Louisiana STUDENT STANDARDS MATHEMATICS

Grade 5

Louisiana Student Standards: Companion Document for Teachers 2.0

This document is designed to assist educators in interpreting and implementing the Louisiana Student Standards for Mathematics. Found here are descriptions of each standard which answer questions about the standard's meaning and application to student understanding. Also included are the intended level of rigor and coherence links to prerequisite and corequisite standards. Examples are samples only and should not be considered an exhaustive list.

Additional information on the Louisiana Student Standards for Mathematics, including how to read the standards' codes, a listing of standards for each grade or course, and links to additional resources, is available on the Louisiana Department of Education [K-12 Math Planning Page](). Please direct any questions to [STEM@la.gov]().

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DEPARTMENT of EDUCATION
Louisiana Believes

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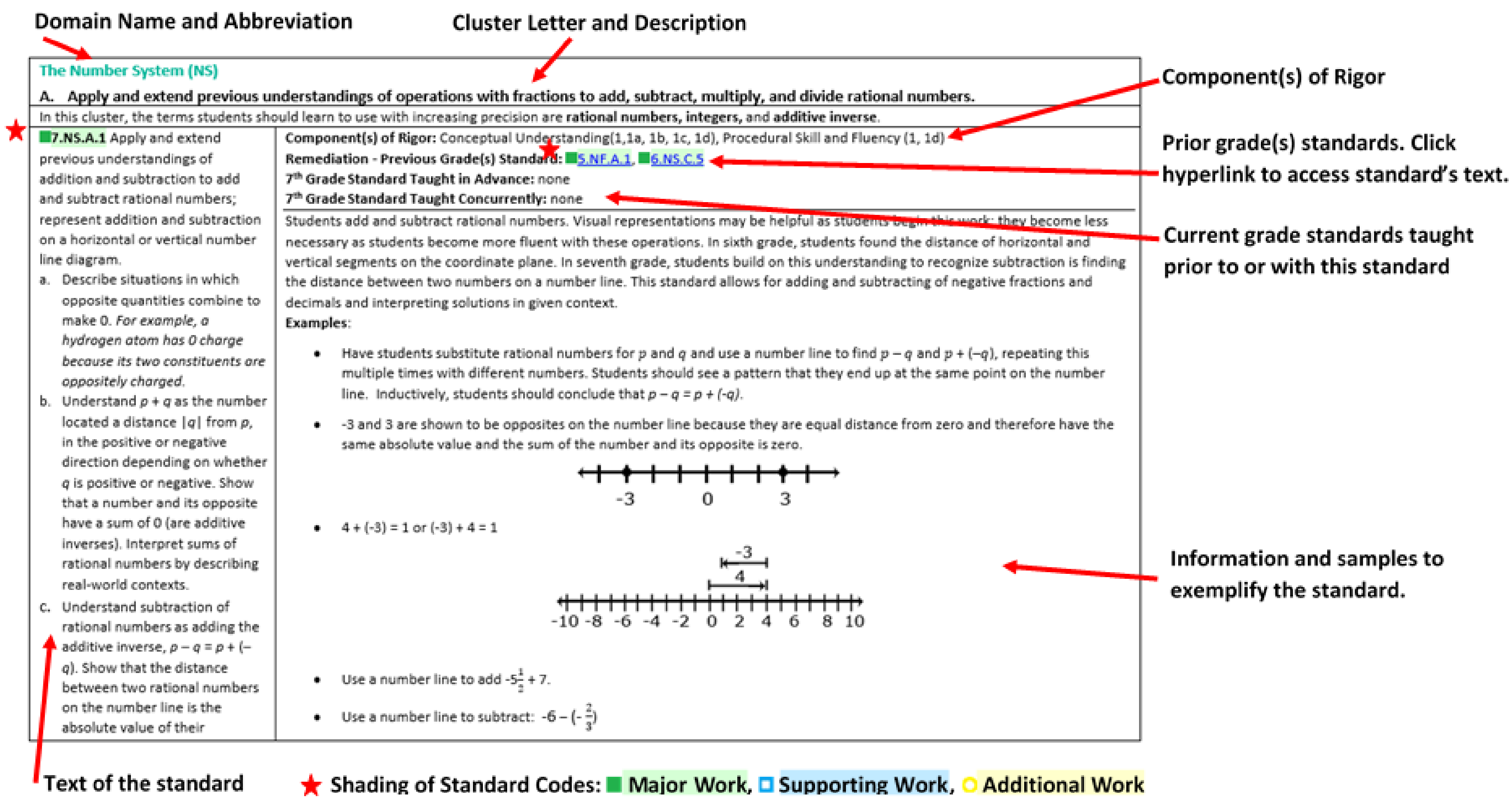
How-to-Read Guide

The diagram below provides an overview of the information found in all companion documents. Definitions and more complete descriptions are provided on the next page.



The Number System (NS)

A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

In this cluster, the terms students should learn to use with increasing precision are **rational numbers, integers,** and **additive inverse**.

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their	**Component(s) of Rigor:** Conceptual Understanding(1,1a, 1b, 1c, 1d), Procedural Skill and Fluency (1, 1d) **Remediation - Previous Grade(s) Standard:** 5.NF.A.1, 6.NS.C.5 **7th Grade Standard Taught in Advance:** none **7th Grade Standard Taught Concurrently:** none Students add and subtract rational numbers. Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with these operations. In sixth grade, students found the distance of horizontal and vertical segments on the coordinate plane. In seventh grade, students build on this understanding to recognize subtraction is finding the distance between two numbers on a number line. This standard allows for adding and subtracting of negative fractions and decimals and interpreting solutions in given context. **Examples:** • Have students substitute rational numbers for p and q and use a number line to find $p - q$ and $p + (-q)$, repeating this multiple times with different numbers. Students should see a pattern that they end up at the same point on the number line. Inductively, students should conclude that $p - q = p + (-q)$. • -3 and 3 are shown to be opposites on the number line because they are equal distance from zero and therefore have the same absolute value and the sum of the number and its opposite is zero. -3 0 3 • 4 + (-3) = 1 or (-3) + 4 = 1 -3 4 -10 -8 -6 -4 -2 0 2 4 6 8 10 • Use a number line to add $-5\frac{1}{2} + 7$. • Use a number line to subtract: $-6 - (-\frac{2}{3})$

1. **Domain Name and Abbreviation:** A grouping of standards consisting of related content that are further divided into clusters. Each domain has a unique abbreviation and is provided in parentheses beside the domain name.
2. **Cluster Letter and Description:** Each cluster within a domain begins with a letter. The description provides a general overview of the focus of the standards in the cluster.
3. **Previous Grade(s) Standards:** One or more standards that students should have mastered in previous grades to prepare them for the current grade standard. If students lack the pre-requisite knowledge and remediation is required, the previous grade standards provide a starting point.
4. **Standards Taught in Advance:** These current grade standards include skills or concepts on which the target standard is built. These standards are best taught before the target standard.
5. **Standards Taught Concurrently:** Standards which should be taught with the target standard to provide coherence and connectedness in instruction.
6. **Component(s) of Rigor:** See full explanation on components of rigor.
7. **Sample Problem:** The sample provides an example how a student might meet the requirements of the standard. Multiple examples are provided for some standards. However, sample problems should not be considered an exhaustive list. Explanations, when appropriate, are also included.
8. **Text of Standard:** The complete text of the targeted Louisiana Student Standards of Mathematics is provided.

Classification of Major, Supporting, and Additional Work

Students should spend the large majority of their time on the ■ major work of the grade. ◘ Supporting work and, where appropriate, ○ additional work can engage students in the major work of the grade. Each standard is color-coded to quickly and simply determine how class time should be allocated. Furthermore, standards from previous grades that provide foundational skills for current grade standards are also color-coded to show whether those standards are classified as ■ major, ◘ supporting, or ○ additional in their respective grades.

Components of Rigor

The K-12 mathematics standards lay the foundation that allows students to become mathematically proficient by focusing on conceptual understanding, procedural skill and fluency, and application.

Conceptual Understanding refers to understanding mathematical concepts, operations, and relations. It is more than knowing isolated facts and methods. Students should be able to make sense of why a mathematical idea is important and the kinds of contexts in which it is useful. It also allows students to connect prior knowledge to new ideas and concepts.

Procedural Skill and Fluency is the ability to apply procedures accurately, efficiently, and flexibly. It requires speed and accuracy in calculation while giving students opportunities to practice basic skills. Students' ability to solve more complex application tasks is dependent on procedural skill and fluency.

Application provides a valuable content for learning and the opportunity to solve problems in a relevant and a meaningful way. It is through real-world application that students learn to select an efficient method to find a solution, determine whether the solution makes sense by reasoning, and develop critical thinking skills.

Standards for Mathematical Practices

The Louisiana Standards for Mathematical Practice are expected to be integrated into every mathematics lesson for all students in grades K-12. Below are a few examples of how these practices may be integrated into tasks that students in grade 5 complete.

Louisiana Standards for Mathematical Practice (MP)	
Louisiana Standard	**Explanations and Examples**
5.MP.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?".
5.MP.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.
5.MP.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.
5.MP.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.

Louisiana Standard	Explanations and Examples
5.MP.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.
5.MP.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.
5.MP.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.
5.MP.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 (OA)

A. Write and interpret numerical expressions.

In this cluster, the terms students should learn to use with increasing precision are **parentheses, brackets, numerical expression, expression, evaluate,** and **grouping symbols**.

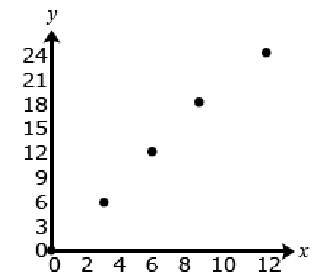
Louisiana Standard	Explanations and Examples
5.OA.A.1 Use parentheses or brackets in numerical expressions, and evaluate expressions with these symbols	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** none **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** none This standard builds on the expectations of third grade where students are expected to start learning the conventional order for performing operations. Students need experiences with multiple expressions that use grouping symbols throughout the year to develop understanding of when and how to use parentheses and brackets. First, students use these symbols with whole numbers. Then the symbols can be used as students add, subtract, multiply and divide decimals and fractions. Students should know the order in which to execute the operations in simple expressions with no grouping symbols. **Examples**: • $(26 + 18) \div 4$ *Answer: 11* • $12 - 0.4 \times 2$ *Answer: 11.2* • $(2 + 3) \times (1.5 - 0.5)$ *Answer: 5* • $6 - \left(\frac{1}{2} + \frac{1}{3}\right)$ *Answer:* $5\frac{1}{6}$ • $80 \div \left[2 \times \left(3\frac{1}{2} + 1\frac{1}{2}\right)\right] + 100$ *Answer: 108* To further develop students' understanding of grouping symbols and facility 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 the equation true. $15 - 7 - 2 = 10 \rightarrow 15 - (7 - 2) = 10$ • Insert grouping symbols to make the equation true. $3 \times 125 \div 25 + 7 = 22 \rightarrow [3 \times (125 \div 25)] + 7 = 22$

5.OA.A.2 Write simple expressions that record calculations with whole numbers, fractions, and decimals, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18,932 + 9.21) is three times as large as 18,932 + 9.21, without having to calculate the indicated sum or product.*	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** none **5th Grade Standard Taught in Advance:** 5.OA.A.1 **5th Grade Standard Taught Concurrently:** 5.NF.B.5 Students use their understanding of operations and grouping symbols to write expressions and interpret the meaning of a numerical expression. Expressions are a series of numbers and symbols (+, –, ×, ÷) without an equal sign. Equations result when two expressions are set equal to each other (2 + 3 = 4 + 1). Examples: 4(5 + 3) is an expression. When a student computes 4(5 + 3), he/she is evaluating the expression. The expression equals 32. 4(5 + 3) = 32 is an equation. **Examples**: • Compare 3 × 2 + 5 and 3 × (2 + 5) • Compare 15 – 6 + 7 and 15 – (6 + 7) • Write an expression for calculations given in words such as "divide 144 by 12, and then subtract $\frac{7}{8}$." They write (144 ÷ 12) – $\frac{7}{8}$ or 144 ÷ 12 – $\frac{7}{8}$. • Describe how 0.5 × (300 ÷ 15) relates to 300 ÷ 15. • Write an expression for "double five and then add 26."

Operations and Algebraic Thinking (OA)

B. Analyze patterns and relationships.

In this cluster, the terms students should learn to use with increasing precision are **numerical pattern, rule, ordered pair, coordinate plane, corresponding terms,** and **sequence**.

Louisiana Standard	Explanations and Examples
5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 4.OA.C.5 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** none This standard extends the work from fourth grade, where students generate numerical patterns when they are given one rule. In fifth grade, students are given two rules and generate two numerical patterns. **Examples**: • Starting with 0, use the rule "add 3" to write a sequence of numbers. Students write 0, 3, 6, 9, 12, . . . • Staring with 0, use the rule "add 6" to write a sequence of numbers. Students write 0, 6, 12, 18, 24, . . . After comparing these two sequences, the students notice that each term in the second sequence is twice the corresponding term of the first sequence. One way they justify this is by describing the patterns of the terms. Their justification may include some mathematical notation (See example below). A student may explain that both sequences start with zero and to generate each term of the second sequence he/she added 6, which is twice as much as was added to produce the terms in the first sequence. Students may also use the distributive property to describe the relationship between the two numerical patterns by reasoning that 6 + 6 + 6 = 2 (3 + 3 + 3). 0, $^{+3}$ 3, $^{+3}$ 6, $^{+3}$ 9, $^{+3}$12, . . . 0, $^{+6}$ 6, $^{+6}$ 12, $^{+6}$18, $^{+6}$ 24, . . .  Once students can describe that each term of the second sequence of numbers is twice the corresponding term of the first sequence, the terms can be written in ordered pairs and then graphed on a coordinate plane. They should recognize that each point on the graph represents two quantities in which the second quantity is twice the first quantity. Ordered pairs: (0, 0), (3, 6), (6, 12), (9, 18)

Number and Operations in Base Ten (NBT)

A. Understand the place value system.

In this cluster, the terms students should learn to use with increasing precision are **place value, decimal, decimal point, pattern, tenths, thousands, greater than, less than, equal to, ‹, ›, =, compare/comparison, round, base-ten numerals (standard from), number name (written form), expanded form, inequality,** and **expression**.

Louisiana Standard	Explanations and Examples
5.NBT.A.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.	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** 4.NBT.A.1, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** none

In fourth grade, students examined the relationships of the digits in numbers for whole numbers only by comparing the place value of a digit to the place value of the digit to the right. Comparing the values of digits to both the left and right of a given digit is the focus of this standard. This standard extends this understanding to the relationship of decimal fractions. Students use base-ten blocks, pictures of base-ten blocks, and interactive images of base-ten blocks to manipulate and investigate the place value relationships. They use their understanding of unit fractions to compare decimal places and fractional language to describe those comparisons.

Before considering the relationship of decimal fractions, students express their understanding that in multi-digit whole numbers, a digit in one place represents 10 times what it represents in the place to its right and 1/10 of what it represents in the place to its left.

A student thinks, "I know that in the number 5555, the 5 in the tens place (55<u>5</u>5) represents 50 and the 5 in the hundreds place (5<u>5</u>55) represents 500. So a 5 in the hundreds place is ten times as much as a 5 in the tens place or a 5 in the tens place is 1/10 of the value of a 5 in the hundreds place."

To extend this understanding of place value to their work with decimals, students use a model of one unit; they cut it into 10 equal pieces, shade in, or describe 1/10 of that model using fractional language ("This is 1 out of 10 equal parts. So it is 1/10. I can write this using 1/10 or 0.1."). They repeat the process by finding 1/10 of a 1/10 (e.g., dividing 1/10 into 10 equal parts to arrive at 1/100 or 0.01) and can explain their reasoning, "0.01 is 1/10 of 1/10 thus is 1/100 of the whole unit."

In the number 55.55, each digit is 5, but the value of the digits is different because of the placement.

5	5	.	5	5

The 5 that the arrow points to is 1/10 of the 5 to the left and 10 times the 5 to the right. The 5 in the ones place is 1/10 of 50 and 10 times five tenths.

5	5	.	5	5

The 5 that the arrow points to is 1/10 of the 5 to the left and 10 times the 5 to the right. The 5 in the tenths place is 10 times five hundredths.

Number and Operations in Base Ten (NBT) **Understand the place value system.**	
Louisiana Standard	**Explanations and Examples**
5.NBT.A.2 Explain and apply patterns in the number of zeros of the product when multiplying a number by powers of 10. Explain and apply patterns in the values of the digits in the product or the quotient, when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. *For example, $10^0 = 1$, $10^1 = 10$ ... and $2.1 \times 10^2 = 210$.*	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** none **5th Grade Standard Taught in Advance:** 5.NBT.A.1 **5th Grade Standard Taught Concurrently:** 5.NBT.B.5, 5.NBT.B.7 New at grade 5 is the use of whole number exponents to denote powers of 10. Students understand why multiplying by a power of 10 shifts the digits in a whole number or decimal that many places to the left. The ultimate goal is that students can automatically write the standard form of the answer if given a problem such as 5.16×10^2. Some curricula focus the movement of the decimal point in patterns. Regardless of the approach, this skill should be developed based on student understanding of the changes in place values of the digits rather than on application of an algorithm. **Example:** Multiplying by 10^4 means to multiply the number by 10 four times. Multiplying by 10 once shifts every digit of the multiplicand one place to the left in the product (the product is ten times as large as the original number) because in the base-ten system the value of each place is 10 times the value of the place to its right. So multiplying by 10 four times shifts every digit 4 places to the left making the value of each digit 10,000 times as large as it was in the original number. Dividing by 10^4 means to divide the number by 10 four times. Dividing by 10 once shifts every digit of the dividend one place to the right in the quotient (the quotient is ten times as small as the original number) because in the base-ten system the value of each place is 10 times the value of the place to its right. So dividing by 10 four times shifts every digit 4 places to the right making the value of each digit 10,000 times as small as it was in the original number. Patterns in the number of 0s in products and quotients of a whole number and a power of 10 and the location of the decimal point in products of decimals with powers of 10 can be explained in terms of place value. Because students have developed their understandings of and computations with decimals in terms of multiples rather than powers, connecting the terminology of multiples with that of powers affords connections between understanding of multiplication/division and exponentiation.

5.NBT.A.2 *continued*	**Examples**: • Students might write: $36 \times 10 = 36 \times 10^1 = 360$ $36 \times 10 \times 10 = 36 \times 10^2 = 3600$ $36 \times 10 \times 10 \times 10 = 36 \times 10^3 = 36{,}000$ $36 \times 10 \times 10 \times 10 \times 10 = 36 \times 10^4 = 360{,}000$ $36 \div 10 = 36 \div 10^1 = 3.6$ $36 \div 10 \div 10 = 36 \div 10^2 = 0.36$ $36 \div 10 \div 10 \div 10 = 36 \div 10^3 = 0.036$ $36 \div 10 \div 10 \div 10 \div 10 = 36 \div 10^4 = 0.0036$ • Students might think and/or say: I noticed that every time I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the right. To make a digit 10 times smaller, I have to move it one place to the right. • When I multiplied 36 by 10, the 30 became 300. The 6 became 60 and the 36 became 360. So I had to add a zero at the end to have 3 represent 3 hundreds (instead of 3 tens) and 6 represents 6 tens (instead of 6 ones). Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense. $523 \times 10^3 = 523{,}000$ The place value of 523 is increased by 3 places. $5.223 \times 10^2 = 522.3$ The place value of 5.223 is increased by 2 places. $52.3 \div 10^1 = 5.23$ The place value of 52.3 is decreased by one place.

5.NBT.A.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 × (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.	**Component(s) of Rigor:** Conceptual Understanding (3, 3a,3b), Procedural Skill and Fluency (3,3a) **Remediation - Previous Grade(s) Standard**: 4.NBT.A.2, 4.NF.C.7 **5th Grade Standard Taught in Advance:** 5.NBT.A.1 **5th Grade Standard Taught Concurrently:** none Students build on the understanding they developed in fourth grade to read, write, and compare decimals to thousandths. They connect their prior experiences with using decimal notation for fractions and addition of fractions with denominators of 10 and 100. They use concrete models and number lines to extend this understanding to decimals to the thousandths. Models may include base-ten blocks, place value charts, grids, pictures, drawings, manipulatives, technology-based, etc. They read decimals using fractional language and write decimals in fractional form, as well as in expanded notation as shown in the standard (part a). 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) 0.720 7 × (1/10) + 2 × (1/100) 7 × (1/10) + 2 × (1/100) + 0 × (1/1000) 0.70 + 0.02 720/1000 Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500), 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 also think that it is 8 hundredths more. 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 and the first number has no hundredths so the second number must be larger." Another student might think while writing fractions, "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). So, 260 thousandths is more than 207 thousandths."

5.NBT.A.4 Use place value understanding to round decimals to any place.

Component(s) of Rigor: Conceptual Understanding , Procedural Skill and Fluency
Remediation - Previous Grade(s) Standard: 4.NBT.A.3
5th Grade Standard Taught in Advance: 5.NBT.A.1, 5.NBT.A.3
5th Grade Standard Taught Concurrently: none

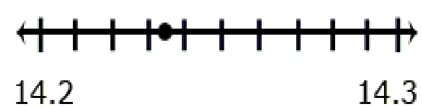
This standard refers to rounding. **Students should go beyond simply applying an algorithm or procedure for rounding.** The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line to support their work with rounding.

When rounding a decimal to a given place, students may identify the two possible answers, and use their understanding of place value to compare the given number to the possible answers.

Example:

- Round 14.235 to the nearest tenth.

  Students recognize that the possible answer must be in tenths; thus, it is either 14.2 or 14.3. They then identify that 14.235 is closer to 14.2 (14.20) than to 14.3 (14.30).



Students may use benchmark numbers to support this work. Benchmarks are convenient numbers for comparing and rounding numbers. 0, 0.5, 1, 1.5 are examples of benchmark numbers.

<table>
<tr><td colspan="2">Number and Operations in Base Ten (NBT)
B. Perform operations with multi-digit whole numbers and with decimals to hundredths.</td></tr>
<tr><td colspan="2">In this cluster, the terms students should learn to use with increasing precision are algorithm, decimal, decimal point, tenths, hundredths, product, quotient, dividend, divisor, factor rectangular array, area model, properties, and reasoning.</td></tr>
<tr><td>Louisiana Standard</td><td>Explanations and Examples</td></tr>
<tr><td>5.NBT.B.5 Fluently multiply multi-digit whole numbers using the standard algorithm.</td><td>Component(s) of Rigor: Procedural Skill and Fluency
Remediation - Previous Grade(s) Standard: 4.NBT.B.4, 4.NBT.B.5
5th Grade Standard Taught in Advance: 5.NBT.A.1
5th Grade Standard Taught Concurrently: 5.NBT.A.2, 5.NBT.B.7

In prior grades, students used various strategies to multiply. Students can continue to use these different strategies as long as they are efficient, but must also understand and be able to use the standard algorithm. In applying the standard algorithm, students recognize the importance of place value.

This standard refers to fluency which means accuracy (correct answer), efficiency (a reasonable amount of steps), and flexibility (using strategies such as the distributive property or breaking numbers apart also using strategies according to the numbers in the problem, e.g., 26×4 may lend itself to $(25 \times 4) + 4$ where as another problem might lend itself to making an equivalent problem $32 \times 4 = 64 \times 2$). This standard builds upon students' work with multiplying numbers in third and fourth grade. In fourth grade, students developed understanding of multiplication through using various strategies. While the standard algorithm is mentioned, alternative strategies are also appropriate to help students develop conceptual understanding. Students can continue to use these different strategies as long as they are efficient, but must also understand and be able to use the standard algorithm. In applying the standard algorithm, students recognize the importance of place value.

Examples:

• 123×34. When students apply the standard algorithm, they, decompose 34 into 30 + 4. Then they multiply 123 by 4, the value of the number in the ones place, and then multiply 123 by 30, the value of the 3 in the tens place, and add the two products.</td></tr>
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5.NBT.B.5 *continued*

Examples of alternative strategies and explanations for 225 × 12

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 up 225 into 200 and 25.
200 × 12 = 2,400
I broke 25 up into 5 × 5, so I had 5 × 5 ×12 or 5 × 12 × 5.
5 × 12= 60. 60 × 5 = 300
I then added 2,400 and 300
2,400 + 300 = 2,700.

Student 3
I doubled 225 and cut 12 in half to get 450 × 6. I then doubled 450 again and cut 6 in half to get 900 × 3.
900 × 3 = 2,700.

- Draw an array model for 225 × 12

	200	20	5
10	2,000	200	50
2	400	40	10

$$\begin{array}{r} 2{,}000 \\ 400 \\ 200 \\ 40 \\ 50 \\ \underline{+\ 10} \\ 2{,}700 \end{array}$$

5.NBT.B.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, subtracting multiples of the divisor and/or the relationship between multiplication and division. Illustrate and/or explain the calculation by using equations, rectangular arrays, area models, or other strategies based on place value.

Component(s) of Rigor: Conceptual Understanding, Procedural Skill and Fluency
Remediation - Previous Grade(s) Standard: 4.NBT.B.4, 4.NBT.B.6
5th Grade Standard Taught in Advance: 5.NBT.A.1, 5.NBT.B.5
5th Grade Standard Taught Concurrently: 5.NBT.B.7

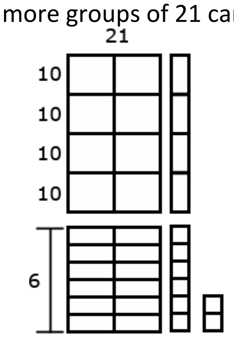
This standard references various strategies for division. Division problems can include remainders. In fourth grade, students’ experiences with division were limited to dividing by one-digit divisors. This standard extends students’ prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a “familiar” number, a student might decompose the dividend using place value.

Examples:

- Using expanded notation $2682 \div 25 = (2000 + 600 + 80 + 2) \div 25$
- Using his or her understanding of the relationship between 100 and 25, a student might think:

  I know that 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80.
  600 divided by 25 has to be 24.
  Since 3×25 is 75, I know that 80 divided by 25 is 3 with a reminder of 5.
  (Note: a student might divide into 82 and not 80.)
  I can’t divide 2 by 25 so 2 plus the 5 leaves a remainder of 7.
  $80 + 24 + 3 = 107$. So, the answer is 107 with a remainder of 7.

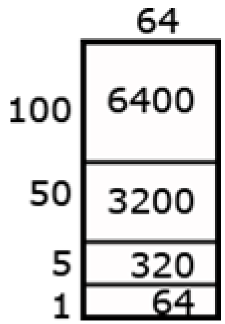
- Using an equation that relates division to multiplication, $25 \times n = 2682$, a student might estimate the answer to be slightly larger than 100 because she recognizes that $25 \times 100 = 2500$.
- Example: $968 \div 21$
  Using base-ten models, a student can represent 962 and use the models to make an array with one dimension of 21. The student continues to make the array until no more groups of 21 can be made. Remainders are not part of the array.



5.NBT.B.6 *continued*

Example: 9984 ÷ 64

- An area model for division is shown below. As the student uses the area model, he/she keeps track of how much of 9984 is left to divide.



Students must recognize that they must add the partial products of 100, 50, 5 and 1 to find the solution to 9984 ÷ 64.

Examples of alternative strategies and explanations for 1,716 ÷ 16.

Student 1
1,716 divided by 16
There are 100 16’s in 1,716.
1,716 – 1,600 = 116
I know there are at least 6 16’s.
116 – 96 = 20
I can take out at least 1 more 16.
20 – 16 = 4
There were 107 teams with 4 students left over. If we put the extra students on different team, 4 teams will have 17 students.

Student 2
1,716 divided by 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.
I know that 2 groups of 16’s is 32.
I would have 107 groups of 16 with 4 students left over.

I could make 4 of the groups have 17 instead of 16.

1716 –1600	100
116 –80	5
36 –32	2
4	

5.NBT.B.6 *continued*

Student 3
1,716 ÷ 16 =
I want to get to 1,716
I know that 100 16's equals 1,600
I know that 5 16's equals 80
1,600 + 80 = 1,680
Two more groups of 16's equals 32, which gets us to 1,712
I am 4 away from 1,716
So we had 100 + 6 + 1 = 107 teams
Those other 4 students can just hang out

Student 4
How many 16's are in 1,716?
We have an area of 1,716. I know that one side of my array is 16 units long. I used 16 as the height. I am trying to answer the question what is the width of my rectangle if the area is 1,716 and the height is 16. 100 + 7 = 107 R 4

	100	7
16	$100 \times 16 = 1,600$	$7 \times 16 = 112$
	1,716 – 1,600 = 116	116 – 112 = 4

The 4 students left over could each be assigned to give out drinks to four teams each.

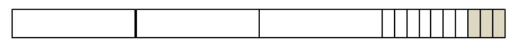
5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used; justify the reasoning used with a written explanation.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 4.NBT.B.4 **5th Grade Standard Taught in Advance:** 5.NBT.A.1, 5.NF.A.1, 5.NF.B.4, 5.NF.B.7 **5th Grade Standard Taught Concurrently:** 5.NBT.A.2, 5.NBT.B.5, 5.NBT.B.6 This standard requires students to extend the models and strategies they developed for whole numbers in grades 1-4 to decimal values. 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 $3\frac{1}{2}$ and 1.7 is more than $1\frac{1}{2}$. • 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 an answer 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 he/she figures the answer to be very close, but smaller than $6 \times 2\frac{1}{2}$ and think of $2\frac{1}{2}$ groups of 6 as 12 (2 groups of 6) + 3 ($\frac{1}{2}$ of a group of 6).

5.NBT.B.7 *continued*

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:

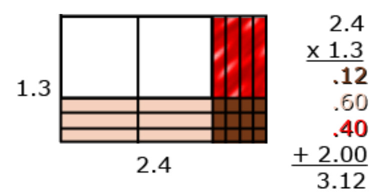
- 4 – 0.3
  3 tenths subtracted from 4 wholes. The wholes must be divided into tenths.



The answer is $3\frac{7}{10}$ or 3.7.

Example:

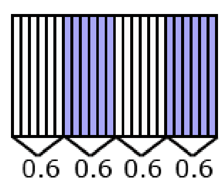
- An area model can be useful for illustrating products.



Students should be able to describe the partial products displayed by the area model. For example, “$\frac{3}{10}$ times $\frac{4}{10}$ is $\frac{12}{100}$. $\frac{3}{10}$ times 2 is $\frac{6}{10}$ or $\frac{60}{100}$. 1 group of $\frac{4}{10}$ is $\frac{4}{10}$ or $\frac{40}{100}$. 1 group of 2 is 2.”

Example: Finding the number in each group or share

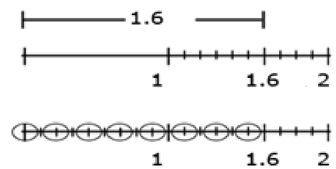
- Students should be encouraged to apply a fair sharing model separating decimal values into equal parts such as



5.NBT.B.7 *continued*

Example: Draw a model to show 1.6 ÷ 0.2

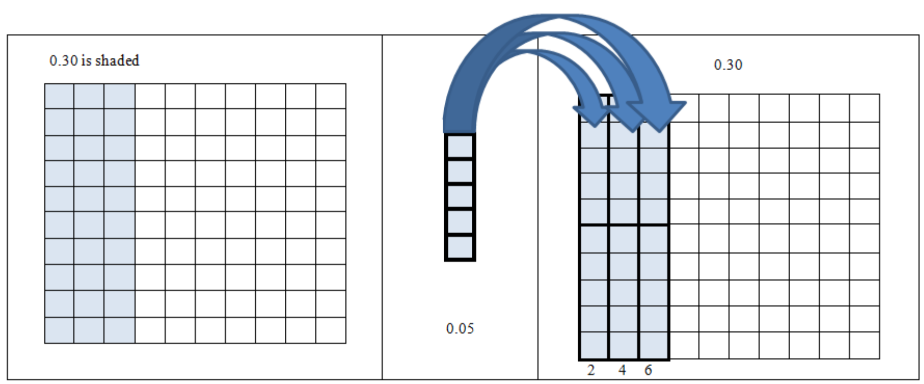
- Draw a segment to represent 1.6. In doing so, a student counts in tenths to identify the 6 tenths and identifies the number of 2 tenths within 6 tenths. The student can then extend the idea of counting by tenths to divide the one into tenths and determine there are 5 more groups of 2 tenths.



- Count groups of 2 tenths without the use of models or diagrams. Knowing that 1 can be thought of as $\frac{10}{10}$, a student might think of 1.6 as 16 tenths. Counting 2 tenths, 4 tenths, 6 tenths, . . . 16 tenths, a student can count 8 groups of 2 tenths.
- Use understanding of multiplication and think, "8 groups of 2 is 16, so 8 groups of $\frac{2}{10}$ is $\frac{16}{10}$ or 1 $\frac{6}{10}$."

Example:

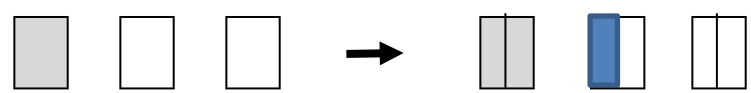
- Using an area model (10 × 10 grid) to show 0.30 ÷ 0.05.
  This model help make it clear why the solution is larger than the number we are dividing.
  The decimal 0.05 is partitioned into 0.30 six times.
  0.30 ÷ 0.05 = 6

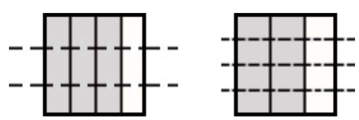


Number and Operations—Fractions (NF)

A. Use equivalent fractions as a strategy to add and subtract fractions.

In this cluster, the terms students should learn to use with increasing precision are **fraction, equivalent, sum, difference, unlike denominator, numerator, benchmark fraction, estimate, reasonableness,** and **mixed number**.

Louisiana Standard	Explanations and Examples
5.NF.A.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, $^2/_3 + {}^5/_4 = {}^8/_{12} + {}^{15}/_{12} = {}^{23}/_{12}$. (In general, $^a/_b + {}^c/_d = {}^{(ad + bc)}/_{bd}$.)*	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 4.NF.A.1, 4.NF.B.3 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** none Students should apply their understanding of equivalent fractions developed in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators. This process should come after students have used visual fraction models (area models, number lines, etc.) to build understanding. The use of visual fraction models allows students to reason about a common denominator prior to using the algorithm. For example, when adding $\frac{1}{3}+\frac{1}{6}$, grade 5 students should apply their understanding of equivalent fractions and their ability to rewrite fractions in an equivalent form to find common denominators. While simplifying fractional answers is not required, simplifying should be allowed. Example: • $\frac{1}{3}+\frac{1}{6}$  $\frac{1}{3}$ is the same as $\frac{2}{6}$ I drew a rectangle and shaded $\frac{1}{3}$. I knew that if I cut every third in half then I would have sixths. Based on my picture, $\frac{1}{3}$ equals $\frac{2}{6}$. Then I shaded in another $\frac{1}{6}$ with a different color. I ended up with an answer of $\frac{3}{6}$, which is equal to $\frac{1}{2}$. Based on the algorithm in the standard, when solving $\frac{1}{3}+\frac{1}{6}$, multiplying 3 and 6 gives a common denominator of 18. Students would make equivalent fractions $\frac{6}{18}+\frac{3}{18}=\frac{9}{18}$ which is also equal to one-half. **Teacher Note**: While multiplying the denominators will always give a common denominator, this may not result in the smallest denominator.

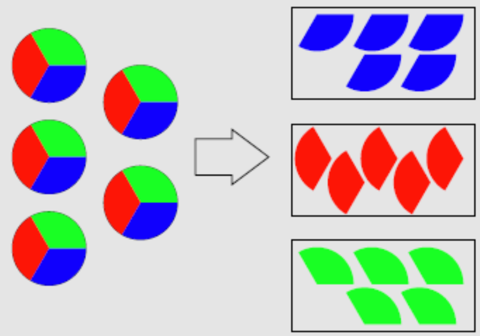
5.NF.A.1 *continued*	Students should apply their understanding of equivalent fractions and their ability to rewrite fractions in an equivalent form to find common denominators. They should know that multiplying the denominators will always give a common denominator but may not result in the smallest denominator. **Examples**: • $\frac{2}{5}+\frac{7}{8}=\frac{16}{40}+\frac{35}{40}=\frac{51}{40}$ • $3\frac{1}{4}-\frac{1}{6}=3\frac{3}{12}-\frac{2}{12}=3\frac{1}{12}$ or $3\frac{1}{4}-\frac{1}{6}=3\frac{6}{24}-\frac{4}{24}=3\frac{2}{24}$ or $3\frac{1}{12}$
5.NF.A.2 Solve word problems involving addition and subtraction of fractions. a. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. b. Use benchmark fractions and number sense of fractions to estimate mentally and justify the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < ½.*	**Component(s) of Rigor:** Conceptual Understanding (2b), Application (2, 2a), **Remediation - Previous Grade(s) Standard:** 4.NF.A.2 **5th Grade Standard Taught in Advance:** 5.NF.A.1 **5th Grade Standard Taught Concurrently:** none This standard is focused on use of number sense in the context of solving word problems Students rely on their understanding of fractions as numbers that lie between whole numbers on a number line. Number sense in fractions also includes moving between decimals and fractions to find equivalents as well as being able to use reasoning such as $\frac{7}{8}$ is greater than $\frac{3}{4}$ because $\frac{7}{8}$ is missing only $\frac{1}{8}$ and $\frac{3}{4}$ is missing $\frac{1}{4}$ so $\frac{7}{8}$ is closer to a whole. Also, 5.NF.A.2b indicates that students should use benchmark fractions to estimate and examine the reasonableness of their answers. **Examples**: • Jerry was making two different types of cookies. One recipe needed $\frac{3}{4}$ cup of sugar and the other needed $\frac{2}{3}$ cup of sugar. How much sugar did he need to make both recipes? Mental estimation: A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may compare both fractions to $\frac{1}{2}$ and state that both are larger than $\frac{1}{2}$ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2. Area model  $\frac{3}{4}$ cup of sugar $\frac{2}{3}$ cup of sugar $\frac{3}{4}=\frac{9}{12}$ $\frac{2}{3}=\frac{8}{12}$ $\frac{3}{4}+\frac{2}{3}=\frac{17}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$

5.NF.A.2 *continued*	Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies for calculations with fractions extend from students' work with whole number operations and can be supported through the use of physical models. **Example**: • Ellie drank $\frac{3}{5}$ quart of milk and Javier drank $\frac{1}{10}$ quart less than Ellie. How much milk did Ellie and Javier drink all together? *Solution:* $\frac{3}{5}-\frac{1}{10}=\frac{6}{10}-\frac{1}{10}=\frac{5}{10}$ This is how much milk Javier drank $\frac{3}{5}+\frac{5}{10}=\frac{6}{10}+\frac{5}{10}=\frac{11}{10}$ Together they drank $1\frac{1}{10}$ quarts of milk This solution is reasonable because Ellie drank slightly more than $\frac{1}{2}$ quart and Javier drank $\frac{1}{2}$ quart, so together they drank slightly more than one quart.

Number and Operations—Fractions (NF)

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

In this cluster, the terms students should learn to use with increasing precision are **fraction, numerator, denominator, operation, mixed number, product, quotient, partition, equal parts, equivalent, factor, unit fraction, area, side lengths, fractional sides lengths,** and **comparing**.

Louisiana Standard	Explanations and Examples
5.NF.B.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. *For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	**Component(s) of Rigor:** Conceptual Understanding, Application **Remediation - Previous Grade(s) Standard:** 3.OA.A.1, 3.OA.A.2, 3.OA.B.6, 4.OA.A.1, 4.OA.A.2, 4.MD.A.2 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** 5.NF.B.4, 5.NF.B.5 Fifth grade student should connect fractions with division, understanding that 5 ÷ 3 = 5/3. Students should explain this by working with their understanding of division as equal sharing. How to share 5 objects equally among 3 shares: $5 \div 3 = 5 \times \frac{1}{3} = \frac{5}{3}$  *If you divide 5 objects equally among 3 shares, each of the 5 objects should contribute $\frac{1}{3}$ of itself to each share. Thus each share consists of 5 pieces, each of which is $\frac{1}{3}$ of an object, and so each share is $5 \times \frac{1}{3} = \frac{5}{3}$ of an object.* Students should also create story contexts to represent problems involving division of whole numbers.

5.NF.B.3 *continued*	Example: Your teacher gives 7 packs of paper to your group of 4 students. If you share the paper equally, how much paper does each student get? Each student receives 1 whole pack of paper and $\frac{1}{4}$ of the each of the 3 packs of paper. So each student gets $1\frac{3}{4}$ packs of paper. **Examples**: • 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 he/she is seeing the solution to the following equation, $10 \times n = 3$ (10 groups of some amount is 3 boxes) which can also be written as n = 3 ÷ 10. Using models or diagram, they divide each box into 10 groups, resulting in each team member getting $\frac{3}{10}$ of a box. • Two afterschool clubs are having pizza parties. For the Math Club, the teacher will order 3 pizzas for 5 students. For the Student Council, the teacher will order 5 pizzas for 8 students. Since you are in both groups, you need to decide which party to attend. How much pizza would you get at each party? If you want to have the most pizza, which party should you attend? • The 6 fifth grade classrooms have a total of 27 boxes of pencils. How many boxes will each classroom receive? • Students may recognize this as a whole number division problem but should also express this equal sharing problem as $\frac{27}{6}$. They explain that each classroom gets $\frac{27}{6}$ boxes of pencils and can further determine that each classroom get $4\frac{3}{6}$ or $4\frac{1}{2}$ boxes of pencils.

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

a. Interpret the product $(m/n) \times q$ as m parts of a partition of q into n equal parts; equivalently, as the result of a sequence of operations, $m \times q \div n$. *For example, use a visual fraction model to show understanding, and create a story context for (m/n) x q.*

b. Construct a model to develop understanding of the concept of multiplying two fractions and create a story context for the equation. [In general, $(m/n) \times (c/d) = (mc)/(nd)$.]

c. 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.

d. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

Component(s) of Rigor: Conceptual Understanding (4, 4a, 4b, 4c, 4d), Procedural Skill and Fluency (4, 4c, 4d)
Remediation - Previous Grade(s) Standard: 4.NF.B.4
5th Grade Standard Taught in Advance: none
5th Grade Standard Taught Concurrently: 5.NF.B.3, 5.NF.B.6, 5.NF.B.7

Students are expected to multiply fractions (including proper fractions, improper fractions, but not mixed numbers) times a whole number. Students are also expected to multiply a fraction times a fraction because of the information found in parts b and d. (Multiplication of mixed numbers is addressed in 5.NF.B.6.) They multiply fractions efficiently and accurately.

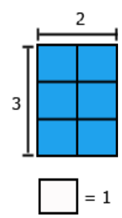
Examples:

- As they multiply fractions such as $\frac{3}{5} \times 6$, they can think of the operation in more than one way.
  $3 \times (6 \div 5)$ or $(3 \times \frac{6}{5})$
  $(3 \times 6) \div 5$ or $18 \div 5$ or $\frac{18}{5}$

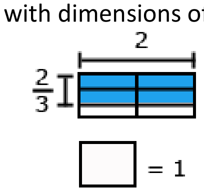
Examples:

Building on previous understandings of multiplication

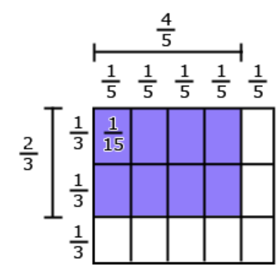
- Rectangle with dimensions of 2 and 3 showing that
  $2 \times 3 = 6$.



- Rectangle with dimensions of 2 and $\frac{2}{3}$ showing that
  $2 \times \frac{2}{3} = \frac{4}{3}$



- In solving the problem $\frac{2}{3} \times \frac{4}{5}$, students use an area model to visualize it as a 2 by 4 array of small rectangles each of which has side lengths $\frac{1}{3}$ and $\frac{1}{5}$. They reason that $\frac{1}{3} \times \frac{1}{5} = \frac{1}{(3\times5)}$ by counting squares in the entire rectangle, so the area of the shaded area is $(2 \times 4) \times \frac{1}{(3\times5)} = \frac{(2\times4)}{(3\times5)}$..



The area model and the line segments show that the area is the same quantity as the product of the side lengths

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5.NF.B.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.

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).

c. Explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number.

d. Relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

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Component(s) of Rigor: Conceptual Understanding (5, 5a, 5b, 5c, 5d)
Remediation - Previous Grade(s) Standard: 3.OA.A.1, 3.OA.A.2, 3.OA.B.6, 4.OA.A.1, 4.OA.A.2, 4.NF.A.1, 4.MD.A.2
5th Grade Standard Taught in Advance: none
5th Grade Standard Taught Concurrently: 5.OA.A.2, 5.NF.B.3, 5.NF.B.6

This standard calls for students to examine the magnitude of products in terms of the relationship between two types of problems. This extends the work with 5.OA.A.2.

Examples:

- 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.
- How does the product of 225 × 60 compare to the product of 225 × 30? How do you know?

  Solution: Since 30 is half of 60, the product of 225 × 60 will be double or twice as large as the product of 225 × 30.

This standard asks students to examine how numbers change when multiplying by fractions. Students should have ample opportunities to examine both cases in the standard: a) when multiplying by a fraction greater than 1, the number increases and b) when multiplying by a fraction less the one, the number decreases. This standard should be explored and discussed while students are working with 5.NF.B.4, and should not be taught in isolation.

Example:

- Mrs. Bennett is planting two flower beds. The first flower bed is 5 meters long and 6/5 meters wide. The second flower bed is 5 meters long and 5/6 meters wide. How do the areas of these two flower beds compare? Is the value of the area larger or smaller than 5 square meters? Draw pictures to prove your answer.
- $\frac{3}{4} \times 7$ is less than 7 because 7 is multiplied by a factor less than 1 so the product must be less than 7.

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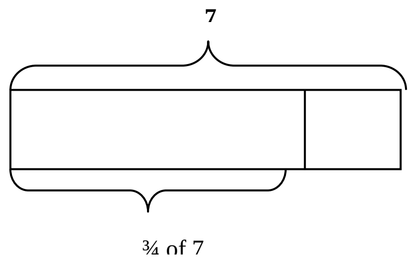
5.NF.B.5 *continued*	 • $2\frac{2}{3}$ x 8 must be more than 8 because 2 groups of 8 is 16 and $2\frac{2}{3}$ is almost 3 groups of 8. So the answer must be close to, but less than 24. • $\frac{3}{4} = \frac{5 \times 3}{5 \times 4}$ because multiplying ¾ by 5/5 is the same as multiplying ¾ by 1

5.NF.B.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.

Component(s) of Rigor: Conceptual Understanding (5, 5a, 5b, 5c, 5d)
Remediation - Previous Grade(s) Standard: 3.OA.A.1, 3.OA.A.2, 3.OA.B.6, 4.OA.A.1, 4.OA.A.2, , 4.MD.A.2
5th Grade Standard Taught in Advance: none
5th Grade Standard Taught Concurrently: 5.NF.B.4, 5.NF.B.5, 5.NF.B.7

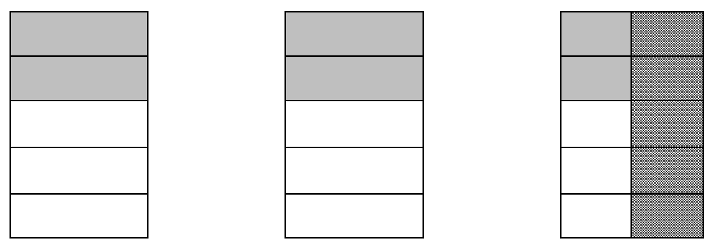
This standard builds on all of the work done in this cluster. Students should be given ample opportunities to use various strategies to solve word problems involving the multiplication of a fraction by a mixed number. This standard includes fraction by a fraction, fraction by a mixed number, mixed number by a mixed number, and whole number by a mixed number.

Examples:

- There are $2\frac{1}{2}$ bus loads of students standing in the parking lot. The students are getting ready to go on a field trip. $\frac{2}{5}$ of the students on each bus are girls. How many busses would it take to carry ***only*** the girls?

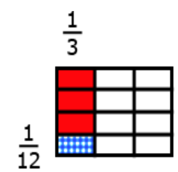
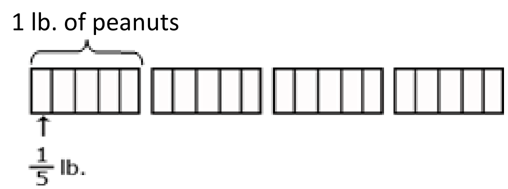
  Sample Response:
  I drew 3 grids and 1 grid represents 1 bus. I cut the third grid in half and I marked out the right half, leaving $2\frac{1}{2}$ grids. I then cut each grid into fifths, and shaded $\frac{2}{5}$ of each grid to represent the number of girls. When I added up the shaded pieces, $\frac{2}{5}$ of the 1st and 2nd bus were both shaded, and 1/5 of the last bus was shaded.

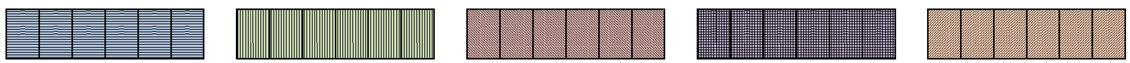
  $$\frac{2}{5} + \frac{2}{5} + \frac{1}{5} = \frac{5}{5} = 1 \text{ whole bus.}$$



- Evan bought 6 roses for his mother. $\frac{2}{3}$ of them were red. How many red roses were there?
  - Using a visual, a student divides the 6 roses into 3 groups and counts how many are in 2 of the 3 groups.

5.NF.B.6 *continued*	A student can use an equation to solve. $\frac{2}{3} \times 6 = \frac{12}{3} = 4$ red roses. • Comparing Heights of Buildings: https://www.illustrativemathematics.org/content-standards/5/NF/B/6/tasks/1174 • Drinking Juice: https://www.illustrativemathematics.org/content-standards/5/NF/B/6/tasks/295 New Park: https://www.illustrativemathematics.org/content-standards/5/NF/B/6/tasks/2102

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division, but division of a fraction by a fraction is not a requirement at this grade.) 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 $(1/12) \times 4 = 1/3$.*	**Component(s) of Rigor:** Conceptual Understanding (7, 7a, 7b), Procedural Skill and Fluency (7, 7a, 7b), Application (7c) **Remediation - Previous Grade(s) Standard:** 3.OA.B.6, 3.NF.A.1, 4.NF.B.4 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** 5.NF.B.4, 5.NF.B.6 In fifth grade, students experience division problems with whole number divisors and unit fraction dividends (fractions with a numerator of 1) or with unit fraction divisors and whole number dividends. Students extend their understanding of the meaning of fractions, how many unit fractions are in a whole, and their understanding of multiplication and division as involving equal groups or shares and the number of objects in each group/share. In sixth grade, they will use this foundational understanding to divide into and by more complex fractions and develop abstract methods of dividing by fractions. **Example**: Knowing the number of groups/shares and finding how many/much in each group/share • Four students sitting at a table were given $\frac{1}{3}$ of a pan of brownies to share. How much of a pan will each student get if they share the pan of brownies equally? The diagram shows the $\frac{1}{3}$ pan divided into 4 equal shares with each share equaling $\frac{1}{12}$ of the pan.  • Angelo has 4 lbs of peanuts. He wants to give each of his friends $\frac{1}{5}$ lb. How many friends can receive $\frac{1}{5}$ lb of peanuts? A diagram for $4 \div \frac{1}{5}$ is shown below. Students explain that since there are five fifths in one whole, there must be 20 fifths in 4 lbs. 

5.NF.B.7 *continued* 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.* 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?*	**Example:** • Create a story context for $5 \div \frac{1}{6}$. Find your answer and then draw a picture to prove your answer and use multiplication to reason about whether your answer makes sense. How many $\frac{1}{6}$ are there in 5? Student Response: A bowl holds 5 Liters of water. If we use a scoop that holds $\frac{1}{6}$ of a Liter, how many scoops will we need in order to fill the entire bowl? I created 5 boxes. Each box represents 1 Liter of water. I then divided each box into sixths to represent the size of the scoop. My answer is the number of small boxes, which is 30. That makes sense since 6 x 5 = 30.  $1 = \frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}$. A whole has $\frac{6}{6}$, so five wholes would be $\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{6}{6}+\frac{6}{6}=\frac{30}{6}$ • How much rice will each person get if 3 people share $\frac{1}{2}$ lb of rice equally? *Solution:* $\frac{1}{2} \div 3 = \frac{3}{6} \div 3 = \frac{1}{6}$ o A student may think or draw $\frac{1}{2}$ and cut it into 3 equal groups then determine that each of those part is $\frac{1}{6}$. o A student may think of $\frac{1}{2}$ as equivalent to $\frac{3}{6}$. $\frac{3}{6}$ divided by 3 is $\frac{1}{6}$.

Measurement and Data (MD)

A. Convert like measurement units within a given measurement system.

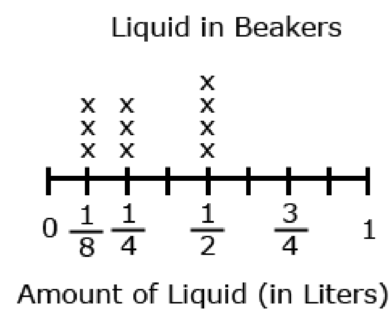
In this cluster, the terms students should learn to use with increasing precision are **conversion/convert, metric unit, customary unit**

From previous grades: relative size, liquid volume, mass, length, kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in.), foot (ft.), yard (yd), mile (mi), ounce (oz), pound (lb), cup (c), pint (pt), quart (qt), gallon (gal), hour, minute, and **second**.

Louisiana Standard	Explanations and Examples
5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real-world problems (e.g., convert 5 cm to 0.05 m; 9 ft. to 108 in).	**Component(s) of Rigor:** Procedural Skill and Fluency, Application **Remediation - Previous Grade(s) Standard:** 4.MD.A.1, 4.MD.A.2 **5th Grade Standard Taught in Advance:** 5.NBT.B.7 **5th Grade Standard Taught Concurrently:** none Students convert measurements within the same system of measurement in the context of multi-step, real-world problems. Both customary and standard measurement systems are included; students worked with both metric and customary units of length in second grade. In third grade, students work with metric units of mass and liquid volume. In fourth grade, students work with both systems and begin conversions within systems in length, mass and volume. Time could also be used in this standard. Students should explore how the base-ten system supports conversions within the metric system. Example: 100 cm = 1 meter. In Grade 5, students extend their abilities from Grade 4 to express measurements in larger or smaller units within a measurement system. This is an excellent opportunity to reinforce notions of place value for whole numbers and decimals, and connection between fractions and decimals (e.g., 2 ½ meters can be expressed as 2.5 meters or 250 centimeters). For example, Grade 5 students might complete a table of equivalent measurements in feet and inches. Grade 5 students also learn and use such conversions in solving multi-step, real world problems. • Minutes and Days: https://www.illustrativemathematics.org/content-standards/5/MD/A/1/tasks/878 • Converting Fractions of a Unit into a Smaller Unit: https://www.illustrativemathematics.org/content-standards/5/MD/A/1/tasks/293 • Gabbi purchased a 50-lb bag of dog food. Gabbi has three dogs that each requires two 10-ounce scoops of food each day, one in the morning and another in the evening. For how many days will the 50-lb bag of dog food last? o 50 lb x 16 oz = 800 oz o 800 oz/ 60 oz per day = $13\frac{1}{3}$ days. To feed all three dogs each day, the 50-lb bag will last 13 days.

Measurement and Data (MD)
B. Represent and interpret data.

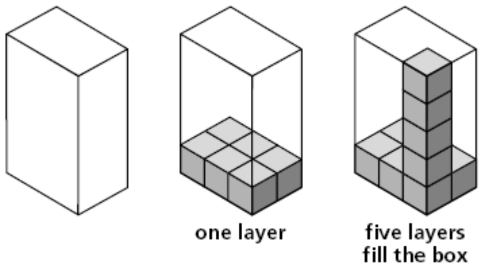
In this cluster, the terms students should learn to use with increasing precision are **line plot, length, mass,** and **liquid volume**.

Louisiana Standard	Explanations and Examples
5.MD.B.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.*	**Component(s) of Rigor:** Procedural Skill and Fluency, Application **Remediation - Previous Grade(s) Standard:** 4.MD.B.4 **5th Grade Standard Taught in Advance:** 5.NF.A.2, 5.NF.B.6, 5.NF.B.7 **5th Grade Standard Taught Concurrently:** none Students apply their understanding of operations with fractions. They use either addition and/or multiplication to determine the total number of liters in the beakers. Then the sum of the liters is shared evenly among the ten beakers. **Example:** • Ten beakers, measured in liters, are filled with a liquid.  The line plot above shows the amount of liquid in liters in 10 beakers. If the liquid is redistributed equally, how much liquid would each beaker have?

Measurement and Data (MD)

C. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

In this cluster, the terms students should learn to use with increasing precision are **measurement, attribute, volume, solid figure, right rectangular prism, unit, unit cube, gap, overlap, cubic units (cubic cm, cubic in., cubic ft., nonstandard cubic units), edge length, height,** and **depth**.

Louisiana Standard	Explanations and Examples
5.MD.C.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.	**Component(s) of Rigor:** Conceptual Understanding (3, 3a,3b) **Remediation - Previous Grade(s) Standard:** 3.MD.C.5 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** none **5. MD.C.3, 5.MD.C.4,** and **5. MD.C.5** represent the first time that students begin exploring the concept of volume. In third grade, students begin working with area and covering spaces. The concept of volume should be extended from area with the idea that students are covering an area (the bottom of cube) with a layer of unit cubes and then adding layers of unit cubes on top of bottom layer (see picture below). Students should have ample experiences with concrete manipulatives before moving to pictorial representations. Students' prior experiences with volume were restricted to liquid volume. As students develop their understanding of volume they understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. This cube has a length of 1 unit, a width of 1 unit and a height of 1 unit and is called a cubic unit. This cubic unit is written with an exponent of 3 (e.g., in^3, m^3). Students connect this notation to their understanding of powers of 10 in our place value system. Models of cubic inches, centimeters, cubic feet, etc. are helpful in developing an image of a cubic unit. Students' estimate how many cubic yards would be needed to fill the classroom or how many cubic centimeters would be needed to fill a pencil box.  $(3 \times 2) = 6$, representing the first layer There are 5 layers, so $(3 \times 2) \times 5$, representing the 5 layers of 3×2 $(3 \times 2) + (3 \times 2) + (3 \times 2) + (3 \times 2) + (3 \times 2) = 6 + 6 + 6 + 6 + 6 = 5 \times 6 = 30$ The major emphasis for measurement in grade 5 is volume. Volume not only introduces a third dimension and thus a significant challenge to students' spatial structuring, but also complexity in the nature of the materials measured. That is, solid units are "packed," such as cubes in a three-dimensional array, whereas a liquid "fills" three-dimensional space, taking the shape of the container. The unit structure for liquid measurement may be psychologically one-dimensional for some students.

<table>
<tr><td>5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and improvised units.</td><td>Component(s) of Rigor: Procedural Skill and Fluency
Remediation - Previous Grade(s) Standard: none
5th Grade Standard Taught in Advance: 5.MD.C.3
5th Grade Standard Taught Concurrently: none

Students understand that same-sized cubic units are used to measure volume. They select appropriate units to measure volume. For example, they make a distinction between which units are more appropriate for measuring the volume of a gym and the volume of a box of books. They can also improvise a cubic unit using any unit as a length (e.g., the length of their pencil). Students can apply these ideas by filling containers with cubic units (wooden cubes) to find the volume. They may also use drawings or interactive computer software to simulate the same filling process. See http://illuminations.nctm.org/ActivityDetail.aspx?ID=6</td></tr>
<tr><td>5.MD.C.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.</td><td>Component(s) of Rigor: Conceptual Understanding (5, 5a,5c), Procedural Skill and Fluency (5, 5a, 5b, 5c), Application (5, 5b, 5c)
Remediation - Previous Grade(s) Standard: 3.OA.B.5, 4.MD.A.3
5th Grade Standard Taught in Advance: 5.MD.C.3, 5.MD.C.4
5th Grade Standard Taught Concurrently: none

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.

Examples:
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 possible dimensions.
<table><tr><th>Length</th><th>Width</th><th>Height</th></tr><tr><td>1</td><td>2</td><td>12</td></tr><tr><td>2</td><td>2</td><td>6</td></tr><tr><td>4</td><td>2</td><td>3</td></tr><tr><td>8</td><td>3</td><td>1</td></tr></table></td></tr>
</table>

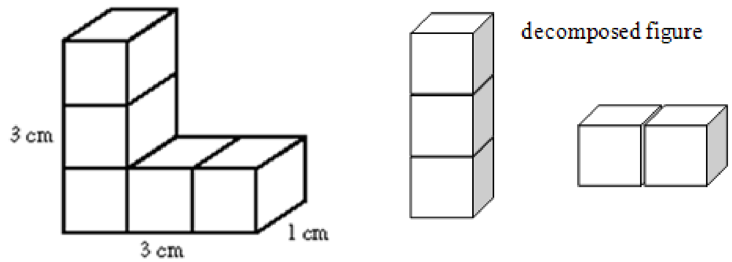
5.MD.C.5 *continued*

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.

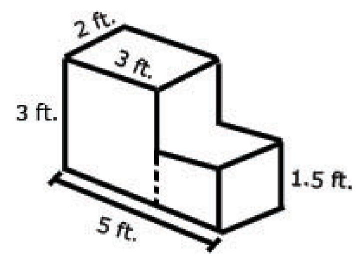
c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.

This standard 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 right rectangular prisms in order to find the volume of the entire 3-dimensional figure. Formulas from part b may be used once students have an understanding of their derivation.

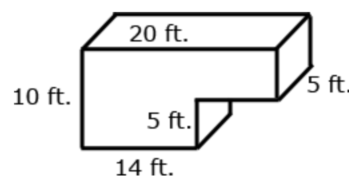
Examples:



- Students determine the volume of concrete needed to build the steps in the diagram below.



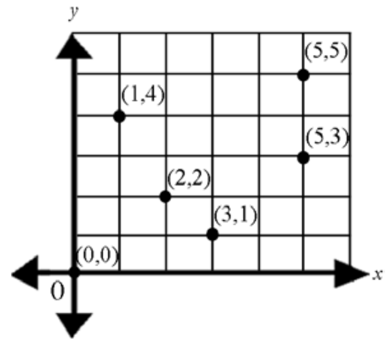
- A homeowner is building a swimming pool and needs to calculate the volume of water needed to fill the pool. The design of the pool is shown in the illustration below.



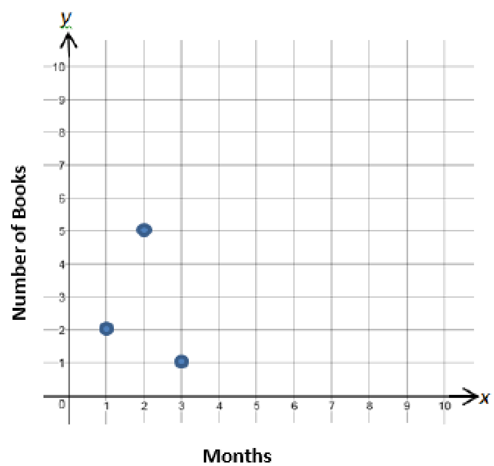
<table>
<tr><td colspan="2">Geometry (G)
A. Graph points on the coordinate plane to solve real-world and mathematical problems.</td></tr>
<tr><td colspan="2">In this cluster, the terms students should learn to use with increasing precision are coordinate system, coordinate plane, first quadrant, point, line, axis/axes, x-axis, y-axis, horizontal, vertical, intersection of lines, origin, ordered pair, coordinate, x-coordinate, and y-coordinate.</td></tr>
<tr><td>Louisiana Standard</td><td>Explanations and Examples</td></tr>
<tr><td>5.G.A.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 in the ordered pair indicates how far to travel from the origin in the direction of one axis, and the second number in the ordered pair 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).</td><td>Component(s) of Rigor: Conceptual Understanding
Remediation - Previous Grade(s) Standard: 3.NF.A.2
5th Grade Standard Taught in Advance: none
5th Grade Standard Taught Concurrently: 5.G.A.2

Examples:

• Students can use a classroom size coordinate system to physically locate the coordinate point (5, 3) by starting at the origin (0, 0), walking 5 units along the x-axis to find the first number in the pair (5), and then walking up 3 units for the second number in the pair (3). The ordered pair names a point in the plane.



• Graph and label the points below in a coordinate system.
o A (0, 0)
o B (5, 1)
o C (0, 6)
o D (6, 2)
o E (4, 1)
o F (3, 0)</td></tr>
</table>

5.G.A.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.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 3.NF.A.2 **5th Grade Standard Taught in Advance:** none **5th Grade Standard Taught Concurrently:** 5.G.A.1 This standard references real-world and mathematical problems. **Example**: • Judah's mom is worried that he's not reading enough, so she asks him to keep track of the number of books he reads each month. Judah uses the graph below to keep track of the number of books he reads each month.  a) What does the point (2, 5) represent? (*Judah reads 5 books in the 2nd month.)* b) If Judah reads zero books in the 5th month, what ordered pair would he need to graph? *(5, 0)* c) Judah realized he read two more books in the 3rd month than is represented on his graph. What order pair does Judah need to graph to correct his mistake? *(3, 3)*

<table>
<tr><td colspan="2">Geometry (G)
B. Classify two-dimensional figures into categories based on their properties.</td></tr>
<tr><td colspan="2">In this cluster, the terms students should learn to use with increasing precision are attribute, category, subcategory, hierarchy, properties, parallel, perpendicular, congruent, symmetry, polygon, parallelogram, quadrilateral, right angle, and two-dimensional.</td></tr>
<tr><td>Louisiana Standard</td><td>Explanations and Examples</td></tr>
<tr><td>5.G.B.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.</td><td>Component(s) of Rigor: Conceptual Understanding
Remediation - Previous Grade(s) Standard: 3.G.A.1, 4.G.A.2
5th Grade Standard Taught in Advance: none
5th Grade Standard Taught Concurrently: none

Geometric properties include properties of sides (parallel, perpendicular, congruent), properties of angles (type, measurement, congruent), and properties of symmetry (point and line).

Example:
• If the opposite sides on a parallelogram are parallel and congruent, then rectangles are parallelograms
• A sample of questions that might be posed to students include:
o A parallelogram has 4 sides with both sets of opposite sides parallel. What types of quadrilaterals are parallelograms?
o Regular polygons have all of their sides and angles congruent. Name or draw some regular polygons.
o All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. True or False?
o A trapezoid has 2 sides parallel so it must be a parallelogram. True or False?</td></tr>
</table>

5.G.B.4 Classify quadrilaterals in a hierarchy based on properties. (Students will define a trapezoid as a quadrilateral with at least one pair of parallel sides.)

Component(s) of Rigor: Procedural Skill and Fluency
Remediation - Previous Grade(s) Standard: none
5th Grade Standard Taught in Advance: 5.G.B.3
5th Grade Standard Taught Concurrently: none

This standard builds on what was done in 4th grade by having students formalize their understanding of the relationship among quadrilaterals in a more way. Figures from previous grades are **polygon, regular polygon, rhombus/rhombi, rectangle, square, triangle, quadrilateral, pentagon, hexagon, cube, trapezoid, half/quarter circle, circle,** and **kite**.
A **kite** is a quadrilateral whose four sides can be grouped into two pairs of equal-length sides that are beside (adjacent to) each other.

Example:

- Create a Hierarchy Diagram using the following terms:

quadrilateral – a four-sided polygon

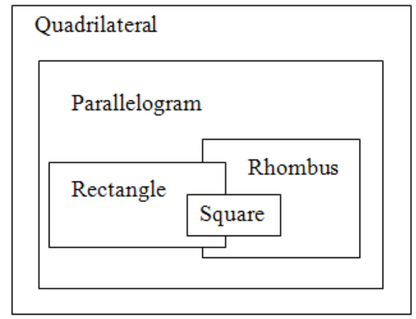
parallelogram – a quadrilateral with two pairs of parallel and congruent sides

rectangle – a quadrilateral with two pairs of congruent, parallel sides and four right angles

rhombus – a parallelogram with all four sides equal in length

square – a parallelogram with four congruent sides and four right angles

Possible student solution:



Student should be able to reason about the attributes of shapes by examining: Why aren't kites classified as parallelograms? Which quadrilaterals have opposite angles congruent and why is this true of certain quadrilaterals?

Teacher Note: In the U.S., the term "trapezoid" may have two different meanings. Research identifies these as inclusive and exclusive definitions. Louisiana has adopted the inclusive definition. The inclusive definition states: A trapezoid is a quadrilateral with *at least* one pair of parallel sides

Grade 3 Standards

3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* *Return to* 5.NF.B.3, 5.NF.B.5, 5.NF.B.6

3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* *Return to* 5.NF.B.3, 5.NF.B.5, 5.NF.B.6

3.OA.B.5 Apply properties of operations as strategies to multiply and divide.[2] *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.)* *Return to* 5.MD.C.5

3.OA.B.6 Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*
Return to 5.NF.B.3, 5.NF.B.7

3.NF.A.1 Understand a fraction 1/b, with denominators 2, 3, 4, 6, and 8, as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. *Return to* 5.NF.B.7

3.NF.A.2 Understand a fraction with denominators 2, 3, 4, 6, and 8 as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
c. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

Return to 5.G.A.1, 5.G.A.2

3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of *n* square units.

Return to 5.MD.C.3

3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. *Return to* 5.G.B.3

Grade 4 Standards

4.OA.A.1 Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7, and 7 times as many as 5. *Return to* 5.NF.B.3, 5.NF.B.5, 5.NF.B.6

4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more.)
Return to 5.NF.B.3, 5.NF.B.5, 5.NF.B.6

4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* *Return to* 5.OA.B.3

4.NBT.A.1 Recognize that in a multi-digit whole number less than or equal to 1,000,000, a digit in one place represents ten times what it represents in the place to its right. *Examples: (1) recognize that 700 ÷ 70 = 10; (2) in the number 7,246, the 2 represents 200, but in the number 7,426 the 2 represents 20, recognizing that 200 is ten times as large as 20, by applying concepts of place value and division.* *Return to* 5.NBT.A.1

4.NBT.A.2 Read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. *Return to* 5.NBT.A.3

4.NBT.A.3 Use place value understanding to round multi-digit whole numbers, less than or equal to 1,000,000, to any place. *Return to* 5.NBT.A.4

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers, with sums less than or equal to 1,000,000, using the standard algorithm.
Return to 5.NBT.B.5, 5.NBT.B.6, 5.NBT.B.7

4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. *Return to* 5.NBT.B.5

4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-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. Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8*.
Return to 5.NBT.B.6

4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) *Return to* 5.NF.A.1, 5.NF.B.5

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) *Return to* 5.NF.A.2

4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. *Example: 3/4 = 1/4 + 1/4 + 1/4.*
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

Return to 5.NF.A.1

4.NF.B.4 Multiply a fraction by a whole number. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)

a. Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*
b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*
c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

Return to 5.NF.B.4, 5.NF.B.7

4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* *Return to* 5.NBT.A.1

4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram; represent 62/100 of a dollar as $0.62.* *Return to* 5.NBT.A.1

4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Return to 5.NBT.A.1, 5.NBT.A.3

4.MD.A.1 Know relative sizes of measurement units within one system of units including: ft, in; km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. (Conversions are limited to one-step conversions.) Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),* *Return to* 5.MD.A.1

4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving whole numbers and/or simple fractions (addition and subtraction of fractions with like denominators and multiplying a fraction times a fraction or a whole number), and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. *Return to* 5.NF.B.3, 5.NF.B.5, 5.NF.B.6, 5.MD.A.1

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* Return to 5.MD.C.5

4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* *Return to* 5.MD.B.2

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. *Return to* 5.G.B.3