

# Mathematics

# Grade 5

2011

Maryland Common Core State Curriculum Framework

Adapted from the Common Core State Standards for Mathematics



DRAFT

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## Introduction

These Standards define what students should understand and be able to do in their study of mathematics. Asking a student to understand something means asking a teacher to assess whether the student has understood it. But what does mathematical understanding look like? One hallmark of mathematical understanding is the ability to justify, in a way appropriate to the student's mathematical maturity, *why* a particular mathematical statement is true or where a mathematical rule comes from. There is a world of difference between a student who can summon a mnemonic device to expand a product such as  $(a + b)(x + y)$  and a student who can explain where the mnemonic comes from. The student who can explain the rule understands the mathematics, and may have a better chance to succeed at a less familiar task such as expanding  $(a + b + c)(x + y)$ . Mathematical understanding and procedural skill are equally important, and both are assessable using mathematical tasks of sufficient richness.

The Standards set grade-specific standards but do not define the intervention methods or materials necessary to support students who are well below or well above grade-level expectations. It is also beyond the scope of the Standards to define the full range of supports appropriate for English language learners and for students with special needs. At the same time, all students must have the opportunity to learn and meet the same high standards if they are to access the knowledge and skills necessary in their post-school lives. The Standards should be read as allowing for the widest possible range of students to participate fully from the outset, along with appropriate accommodations to ensure maximum participation of students with special education needs. For example, for students with disabilities reading should allow for use of Braille, screen reader technology, or other assistive devices, while writing should include the use of a scribe, computer, or speech-to-text technology. In a similar vein, speaking and listening should be interpreted broadly to include sign language. No set of grade-specific standards can fully reflect the great variety in abilities, needs, learning rates, and achievement levels of students in any given classroom. However, the Standards do provide clear signposts along the way to the goal of college and career readiness for all students.

## How to Read the Maryland Common Core Curriculum Framework for Grade 5

This framework document provides an overview of the standards that are grouped together to form the domains of study for Grade 5 mathematics. The standards within each domain are grouped by clusters and are in the same order as they appear in the Common Core State Standards for Mathematics. This document is not intended to convey the exact order in which the standards within a domain will be taught nor the length of time to devote to the study of the unit.

The framework contains the following:

- **Domains** are intended to convey coherent groupings of content.
- **Clusters** are groups of related standards. A description of each cluster appears in the left column.
- **Standards** define what students should understand and be able to do.
- **Essential Skills and Knowledge** statements provide language to help teachers develop common understandings and valuable insights into what a student must know and be able to do to demonstrate proficiency with each standard. Maryland mathematics educators thoroughly reviewed the standards and, as needed, provided statements to help teachers comprehend the full intent of each standard. The wording of some standards is so clear, however, that only partial support or no additional support seems necessary.
- **Standards for Mathematical Practice** are listed in the right column.

### Formatting Notes

- *Black* – wording from the Common Core State Standards document
- **Red Bold** - items unique to Maryland Common Core State Curriculum Frameworks
- **Blue bold** – words/phrases that are linked to clarifications
- **Green bold** – codes for standards that are referenced from other grades or standards, and are hot-linked to a full description
- **Purple bold** – strong connection to current state curriculum for this grade

## Standards for Mathematical Practice

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

### 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 quantities and their relationships in problem situations. They 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 determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

**4. Model with mathematics.**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

**5. Use appropriate tools strategically.**

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

**6. Attend to precision.**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

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

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see  $7 \times 8$  equals the well remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  and the 9 as  $2 + 7$ . They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see  $5 - 3(x - y)^2$  as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers  $x$  and  $y$ .

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

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation  $(y - 2)/(x - 1) = 3$ . Noticing the regularity in the way terms cancel when expanding  $(x - 1)(x + 1)$ ,  $(x - 1)(x^2 + x + 1)$ , and  $(x - 1)(x^3 + x^2 + x + 1)$  might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.



## Connecting Standards for Mathematical Practice to Standards for Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction. The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices. In this respect, those content standards which set an expectation of understanding are potential “points of intersection” between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

**Codes for Common Core State Standards: Mathematics Grades K – 12**

<b>Grades K – 8</b>		<b>Applicable Grades</b>
CC	Counting & Cardinality	K
EE	Expressions & Equations	6, 7, 8
F	Functions	8
G	Geometry	K, 1, 2, 3, 4, 5, 6, 7, 8
MD	Measurement & Data	K, 1, 2, 3, 4, 5
NBT	Number & Operations (Base Ten)	K, 1, 2, 3, 4, 5
NF	Number & Operations (Fractions)	3, 4, 5
NS	Number System	6, 7, 8
OA	Operations & Algebraic Thinking	K, 1, 2, 3, 4, 5
RP	Ratios & Proportional Relationship	6, 7
SP	Statistics & Probability	6, 7, 8
<b>Modeling</b>		
No Codes		Not determined
<b>High School</b>		
<b>Algebra (A)</b>		
A-APR	Arithmetic with Polynomial & Rational Expressions	8 -12
A-CED	Creating Equations	8 -12
A-REI	Reasoning with Equations & Inequalities	8 -12
A-SSE	Seeing Structure in Expressions	8 -12
<b>Functions (F)</b>		
F-BF	Building Functions	8 -12
F-IF	Interpreting Functions	8 -12
F-LE	Linear, Quadratic & Exponential Models	8 -12
F-TF	Trigonometric Functions	Not determined
<b>Geometry (G)</b>		
G-C	Circles	Not determined
G-CO	Congruence	Not determined
G-GMD	Geometric Measurement & Dimension	Not determined
G-MG	Modeling with Geometry	Not determined
G-GPE	Expressing Geometric Properties with Equations	Not determined
G-SRT	Similarity, Right Triangles & Trigonometry	Not determined
<b>Number &amp; Quantity (N)</b>		
N-CN	Complex Number System	Not determined
N-Q	Quantities	Not determined
N-RN	Real Number System	8 -12
N-VM	Vector & Matrix Quantities	Not determined
<b>Statistics (S)</b>		
S-ID	Interpreting Categorical & Quantitative Data	8 -12
S-IC	Making Inferences & Justifying Conclusions	Not determined
S-CP	Conditional Probability & Rules of Probability	Not determined
S-MD	Using Probability to Make Decisions	Not determined
<b>Modeling</b>		
No Codes		Not determined

DOMAIN: Operations and Algebraic Thinking		
Cluster	Standard	Mathematical Practices
Write and interpret numerical expressions.	<p><b>5.OA.1</b> Use <b>parentheses</b>, <b>brackets</b>, or <b>braces</b> in numerical <b>expressions</b>, and evaluate expressions with these symbols.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Ability to build on knowledge of order of operations (3.OA.8) to find the value of an expression without variables.</li> </ul> <p><b>5.OA.2</b> Write simple <b>expressions</b> that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Operations and Algebraic Thinking		
Cluster	Standard	Mathematical Practices
Analyze patterns and relationships	<p><b>5.OA.3</b> Generate two numerical patterns using two given rules. Identify apparent relationships between <b>corresponding terms</b>. Form ordered pairs consisting of <b>corresponding terms</b> from the two patterns, and graph the ordered pairs on a <b>coordinate plane</b>. 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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• Knowledge that <b>corresponding terms</b> are used to create ordered pairs.</li> <li>• Ability to apply knowledge of the coordinate system.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Number and Operations in Base Ten		
Cluster	Standard	Mathematical Practices
Understand the place value system	<p><b>5.NBT.1</b> 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 <math>\frac{1}{10}</math> of what it represents in the place to its left.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Ability to build on experience with whole numbers and decimals within the base 10 system. (4.NBT.1)</li> </ul> <p><b>5.NBT.2</b> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Knowledge of exponents with powers of 10.</li> </ul> <p><b>5.NBT.3</b> Read, write, and compare decimals to thousandths.</p> <p>a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., <math>347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times \left(\frac{1}{10}\right) + 9 \times \left(\frac{1}{100}\right) + 2 \times \left(\frac{1}{1000}\right)</math>.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>b. Compare two decimals to thousandths based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Number and Operations in Base Ten		
Cluster	Standard	Mathematical Practices
	<p><b>5.NBT.4</b> Use place value understanding to round decimals to any place.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>SC 5</p>	
<p><b>Perform operations with multi-digit whole numbers and with decimals to hundredths.</b></p>	<p><b>5.NBT.5</b> Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>SC 5</p> <p><b>5.NBT.6</b> 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, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p><b>5.NBT.7</b> 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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Ability to recognize that the product is not always larger than its factors</li> <li>Ability to recognize that the quotient is not always smaller than the dividend</li> </ul>	<ol style="list-style-type: none"> <li>Make sense of problems and persevere in solving them.</li> <li>Reason abstractly and quantitatively.</li> <li>Construct viable arguments and critique the reasoning of others.</li> <li>Model with mathematics.</li> <li>Use appropriate tools strategically.</li> <li>Attend to precision.</li> <li>Look for and make use of structure.</li> <li>Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Number and Operations—Fractions		
Cluster	Standard	Mathematical Practices
Use equivalent fractions as a strategy to add and subtract fractions.	<p><b>5.NF.1</b> 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, <math>\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}</math>. (In general, <math>\frac{a}{b} + \frac{c}{d} = \frac{(ad+bc)}{bd}</math>)</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Ability to create equivalent fractions for each addend by using the identity property.</li> </ul> <p>SC 5</p> <p><b>5.NF.2</b> 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. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result <math>\frac{2}{5} + \frac{1}{2} = \frac{3}{7}</math> by observing that <math>\frac{3}{7} &lt; \frac{1}{2}</math>.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Knowledge of understanding addition and subtraction of fractions as joining and separating parts referring to the same whole. (4.NF.3a).</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Number and Operations—Fractions		
Cluster	Standard	Mathematical Practices
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	<p><b>5.NF.3</b> Interpret a fraction as division of the numerator by the denominator (<math>\frac{a}{b} = a \div b</math>). 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 <math>\frac{3}{4}</math> as the result of dividing 3 by 4, noting that <math>\frac{3}{4}</math> multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size <math>\frac{3}{4}</math>. 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?</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Ability to recognize that a fraction is a representation of division.</li> </ul> <p><b>5.NF.4</b> Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.</p> <p>a. Interpret the product <math>(\frac{a}{b}) \times q</math> as a parts of a partition of <math>q</math> into <math>b</math> equal parts; equivalently, as the result of a sequence of operations <math>a \times q \div b</math>. For example, use a visual fraction model to show <math>(\frac{2}{3}) \times 4 = \frac{8}{3}</math>, and create a story context for this equation. Do the same with <math>(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}</math>. (In general, <math>(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}</math>.)</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Knowledge of unit fractions to multiply all fractions. (4.NF.3)</li> <li>Knowledge of using rectangular arrays to find area using rational numbers. (4.NBT.5)</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>



DOMAIN: Number and Operations—Fractions		
Cluster	Standard	Mathematical Practices
<p><b>Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (continued)</b></p>	<p><b>5.NF.5</b> Interpret multiplication as <b>scaling (resizing)</b> by:</p> <p>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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>b. Explaining why multiplying a given number by a fraction greater than one results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>\frac{a}{b} = \frac{(n \times a)}{(n \times b)}</math> to the effect of multiplying <math>\frac{a}{b}</math> by 1.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>
	<p><b>5.NF.6</b> Solve <b>real world problems</b> involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	
	<p><b>5.NF.7</b> 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.)</p> <p>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for <math>(\frac{1}{3}) \div 4</math> and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>(\frac{1}{3}) \div 4 = \frac{1}{12}</math> because <math>(\frac{1}{12}) \times 4 = \frac{1}{3}</math>.</p>	

DOMAIN: Number and Operations—Fractions		
Cluster	Standard	Mathematical Practices
<p><b>Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (continued)</b></p>	<p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• See the skills and knowledge that are stated in the Standard.</li> </ul> <p>b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for <math>4 \div (\frac{1}{5})</math> and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>4 \div (\frac{1}{5}) = 20</math> because <math>20 \times (\frac{1}{5}) = 4</math>.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• See the skills and knowledge that are stated in the Standard.</li> </ul> <p>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 <math>\frac{1}{2}</math> lb of chocolate equally? How many <math>\frac{1}{3}</math>-cup servings are in 2 cups of raisins?</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• Knowledge of the relationship between multiplication and division (4.NBT.6), (5.NF.7a), (5.NF.7b)</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>

DOMAIN: Measurement and Data		
Cluster	Standard	Mathematical Practices
Convert like measurement units within a given measurement system.	<p><b>5.MD.1</b> Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>
Represent and interpret data.	<p><b>5.MD.2</b> Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). 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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Knowledge of whole numbers on a line plot to represent and interpret fractional data on a line plot.(4.MD.4)</li> </ul>	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	<p><b>5.MD.3</b> Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <p>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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	

DOMAIN: Measurement and Data	
<p><b>Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (continued)</b></p>	<p><b>5.MD.4</b> Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• See the skills and knowledge that are stated in the Standard.</li> </ul> <p><b>SC 5</b></p> <p><b>5.MD.5</b> Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.</p> <p>a. Find the volume of a <b>right rectangular prism</b> 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 three-fold whole-number products as volumes, e.g., to represent the associative property of multiplication.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• See the skills and knowledge that are stated in the Standard.</li> </ul> <p>b. Apply the formulas <math>V = (l)(w)(h)</math> and <math>V = (b)(h)</math> 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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• See the skills and knowledge that are stated in the Standard.</li> </ul> <p>c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping <b>right rectangular prisms</b> by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>• Knowledge that the volume of a prism is the area of the Base times the height.</li> </ul>

DOMAIN: Geometry		
Cluster	Standard	Mathematical Practices
<p><b>Graph points on the coordinate plane to solve real-world and mathematical problems.</b></p>	<p><b>5.G.1</b> Use a pair of perpendicular number lines, called <b>axes</b>, to define a <b>coordinate system</b>, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one <b>axis</b>, and the second number indicates how far to travel in the direction of the second <b>axis</b>, with the convention that the names of the two <b>axes</b> and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p><b>5.G.2</b> Represent real world and mathematical problems by graphing points in the first <b>quadrant</b> of the coordinate plane, and interpret coordinate values of points in the context of the situation.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul> <p>SC 5</p>	<ol style="list-style-type: none"> <li>1. Make sense of problems and persevere in solving them.</li> <li>2. Reason abstractly and quantitatively.</li> <li>3. Construct viable arguments and critique the reasoning of others.</li> <li>4. Model with mathematics.</li> </ol>
	<p><b>5.G.3</b> 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.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>Knowledge of classifying two dimensional figures (4.G.2) to see relationships among the attributes of two-dimensional figures.</li> </ul> <p><b>5.G.4</b> Classify two-dimensional figures in a <b>hierarchy</b> based on properties.</p> <p><b>Essential Skills and Knowledge</b></p> <ul style="list-style-type: none"> <li>See the skills and knowledge that are stated in the Standard.</li> </ul>	
<p><b>Classify two-dimensional figures into categories based on their properties.</b></p>		<ol style="list-style-type: none"> <li>5. Use appropriate tools strategically.</li> <li>6. Attend to precision.</li> <li>7. Look for and make use of structure.</li> <li>8. Look for and express regularity in repeated reasoning.</li> </ol>