**3rd Grade Unit 4 Mathematics**

Dear Parents,

The Common Core State Standards (CCSS), also known in Georgia as the Common Core Georgia Performance Standards (CCGPS), 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.

**OA.5 Apply properties of operations as strategies to multiply and divide.**

Examples:

* If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication)
* 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication)
* Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property)

This standard references properties of multiplication. While students DO NOT need to use the formal terms of these properties, students should understand that properties are rules about how numbers work. They need to be able to apply these properties flexibly and fluently. Students represent expressions using various objects, pictures, words, and symbols in order to develop their understanding of properties. They multiply by 1 and 0, and they divide by 1. They change the order of numbers to determine that the order of numbers does not make a difference in multiplication, but it does make a difference in division. Given three factors, they investigate changing the order of how they multiply the numbers to determine that changing the order does not change the product. They also decompose numbers to build fluency with multiplication.

The **associative property** states that the sum or product stays the same when the grouping of addends or factors is changed. For example, when a student multiplies 7 × 5 × 2, a student could rearrange the numbers to first multiply 5 × 2 = 10 and then multiply 10 × 7 = 70.

The **commutative property** (order property) states that the order of numbers does not matter when you are adding or multiplying numbers. For example, if a student knows that 5 × 4 = 20, then they also know that 4 × 5 = 20.

Students are introduced to the **distributive property** **of multiplication over addition** as a strategy for using products they know to solve products they don’t know. Students would be using mental math to determine a product. Here are ways that students could use the distributive property to determine the product of 7 × 6. Again, students should use the distributive property, but can refer to this in informal language such as “breaking numbers apart”.

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| **Student 1**  **7 × 6**  I know that 7 × 5 = 35 and  7 × 1 = 7. So, 7 x 6 = 35 + 7 which is 42. |  | **Student 2**  **7 × 6**  I know 7 × 3 = 21. So, since 6 is twice as much as 3, I can double 21 to get 42. |  | **Student 3**  **7 × 6**  I can break 7 into 5 and 2. I know 5 × 6 = 30 and  2 × 6 = 12 and 30 + 12 = 42. So, 7 x 6 = 42. |

Shown below is another example of how the **distributive property** helps students determine the products and factors of problems by breaking numbers apart.

Example:

In the problem 7 × 8 = ?, students can decompose the 7 into a 5 and 2, and reach the answer by multiplying 5 × 8 = 40 and 2 × 8 =16 and adding the two products (40 +16 = 56).

**2 × 8 = 16**

**5 × 8 = 40**

**OA.6 Understand division as an unknown-factor problem.**

Since multiplication and division are inverse operations, students are expected to solve problems and explain their processes of solving division problems that can also be represented as unknown factor multiplication problems.

Example: A student knows that 2 x 9 = 18. How can they use that fact to determine the answer to the following question: 18 people are divided into pairs in P.E. class. How many pairs are there? Write a division equation and explain your reasoning.

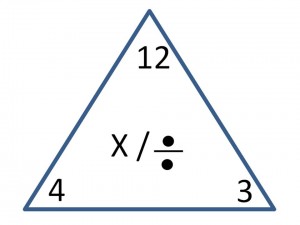
* Student: A pair means 2 people. I need to divide to find the answer:

18 ÷ 2 = \_\_\_\_. I can think of this problem as 2 x ? = 18. I know that 2 x 9 = 18. There would be 9 pairs, so 18 ÷ 2 = 9.

Fact family triangles demonstrate the inverse operations of multiplication and division by showing the two factors and how those factors relate to the product and/or quotient.

Example:

* 4 × 3 = 12
* 3 × 4 = 12
* 12 ÷ 3 = 4
* 12 ÷ 4 = 3



**OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.**

This standard uses the word fluently, which means being accurate, efficient (using a reasonable amount of steps and time), and flexible (using strategies such as the distributive property). “Know from memory” should not focus only on timed tests and repetitive practice, but ample experiences working with manipulatives, pictures, arrays, word problems, and numbers to internalize the basic facts (up to 9 × 9). Exposure to the 10s facts through place value is also helpful in building number sense as well as assisting students in learning their 5s facts.

By studying patterns and relationships in multiplication facts and relating multiplication and division, students build a foundation for fluency with multiplication and division facts. Students demonstrate fluency with multiplication facts through 10 and the related division facts. Multiplying and dividing fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them accurately, flexibly, and efficiently.

Strategies students may use to attain fluency include:

* Multiplication by zeros and ones
* Doubles (2s facts), Doubling twice (4s), Doubling three times (8s)
* Tens facts (relating to place value, 5 × 10 is 5 tens or 50)
* Five facts (half of tens)
* Skip counting (counting groups of \_\_ and knowing how many groups have been counted)
* Square numbers (3 × 3, 4 x 4, 5 x 5, etc)
* Nines (10 groups less one group, e.g., 9 × 3 is 10 groups of 3 minus one group of 3)
* Decomposing into known facts (6 × 7 is 6 x 6 plus one more group of 6)
* Turn-around facts (Commutative Property)
* Fact families (6 × 4 = 24; 24 ÷ 6 = 4; 24 ÷ 4 = 6; 4 × 6 = 24)

**NOTE**: By the end of Grade 3, students should know from memory all the products of two 1-digit numbers. Students should also have exposure to multiplication and division problems presented in both vertical and horizontal forms.