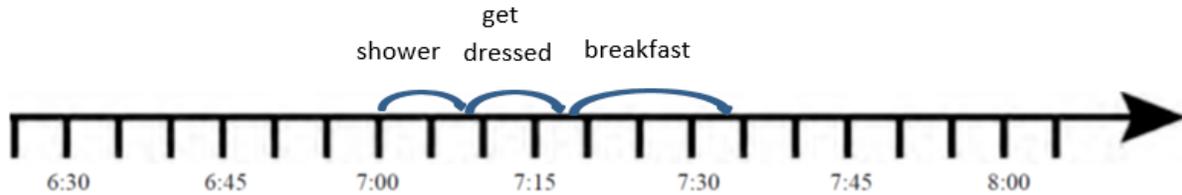
$$\$3.00 + 20¢ = \$3.20$$

So Rachel got \$3.20 back in change.

Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a liquid volume measure on the side of a container.

Example:

At 7:00 a.m. Candace wakes up to go to school. It takes her 8 minutes to shower, 9 minutes to get dressed and 17 minutes to eat breakfast. How many minutes does she have until the bus comes at 8:00 a.m.? Use the number line to help solve the problem.



Candace is finished at 7:34. If the bus comes at 8:00, I can count on to find how many minutes it takes for the bus to arrive. From 7:34 to 7:35 is one minute. From 7:35 to 7:40 is 5 minutes and from 7:40 to 8:00 is 20 minutes. 1 minute + 5 minutes + 20 minutes = 26 minutes until the bus arrives.

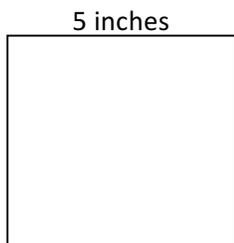
MGSE4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

In unit one, students focus on applying the perimeter formulas for rectangles in real world and mathematical problems. Students developed understanding of perimeter in 3rd grade by using visual models.

While students are expected to use formulas to calculate perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. The formula for perimeter can be $2l + 2w$ or $2(l + w)$ and the answer will be in linear units. This standard calls for students to generalize their understanding of perimeter by connecting the concepts to mathematical formulas. These formulas should be developed through experience, not just memorization.

Example:

Find the perimeter of the square:



Since a square has four sides that are equal in length, each side must measure 5 inches. Using the perimeter formulas:
 $2l + 2w = (2 \times 5) + (2 \times 5) = 10 + 10 = 20$ inches

$$2(l + w) = 2(2 \times 5) = 2(10) = 20 \text{ inches}$$

The perimeter of the square is 20 inches.

(Adapted from Henry County Schools)