Fifth Grade Unit 7 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 Seven 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.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. $2{,}411 \times 5 = 12{,}055$.
- Next multiply by the 2 outside of the braces. $12{,}055 \times 2 = 24{,}110$.

This standard builds on the expectations from third grade where students learn the order of operations (In a numerical expression, computations must be done in a specific order according to a set of rules: parentheses first, then multiplication or division whichever comes first when reading from left to right, and finally addition or subtraction whichever comes first when reading from left to right). Students need experiences with multiple expressions that use grouping symbols to develop understanding of when and how to use parentheses as well as other grouping symbols such as brackets, and braces. First, students use these symbols with whole numbers. Later, the symbols can be used as students add, subtract, multiply and divide decimals and fractions.

Examples:

- $(26 + 18) \div 4$ Solution: 11
- $\{[2 \times (3 + 5)] – 9\} + [5 \times (23 - 18)]$ Solution: 32
- $12 – (4 \times 2)$ Solution: 4
- $(2 + 3) \times (15 – 5)$ Solution: 50

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

Examples:

- Insert parentheses to make $15 – 7 – 2$ equal to $10 \rightarrow 15 – (7 – 2) = 10$
- Insert brackets and parentheses to make $3 \times 125 \div 25 + 7$ equal to $22 \rightarrow [3 \times (125 \div 25)] + 7 = 22$
- Compare the value of $3 \times 2 + 5$ to the value of $3 \times (2 + 5)$.
- Compare the value of $15 – 6 + 7$ to the value of $15 – (6 + 7)$.

MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

This standard calls for students to convert measurements within the same system (metric or standard) in the context of multi-step, real-world problems. Students worked with both metric and standard units of length in second grade. In third grade, students worked with metric units of mass and liquid volume. In fourth grade, students worked with both systems and began conversions within systems in length, mass and liquid volume (capacity). Students should also explore how the base-ten system supports conversions within the metric system.

Examples:

- Sarah bought a roll of packing tape that was 55 yards long. She used 20 inches of tape to seal a box. How many inches of tape are left on the roll?
- Eric jumped 7 meters at his school's track meet. His friend, Nathan, jumped 4 centimeters less than Eric. How many meters did Nathan jump?
- Kyle's dad is 6 feet tall. Kyle's mom is 66 inches tall. How much taller is Kyle's dad than his mom?

MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

These standards develop the concept that volume refers to how much space a three-dimensional figure takes up. The study of volume begins with 5th graders looking at rectangular prisms. They use models to see that a rectangular prism can be packed with unit cubes (without gaps or overlaps) to find the volume. They can then see why volume is labeled with cubic units.

MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole- number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

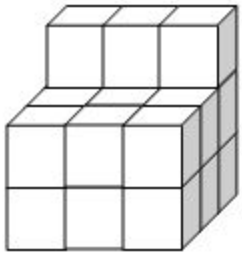
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

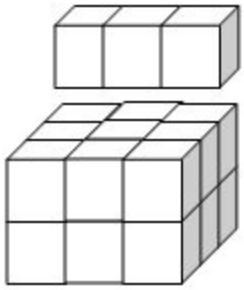
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems

This standard involves finding the volume of rectangular prisms, first by counting unit cubes, then by applying a formula. Students should have experiences to describe and reason about why the formula is true. Specifically, they are covering the bottom of a rectangular prism (length x width) with multiple layers (height). Therefore, the formula (length × width × height **or** area of the base x height) is an extension of the formula for the area of a rectangle.

This standard also calls for students to extend their work with the area of composite figures into the context of volume. Students should be given concrete experiences of breaking apart (decomposing) 3-dimensional figures into smaller rectangular prisms in order to find the volume of the entire 3-dimensional figure.

Example:
The volume of the three-dimensional figure below can be calculated by decomposing or breaking apart the figure into two different rectangular prisms.





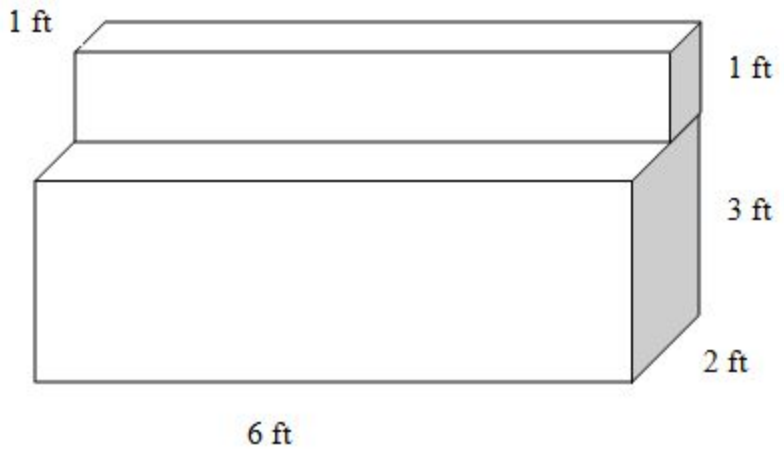
Students need multiple opportunities to measure volume by filling rectangular prisms with cubes and looking at the relationship between the total volume and the area of the base. They derive the volume formula (volume equals the area of the base times the height) and explore how this idea would apply to other prisms. Students use the associative property of multiplication and decomposition of numbers using factors to investigate rectangular prisms with a given number of cubic units.

Example:
When given 24 cubes, students make as many rectangular prisms as possible with a volume of 24 cubic units. Students build the prisms and record the dimensions.

Length	Width	Height
1	2	12
2	2	6
4	2	3
8	3	1

After constructing rectangular prisms and examining how the formula is derived, students are ready to apply the formula for volume to not only rectangular prisms, but figures composed of more than one connected, but not overlapping, rectangular prism.

Example: The drama department is building a concrete platform for their play. What is the volume of the platform?



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

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

This standard extends students' work with area. In third grade, students determine the area of rectangles and composite rectangles. In fourth grade, students continue this work. The fifth grade standard calls students to continue that modeling using fractional lengths.

Example:

A class is made up of three-fourths boys. Two-thirds of the boys are wearing tennis shoes. What fraction of the class are boys wearing tennis shoes?

This question is asking what is $^{2}/_{3}$ of $^{3}/_{4}$ or what is $^{2}/_{3}$ ´ ¾? In this case you have $^{2}/_{3}$ groups of $^{3}/_{4}$.

Boys

Boys wearing tennis shoes = ½ the class

Student:

I drew a rectangle to represent the whole class. The four columns represent the fourths of a class. I shaded 3 columns to represent the fraction that are boys. I then split the rectangle with horizontal lines into thirds.

The dark area represents the fraction of the boys in the class wearing tennis shoes, which is 6 out of 12. That is $^{6}/_{12}$, which equals $^{1}/_{2}$.