FIFTH GRADE MATHEMATICS
UNIT 1 STANDARDS

Dear Parents,
As we shift to Common Core Standards, 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 ☺

CCGPS.5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
The standard calls for students to evaluate expressions with parentheses ( ), brackets [ ] and braces { }.
Example:
Evaluate the expression 2{ 5[12 + 5(500 - 100) + 399]}
Students should have experiences working with the order of first evaluating terms in parentheses, then brackets, and then braces.

- The first step would be to subtract 500 – 100 = 400.
- Then multiply 400 by 5 = 2,000.
- Inside the bracket, there is now [12 + 2,000 + 399]. That equals 2,411.
- Next multiply by the 5 outside of the bracket. 2,411 × 5 = 12,055.
- Next multiply by the 2 outside of the braces. 12,055 × 2= 24,110.

This standard builds on the expectations of third grade where students are expected to start learning the conventional order. Students need experiences with multiple expressions that use grouping symbols throughout the year to develop understanding of when and how to use parentheses, brackets, and braces. First, students use these symbols with whole numbers. Then the symbols can be used as students add, subtract, multiply and divide decimals and fractions.
Examples:

- (26 + 18) 4 Solution: 11
- {[2 × (3+5)] – 9} + [5 × (23-18)] Solution: 32
- 12 – (0.4 × 2) Solution: 11.2
- (2 + 3) × (1.5 – 0.5) Solution: 5
- $6 - \left(\frac{1}{2} + \frac{1}{3}\right)$ Solution: $5\frac{1}{6}$
- { 80 ÷ [2 × (3½ + 1½)] }+ 100 Solution: 108

To further develop students' understanding of grouping symbols and facility with operations, students place grouping symbols in equations to make the equations true or they compare expressions that are grouped differently.

Example:

- 15 – 7 – 2 = 10 → 15 – (7 – 2) = 10
- 3 × 125 ÷ 25 + 7 = 22 → [3 × (125 ÷ 25)] + 7 = 22
- 24 ÷ 12 ÷ 6 ÷ 2 = 2 x 9 + 3 ÷ ½ → 24 ÷ [(12 ÷ 6) ÷ 2] = (2 × 9) + (3 ÷ ½)
- Compare 3 × 2 + 5 and 3 × (2 + 5).
- Compare 15 – 6 + 7 and 15 – (6 + 7).

CCGPS.5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them

This standard refers to expressions. Expressions are a series of numbers and symbols (+, -, x, ÷) without an equals sign. Equations result when two expressions are set equal to each other (2 + 3 = 4 + 1).

Example:

- 4(5 + 3) is an expression.
- When we compute 4(5 + 3) we are evaluating the expression. The expression equals 32.
- 4(5 + 3) = 32 is an equation.

This standard calls for students to verbally describe the relationship between expressions without actually calculating them. This standard does not include the use of variables, only numbers and signs for operations.

Example:

Write an expression for the steps "double five and then add 26."

Student: *(2 × 5) + 26*

Describe how the expression 5(10 × 10) relates to 10 × 10.

Student: The expression 5(10 × 10) is 5 times larger than the expression 10 × 10 since I know that I that 5(10 × 10) means that I have 5 groups of (10 × 10).

CCGPS.5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

This standard includes multiplying by multiples of 10 and powers of 10, including 10^2 which is 10 × 10=100, and 10^3 which is 10 × 10 × 10 =1,000.

Examples: $2.5 \times 10^3 = 2.5 \times (10 \times 10 \times 10) = 2.5 \times 1{,}000 = 2{,}500$

Students should reason that the exponent above the 10 indicates how many places the decimal point is moving (not just that the decimal point is moving but that you are multiplying or making the number 10 times greater three times) when you multiply by a power of 10. Since we are multiplying by a power of 10 the decimal point moves to the right. When we are dividing by powers of 10, the decimal point moves to the left.

Examples:

Students might write:

- $36 \times 10 = 36 \times 10^1 = 360$
- $36 \times 10 \times 10 = 36 \times 10^2 = 3600$
- $36 \times 10 \times 10 \times 10 = 36 \times 10^3 = 36{,}000$
- $36 \times 10 \times 10 \times 10 \times 10 = 36 \times 10^4 = 360{,}000$

Students might think and/or say:

I noticed that every time, I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left.

When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones).

Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense.

$523 \times 10^3 = 523{,}000$	The place value of 523 is increased by 3 places.
$5.223 \times 10^2 = 522.3$	The place value of 5.223 is increased by 2 places.
$52.3 \div 10^1 = 5.23$	The place value of 52.3 is decreased by one place.

CCGPS.5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

This standard builds upon students' work with multiplying numbers in 3rd and 4th grade. In 4th grade, students developed understanding of multiplication through using various strategies. While the standard algorithm is mentioned, alternative strategies are also appropriate to help students develop conceptual understanding. The size of the numbers should NOT exceed a three-digit factor by a two-digit factor.

Examples of alternative strategies:

There are 225 dozen cookies in the bakery. How many cookies are there?

Student 1

225×12

I broke 12 up into 10 and 2.

$225 \times 10 = 2{,}250$
$225 \times 2 = 450$

$2{,}250 + 450 = 2{,}700$

Student 2

225×12

I broke 225 up into 200 and 25.

$200 \times 12 = 2{,}400$

I broke 25 up into 5 × 5, so I had 5 × 5 × 12 or 5 × 12 × 5.

$5 \times 12 = 60$
$60 \times 5 = 300$

Then I added 2,400 and 300.

$2{,}400 + 300 = 2{,}700$

Student 3

I doubled 225 and cut 12 in half to get 450 × 6. Then I doubled 450 again and cut 6 in half to 900 × 3.

$900 \times 3 = 2{,}700$

Draw an array model for 225 × 12 → 200 × 10, 200 × 2, 20 × 10, 20 × 2, 5 × 10, 5 × 2.

225 × 12

	200	20	5
10	2,000	200	50
2	400	40	10

2,000
400
200
40
50
+ 10
2,700

CCGPS.5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

This standard references various strategies for division. Division problems can include remainders. This standard extends students' prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a "familiar" number, a student might decompose the dividend using place value.

Example:

There are 1,716 students participating in Field Day. They are put into teams of 16 for the competition. How many teams get created? If you have left over students, what do you do with them?

Student 1

$1{,}716 \div 16$

There are 100 16's in 1,716.

$1{,}716 - 1{,}600 = 116$

I know there are at least 6 16's in 116.

$116 - 96 = 20$

I can take out one more 16.

$20 - 16 = 4$

There were 107 teams with 4 students left over. If we put the extra students on different teams, 4 teams will have 17 students.

Student 2

$1{,}716 \div 16$

There are 100 16's in 1,1716.

Ten groups of 16 is 160. That's too big. Half of that is 80, which is 5 groups.

I know that 2 groups of 16's is 32.

I have 4 students left over.

1,716 − 1,600	100
116 − 80	5
36 − 32	2
4	

Student 3

Student 4

1,716 ÷ 16

I want to get to 1,716. I know that 100 16's equals 1,600. I know that 5 16's equals 80.

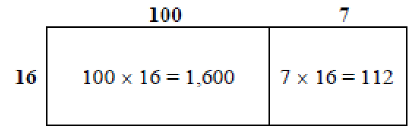
1,600 + 80 = 1,680

Two more groups of 16's equals 32, which gets us to 1,712. I am 4 away from 1,716.

So we had 100 + 6 + 1 = 107 teams. Those other 4 students can just hang out.

How many 16's are in 1,716?

We have an area of 1,716. I know that one side of my array is 16 units long. I used 16 as the height. I am trying to answer the question: What is the width of my rectangle if the area is 1,716 and the height is 16?



1,716 – 1,600 = 116

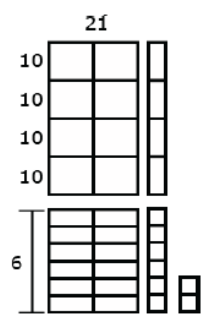
116 – 112 = 4

100 + 7 = 107 R 4

Examples:

- Using expanded notation: 2682 ÷ 25 = (2000 + 600 + 80 + 2) ÷ 25
- Using understanding of the relationship between 100 and 25, a student might think:
  - I know that 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80.
  - 600 divided by 25 has to be 24.
  - Since 3 × 25 is 75, I know that 80 divided by 25 is 3 with a reminder of 5. (Note that a student might divide into 82 and not 80.)
  - I can't divide 2 by 25 so 2 plus the 5 leaves a remainder of 7.
  - 80 + 24 + 3 = 107. So, the answer is 107 with a remainder of 7.
- Using an equation that relates division to multiplication, 25 × n = 2682, a student might estimate the answer to be slightly larger than 100 because s/he recognizes that 25 × 100 = 2500.

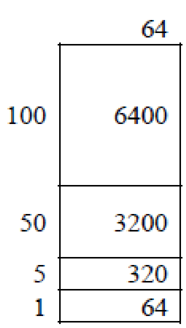
Example: 968 ÷ 21



Using base ten models, a student can represent 962 and use the models to make an array with one dimension of 21. The student continues to make the array until no more groups of 21 can be made. Remainders are not part of the array.

Example: 9984 ÷ 64

An area model for division is shown below. As the student uses the area model, s/he keeps track of how much of the 9984 is left to divide.



$$
\begin{array}{rl}
64\overline{)9984} & \\
\underline{-6400} & (100 \times 64) \\
3584 & \\
\underline{-3200} & (50 \times 64) \\
384 & \\
\underline{-320} & (5 \times 64) \\
64 & \\
\underline{-64} & (1 \times 64) \\
0 &
\end{array}
$$