5th Grade Unit 2 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 Two 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.

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

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).

NBT.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 x (1/100) + 2 × (1/1000).

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

This standard references expanded form of decimals. Students read decimals using fractional language and write decimals in fractional form, as well as in expanded notation. This investigation leads them to understanding equivalence of decimals (0.8 = 0.80 = 0.800).

Example: Some equivalent forms of 0.72 are:

$^{72}/_{100}$	$^{70}/_{100} + {}^{2}/_{100}$
$^{7}/_{10} + {}^{2}/_{100}$	0.72
$7 \times ({}^{1}/_{10}) + 2 \times ({}^{1}/_{100})$	$7 \times ({}^{1}/_{10}) + 2 \times ({}^{1}/_{100})$

This standard also calls for students to reason about the size of decimal numbers, relating them to common benchmarks such as 0, 0.5, and 1. Comparing tenths to tenths, hundredths to hundredths, and thousandths to thousandths is simplified if students use their understanding of fractions to compare decimals.

Examples:

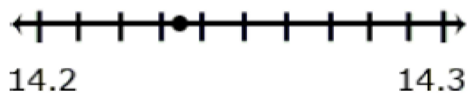
- Comparing 0.25 and 0.17, a student might think, "25 hundredths is more than 17 hundredths". They may write this comparison as 0.25 > 0.17 and recognize that 0.17 < 0.25 is another way to express this comparison.
- Comparing 0.207 to 0.26, a student might think, "Both numbers have 2 tenths, so I need to compare the hundredths. The second number has 6 hundredths while the first number has no hundredths, so the second number is larger." Another student might think about fractions while comparing decimals, "I know that 0.207 is 207 thousandths (and may write $^{207}/_{1000}$); 0.26 is 26 hundredths (and may write $^{26}/_{100}$), but I can also think of it as 260 thousandths ($^{260}/_{1000}$). 260 thousandths is more than 207 thousandths so 0.26 > 0.207."

<u>NBT.4 Use place value understanding to round decimals to any place.</u>

This standard calls for students to use their understanding of place value and number sense to explain and reason about rounding. Students should "round by reason" rather than by a "rote rule". They should have numerous experiences using a number line to support their work with rounding.

Example: Round 14.235 to the nearest tenth.

- Students recognize that the possible answer must be in tenths and is between 14.2 or 14.3. They can then identify that 14.235 is closer to 14.2 (14.20) than to 14.3 (14.30).



- Students should use benchmark numbers to support this work. Benchmarks are numerical reference points for comparing and rounding numbers. (0, 0.5, 1, 1.5 are examples of benchmark numbers.)

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

This standard builds upon students' work with multiplying numbers in 3rd and 4th grade. In 4th 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 & 2 digit by 2 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

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

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.

******Primary focus on 3 digit by 2 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 100 16's (1,600) in 1,716.

1,716 – 1,600 = 116

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

116 – 96 = 20

There is still 1 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.

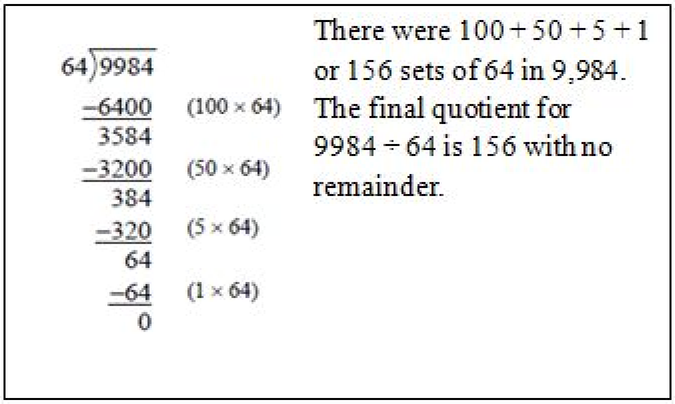
I know that 2 groups of 16 is 32.

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.



NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

******Primary focus on addition and subtraction in this unit.******

In 5th grade, students begin adding, subtracting, multiplying, and dividing decimals. This work should focus on concrete models and pictorial representations, rather than relying solely on the algorithm. The use of symbolic notations involves having students record the answers to computations (2.25 × 3 = 6.75), but this work should not be done without models or pictures. This standard includes students' reasoning and explanations of how they use models, pictures, and strategies.

Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers.

Examples:

3.6 + 1.7

- A student might estimate the sum to be larger than 5 because 3.6 is more than 3½ and 1.7 is more than 1½.

5.4 – 0.8

- A student might estimate the answer to be a little more than 4.4 because a number less than 1 is being subtracted.

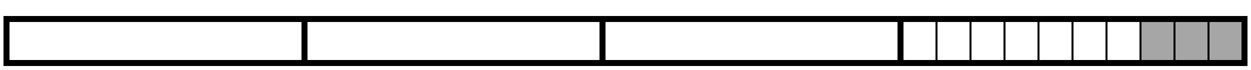
6 × 2.4

- A student might estimate the answer to be between 12 and 18 since 6 × 2 is 12 and 6 × 3 is 18. Another student might give an estimate of a little less than 15 because s/he figures the answer to be very close, but smaller than 6 × 2½ and think of 2½ groups of 6 as 15 (2 groups of 6) + 3 (½ of a group of 6).

Students should be able to express that when they add decimals they add tenths to tenths and hundredths to hundredths. So, when they are adding in a vertical format (numbers beneath each other), it is important that they write numbers with the same place value beneath each other. This understanding can be reinforced by connecting addition of decimals to their understanding of addition of fractions. Adding fractions with denominators of 10 and 100 is a standard in fourth grade.

Example: **4 - 0.3 (**3 tenths subtracted from 4 wholes)

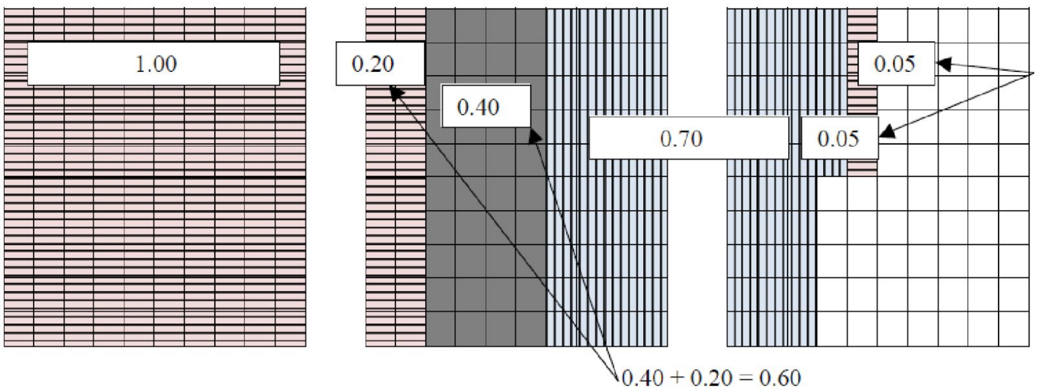
One of the wholes must be divided into tenths.



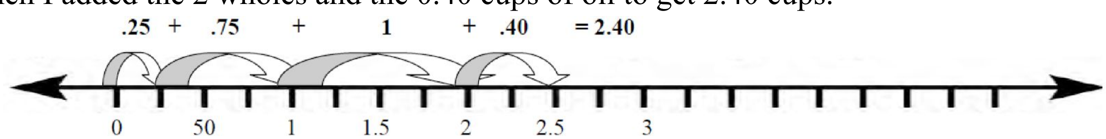
The solution is $3^{7}/_{10}$ or 3.7.

Example:
A recipe for a cake requires 1.25 cups of milk, 0.40 cups of oil, and 0.75 cups of water. How much liquid is in the mixing bowl?

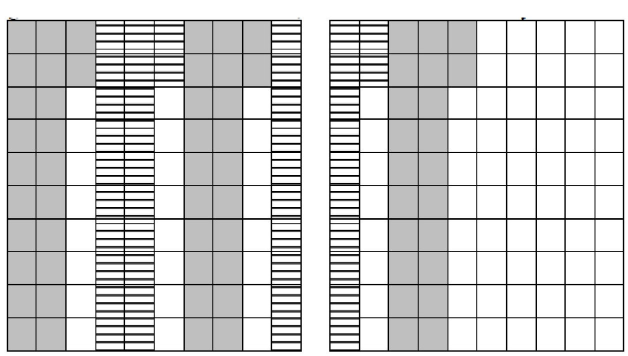
Student 1: 1.25 + 0.40 + 0.75
First, I broke the numbers apart. I broke 1.25 into 1.00 + 0.20 + 0.05. I left 0.40 like it was. I broke 0.75 into 0.70 + 0.05.
I combined my two 0.05's to get 0.10. I combined 0.40 and 0.20 to get 0.60. I added the 1 whole from 1.25. I ended up with 1 whole, 6 tenths, 7 more tenths, and another 1 tenth, so the total is 2.4.



Student 2: 1.25 + 0.40 + 0.75
I saw that the 0.25 in the 1.25 cups of milk and the 0.75 cups of water would combine to equal 1 whole cup. That plus the 1 whole in the 1.25 cups of milk gives me 2 whole cups. Then I added the 2 wholes and the 0.40 cups of oil to get 2.40 cups.

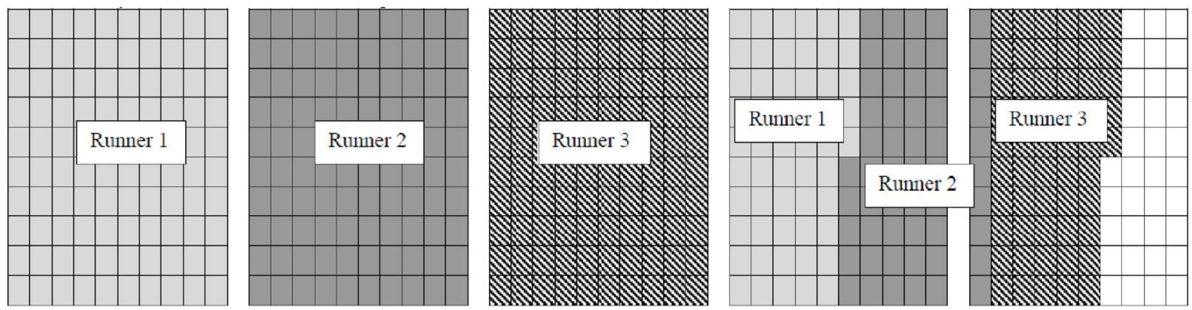


Example:
A gumball costs $0.22. How much do 5 gumballs cost? Estimate the total, and then calculate. Was your estimate close?



I estimate that the total cost will be a little more than a dollar. I know that five 20's equal 100 and we have five 22's. I have 10 whole columns shaded and 10 individual boxes shaded to represent the five sets of 22 cents. The 10 columns equal 1 whole dollar. The 10 individual boxes equal 10 hundredths or 1 tenth. My answer is $1.10.
My estimate was a little more than a dollar, and my answer was $1.10. I was really close.

Example: A relay race lasts 4.65 miles. The relay team has 3 runners. If each runner goes the same distance, how far does each team member run? Make an estimate, find your actual answer, and then compare them.



My estimate is that each runner runs between 1 and 2 miles. If each runner went 2 miles, that would be a total of 6 miles which is too high. If each runner ran 1 mile, that would be 3 miles, which is too low.

I used the 5 grids above to represent the 4.65 miles. I am going to use all of the first 4 grids and 65 of the squares in the 5th grid to represent the whole race. I have to divide the 4 whole grids and the 65 squares into 3 equal groups. I labeled each of the first 3 grids for each runner, so I know that each team member ran at least 1 mile. I then have 1 whole grid and 65 squares to divide up. Each column represents one-tenth. If I give 5 columns to each runner, that means that each runner has run 1 whole mile and 5 tenths of a mile. Now, I have 15 squares left to divide up. Each runner gets 5 of those squares. So each runner ran 1 mile, 5 tenths and 5 hundredths of a mile. I can write that as 1.55 miles.

My answer is 1.55 and my estimate was between 1 and 2 miles. I was pretty close.

<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?