Introduction

Development of K-12 Louisiana Student Standards for Mathematics

The Louisiana mathematics standards were created by over one hundred Louisiana educators with input by thousands of parents and teachers from across the state. Educators envisioned what mathematically proficient students should know and be able to do to compete in our society and focused their efforts on creating standards that would allow them to do so. The new standards provide appropriate content for all grades or courses, maintain high expectations, and create a logical connection of content across and within grades.

The Role of Standards in Establishing Key Student Skills and Mathematical Proficiency

Students in Louisiana are ready for college or a career if they are able to meet college and workplace expectations without needing remediation in mathematics skills and concepts. The standards define what Louisiana students should know, understand, and be able to do mathematically and represent the steps students must take along the way to be able to meet this goal.

For example, all students should be able to recall and use math skills and concepts on a daily basis. That is, a student should know certain math facts and concepts such as how to add, subtract, multiply, and divide basic numbers with ease, how to work with simple fractions and percentages, and how to apply basic algebra and geometry principles. Additionally, students need to be able to reason mathematically, communicate with others about math through speaking and writing, and problem solve in real-world situations to be prepared mathematically for post-secondary education or to pursue a career.

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 context 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(s) makes sense by reasoning, and develop critical thinking skills.

Structure of the Standards

There are two types of standards in the Louisiana Mathematics Standards – mathematical practice and content. A summary of each type is provided below:

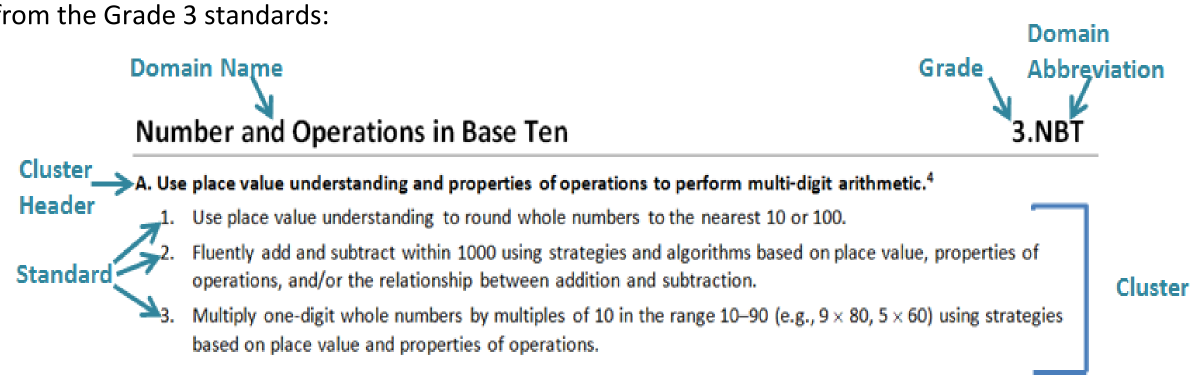
1. Standards for Mathematical Practice
   – Apply to all grade levels
   – Describe mathematically proficient students
2. Standards for Mathematical Content
   – K-8 standards presented by grade level
   – High school standards presented by high school course (Algebra I, Geometry, Algebra II), then organized by conceptual categories:
      - Number and Quantity
      - Algebra
      - Functions
      - Modeling
      - Geometry
      - Statistics and Probability

The following terms will assist in understanding how to read the content standards and their codes. Terms are defined in order from most specific to most general.

- **Standards -** Statements of what a student should know, understand, and be able to do.
- **Clusters -** Groups of **related** standards. Cluster headings may be considered as the big idea(s) that the group of standards they represent are addressing. Cluster headings are therefore useful as a quick summary of the progression of ideas that the standards in a domain are covering and can help teachers to determine the focus of the standards they are teaching.
- **Domains -** A **large** category of mathematics that the clusters and their respective content standards delineate and address. For example, *Number and Operations – Fractions* is a domain under which there are a number of clusters (the big ideas that will be addressed) along with their respective content standards, which give the specifics of what the student should know, understand, and be able to do when working with fractions.
- **Conceptual Categories –** The content standards, clusters, and domains in Algebra I, Geometry, and Algebra II are further organized under conceptual categories. These are very broad categories of mathematical thought and lend themselves to the organization of high school course work. For example, Algebra is a conceptual category in the high school standards under which are domains such as Seeing Structure in Expressions, Creating Equations, Arithmetic with Polynomials and Rational Expressions, etc.

Reading Standards and Interpreting their Codes in Grades K-8

Example from the Grade 3 standards:



There are four parts to the code for a mathematics standard in Kindergarten through Grade 8. The Cluster Headers are identified by an uppercase letter (A, B, C…). If a Domain has four clusters, then the letter A is assigned to the heading for the first cluster, B to the second, C to the third, and D to the fourth cluster. Each part of the code is separated by a period and has a specific meaning:

PART ONE Grade Level ● **PART TWO** Domain ● **PART THREE** Cluster ● **PART FOUR** Standard #

Look at the example below. It is the code for the last Grade 3 standard in the above list.

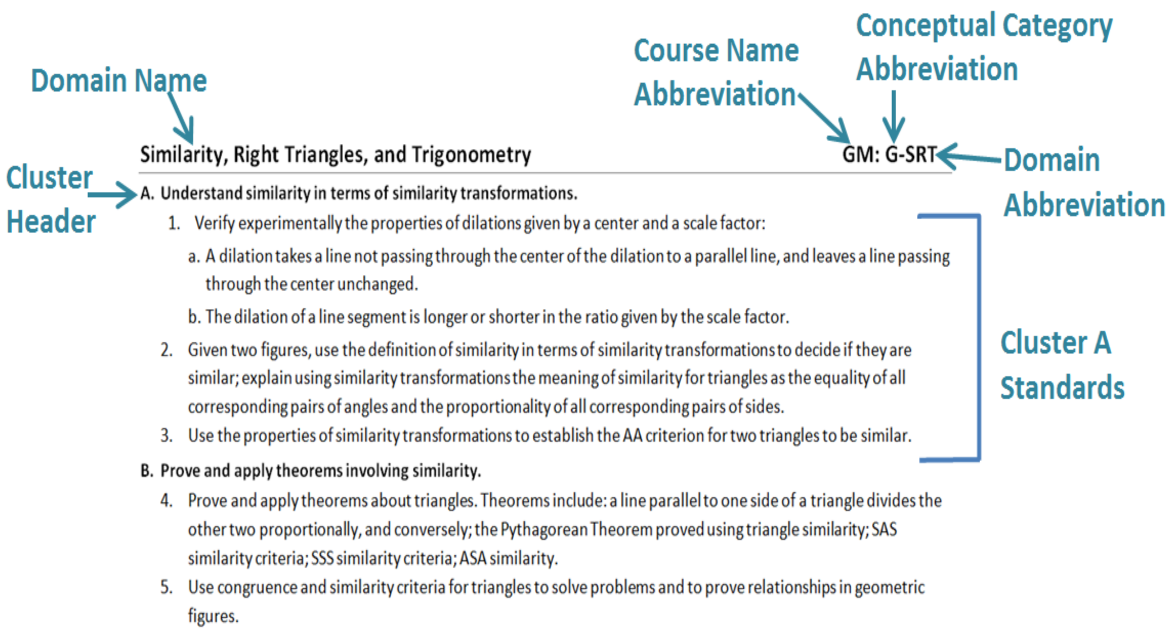
3.NBT.A.3

The grade level is 3, the domain code is NBT (Numbers and Operations in Base Ten), the cluster is A (first cluster), and the standard number is 3. The text of standard 3.NBT.A.3 is provided below.

3.NBT.A.3. *Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.*

Reading Standards and Interpreting their Codes in High School Courses

The codes for standards in high school math courses have five parts. An excerpt of the standards for the high school Geometry course as displayed in this document is shown below.



Similarity, Right Triangles, and Trigonometry — GM: G-SRT

A. Understand similarity in terms of similarity transformations.

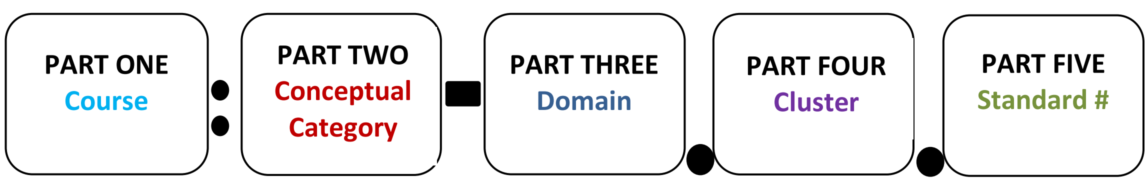
1. Verify experimentally the properties of dilations given by a center and a scale factor:
   a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
   b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

B. Prove and apply theorems involving similarity.

4. Prove and apply theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity; SAS similarity criteria; SSS similarity criteria; ASA similarity.
5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

As indicated in the excerpt, the abbreviation used for the high school Geometry course is GM. The abbreviations used for Algebra I and Algebra II are A1 and A2, respectively. The course name abbreviation is followed by abbreviations for the Conceptual Category and the Domain, the letter of the Cluster Header, and then the standard number. High school Conceptual Categories and their abbreviations are located in the table of the next section (Progressions).

The code for standard 5 in the list above is **GM: G-SRT.B.5** with the meaning of each part noted in the graphic below.



Algebra I Example A1: N-Q.A.2

Quantities* — A1: N-Q

A. Reason quantitatively and use units to solve problems.

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Algebra II Example A2: F-LE.B.4

Linear, Quadratic, and Exponential Models* **A2: F-LE**

A. Construct and compare linear, quadratic, and exponential models and solve problems.

2. Given a graph, a description of a relationship, or two input-output pairs (include reading these from a table), construct linear and exponential functions, including arithmetic and geometric sequences, to solve multi-step problems
4. For exponential models, express as a logarithm the solution to $a\,b^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

B. Interpret expressions for functions in terms of the situation they model.

5. Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.

Note: There is not an error in the Algebra II listing of standards above. Standards 1 and 3 in the Linear, Quadratic, and Exponential Models domain are in the Algebra I standard with codes of A1: F-LE.A.1 and A1:F-LE.A.3.

Companion Documents for Teachers

Companion documents for teachers are designed to assist educators in interpreting and implementing the new Louisiana Student Standards for Mathematics by providing descriptions and examples for each standard in a grade level or course. The companion documents are linked in the Resources section and the grade level listings of this document. Access the companion document for a specific grade or course by clicking an icon similar to the one to the right which links to the Grade 5 Teachers Companion document.

GRADE 5 TEACHERS COMPANION DOCUMENT

Progressions in the Math Standards

The standards for each grade should not be considered a checklist or taught in isolation. There is a flow or progression that creates coherence within a grade and from one grade to the next. The progressions are organized using domains in grades K -8 and conceptual categories in high school. The color-coded table shows the domains, categories, and their abbreviations, and identifies the five progressions present in the Louisiana Student Standards for Mathematics. Each of the progressions begins in Kindergarten and indicates a constant movement toward the high school standards. Progressions guarantee a steady, age-appropriate development of each topic and also ensure that gaps are not created in the mathematical education of Louisiana's students. The table is designed to allow teachers to see the coherence and connections among the mathematical topics in the standards.

<table>
<tr><th>Kindergarten</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>High School</th></tr>
<tr><td colspan="9">Domains and Abbreviations</td><td>Categories and Abbreviations</td></tr>
<tr><td>Counting and Cardinality (CC)</td><td colspan="8"></td><td rowspan="3">Number and Quantity (N)</td></tr>
<tr><td colspan="6">Numbers and Operations in Base Ten (NBT)</td><td colspan="2">Ratios and Proportional Relationships (RP)</td><td></td></tr>
<tr><td colspan="3"></td><td colspan="3">Number and Operations – Fractions (NF)</td><td colspan="3">The Number System (NS)</td></tr>
<tr><td colspan="6" rowspan="2">Operations and Algebraic Thinking (OA)</td><td colspan="3">Expressions and Equations (EE)</td><td>Algebra (A)</td></tr>
<tr><td colspan="2"></td><td>Functions (F)</td><td>Functions (F)</td></tr>
<tr><td colspan="6">Geometry (G)</td><td colspan="3">Geometry (G)</td><td>Geometry (G)</td></tr>
<tr><td colspan="6">Measurement and Data (MD)</td><td colspan="3">Statistics and Probability (SP)</td><td>Statistics and Probability (S)</td></tr>
</table>

Mathematics | Standards for Mathematical Practice

Being successful in mathematics requires that development of approaches, practices, and habits of mind are implemented as one strives to develop mathematical fluency, procedural skills, and conceptual understanding. The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education.

The Standards for Mathematical Practice are typically developed as students solve high-level mathematical tasks that support approaches, practices, and habits of mind which are called for within these standards.

The following are the eight Standards for Mathematical Practice and their descriptions.

1 **Make sense of problems and persevere in solving them.**
Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2 **Reason abstractly and quantitatively.**
Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

3 **Construct viable arguments and critique the reasoning of others.**
Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to

Mathematics | Grade 4

GRADE 4 TEACHERS COMPANION DOCUMENT

Grade Level Overview

(1) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

(2) Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., $^{15}/_{9} = {}^{5}/_{3}$), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

(3) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Operations and Algebraic Thinking 4.OA

A. Use the four operations with whole numbers to solve problems.

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.
2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and/or 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 than).[1]
3. Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *Example: Twenty-five people are going to the movies. Four people fit in each car. How many cars are needed to get all 25 people to the theater at the same time?*

B. Gain familiarity with factors and multiples.

4. Using whole numbers in the range 1–100,
   a. Find all factor pairs for a given whole number.
   b. Recognize that a given whole number is a multiple of each of its factors.
   c. Determine whether a given whole number is a multiple of a given one-digit number.
   d. Determine whether a given whole number is prime or composite.

[1] See Glossary, Table 2.

C. Generate and analyze patterns.

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.*

Number and Operations in Base Ten 4.NBT

A. Generalize place value understanding for multi-digit whole numbers.

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. *For example, (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.*
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.
3. Use place value understanding to round multi-digit whole numbers, less than or equal to 1,000,000, to any place.

B. Use place value understanding and properties of operations to perform multi-digit arithmetic.

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

Number and Operations—Fractions 4.NF

A. Extend understanding of fraction equivalence and ordering.

1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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.)
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.)

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

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.
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,* $n \times (a/b) = (n \times a)/b$*.)*
   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?*

C. Understand decimal notation for fractions, and compare decimal fractions.

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.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
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.*
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.

Measurement and Data 4.MD

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

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. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.) *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*), *…*

[2] Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.

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[3] 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.
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.*

B. Represent and interpret data.

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.*

C. Geometric measurement: understand concepts of angle and measure angles.

5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
   a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where two rays intersect the circle.
   b. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
   c. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems, e.g., by using an equation with a letter for the unknown angle measure.

D. Relate area to operations of multiplication and addition.

8. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.

Geometry 4.G

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
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.
3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

[3] Students in Grade 4 will be assessed on multiplying a fraction and a whole number as indicated in the NF domain. Some students may be able to multiply a fraction by a fraction as a result of generating equivalent fractions; however, mastery of multiplying two fractions occurs in Grade 5.