5^{th} Grade Unit 1 Mathematics

Dear Parents,

The Mathematics Georgia Standards of Excellence (MGSE), present a balanced approach to mathematics that stresses understanding, fluency, and real world application equally. Know that your child is not learning math the way many of us did in school, so hopefully being more informed about this curriculum will assist you when you help your child at home.

Below you will find the standards from Unit One in bold print and underlined. Following each standard is an explanation with student examples. Please contact your child's teacher if you have any questions.

<u>OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them</u>

This standard refers to expressions. Expressions are not equations. Expressions are a series of numbers and symbols (+, -, x, ÷) without an equal sign. Equations, however, have an equal sign.

Example:

- 4(5 + 3) is an expression.
- When we compute 4(5 + 3), we are evaluating the expression. The expression's value is 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 symbols for operations.

Example:

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

Student: *(2 × 5) + 26*

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

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

<u>NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.</u>

This standard builds upon students' work with multiplying numbers in 3^{rd} and 4^{th} grade. In 4^{th} grade, students developed understanding of multiplication using various strategies. While learning the standard algorithm is the focus, alternate strategies are also appropriate to help students develop conceptual understanding. Students' work is limited to multiplying three-digit by two-digit numbers.

******Primary focus on 3 digit by 1 digit multiplication in this unit.******

Examples of alternate 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 × 10 = 2,250
225 × 2 = 450

2,250 + 450 = 2,700

Student 2

225 × 12

I broke 225 up into 200 and 25.

200 × 12 = 2,400

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

5 × 12 = 60 and 60 × 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 × 3 = 2,700

Draw an array model for 225 × 12

225 x 12

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

$$\begin{array}{r} 2{,}000 \\ 400 \\ 200 \\ 40 \\ 50 \\ +\quad 10 \\ \hline 2{,}700 \end{array}$$

<u>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.</u>

******Primary focus on 4 digit by 1 digit division in this unit.******

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 will there be? If you have left over students, what do you do with them?

Student 1

1,716 ÷ 16

There are <u>100</u> 16's (1,600) in 1,716.

1,716 – 1,600 = 116

I know there are at least <u>6</u> 16's (96) in 116.

116 – 96 = 20

There is still <u>1</u> more 16 in 20.

20 – 16 = 4

There are 107 (100 + 6 + 1) teams with 16 students with 4 students left over. If we put the extra students on different teams, 4 teams will have 17 students.

Student 2

1,716 ÷ 16

There are 100 16's in 1,716.

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

I know that 2 groups of 16 is 32.

I have 4 students left over.

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

There are 100 + 5 + 2 or 107 teams of 16 students with 4 students left over. Those students could be added to four of the teams.

Example: 9984 ÷ 64

- A partial quotient model for division is shown below. As the student uses the partial quotient model, he/she keeps track of how much of the 9984 is left to divide.

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

There were 100 + 50 + 5 + 1 or 156 sets of 64 in 9,984. The final quotient for 9984 ÷ 64 is 156 with no remainder.

NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

******Primary focus on adding and subtracting with like denominators in this unit.******

This standard builds on the work in 4th grade where students add and subtract fractions with like denominators. In 5th grade, students will work with adding and subtracting fractions with unlike denominators. For $^1/_3 + ^1/_6$, a common denominator is 18, which is the product of 3 and 6. Although this is not the least common denominator, 5th graders learn that multiplying the denominators given will always give a common denominator. This process should be introduced using visual fraction models (area models, number lines, etc.) to build understanding before moving into the standard algorithm.

Students should apply their understanding of equivalent fractions and their ability to rewrite fractions in an equivalent form to find the sum or difference with unlike denominators. They should be reminded that multiplying the denominators will always give a common denominator but may not result in the smallest common denominator.
Example:

$$\frac{2}{5}+\frac{3}{8}=\frac{16}{40}+\frac{15}{40}=\frac{31}{40}$$

NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers

******Primary focus on adding and subtracting with like denominators in this unit.******

This standard refers to number sense, which means students' understanding of fractions as numbers that lie between whole numbers on a number line. Number sense in fractions also includes moving between decimals and fractions to find equivalents. Students should also be able to use reasoning when comparing fractions (i.e., $^7/_8$ is greater than $^3/_4$ because $^7/_8$ is missing only $^1/_8$ of a whole and $^3/_4$ is missing ¼ of a whole, so $^7/_8$ is closer to a whole and therefore greater). Also, students should use benchmark fractions to estimate and examine the reasonableness of their answers. An example of using a benchmark fraction is illustrated with comparing $^5/_8$ and $^6/_{10}$. Students should recognize that $^5/_8$ is $^1/_8$ larger than $^1/_2$ (since $^1/_2 = ^4/_8$) and $^6/_{10}$ is $^1/_{10}$ larger than $^1/_2$ (since $^1/_2 = ^5/_{10}$).
Example:
Your teacher gave you $^1/_7$ of a bag of candy. She also gave your friend $^1/_3$ of the same bag of candy. If you and your friend combined your candy, what fraction of the bag would you have? Estimate your answer and then calculate. How reasonable was your estimate?

Student 1

$^1/_7$ is really close to 0. $^1/_3$ is larger than $^1/_7$ but still less than $^1/_2$. If we put them together we might get close to $^1/_2$.

$$^1/_7 + {}^1/_3 = {}^3/_{21} + {}^7/_{21} = {}^{10}/_{21}$$

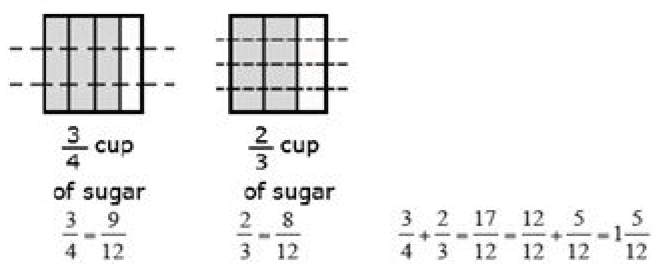
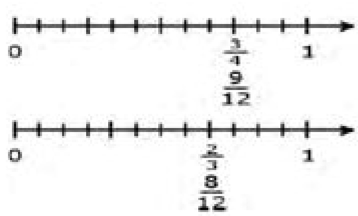
The fraction $^{10}/_{21}$ does not simplify, but I know that 10 is half of 20, so $^{10}/_{21}$ is a little less than $^1/_2$.

Student 2

$^1/_7$ is close to $^1/_6$ but less than $^1/_6$. $^1/_3$ is equivalent to $^2/_6$. So $^1/_7 + {}^1/_3$ is a little less than $^3/_6$ or $^1/_2$.

Example:
Jerry was making two different types of cookies. One recipe needed $^3/_4$ cup of sugar and the other needed $^2/_3$ cup of sugar. How much sugar did he need to make both recipes?

Mental estimation: A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may be to compare both fractions to $^1/_2$ and state that both are larger than $^1/_2$ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2.

Area model	
Linear model	
Solution:	$\frac{3}{4}+\frac{2}{3}=\frac{8}{12}+\frac{9}{12}=\frac{17}{12}=1\frac{5}{12}$

Estimation skills include identifying when an 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 for calculations with fractions extend from students' work with whole number operations and can be supported through the use of physical models.

Example:
Elli drank $^{3}/_{5}$ quart of milk and Javier drank $^{1}/_{10}$ of a quart less than Ellie. How much milk did they drink all together?

Solution:

Elli: $\frac{3}{5}$ Javier: $\frac{3}{5} - \frac{1}{10} = \frac{6}{10} - \frac{1}{10} = \frac{5}{10}$ Total: $\frac{3}{5} + \frac{5}{10} = \frac{6}{10} + \frac{5}{10} = \frac{11}{10}$

This solution is reasonable because Ellie drank more than $^{1}/_{2}$ quart and Javier drank $^{1}/_{2}$ quart, so together they drank slightly more than one quart.

<u>NF.3 Interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem</u>

******Primary focus on adding and subtracting with like denominators in this unit.******

This standard calls for students to extend their work of partitioning a number line from third and fourth grade. Students need ample experiences to explore the concept that a fraction is a way to represent the division of two quantities. Students are expected to demonstrate their understanding using concrete materials, drawing models, and explaining their thinking when working with fractions in multiple contexts. They read 3/5 as "three-fifths" and after many experiences with sharing problems, learn that 3/5 can also be interpreted as "3 divided by 5".
Examples:
Ten team members are sharing 3 boxes of cookies. How much of a box will each student get?
When working this problem, a student should recognize that the 3 boxes are being divided into 10 groups, so s/he is seeing the solution to the following equation: 10 ´ n = 3 (10 groups of some amount is 3 boxes) which can also be written as n = 3 ÷ 10. Using models or a diagram, they divide each box into 10 groups, resulting in each team member getting 3/10 of a box.

Your teacher gives 7 packs of paper to a group of 4 students. If the students share the paper equally, how much paper does each student get?

Each student receives 1 whole pack of paper and $^{1}/_{4}$ of each of the other 3 packs of paper.
So each student gets 1 $^{3}/_{4}$ packs of paper.

<u>MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.</u> ***<u>For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were</u>***

******Primary focus on understanding data in whole numbers in this unit.******

This standard provides a context for students to work with fractions by measuring objects to one-eighth of a unit. This includes length, mass, and liquid volume. Students are making a line plot of this data and then adding and subtracting fractions based on data in the line plot.

Example:

Students measured objects in their desk to the nearest $^1/_8$ of an inch then displayed data collected on a line plot. How many objects measured $^1/_4$? $^1/_2$? If you put all the objects together end to end what would be the total length of **all** the objects?