Fifth Grade Unit 4 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 Four 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>**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:

1. 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.

2. 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.

NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product (*a*/*b*) × *q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*.

Students need to develop a fundamental understanding that the multiplication of a fraction by a whole number could be represented as repeated addition of a unit fraction (e.g., 2 ´ ($^{1}/_{4}$) = $^{1}/_{4}$ + $^{1}/_{4}$). This standard extends students' work of multiplication from earlier grades. In 4th grade, students worked with recognizing that a fraction such as $^{3}/_{5}$ actually could be represented as 3 pieces that are each one-fifth (3 ´ $^{1}/_{5}$). This standard references both the multiplication of a fraction by a whole number and the multiplication of two fractions.

Visual fraction models (area models, tape diagrams, number lines) should be used and created by students during their work with this standard. As they multiply fractions such as 6 x $^{3}/_{5}$, they can think of the operation in more than one way. One way might be:

$$6\times\frac{3}{5}=\frac{(6\times3)}{5}=\frac{18}{5}=3\frac{3}{5}$$

Students create a story problem for 6 x $^{3}/_{5}$ such as:

· Isabel had 6 feet of wrapping paper. She used $^{3}/_{5}$ of the paper to wrap some presents. How much does she have left?

· Every day Tim ran $^{3}/_{5}$ of mile. How far did he run after 6 days?

NF.5 Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication

This standard calls for students to examine the magnitude of products in terms of the relationship between two situations.

Example 1:
Mrs. Jones teaches in a room that is 60 feet wide and 40 feet long. Mr. Thomas teaches in a room that is half as wide, but has the same length. How do the dimensions and area of Mr. Thomas' classroom compare to Mrs. Jones' room? Draw a picture to prove your answer.

Example 2:
How does the product of 225 ´ 60 compare to the product of 225 ´ 30? How do you know? Since 30 is half of 60, the product of 225 ´ 60 will be double or twice as large as the product of 225 ´ 30.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1

This standard asks students to examine how numbers change when we multiply by fractions. Students should have ample opportunities to examine both cases in the standard:
a) when multiplying by a fraction greater than one, the product increases
b) when multiplying by a fraction less the one, the product decreases.

Example:
3 x 2 ½ will be greater than 3, since we are multiplying by a fraction greater than 1

2 ½	2 ½	2 ½
7 ½		

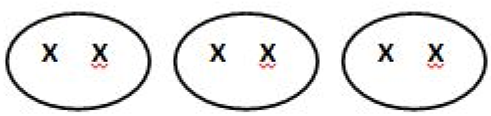
3 x ¼ will be less than 3, since we are multiplying by a fraction less than 1.

¼	¼	¼
¾		

NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

This standard builds on all of the work done in this cluster. Students should be given ample opportunities to use various strategies to solve word problems involving the multiplication of a fraction by a mixed number. This standard could include fraction by a fraction, fraction by a mixed number, or mixed number by a mixed number.
Example:
Evan bought 6 roses for his mother. $^{2}/_{3}$ of them were red. How many red roses were there?

Student 1:
I divided the 6 roses into 3 equal groups. Then I counted how many roses were in 2 of the 3 groups. There are 4 red roses.

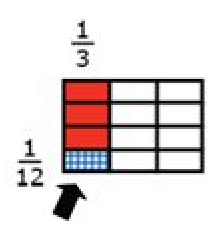


Student 2:
I used an equation to solve the problem. If there were 6 roses and 2/3 of them were red, I need to multiply 6 x 2/3 = 12/3= 4. There were 4 red roses.

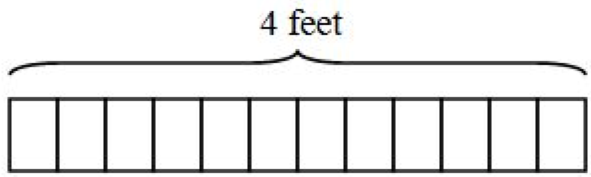
NF.7 Apply and extend previous understandings of division to divide unit fractions, by whole numbers and whole numbers by unit fractions

When students begin to work on this standard, it is the first time they are dividing with fractions. In 4th grade students divided whole numbers and multiplied a whole number by a fraction. The concept *unit fraction* is a fraction that has a one as a numerator. For example, the fraction $^{3}/_{5}$ is 3 copies of the unit fraction $^{1}/_{5}$ ($^{1}/_{5}+ {}^{1}/_{5} + {}^{1}/_{5} = {}^{3}/_{5}$)
Examples:

Four students sitting at a table were given $^{1}/_{3}$ of a pan of brownies to share. How much of the whole pan of brownies will each student get if they share it equally?
The diagram shows the $^{1}/_{3}$ pan of brownies divided into 4 equal shares with each share equaling $^{1}/_{12}$ of the pan. **1/3 ÷ 4 = 1/12**



A piece of wood is 4 feet long. It needs to be cut into pieces that are 1/3 foot long. How many pieces of wood can be cut?



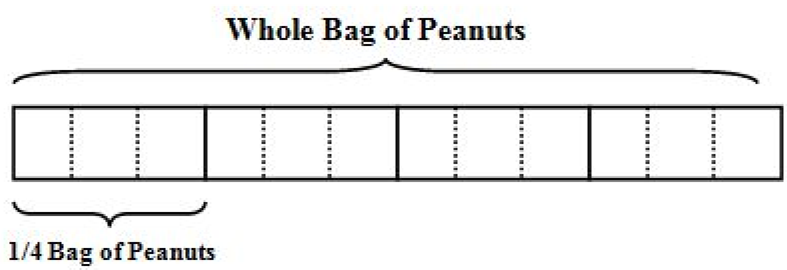
The diagram shows the 4 feet of wood divided into 1/3 foot equal parts. The board can be cut into 12 equal pieces. **4 ÷ 1/3 = 12**

a. **Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.** ***For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.***

This standard asks students to work with story contexts where a unit fraction is divided by a non-zero whole number. Students should use various fraction models and reasoning about fractions.

Example:

You have $^{1}/_{4}$ of a bag of peanuts and you need to share that part of the bag among 3 people. How much of the whole bag does each person get?



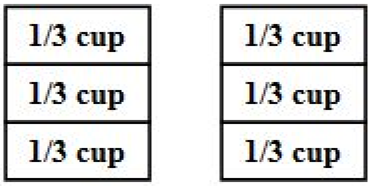
When ¼ bag of peanuts is shared with 3 people, each person will receive 1/12 of the whole bag. ¼ ÷ 3 = 1/12

b. **Interpret division of a whole number by a unit fraction, and compute such quotients.** ***For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.***

This standard calls for students to create story contexts and visual fraction models for division situations where a whole number is being divided by a unit fraction.

Example:

You have 2 cups of sugar. Each batch of cookies takes 1/3 cup of sugar. How many batches of cookies can you make?



There are six 1/3 cups in 2 cups of sugar. 2 ÷ 1/3 = 6

c. <u>Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.</u> ***<u>For example, how much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many 1/3-cup servings are 2 cups of raisins?</u>***

Students will continue to model real world problems involving division of fractions by whole numbers and whole numbers by fractions (see above examples).

<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 fractional values 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?