



# 5th Grade Math





## Fifth Grade Mathematics Teaching & Learning Framework

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Quarter 1			Quarter 2		Quarter 3		Quarter 4	
Unit 1 3 weeks	Unit 2 2 weeks	Unit 3 4 weeks	Unit 4 9 weeks		Unit 5 3 weeks	Unit 6 6 weeks	Unit 7 2 weeks	Unit 8 7 weeks
<b>Order of Operations and Whole Numbers</b>	<b>Decimals</b>	<b>Multiplying and Dividing with Decimals</b>	<b>Adding, Subtracting, Multiplying and Dividing Fractions</b>		<b>2D Figures</b>	<b>Volume and Measurement</b>	<b>Geometry and the Coordinate Plane</b>	<b>Review, Mastery and Extend</b>
<b>MGSE5.OA.1</b> (Use parenthesis and evaluate expressions) <b>MGSE5.OA.2</b> (Write simple expressions) <b>MGSE5.NBT.1</b> (Place value) <b>MGSE5.NBT.2</b> (Power of 10) <b>MGSE5.NBT.5</b> (Fluently multiply) <b>MGSE5.NBT.6</b> (Whole number quotients)	<b>MGSE5.NBT.1</b> (Place value) <b>MGSE5.NBT.3</b> (Read, write and compare decimals to thousandths) <b>MGSE5.NBT.4</b> (Round decimals) <b>MGSE5.NBT.7</b> (Add, subtract decimals)	<b>MGSE5.NBT.2</b> (Power of ten) <b>MGSE5.NBT.7</b> (All operations with decimals)	<b>MGSE5.NF.1</b> (Add and subtract fractions) <b>MGSE5.NF.2</b> (Word problems, add and subtract fractions) <b>MGSE5.NF.3</b> (Interpret fraction as division) <b>MGSE5.NF.4</b> (Multiply fractions) <b>MGSE5.NF.5</b> (Multiplication as scaling) <b>MGSE5.NF.6</b> (Real world problems of fractions and mixed numbers) <b>MGSE5.NF.7</b> (Division of Unit fraction) <b>MGSE5.MD.2</b> (Line plot)		<b>MGSE5.G.3</b> (Understanding attributes) <b>MGSE5.G.4</b> (Classify two-dimensional figures)	<b>MGSE5.MD.1</b> (Converting measurement) <b>MGSE5.MD.2</b> (Line plot) <b>MGSE5.MD.3</b> (Volume as an attribute) <b>MGSE5.MD.4</b> (Volume by counting cubes) <b>MGSE5.MD.5</b> (Volume) <b>MGSE5.NF.6</b> (Real world problems of fractions and mixed numbers) <b>MGSE5.NBT.7</b> (All operations with decimals)	<b>MGSE5.G.1</b> (Define a coordinate system) <b>MGSE5.G.2</b> (Real world math problems with coordinate plane) <b>MGSE5.OA.3</b> (Generate patterns)	Review all standards based on student needs.  <b>Mastery:</b> <b>MGSE5.NF.6</b> (Real world fractions) <b>MGSE5.NBT.5</b> (Fluently multiply) <b>MGSE5.MD.5</b> (Volume)  <b>Extend:</b> <b>MGSE.6.NS.1</b> (Divide fractions) <b>MGSE.6.NS.3</b> (All operations with decimals)
These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units. All units will include the Mathematical Practices and indicate skills to maintain.								

**NOTE:** Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

**Grades K-2 Key:** MGSE= Mathematics Georgia Standards of Excellence CC = Counting and Cardinality, G= Geometry, MD=Measurement and Data, NBT= Number and Operations in Base Ten, OA = Operations and Algebraic Thinking.



## Standards for Mathematical Practice

*Mathematical Practices are listed with each grade's mathematical content standards to reflect the need to connect the mathematical practices to mathematical content in instruction.*

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

### ***Students are expected to:***

#### **1. Make sense of problems and persevere in solving them.**

Students solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, “What is the most efficient way to solve the problem?”, “Does this make sense?”, and “Can I solve the problem in a different way?”.

#### **2. Reason abstractly and quantitatively.**

Fifth graders should recognize that a number represents a specific quantity. They connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions that record calculations with numbers and represent or round numbers using place value concepts.

#### **3. Construct viable arguments and critique the reasoning of others.**

In fifth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?” They explain their thinking to others and respond to others’ thinking.



## Standards for Mathematical Practice continued

### **4. Model with mathematics.**

Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.

### **5. Use appropriate tools strategically.**

Fifth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data.

### **6. Attend to precision.**

Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units

### **7. Look for and make use of structure.**

In fifth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. They examine numerical patterns and relate them to a rule or a graphical representation.

### **8. Look for and express regularity in repeated reasoning.**

Fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. Students explore operations with fractions with visual models and begin to formulate generalizations.



## Operations and Algebraic Thinking (5.OA)

### Write and interpret numerical expressions.

**MGSE5.OA.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

**MGSE5.OA.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as  $2 \times (8 + 7)$ . Recognize that  $3 \times (18932 + 921)$  is three times as large as  $18932 + 921$ , without having to calculate the indicated sum or product.

### Analyze patterns and relationships.

**MGSE5.OA.3** Generate two numerical patterns using a given rule. Identify apparent relationships between corresponding terms by completing a function table or input/output table. Using the terms created, form and graph ordered pairs on a coordinate plane.

## Number and Operations in Base Ten (5.NBT)

### Understand the place value system.

**MGSE5.NBT.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and  $1/10$  of what it represents in the place to its left.

**MGSE5.NBT.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

**MGSE5.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.,  $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$ .
- b. Compare two decimals to thousandths based on meanings of the digits in each place, using  $>$ ,  $=$ , and  $<$  symbols to record the results of comparisons.

**MGSE5.NBT.4** Use place value understanding to round decimals up to the hundredths place.



## **Perform operations with multi-digit whole numbers and with decimals to hundredths.**

**MGSE5.NBT.5** Fluently multiply multi-digit whole numbers using the standard algorithm (or other strategies demonstrating understanding of multiplication) up to a 3 digit by 2 digit factor.

**MGSE5.NBT.6** Fluently divide up to 4-digit dividends and 2-digit divisors by using at least one of the following methods: 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 or concrete models. (e.g., rectangular arrays, area models)

**MGSE5.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.

## **Number and Operations Fractions (5.NF)**

### **Use equivalent fractions as a strategy to add and subtract fractions.**

**MGSE5.NF.1** Add and subtract fractions and mixed numbers with unlike denominators by finding a common denominator and equivalent fractions to produce like denominators.

**MGSE5.NF.2** Solve word problems involving addition and subtraction of fractions, 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. For example, recognize an incorrect result  $2/5 + 1/2 = 3/7$ , by observing that  $3/7 < 1/2$ .

### **Apply and extend previous understandings of multiplication and division to multiply and divide fractions.**

**MGSE5.NF.3** Interpret a fraction as division of the numerator by the denominator ( $a/b = a \div b$ ). 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. *Example:*  $\frac{3}{5}$  can be interpreted as "3 divided by 5 and as 3 shared by 5".

**MGSE5.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

- Apply and use understanding of multiplication to multiply a fraction or whole number by a fraction. *Examples:*  $\frac{a}{b} \times q$  as  $\frac{a}{b} \times \frac{q}{1}$  and  $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$
- 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.



**Apply and extend previous understandings of multiplication and division to multiply and divide fractions cont.**

**MGSE5.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. **Example:  $4 \times 10$  is twice as large as  $2 \times 10$ .**
- 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.

**MGSE5.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

**MGSE5.NF.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions

- a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for  $(1/3) \div 4$ , and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $(1/3) \div 4 = 1/12$  because  $(1/12) \times 4 = 1/3$ .
- b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for  $4 \div (1/5)$ , and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $4 \div (1/5) = 20$  because  $20 \times (1/5) = 4$ .
- c. 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. For example, how much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $1/3$ -cup servings are in 2 cups of raisins?



## Measurement and Data (5.MD)

### **Convert like measurement units within a given measurement system.**

**MGSE5.MD.1** Convert among different-sized standard measurement units (mass, weight, length, time, etc.) within a given measurement system (customary and metric) (e.g., convert 5cm to 0.05m), and use these conversions in solving multi-step, real world problems. Represent and interpret data.

**MGSE5.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. *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 redistributed equally.*

### **Geometric Measurement: understand concepts of volume and relate volume to multiplication and division.**

**MGSE5.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.

**MGSE5.MD.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

**MGSE5.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.





## Geometry (5.G)

### **Graph points on the coordinate plane to solve real-world and mathematical problems.**

**MGSE5.G.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

**MGSE5.G.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

### **Classify two-dimensional figures into categories based on their properties**

**MGSE5.G.3** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

**MGSE5.G.4** Classify two-dimensional figures in a hierarchy based on properties (*polygons, triangles, and quadrilaterals*).