Standards Resource Guide

Grade 4

Overview

This guide is designed to support educators in interpreting and implementing the 2025 Louisiana Student Standards for Mathematics (LSSM). It provides descriptions of each standard to clarify its meaning and application to student learning. The document outlines the intended level of rigor and includes coherence to prerequisite and corequisite standards. Examples are provided for illustrative purposes only and do not represent a comprehensive list.

Additional information on the 2025 Louisiana Student Standards for Mathematics, including guidance on reading standards codes, a listing of standards for each grade or course, and links to additional resources, is available on the Louisiana Math Page. Questions may be directed to math@la.gov.

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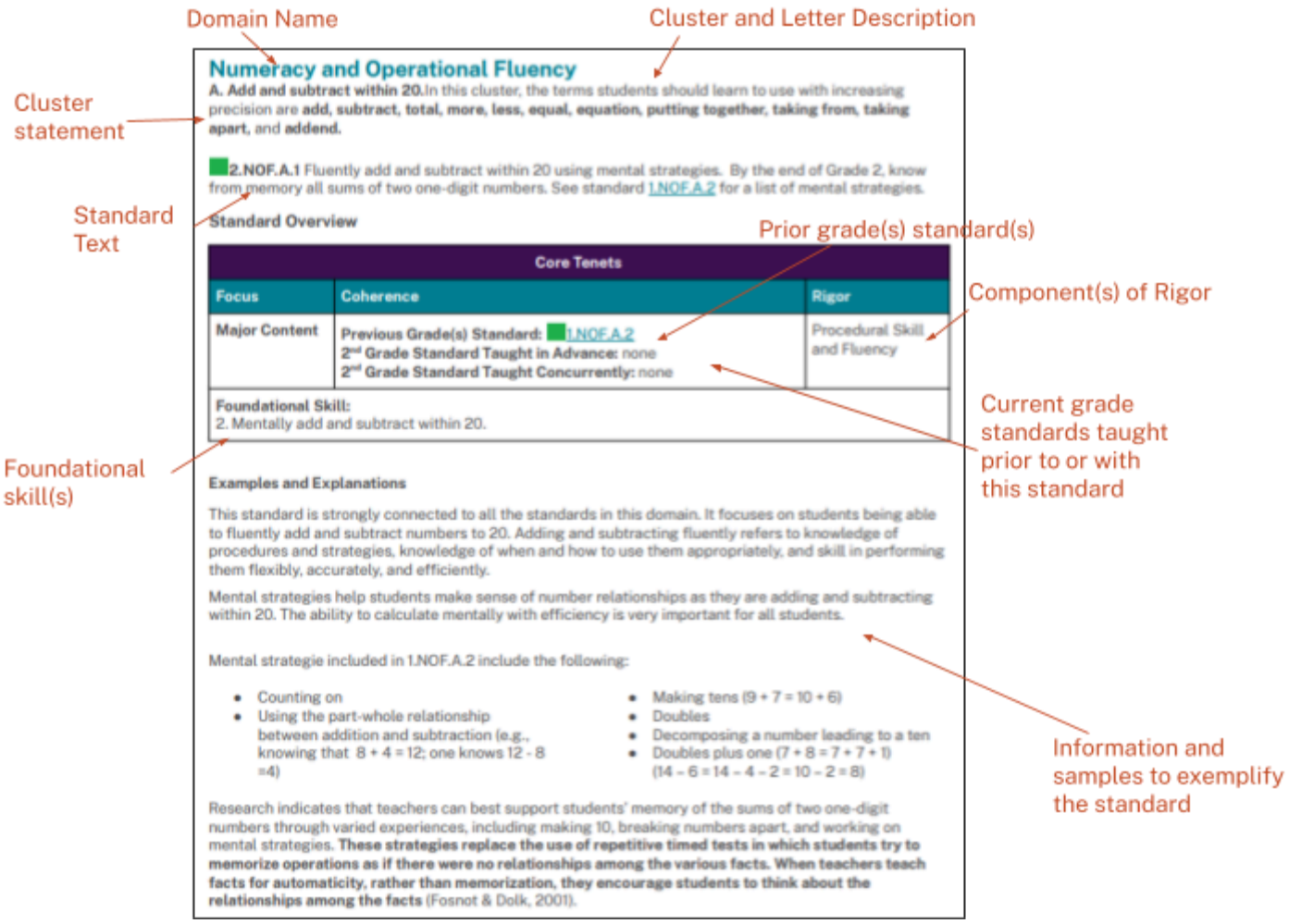
Introduction

How to Read This Guide

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



*Grades 3 through Geometry will also include a section with connections to assessment item types and achievement level descriptors.

Standards Codes: Major Work, Supporting Work, Additional Work

1. **Domain Name and Abbreviation:** A grouping of standards consisting of related content that is further divided into clusters. Each domain has a unique abbreviation, which 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 new learning related to the current grade-level standard. For students who have unfinished learning, teachers should build in proactive, just-in-time supports to build essential prerequisite knowledge.
4. **Standards Taught in Advance:** These grade-level standards demonstrate within-grade coherence and include concepts on which the target standard is built. Students should have exposure to these standards before instruction in the target standard. As with previous-grade standards, teachers should plan proactive, just-in-time supports to build within-grade prerequisite knowledge ahead of instruction on the target standard.
5. **Standards Taught Concurrently:** These grade-level standards demonstrate within-grade coherence and include standards that should be taught at the same time as the target standard to provide coherence and connectedness in instruction.
6. **Component(s) of Rigor:** See full explanation on components of rigor below.
7. **Sample Problem:** The sample problem provides an example of 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

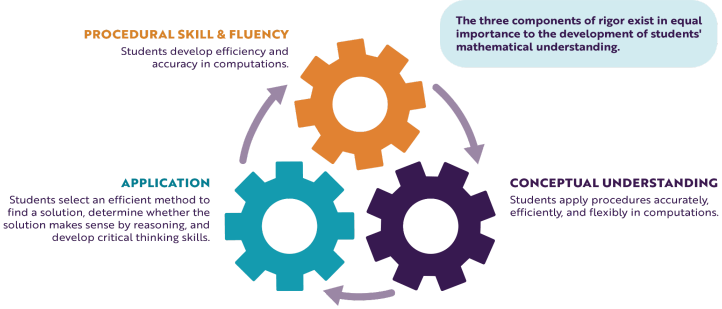
Students should spend the majority of their time on the major work of the grade, supporting work, and, where appropriate, additional work engages students in the major work of the grade, often through a change of the **context** within which students are performing mathematics. Each standard is color-coded to quickly and simply determine the focus for the grade. 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 respective grades.

Core Tenets

The 2016 Louisiana Student Standards for Math called for three instructional shifts. Since then, teachers have used these shifts to ensure deep understanding and consistent application in mathematics classrooms across the state. Now, these shifts are recognized as core tenets that serve as the foundation and guiding principles of Louisiana's mathematics standards.

Coherence in mathematics refers to a coherent body of knowledge composed of interconnected concepts, principles, and procedures. These concepts are logically linked, building upon one another, and work together to deepen understanding, support problem solving, and enable learners to apply mathematical ideas consistently and meaningfully across different contexts.

Rigor in mathematics instruction does not simply mean increasing the difficulty or complexity of practice problems. Incorporating rigor into classroom instruction and student learning requires students to engage deeply with standards and grapple meaningfully with the concepts and ideas embedded within them. The **three** components of rigor, listed



below, exist in equal importance to the development of students' mathematical understanding.

- **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 without dictating the strategy or method chosen. Students' ability to solve more complex application tasks is dependent on procedural skill and fluency.
- **Application** provides valuable context for learning and the opportunity to solve problems in a relevant and 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.

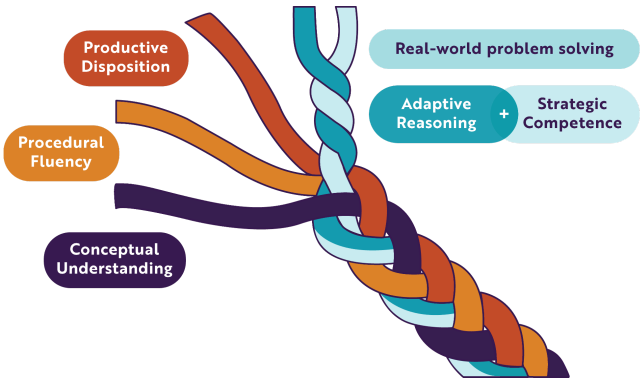
Focus calls for intentional emphasis on specific topics, skills, and ideas within grade-level mathematics instruction. Not all content in a given grade is emphasized equally in the standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or the importance to future mathematics or the demands of college and career readiness. More time in these areas is also necessary for students to meet the Louisiana Standards for Mathematical Practice. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Students should spend the large majority of 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.

The Strands for Mathematical Proficiency

The strands of mathematical proficiency, as defined by the National Research Council (NRC),[1] provide a framework describing what proficiency means for a learner in mathematics.

The strands of mathematical proficiency are intertwined, gradually developed, and deepened over time. When intentionally presented in a connected and balanced way, each strand supports the others, ultimately strengthening the proficiency of learners.

1. **Conceptual Understanding** - Students develop an understanding of key mathematical ideas and relationships and explain why procedures work.



2. **Procedural Fluency** - Students use mathematical procedures with skill and flexibility, guided by a strong grasp of underlying concepts.
3. **Productive Dispositions** - Students view mathematics as coherent, valuable, and meaningful
4. **Real World and Problem Solving** - A combination of both adaptive reasoning and strategic competence, students represent and solve real-world mathematical problems logically, justify solutions, and clearly explain and defend reasoning.

The Relationship Between Mathematical Proficiency and the Components of Rigor

While there is some overlap between the Strands of Mathematical proficiency and the Core Tenets, there is a distinct difference between the two. The strands are a framework that is focused on learner outcomes and what it means for a student to be proficient in mathematics. The Core Tenets provide a framework for how teachers should design instruction to support learning. The core tenets reflect what should be done instructionally, while the proficiency strands represent the outcome, or what students become, as a result of that instruction.

Mathematical Fluency

Fluency in mathematics is the ability to apply foundational skills and concepts flexibly, accurately, and efficiently, grounded in strong conceptual understanding to solve problems, make connections, and reason mathematically across various contexts. While fluency is an essential component of mathematics instruction, it does not represent the full depth of a mathematical standard; it must be developed alongside conceptual understanding, reasoning, and problem-solving to ensure deep and meaningful learning.

Concrete - Representational - Abstract Framework

The Concrete-Representational-Abstract (CRA) Framework describes the instructional processes that students experience to build conceptual understanding of mathematics. The first stage is where students build a concrete understanding of a concept through the use of manipulatives or other physical objects. During the second phase, learners move into visual representations of concepts. Finally, during the

[1] ADDING + IT UP HELPING CHILDREN LEARN MATHEMATICS National Academies of Sciences, Engineering, and Medicine. 2001. Adding It Up: Helping Children Learn Mathematics. Washington, DC: The National Academies Press. https://doi.org/10.17226/5109.

abstract phase, students apply their understanding of the concepts abstractly through the use of numbers and symbols. When students engage in learning that follows this process, it allows them to build a solid understanding of key mathematical concepts and ideas, ensuring comprehension that is transferable and flexibly applied across grade bands.

An example of how this framework is represented across the progression of the Louisiana Student Standards for Mathematics can be seen in the way student learning progresses across a concept, such as linear functions. In fourth grade (4.AR.A.1), students are introduced to multiplicative comparison, where much of the learning is very **concrete**. At this phase, students are using counters and other manipulatives to physically compare quantities to determine the meaning of "times as many." When they move into the middle grades, this becomes more representational as students apply their concrete understanding to recognize and represent proportional relationships. These are represented in various ways, such as ratio tables, double number lines, and graphs (6.PF.A.2, 7.PF.A.2). When students enter high school, the learning becomes **abstract** as they interpret linear functions such as y=kx and come to understand slope as rate of change.

While the example above represents a linear version of this instructional process across multiple grades, it is important to note that the concrete and representational components can occur at different times throughout the progression of learning, and may occur simultaneously across various periods. Additionally, this instructional process may also occur within lessons, units, or within the grade level.

Note about tasks vs. word problems: Real-world math tasks are open-ended and involve reasoning, exploration, and multiple solution paths. Word problems, by contrast, are usually structured scenarios with all needed information and a single correct answer. Real-world tasks build critical thinking and decision-making, while word problems focus on translating language into mathematical operations. Both types of tasks play an important role in mathematics learning — neither is inherently better than the other. Students should have frequent opportunities to engage with both, as each develops different but complementary aspects of mathematical proficiency. See the example below.

Word Problem (4.AR.A.3)	**Real-World Mathematical Task** (4.AR.A.3)
Chris bought clothes for school. She bought 3 shirts for $12 each and a skirt for $15. How much money did Chris spend on her new school clothes?	Chris is shopping for school clothes. She has $60 to spend. Shirts cost $12 each, and skirts cost $15 each. What clothes combinations could Chris buy? How much would she spend? Show your thinking.

Standards for Mathematical Practice

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 4 complete.

Louisiana Standards for Mathematical Practice (MP)	
Louisiana Standard	**Explanations and Examples**
4.MP.1 Make sense of problems and persevere in solving them.	In fourth grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different strategies when they have difficulty solving a problem. They often will use another method to check their answers.
4.MP.2 Reason abstractly and quantitatively.	Fourth graders should recognize that a number represents a specific quantity. They connect the quantity 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, record calculations with numbers, and represent or round numbers using place value concepts.
4.MP.3 Construct viable arguments and critique the reasoning of others.	In fourth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. 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.
4.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. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
4.MP.5 Use appropriate tools strategically.	Fourth 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 graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.
4.MP.6 Attend to precision.	As fourth graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot.

4.MP.7 Look for and make use of structure.	In fourth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial-products model). They relate representations of counting problems, such as tree diagrams and arrays, to the multiplication principle of counting. They generate number or shape patterns that follow a given rule.
4.MP.8 Look for and express regularity in repeated reasoning.	Students in fourth grade should notice repetitive actions in computation to make generalizations. Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.

Grade Level Foundational Skills

By the end of grade 4, mathematically proficient students can reliably apply the following skills to engage in grade-appropriate mathematical tasks. This list does not represent the full depth of learning expected in grade 4, but is comprised of the foundational skills required by the standards.

1. Fluently add and subtract up to 1,000,000.
2. Identify factors and multiples within 100.
3. Compare and order numbers up to 1,000,000, identifying whether one number is greater than, less than, or equal to another.
4. Multiply multi-digit numbers with products up to 100.
5. Estimate and round whole numbers within 1,000,000 to any place value.
6. Add and subtract fractions with like denominators.
7. Multiply a fraction by a whole number.

Numeracy and Operational Fluency

A. Generalize place value understanding for multi-digit whole numbers. In this cluster, the terms students should learn to use with increasing precision are **place value, greater than, less than, equal to, ‹, ›, =, comparisons/compare, round, base-ten numerals (standard form), number name (written form), expanded form, inequality,** and **expression.**

4.NOF.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.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 2.NOF.B.2 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding
Foundational Skills: 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

Students should be familiar with and use place value as they work with numbers. This standard calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10. In this standard, students should reason about the magnitude of digits in a number. Students should be given opportunities to reason and analyze the relationships of numbers that they are working with. Some activities that will help students develop an understanding of this standard are as follows:

- Compare the value of the 2 in the number 582 to the value of the 2 in the number 528.
- Thousands and Millions of Fourth Graders

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.3, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Place Value 4.NOF.A.1 4.NOF.A.2 4.NOF.A.3	In any **multi**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any **four**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.
	Reads, writes, and compares **multi-**digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), rounds to any place value.	Reads, writes, and compares **four-**digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value.	**Reads, writes, and compares three-digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value with scaffolding.**	

4.NOF.A.2 Read and write multi-digit whole numbers up to 1,000,000 using base-ten numerals/standard form, written form (number names), unit form, and expanded form.

a. Compare multi-digit whole numbers up to 1,000,000 using >, =, and < symbols to record the results of comparisons.
b. b. Order a set of whole numbers up to 1,000,000.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.NOF.A.1 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
3. Compare and order numbers up to 1,000,000, identifying whether one number is greater than, less than, or equal to another.		

Examples and Explanations

No Grade 3 standard focuses on reading and writing numbers. As a result, students may need to look back at 2.NOF.B.4 prior to engaging with this standard. This standard refers to various ways to write numbers: standard form, written from, unit form, and expanded form. Students should have flexibility with the different number forms. The traditional expanded form is 285 = 200 + 80 + 5. Written form or number name for 285 is two hundred eighty-five. In addition, students will need opportunities to explore the idea that 285 could also be 28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones.

To read numerals between 1,000 and 1,000,000, students need to understand the role of commas. Each sequence of three digits made by commas is read as hundreds, tens, and ones, followed by the name of the appropriate base-thousand unit (thousand, million, billion, trillion, etc.). Thus, 457,000 is read “four hundred fifty-seven thousand.”

Examples and Explanations

In this standard, students should be able to compare two multi-digit whole numbers using appropriate symbols. In comparing 34,570 to 34,192, a student might say both numbers have the same number of 10,000s and the same number of 1,000s; however, the value in the 100s place is different, so that is where I would compare the two numbers.

The same methods students used for comparing and ordering numbers in previous grades apply to these numbers, because of the uniformity of the base-ten system.

Example:

To order a set of numbers from least to greatest, begin by comparing the digits in the largest place value. The numbers should then be arranged based on the first place where the digits are different, as this digit determines which number is greater.

Order 3,205; 3,250; 3,025

Solution: The digits in the thousands place of all three numbers (3,025; 3,205; and 3,250) are the same (3). To determine the least number, compare the digits in the hundreds place. The hundreds place in 3,025 (0) is smaller than the hundreds place in 3,205 (2) and 3,250 (2), making 3,025 the least number.

Next, compare 3,205 and 3,250 using the tens place. The digit in the tens place of 3,205 (0) is less than the digit in the tens place of 3,250 (5).

Therefore, ordered from least to greatest, the numbers are 3,025; 3,205; and 3,250.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.3, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Place Value 4.NOF.A.1 4.NOF.A.2 4.NOF.A.3	In any **multi**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any **four**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.
	Reads, writes, and compares **multi-**digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), rounds to any place value.	Reads, writes, and compares **four-**digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value.	**Reads, writes, and compares three-digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value with scaffolding.**	

4.NOF.A.3 Use place value understanding to

a. Round multi-digit whole numbers up to 1,000,000, to any place.
b. Use estimation to reason about solutions to real-world mathematical tasks.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.NOF.C.5 **4th Grade Standard Taught in Advance:** 4.NOF.A.1, 4.NOF.A.2 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding
Foundational Skills: 5. Estimate and round whole numbers within 1,000,000 to any place value.		

Examples and Explanations

This standard refers to place value understanding, which extends beyond 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 and a hundreds chart as tools to support their work with rounding.

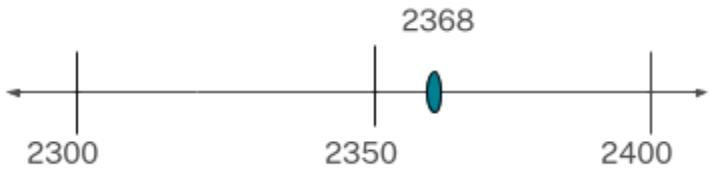
When students are asked to round large numbers, they first need to identify which digit is in the appropriate place.

Example: Round 76,398 to the nearest 1000.

Since I needed to round to the nearest 1,000, I knew the answer was either 76,000 or 77,000. I knew that the halfway point between these two numbers is 76,500. Then I saw that 76,398 was between 76,000 and 76,500, so the rounded number would be 76,000.

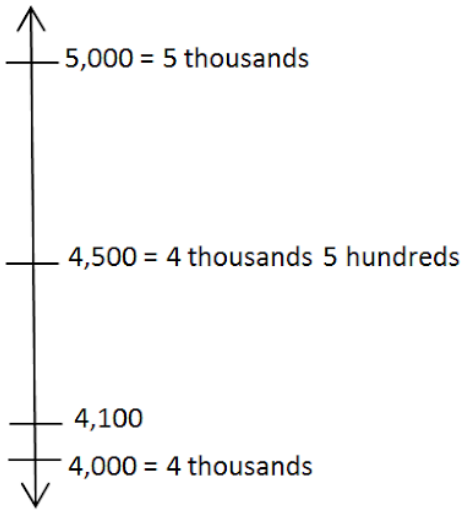
Example: Round 2368 to the nearest hundred.

This will either be 2300 or 2400, since those are the two hundreds before and after 2368. I drew a number line and divided the space between 2300 and 2400 into 50s. I had to determine whether 2368 is closer to 2300 or 2400. Since 2368 is closer to 2400, this number should be rounded to 2400.



Students may also use a vertical number line for rounding.

Round to the nearest thousand
4,100



Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.3, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Place Value 4.NOF.A.1 4.NOF.A.2 4.NOF.A.3	In any **multi**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any **four**-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.	In any three-digit whole number, recognizes a digit in one place represents 10 times as much as it represents in the place to its right.
	Reads, writes, and compares **multi**-digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), rounds to any place value.	Reads, writes, and compares **four**-digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value.	**Reads, writes, and compares three-digit whole numbers using base-10 numerals, number names in expanded form and symbols (>, <, =), and rounds to any place value with scaffolding.**	

D. Use place value understanding and properties of operations to perform multi-digit arithmetic. In this cluster, the terms students should learn to use with increasing precision are **add, addend, sum, subtract, difference, equation, strategies, properties of operations, algorithm, rectangular arrays, area model, multiply, divide, factor, product, quotient,** and **reasonableness.**

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

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.NOF.C.6 **4th Grade Standard Taught in Advance:** 4.NOF.C.7 **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency
Foundational Skills: 1. Fluently add and subtract up to 1,000,000.		

Examples and Explanations

Students build on their understanding of addition and subtraction, their use of place value, and their flexibility with multiple strategies to make sense of a standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract.

This standard refers to fluency, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using a variety of strategies). **This is the first grade level where students are expected to be proficient at using a standard algorithm to add and subtract. However, other previously learned strategies are still appropriate for students to use.**

In mathematics, an algorithm is defined by its steps and not by the way those steps are recorded in writing. With this in mind, minor variations in methods of recording standard algorithms are acceptable. As with addition and subtraction, students should use methods they understand and can explain.

When students begin using a standard algorithm, their explanations may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain their steps either orally or in writing to help internalize the algorithm.

3892
+ 1567

Student explanation for this problem:

1. Two ones plus seven ones is nine ones.
2. Nine tens plus six tens is 15 tens.
3. I am going to write down five tens and think of the 10 tens as one more hundred. (Notates with a 1 above the hundreds column.)
4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds.
5. I am going to write the four hundreds and think of the 10 hundreds as one more 1,000. (Notates with a 1 above the thousands column.)
6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand.

- 3546
  - 928

  Student explanation for this problem:

  1. There are not enough ones to take 8 ones from 6 ones, so I have to use one ten as 10 ones. Now I have 3 tens and 16 ones. (Marks through the 4 and notates with a 3 above the 4 and writes a 1 above the ones column to be represented as 16 ones.)
  2. Sixteen ones minus 8 ones is 8 ones. (Writes an 8 in the ones column of answer.)
  3. Three tens minus 2 tens is one ten. (Writes a 1 in the tens column of answer.)
  4. There are not enough hundreds to take 9 hundreds from 5 hundreds so I have to use one thousand as 10 hundreds. (Marks through the 3 and notates with a 2 above it. (Writes down a 1 above the hundreds column.)
  5. Now I have 2 thousand and 15 hundreds.
  6. Fifteen hundreds minus 9 hundreds is 6 hundreds. (Writes a 6 in the hundreds column of the answer.)
  7. I have 2 thousands left since I did not have to take away any thousands. (Writes 2 in the thousands place of answer.)

Teacher Note: Students should know that it is mathematically possible to subtract a larger number from a smaller number, but that their work with whole numbers does not allow this, as the difference would result in a negative number.

Assessment Connections

Assessment Item Type(s): Type I, III
Evidence Statement(s): LEAP.I.4.7, LEAP.I.4.8LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Addition and Subtraction 4.NOF.B.4 LEAP.I.4.7 LEAP.I.4.8	Fluently adds and subtracts multi-digit whole numbers	**Fluently** adds and subtracts multi-digit whole numbers.	Adds **and** subtracts multi-digit whole numbers.	Adds or subtracts multi-digit whole numbers.
	Solves **multi**-step problems by adding or subtracting multi-digit whole numbers.	Solves **two**-step problems by adding and subtracting multi-digit whole numbers.	Solves one-step problems by adding and subtracting multi-digit whole numbers.	Solves one-step problems by adding and subtracting multi-digit whole numbers.

4.NOF.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 understanding and the properties of operations.

a. Illustrate and explain the calculation by using equations, rectangular arrays, number line diagrams, and/or area models.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.AR.B.5, 3.NOF.B.4, 3.NOF.C.6, 3.NOF.C.7 **4th Grade Standard Taught in Advance:** 4.NOF.A.1 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
Foundational Skills: 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

Students who develop flexibility in breaking numbers apart have a better understanding of the importance of place value and the distributive property in multi-digit multiplication. Students use base ten blocks, area models, partitioning, compensation[2] and other strategies when multiplying whole numbers. Students use words and diagrams to explain their thinking. They use the terms *factor* and *product* when communicating their reasoning. Multiple strategies enable students to develop fluency with multiplication and transfer that understanding to division. **Use of the standard algorithm for multi-digit multiplication is not an expectation until the 5th grade (5.NOF.D.10).**

Another part of understanding general base-ten methods for multi-digit multiplication is understanding the role played by the distributive property. This allows numbers to be decomposed into base-ten units, products of the units to be computed, and then combined. By decomposing the factors into like base-ten units and applying the distributive property, multiplication computations are reduced to single-digit multiplications and products of numbers with multiples of 10, of 100, and of 1,000. Students can connect diagrams of areas or arrays to numerical work to develop an understanding of general base-ten multiplication methods. Computing products of two two-digit numbers requires using the distributive property several times when the factors are decomposed into base-ten units.

[2] http://www.showme.com/sh/?h=4Li5Pm4

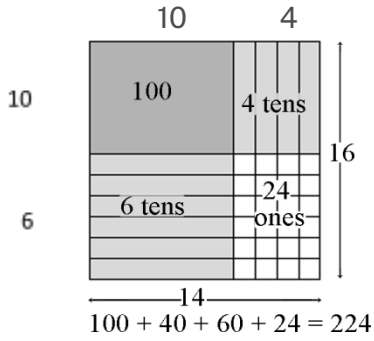
Examples:

36 x 94 = (30 + 6) x (90 + 4)
= (30 + 6) x 90 + (30 + 6) x 4
= 30 x 90 + 6 x 90 + 30 x 4 + 6 x 4

Use of place value and the distributive property are applied in the **scaffolded examples** below.

- To illustrate, 154 x 6 students use base-ten blocks or use drawings to show 154 six times. Seeing 154 six times will lead them to understand the distributive property: 154 x 6 = (100 + 50 + 4) x 6 = (100 x 6) + (50 x 6) + (4 x 6) = 600 + 300 + 24 = 924.

- The area model shows the partial products.



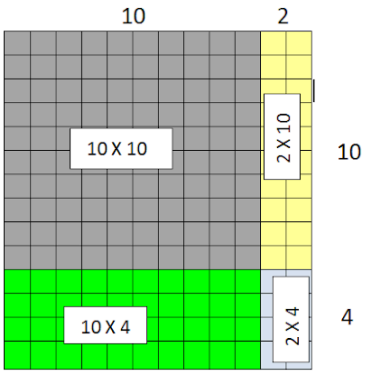
Using the area model, students first verbalize their understanding:

- 10 x 10 is 100
- 4 x 10 is 40
- 10 x 6 is 60, and
- 4 x 6 is 24.

They use different strategies to record this type of thinking.

An array model is similar to an area model, as one finds area by using square units. The array below models 12 x 14.

100 + 20 + 40 + 8 = 168.



Other strategies are shown below.

25	25
x24	X24
400 (20 x 20)	500 (20 x 25)
100 (20 x 5)	100 (4 x 25)
80 (4 x 20)	600
20 (4 x 5)	
600	

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.I.4.2, LEAP.I.4.3, LEAP.II.4.1, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Solve Multi-step Problems 4.AR.A.3 4.NOF.B.5 4.NOF.B.6 LEAP.I.4.2 LEAP.I.4.3	Solves **multi-step** word problems using the four operations with whole numbers.	Solves two-step **word** problems using the four operations with whole numbers.	Solves one- **or two-step** problems using the four operations with whole numbers.	Solves one-step problems using the four operations with whole numbers.
	Multiplies a three- **or four-digit** by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.

4.NOF.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value understanding, the properties of operations, and/or the relationship between multiplication and division.

a. Represent and explain the calculation by using equations, rectangular arrays, and/or area models.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.AR.B.5, 3.NOF.B.4, 3.NOF.C.6 **4th Grade Standard Taught in Advance:** 4.NOF.A.1, 4.NOF.B.5 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
Foundational Skills: 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

In fourth grade, students build on their third-grade work with division within 100. Students need opportunities to develop their understanding by using problems in and out of context.

Examples:

Using Base-ten Blocks: Students build 260 with base-ten blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50.

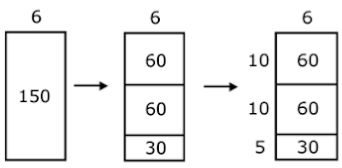
Using Place Value: 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4)

Using Multiplication: 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65

- **Using an Open Array or Area Model**

  After developing an understanding of using arrays to divide, students begin to use a more abstract model for division. This model connects to the algorithm that will be formalized in the sixth grade. It is based on use of the distributive property.

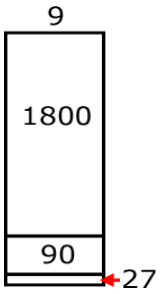
  - **Example:** 150 ÷ 6



1. Students make a rectangle and write 6 on one of its sides. They indicate that 150 could represent the area of the rectangle by writing 150 inside the rectangle. (Left diagram)
2. Students think of ways to rewrite 150: 60 + 60 + 30 = 150, and each addend is a multiple of 6. (Middle diagram)

3. Students think of the values shown in the middle diagram as areas of the small rectangles and use the area formula to find the missing lengths of the smaller rectangles. (Right diagram)
4. The area model on the right now shows that 25 x 6 = 150, so 150 ÷ 6 = 25.

- **Example**: 1917 ÷ 9



A student's description of his or her thinking may be similar to the following:

I need to find out how many 9s are in 1917. I know that 200 x 9 is 1800. So if I use 1800 of the 1917, I have 117 left. I know that 9 x 10 is 90. So if I have 10 more 9s, I will have 27 left. I can make 3 more 9s. I have 200 nines, 10 nines, and 3 nines. So I made 213 nines. 1,917 ÷ 9 = 213.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.I.4.4, LEAP.II.4.1, LEAP.II.4.2, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Solve Multi-step Problems 4.AR.A.3 4.AR.D.6 4.NOF.B.6 LEAP.I.4.4	Solves **multi-step** word problems using the four operations with whole numbers.	Solves two-step **word** problems using the four operations with whole numbers.	Solves one- **or two-step** problems using the four operations with whole numbers.	Solves one-step problems using the four operations with whole numbers.
	Multiplies a three- **or four-digit** by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.

C. Extend understanding of fraction equivalence and ordering. In this cluster, the terms students should learn to use with increasing precision are partition(ed), fraction, unit fraction, equivalent, expression, multiple, reason, denominator, numerator, comparison/compare, ‹, ›, =, and benchmark fraction.

4.NOF.C.7 Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models or number line diagrams, 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.)

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.NOF.A.3 **4th Grade Standard Taught in Advance:** 4.AR.A.2 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
Foundational Skills: 7. Multiply a fraction by a whole number.		

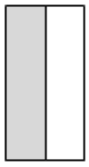
Examples and Explanations

This standard extends the work in third grade by using additional denominators (5, 10, 12, and 100). Students use visual models to generate equivalent fractions.

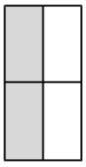
All the models show 1/2. The second model shows 2/4 but also shows that 1/2 and 2/4 are equivalent fractions because their areas are equivalent. When a horizontal (or vertical) line is drawn through the center of the model, the number of equal parts doubles, and the size of the parts is halved. The

Students will begin to notice connections between the models and fractions because of the way that the parts and wholes are counted. They begin to generate a rule for writing equivalent fractions.

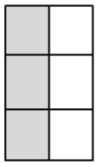
$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$



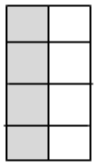
$\frac{1}{2}$



$\frac{2}{4} = \frac{2 \times 1}{2 \times 2}$

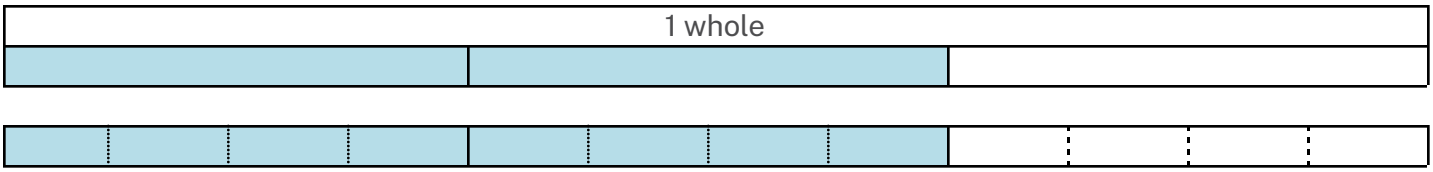


$\frac{3}{6} = \frac{3 \times 1}{3 \times 2}$



$\frac{4}{8} = \frac{4 \times 1}{4 \times 2}$

Using fraction strips to show that $\frac{2}{3} = \frac{8}{12}$.



$$\frac{2}{3} = \frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$$

Students can also use number line diagrams to find equivalent fractions, which helps them visualize how fractions relate to each other. For example, when finding fractions equivalent to $\frac{1}{2}$, students can use double number lines to see the relationship between fractions. By marking $\frac{1}{2}$ on a number line and then partitioning another number line into fourths, students can see that $\frac{1}{2}$ aligns with $\frac{2}{4}$. This reinforces the idea that equivalent fractions represent the same point on the number line, even though they are written with different numerators and denominators.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.I.4.I, LEAP.II.4.5, LEAP.II.4.7, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Compare Fractions and Compare Decimals 4.NOF.C.7 4.NOF.C.8 4.NOF.E.12 4.NOF.E.13 4.NOF.E14 LEAP.I.4.1	Compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths). Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions and comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; **expresses a fraction with denominator 10 as an equivalent fraction with denominator 100;** uses decimal notation for fractions (tenths and hundredths); and compares fractions, with like or unlike numerators and denominators, **by creating equivalent fractions and** comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and compares fractions, with like **or unlike numerators and denominators by comparing to a benchmark fraction**.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and **compares fractions with like denominators.**
	Recognizes that decimals and fractions must refer to the same whole in order to compare.	Recognizes that decimals and fractions must refer to the same whole in order to compare.	**Recognizes that decimals and fractions must refer to the same whole in order to compare.**	
	Shows results using symbols.	Shows results using symbols.	**Shows results using symbols.**	

	Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison.	Solves simple word problems requiring fraction comparison.	**Solves simple word problems requiring fraction comparison with scaffolding.**	
	Adds fractions with denominators of 10 and 100.			

4.NOF.C.8 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, and by comparing to a benchmark fraction such as $\frac{1}{2}$.

- 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 or a number line diagram. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)

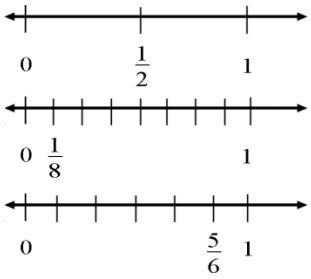
Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.NOF.C.7 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding
Foundational Skills: 3. Compare and order numbers up to 1,000,000, identifying whether one number is greater than, less than, or equal to another.		

Examples and Explanations

This standard calls students to compare fractions by creating visual fraction models, finding common denominators or numerators, or comparing to a benchmark fraction. **Students' experiences should focus on visual fraction models rather than algorithms.** Students should learn to draw fraction models to help them compare. Students must also recognize that they must consider the size of the whole when comparing fractions (i.e., $\frac{1}{2}$ and $\frac{1}{8}$ of two medium pizzas are very different from $\frac{1}{2}$ of one medium and $\frac{1}{8}$ of one large).

- Fractions may be compared using $\frac{1}{2}$ as a benchmark.



Possible student thinking by using benchmarks:

- $\frac{1}{8}$ is smaller than $\frac{1}{2}$ because when 1 whole is cut into 8 pieces, the pieces are much smaller than when 1 whole is cut into 2 pieces.

Possible student thinking by creating common denominators:

- $\frac{5}{6} > \frac{1}{2}$ because $\frac{3}{6} = \frac{1}{2}$ and $\frac{5}{6} > \frac{3}{6}$

Fractions with the same denominators may be compared using the numerators as a guide.

- $\frac{2}{6} < \frac{3}{6} < \frac{5}{6}$

Fractions with the same numerators may be compared and ordered using the denominators as a guide.

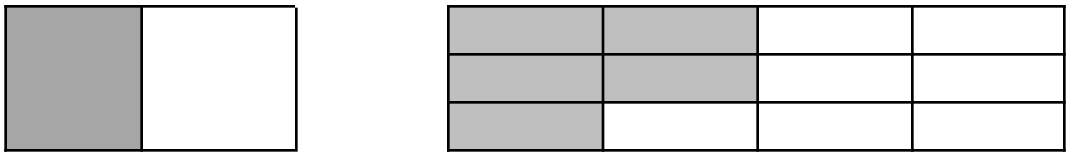
- $\frac{3}{10} < \frac{3}{8} < \frac{3}{4}$

Two cakes on the counter are the same size. The first cake has $\frac{1}{2}$ of it left. The second cake has $\frac{5}{12}$ left. Which cake has more left?

Student 1

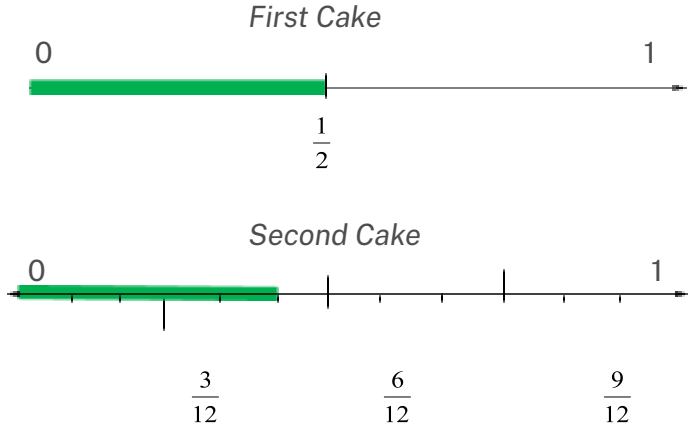
Area model:

The first cake has more left over. The second cake has $\frac{5}{12}$ left which is smaller than $\frac{1}{2}$.



Student 2

Number line model:



Student 3 verbal explanation:
I know that $\frac{6}{12}$ equals $\frac{1}{2}$. Therefore, the second cake which has $\frac{5}{12}$ left is less than $\frac{1}{2}$.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAPI.4.I, LEAP.II.4.5, LEAP.II.4.7, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Compare Fractions and Compare Decimals 4.NOF.C.7 4.NOF.C.8 4.NOF.E.12 4.NOF.E.13 4.NOF.E14 LEAP.I.4.1	Compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths). Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions and comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; **expresses a fraction with denominator 10 as an equivalent fraction with denominator 100;** uses decimal notation for fractions (tenths and hundredths); and compares fractions, with like or unlike numerators and denominators, **by creating equivalent fractions and** comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and compares fractions, with like **or unlike numerators and denominators by comparing to a benchmark fraction**.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and **compares fractions with like denominators.**
	Recognizes that decimals and fractions must refer to the same whole in order to compare.	Recognizes that decimals and fractions must refer to the same whole in order to compare.	**Recognizes that decimals and fractions must refer to the same whole in order to compare.**	
	Shows results using symbols.	Shows results using symbols.	**Shows results using symbols.**	

	Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison.	Solves simple word problems requiring fraction comparison.	**Solves simple word problems requiring fraction comparison with scaffolding.**	
	Adds fractions with denominators of 10 and 100.			

D. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. In this cluster, the terms students should learn to use with increasing precision are **operations, addition/joining, subtraction/separating, fraction, unit fraction, equivalent, multiple, reason, denominator, numerator, decomposing, mixed number, properties of operations, multiply,** and **multiple.**

4.NOF.D.9 Understand a fraction $\frac{a}{b}$ 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.
b. Decompose a fraction, including mixed numbers and fractions greater than 1, into a sum of fractions, including unit fractions and non-unit 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 or number line diagram.
c. Evaluate the reasonableness of sums and differences of fractions using benchmark fractions, 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, referring to the same whole.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 1.AR.B.3, 1.AR.B.4, 1.AR.C.6, 2.AR.A.1, 3.NOF.A.1, 3.NOF.A.2 **4th Grade Standard Taught in Advance:** 4.NOF.C.7 **4th Grade Standard Taught Concurrently:** 4.DM.A.2, 4.DM.B.4	Conceptual Understanding
Foundational Skills: 6. Add and subtract fractions with like denominators.		

Examples and Explanations

A fraction with a numerator of one is called a unit fraction. When students investigate fractions other than unit fractions, such as $\frac{2}{3}$, they should be able to decompose the non-unit fraction into a combination of several unit fractions.

Examples:

- $\frac{2}{3} = \frac{1}{3} + \frac{1}{3}$

  Being able to visualize this decomposition into unit fractions helps students when adding or subtracting fractions. Students need multiple opportunities to work with all forms of fractions,

including mixed numbers, and be able to decompose them in more than one way. Students may use visual models to help develop this understanding.

- $1\frac{1}{4} - \frac{3}{4} = \square$ and $1\frac{1}{4} = \frac{4}{4} + \frac{1}{4}$

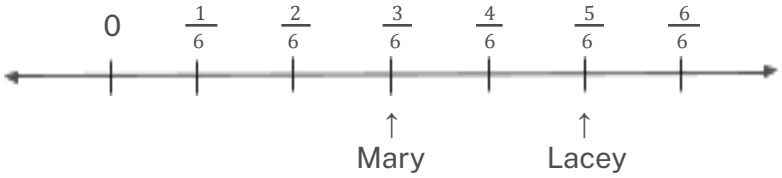
  $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$

  $\frac{5}{4} - \frac{3}{4} = \frac{2}{4} = \frac{1}{2}$

- Mary and Lacey decide to share a pizza. Mary ate $\frac{3}{6}$ and Lacey ate $\frac{2}{6}$ of the pizza. How much of the pizza did the girls eat together?

  Solution: The amount of pizza Mary ate can be thought of as $\frac{3}{6}$ or $\frac{1}{6}$ and $\frac{1}{6}$ and $\frac{1}{6}$. The amount of pizza Lacey ate can be thought of as $\frac{1}{6}$ and $\frac{1}{6}$. The total amount of pizza they ate is $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$ or $\frac{5}{6}$ of the whole pizza.

  The solution can also be modeled on a number line showing the decomposition of $\frac{3}{6}$ and $\frac{2}{6}$ to find the sum, $\frac{5}{6}$.



A separate algorithm for mixed numbers in addition and subtraction is not necessary. Students will tend to add or subtract the whole numbers first and then work with the fractions using the same strategies they have applied to problems that contained only fractions.

Teacher Note: There is no mathematical reason to simplify fractions. Therefore, students are not required to do so.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.4, LEAP.II.4.7, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Solve Fraction Problems 4.NOF.D.9 LEAP.I.4.6	**Understands and** solves mathematical and word problems involving the addition and subtraction of fractions and mixed numbers with like denominators by joining and separating parts referring to the same whole**, and justifies the solution with a visual model**.	Using visual models, solves mathematical **and word** problems involving the addition and subtraction of fractions **and mixed numbers** with like denominators by joining and separating parts referring to the same whole.	Using visual models, solves mathematical problems involving the addition and subtraction of fractions with like denominators by joining and separating parts referring to the same whole.	Using visual models, solves mathematical problems involving the addition and subtraction of fractions with like denominators by joining and separating parts referring to the same whole.
	Decomposes a fraction into a sum of fractions with the same denominator in more than one way and records the decomposition using an equation.	Decomposes a fraction into a sum of fractions with the same denominator **in more than one way** and records the decomposition using an equation.	**Decomposes a fraction into a sum of fractions with the same denominator and records the decomposition using an equation.**	

4.NOF.D.10 Add and subtract fractions with like denominators.

a. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction greater than 1 and/or by using properties of operations and the relationship between addition and subtraction.
b. Solve real-world mathematical tasks involving addition and subtraction of fractions, including mixed numbers and fractions greater than 1, referring to the same whole and having like denominators, e.g., by using visual fraction models, number lines, or equations to represent the problem.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 1.AR.B.3, 1.AR.B.4, 1.AR.C.6, 2.AR.A.1, 3.NOF.A.1, 3.NOF.A.2 **4th Grade Standard Taught in Advance:** 4.NOF.C.7 **4th Grade Standard Taught Concurrently:** 4.DM.A.2, 4.DM.B.4	Procedural Skill and Fluency, Application
Foundational Skills: 6. Add and subtract fractions with like denominators.		

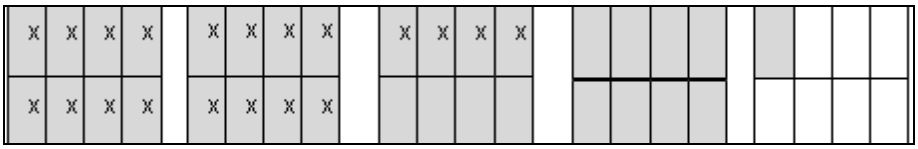
Examples and Explanations

- Susan and Maria need $8\frac{3}{8}$ feet of ribbon to package gift baskets. Susan has $3\frac{1}{8}$ feet of ribbon, and Maria has $5\frac{3}{8}$ feet of ribbon. How much ribbon do they have altogether? Will the amount they have be enough to complete the project? Explain why or why not.

  The student thinks: I can add the ribbon Susan has to the ribbon Maria has to find out how much ribbon they have altogether. Susan has $3\frac{1}{8}$ feet of ribbon, and Maria has $5\frac{3}{8}$ feet of ribbon. I can write this as $3\frac{1}{8} + 5\frac{3}{8}$. I know they have 8 feet of ribbon by adding the 3 and 5. They also have $\frac{1}{8}$ and $\frac{3}{8}$ which makes a total of $\frac{4}{8}$ more. Altogether they have $8\frac{4}{8}$ feet of ribbon. $8\frac{4}{8}$ is larger than $8\frac{3}{8}$ so they will have enough ribbon to complete the project. They will even have a little extra ribbon left, $\frac{1}{8}$ foot.

- Trevor has $4\frac{1}{8}$ pizzas left over from his soccer party. After giving some pizza to his friend, he has 2 $\frac{4}{8}$ of a pizza left. How much pizza did Trevor give to his friend?

Solution: Trevor had $4\frac{1}{8}$ or $\frac{33}{8}$ pizzas to start. I shaded in rectangles to show how much he started with. I put an x in each shaded rectangle to show how much pizza he had left, which was $2\frac{4}{8}$ or $\frac{20}{8}$ pizzas. The shaded rectangles without an x are the pieces of pizza he gave to his friend. There are 13 shaded rectangles without an x, so he gave his friend $\frac{13}{8}$ or $1\frac{5}{8}$ pizzas.



Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.I.4.6 (jointly with 4.DM.A.3 - tasks must combine both), LEAP.II.4.6, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Solve Fraction Problems 4.NOF.B.4 LEAP.I.4.6	**Understands and** solves mathematical and word problems involving the addition and subtraction of fractions and mixed numbers with like denominators by joining and separating parts referring to the same whole**, and justifies the solution with a visual model**.	Using visual models, solves mathematical **and word** problems involving the addition and subtraction of fractions **and mixed numbers** with like denominators by joining and separating parts referring to the same whole.	Using visual models, solves mathematical problems involving the addition and subtraction of fractions with like denominators by joining and separating parts referring to the same whole.	Using visual models, solves mathematical problems involving the addition and subtraction of fractions with like denominators by joining and separating parts referring to the same whole.
	Decomposes a fraction into a sum of fractions with the same denominator in more than one way and records the decomposition using an equation.	Decomposes a fraction into a sum of fractions with the same denominator **in more than one way** and records the decomposition using an equation.	**Decomposes a fraction into a sum of fractions with the same denominator and records the decomposition using an equation.**	

4.NOF.D.11 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 $\frac{a}{b}$ as a multiple of $\frac{1}{b}$.
b. Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to multiply a fraction by a whole number.
c. Solve real-world mathematical tasks involving multiplication of a fraction by a whole number, e.g., by using visual fraction models, number line diagrams, and equations to represent the problem.

Standard Overview

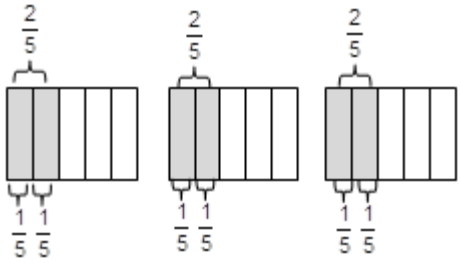
Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency, Application
Foundational Skills: 7. Multiply a fraction by a whole number.		

Examples and Explanations

Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations.

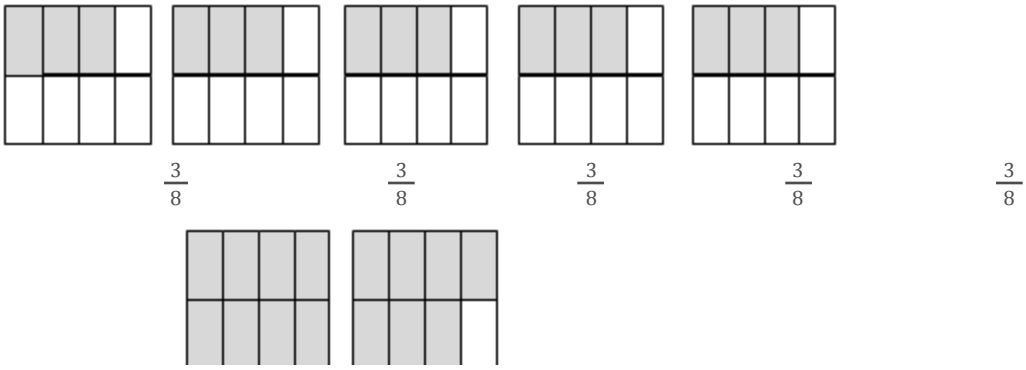
Examples:

- $3 \times \frac{2}{5} = 6 \times \frac{1}{5} = \frac{6}{5}$



- If each person at a party eats $\frac{3}{8}$ of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie?

  A student may build a fraction model to represent this problem.



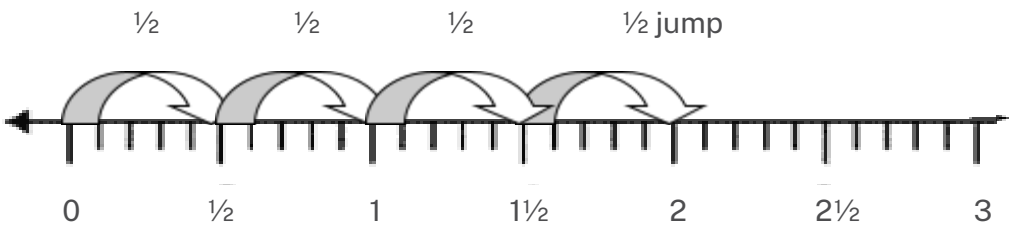
$\frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} = \frac{15}{8} = 1\frac{7}{8}$ pounds of roast beef.

My answer is between 1 and 2.

- In a relay race, each runner runs $\frac{1}{2}$ of a lap. If there are 4 team members, how long is the race?

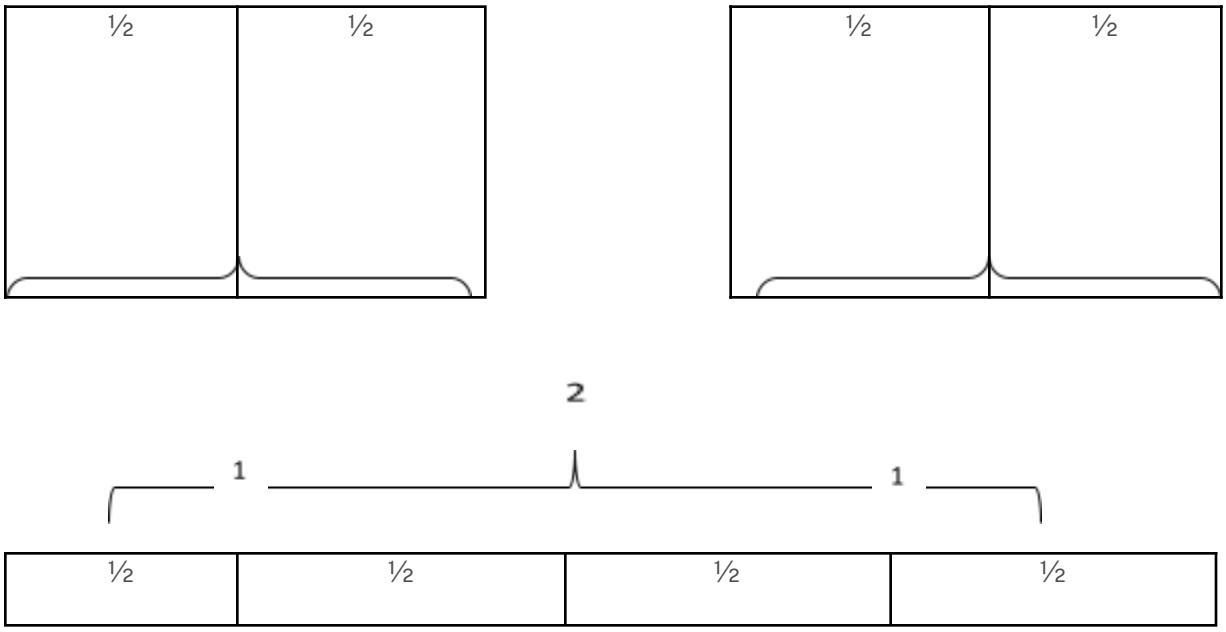
Student 1

Draws a number line and shows 4 jumps of $\frac{1}{2}$.



Student 2

Draws an area model showing 4 pieces of $\frac{1}{2}$ joined together to equal 2.



Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.4, LEAP.II.4.6, LEAP.II.4.7, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Multiply Fractions by Whole Numbers 4.NOF.D.11	**Describes** a visual fraction model and solves mathematical and real-world problems by recognizing that a fraction *a*/*b* is a multiple of 1/*b* and multiplies a fraction by a whole number.	Using visual models, solves mathematical **and real- world** problems by recognizing that a fraction *a*/*b* is a multiple of 1/*b* and multiplies a fraction by a whole number.	Using visual models, solves mathematical problems by recognizing that a fraction *a*/*b* is a multiple of 1/*b* **and multiplies a fraction by a whole number**.	Using visual models, solves mathematical problems by recognizing that a fraction *a*/*b* is a multiple of 1/*b*.

E. Understand decimal notation for fractions, and compare decimal fractions. In this cluster, the terms students should learn to use with increasing precision are **fraction, numerator, denominator, equivalent, reasoning, decimals, tenths, hundredths, multiplication, comparisons/compare,** ‹, ›, and **=.**

4.NOF.E.12 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.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.NOF.C.7 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency, Application
Foundational Skills: 6. Add and subtract fractions with like denominators.		

Examples and Explanations

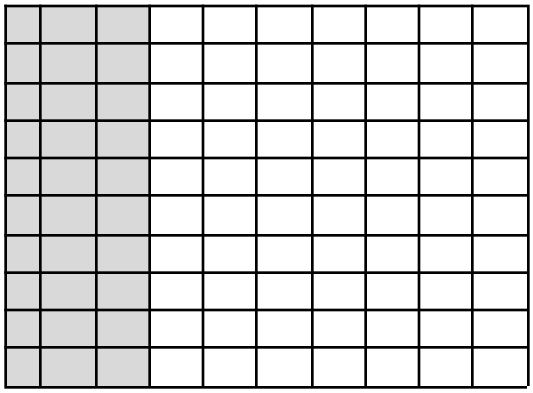
This standard continues the work of equivalent fractions by having students change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator. To prepare for work with decimals (4.NOF.C.7 and 4.NOF.C.8), experiences that allow students to shade decimal grids (10 × 10 grids) can support this work**. Student experiences should focus on working with grids rather than algorithms.** Students can also use base-ten blocks and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100.

Students may represent $\frac{3}{10}$ with 3 long blocks and may also write the fraction as $\frac{30}{100}$ with the whole being the flat (the flat represents one hundred units with each unit equal to one hundredth).

Tenths Grid

3 tenths = $\frac{3}{10}$

Hundredths Grid



30 hundredths = $\frac{30}{100}$

This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade.

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): LEAP.II.4.4, LEAP.II.4.5, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Compare Fractions and Compare Decimals 4.NOF.C.7 4.NOF.C.8 4.NOF.E.12 4.NOF.E.13 4.NOF.E14 LEAP.I.4.	Compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths). Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions and comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; **expresses a fraction with denominator 10 as an equivalent fraction with denominator 100;** uses decimal notation for fractions (tenths and hundredths); and compares fractions, with like or unlike numerators and denominators, **by creating equivalent fractions and** comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and compares fractions, with like **or unlike numerators and denominators by comparing to a benchmark fraction**.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and **compares fractions with like denominators.**
	Recognizes that decimals and fractions must refer to the same whole in order to compare.	Recognizes that decimals and fractions must refer to the same whole in order to compare.	**Recognizes that decimals and fractions must refer to the same whole in order to compare.**	
	Shows results using symbols.	Shows results using symbols.	**Shows results using symbols.**	

	Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison.	Solves simple word problems requiring fraction comparison.	**Solves simple word problems requiring fraction comparison with scaffolding.**	
	Adds fractions with denominators of 10 and 100.			

4.NOF.E.13 Use decimal notation and precise language for fractions with denominators 10 or 100.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency, Application

Examples and Explanations

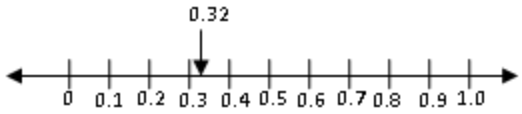
Decimals are introduced for the first time in fourth grade. Students should have ample opportunities to explore and reason about the idea that a number can be represented as both a fraction and a decimal.

Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say $\frac{32}{100}$ as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model as shown below.

Hundreds	Tens	Ones	·	Tenths	Hundredths
			·	3	2

Students use the representations explored in 4.NOF.E.12 to understand $\frac{32}{100}$ can be expanded to $\frac{3}{10}$ and $\frac{2}{100}$.

Students represent values such as 0.32 or $\frac{32}{100}$ on a number line. $\frac{32}{100}$ is more than $\frac{30}{100}$ (or $\frac{3}{10}$) and less than $\frac{40}{100}$ (or $\frac{4}{10}$). It is closer to $\frac{30}{100}$, so it would be placed on the number line near that value.



Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.4, LEAP.II.4.5, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Compare Fractions and Compare Decimals 4.NOF.C.7 4.NOF.C.8 4.NOF.E.12 4.NOF.E.13 4.NOF.E14 LEAP.I.4.	Compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths). Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions and comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; **expresses a fraction with denominator 10 as an equivalent fraction with denominator 100;** uses decimal notation for fractions (tenths and hundredths); and compares fractions, with like or unlike numerators and denominators, **by creating equivalent fractions and** comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and compares fractions, with like **or unlike numerators and denominators by comparing to a benchmark fraction**.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and **compares fractions with like denominators.**
	Recognizes that decimals and fractions must refer to the same whole in order to compare.	Recognizes that decimals and fractions must refer to the same whole in order to compare.	**Recognizes that decimals and fractions must refer to the same whole in order to compare.**	
	Shows results using symbols.	Shows results using symbols.	**Shows results using symbols.**	

	Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison.	Solves simple word problems requiring fraction comparison.	**Solves simple word problems requiring fraction comparison with scaffolding.**	
	Adds fractions with denominators of 10 and 100.			

4.NOF.E.14 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 or number line diagram.

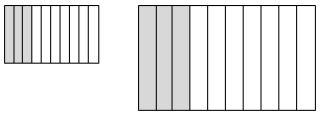
Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.NOF.C.8, 4.NOF.E.13 **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding
Foundational Skills: 3. Compare and order numbers up to 1,000,000, identifying whether one number is greater than, less than, or equal to another.		

Examples and Explanations

Students build area and other models to compare decimals. Through these experiences and their work with fraction models, they build the understanding that comparisons between decimals or fractions are only valid when the whole is the same for both cases.

- Each of the models below shows 3/10, but the whole on the right is much bigger than the whole on the left. They are both 3/10, but the model on the right is a much larger quantity than the model on the left.

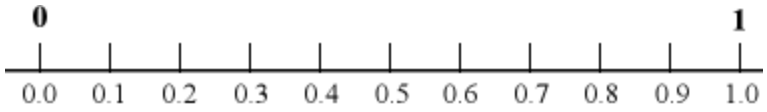


Decimals or fractions can be compared only when the wholes are the same.

Examples:

- Draw a model to show that 0.3 < 0.5. (Students would sketch two models of approximately the same size to show that the area that represents three-tenths is smaller than the area that represents five-tenths.

A number line can be used to model the comparison of 0.3 < 0.5. Students can see that 0.3 is positioned before 0.5, which demonstrates that 0.3 is less than 0.5.



- Fill in the blank with <, =, or > to make the correct comparison.
    - 4 tenths + 3 hundredths _____ 2 tenths + 12 hundredths
    - 3 hundredths + 4 tenths _____ 2 tenths + 22 hundredths
    - 5 hundredths + 1 tenth _____ 11 tenths + 4 hundredths
    - 5 hundredths + 1 tenth _____ 15 hundredths + 0 tenths
    - 5 hundredths + 1 tenth _____ 0 tenths + 15 hundredths
- Fill in the blank with <, =, or > to complete the equation.
    - 0.01 _____ 0.11
    - 0.2 _____ 0.20
    - 0.6 _____ 0.41
    - 0.07 _____ 0.70
    - 0.57 _____ 0.75

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.II.4.4, LEAP.II.4.5, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Compare Fractions and Compare Decimals 4.NOF.C.7 4.NOF.C.8 4.NOF.E.12 4.NOF.E.13 4.NOF.E14 LEAP.I.4.	Compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths). Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions and comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; **expresses a fraction with denominator 10 as an equivalent fraction with denominator 100;** uses decimal notation for fractions (tenths and hundredths); and compares fractions, with like or unlike numerators and denominators, **by creating equivalent fractions and** comparing to a benchmark fraction.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and compares fractions, with like **or unlike numerators and denominators by comparing to a benchmark fraction**.	Given a visual model, compares decimals to hundredths; uses decimal notations for fractions (tenths and hundredths); and **compares fractions with like denominators.**
	Recognizes that decimals and fractions must refer to the same whole in order to compare.	Recognizes that decimals and fractions must refer to the same whole in order to compare.	**Recognizes that decimals and fractions must refer to the same whole in order to compare.**	
	Shows results using symbols.	Shows results using symbols.	**Shows results using symbols.**	

	Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison.	Solves simple word problems requiring fraction comparison.	**Solves simple word problems requiring fraction comparison with scaffolding.**	
	Adds fractions with denominators of 10 and 100.			

Algebraic Reasoning

A. Use the four operations with whole numbers to solve real-world mathematical tasks. In this cluster, the terms students should learn to use with increasing precision are **multiplication/multiply, division/divide, addition/add, subtraction/subtract, equations, multiplicative comparison, additive comparison, unknown, remainders, reasonableness, mental computation, estimation,** and **rounding.**

4.AR.A.1 Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.AR.A.1, 3.AR.A.3 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding
Foundational Skills: 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

A *multiplicative comparison* is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "*a* is *n* times as much as *b*"). Students should be able to identify and verbalize which number is being multiplied and which number tells how many times.

Students should be given opportunities to write and identify equations and statements for multiplicative comparisons.

Examples: Have students interpret statements such as:

- 9 × 8 = 72
  Sample response: 72 is 8 times as many as 9; 9 times as many as 8 is 72.

- 35 = 5 x 7
  Sample response: 35 is 5 times as many as 7; 7 times as many as 5 is 35.

Assessment Connections

Assessment Item Type(s): Type I, III
Evidence Statement(s): LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Multiplicative Comparison 4.AR.A.1 4.AR.A.2	Interprets multiplication equations as comparisons and represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.
	Uses multiplication or division to solve **multi-step** word problems involving multiplicative comparisons.	Uses multiplication or division to solve one- or two-step word problems involving multiplicative comparisons.	Uses multiplication or division to solve **scaffolded** one- or two-step word problems involving multiplicative comparisons.	
	Uses a symbol for the unknown number in an equation or expression.			

4.AR.A.2 Multiply or divide to solve real-world mathematical tasks involving multiplicative comparison.

a. Represent these tasks by using drawings and/or equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.AR.A.3 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** 4.DM.A.1	Application
Foundational Skills: 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

Students need many opportunities to solve contextual problems. Table 2* includes the following multiplication problem:

- A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?
  In solving this problem, the student should identify $6 as the quantity that is being multiplied by 3. The student should write the problem using a symbol to represent the unknown. ($6 x 3 = ☐)

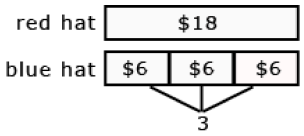
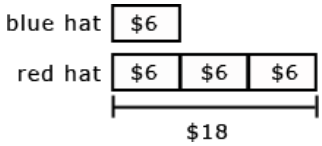


Table 2 includes the following division problem:

- A red hat costs $18, and a blue hat costs $6. How many times as much does the red hat cost as the blue hat?
  In solving this problem, the student should identify $18 as the quantity being divided into shares of $6.
  The student should write the problem using a symbol to represent the unknown. ($18 ÷ $6 = ☐).



When distinguishing multiplicative comparison from additive comparison, students should note that:

- additive comparisons focus on the difference between two quantities (e.g., Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have?). A simple way to remember this is, "How many more?"
- multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times as large as or as small as than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is "How many times as much?" or "How many times as many?".

Assessment Connections

Assessment Item Type(s): Type I, III
Evidence Statement(s): LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Multiplicative Comparison 4.AR.A.1 4.AR.A.2	Interprets multiplication equations as comparisons and represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.	Interprets multiplication equations as comparisons or represents statements of comparisons as multiplication equations.
	Uses multiplication or division to solve **multi-step** word problems involving multiplicative comparisons.	Uses multiplication or division to solve one- or two-step word problems involving multiplicative comparisons.	Uses multiplication or division to solve **scaffolded** one- or two-step word problems involving multiplicative comparisons.	
	Uses a symbol for the unknown number in an equation or expression.			

4.AR.A.3 Solve multi-step real-world mathematical tasks involving more than one operation posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.

a. Represent these problems using equations with a letter standing for the unknown quantity.
b. Assess the reasonableness of answers using mental computation and estimation strategies, including rounding.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Major Content	**Previous Grade(s) Standard:** 3.AR.C.7 **4th Grade Standard Taught in Advance:** 4.NOF.A.3, 4.NOF.B.6 **4th Grade Standard Taught Concurrently:** 4.DM.A.2	Conceptual Understanding, Application
Foundational Skills: 1. Fluently add and subtract up to 1,000,000. 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

Students need many opportunities to solve multi-step story problems using all four operations.

An interactive whiteboard, document camera, drawings, words, numbers, and/or objects may be used to help solve story problems.

Example:

- Chris bought clothes for school. She bought 3 shirts for $12 each and a skirt for $15. How much money did Chris spend on her new school clothes?

  $3 \times \$12 + \$15 = a$

In division problems, the remainder is the whole number left over when as large a multiple of the divisor as possible has been subtracted.

Examples:

- Kim is making candy bags. There will be 5 pieces of candy in each bag. She had 53 pieces of candy. She ate 14 pieces of candy. How many full candy bags can Kim make now?
  (53 – 14 = 39, 39 ÷ 5 = 7 bags with 4 pieces of candy left over)
- Kim has 28 cookies. She wants to share them equally between herself and 3 friends. How many cookies will each person get?
  (28 ÷ 4 = 7 cookies each)
- There are 29 students in one class and 28 students in another class going on a field trip. Each car can hold 5 students. How many cars are needed to get all the students to the field trip?

(12 cars, one possible explanation is 11 cars holding 5 students and the 12th holding the remaining 2 students, 29 + 28 = 11 × 5 + 2)

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 solutions using various estimation strategies. Numerous estimation strategies are provided in *Teaching Computational Estimation: Concepts and Strategies*, written by Barbara J. Reys, program coordinator for mathematics education at the University of Missouri, and noted expert and author on the topic. The article provides guidance starting at the bottom of page 3 to help students understand and use

- front-end estimation with adjusting (using the highest place value and estimating from the front end, making adjustments to the estimate by taking into account the remaining amounts);
- clustering around an average (when the values are close together, an average value is selected and multiplied by the number of values to determine an estimate);
- rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values); and
- friendly or compatible numbers that fit together easily.

Assessment Connections

Assessment Item Type(s): Type I, II, III
Evidence Statement(s): LEAP.I.4.2, LEAP.I.4.3, LEAP.I.4.4, LEAP.I.4.5, LEAP.II.4.5, LEAP.II.4.6, LEAP.III.4.1

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Solve Multi-step Problems 4.AR.A.3 4.NOF.B.5 4.NOF.B.6 LEAP.I.4.2 LEAP.I.4.3 LEAP.I.4.4 LEAP.I.4.5	Solves **multi-step** word problems using the four operations with whole numbers.	Solves two-step **word** problems using the four operations with whole numbers.	Solves one- **or two-step** problems using the four operations with whole numbers.	Solves one-step problems using the four operations with whole numbers.
	Multiplies a three- **or four-digit** by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.	Multiplies a three-digit by a one-digit number, or two two-digit numbers.
	Finds whole number quotients and remainders with up to **four-**digit dividends and one-digit divisors and interprets remainders.	Finds whole number quotients and remainders with up to three-digit dividends and one-digit divisors **and interprets remainders**.	Finds whole number quotients and remainders with up to three-digit dividends and one-digit divisors.	Finds whole number quotients and remainders with up to three-digit dividends and one-digit divisors.

B. Gain familiarity with factors and multiples. In this cluster, the terms students should learn to use with increasing precision are **multiplication/multiply, division/divide, factor pairs, factor, multiple, prime,** and **composite.**

4.AR.B.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.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** 3.NOF.B.4 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
Foundational Skills: 2. Identify factors and multiples within 100.		

Examples and Explanations

Students should understand the process of finding factor pairs so they can do this for any number 1–100.

Example:

- Factor pairs for 96: 1 and 96, 2 and 48, 3 and 32, 4 and 24, 6 and 16, 8 and 12

Multiples can be thought of as the result of skip-counting by each of the factors. When skip-counting, students should be able to identify the number of factors counted (e.g., 5, 10, 15, 20, so there are 4 fives in 20).

Example::

- Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24
  Multiples of factors of 24
  1, 2, 3, 4, 6 … 24
  2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
  3, 6, 9, 12, 15, 18, 21, 24
  4, 8, 12, 16, 20, 24
  8, 16, 24
  12, 24
  24

Teacher Note:
To determine if a number between 1–100 is a multiple of a given one-digit number, some helpful hints include the following:

- all even numbers are multiples of 2
- all even numbers that can be halved twice (with a whole number result) are multiples of 4
- all numbers ending in 0 or 5 are multiples of 5

Example:

- Circle the numbers that are multiples of 3: 1, 3, 5, 6, 10, 12, 15, 20, 21, 25, 33, 42

Teacher Note:
Prime vs. Composite

- A prime number is a number greater than 1 that has only 2 factors, 1 and itself.
- Composite numbers have more than 2 factors.

Example:
Students investigate whether numbers are prime or composite by

- building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g., 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1; therefore, it is a prime number).
- finding factors of the number.

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s):

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Operations and Factors 4.AR.B.4	Recognizes a whole number is a multiple of factors and determines **all** factor pairs and multiples of whole numbers within the range of 1-100.	Recognizes a whole number is a multiple of factors and determines factor pairs or multiples of whole numbers within the range of 1-100.	Recognizes a whole number is a multiple of factors and **determines** factor pairs or multiples of whole numbers within the range of 1-100.	Recognizes a whole number is a multiple of factors and identifies factor pairs or multiples of whole numbers within the range of 1-100.
	Determines whether a whole number in the range 1-100 is prime or composite.	Determines whether a whole number in the range 1-100 is prime or composite.	**Determines, with scaffolding, whether a whole number in the range 1-100 is prime or composite.**	

C. Generate and analyze patterns. In this cluster, the terms students should learn to use with increasing precision are **pattern (number or shape)** and **pattern rule.**

4.AR.C.5 Generate and extend a number or shape pattern that follows a given rule.
a. Identify apparent features of the pattern that were not explicit in the rule itself.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** 3.AR.C.8 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency
Foundational Skills: 2. Identify factors and multiples within 100.		

Examples and Explanations

Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities to create and extend number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations.

Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features.

Example:

Pattern	Rule	Feature(s)
3, 8, 13, 18, 23, 28, …	Start with 3, add 5	The numbers alternately end with a 3 or 8
5, 10, 15, 20 …	Start with 5, add 5	The numbers are multiples of 5 and end with either 0 or 5. The numbers that end with 5 are products of 5 and an odd number. The numbers that end in 0 are products of 5 and an even number.

After students have identified rules and features from patterns, they need to generate a number or shape pattern from a given rule.

Example:

- Rule: Starting at 1, create a pattern that multiplies each number by 3. Stop when you have 6 numbers.

  Students write 1, 3, 9, 27, 81, 243. Students notice that all the numbers are odd. Some students might investigate this beyond 6 numbers. Another feature to investigate is the pattern in the differences of the numbers (3 - 1 = 2, 9 - 3 = 6, 27 - 9 = 18, etc.)

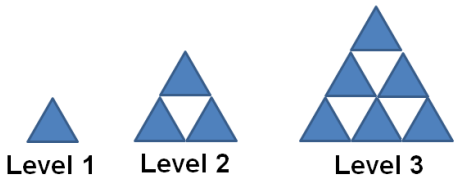
This standard calls for students to describe features of an arithmetic number pattern or shape pattern by identifying the rule with features that are not explicit in the rule. A t-chart is a tool to help students see number patterns.

Example:
There are 4 beans in the jar. Each day, 3 beans are added. How many beans are in the jar for each of the first 5 days?
Students create the table below.

Day	Operation	Beans
0	3 x 0 + 4	4
1	3 x 1 + 4	7
2	3 x 2 + 4	10
3	3 x 3 + 4	13
4	3 x 4 + 4	16
5	3 x 5 + 4	19

Example:
How many blue triangles are in each figure below? _____, _____, _____

How many blue triangles would be in the level 5 figure? Use a number pattern to determine your answer and explain the pattern.



Sample Student Response: 1, 3, 6. Level 5 would have 15 blue triangles. I saw you don't add the same number each time to get the next number in the pattern. You add 2 to 1 to get 3. You add 3 to 3 to get 6. So I added 4 to 6 and got 10, which means Level 4 would have 10 blue triangles. Then I added 5 to 10 and got 15 for Level 5. I added 2, then 3, then 4, and then 5 to the number I had before.

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Generate and Analyze Patterns 4.AR.C.5	Generates a number or shape pattern that follows a given rule and identifies **apparent** features of the pattern **(not explicit in the rule) and describes the rule for generating the number or shape pattern.**	Generates a number or shape pattern that follows a given rule **and identifies explicit features of the pattern**.	**Generates** a number or shape pattern that follows a given rule.	Identifies a number or shape pattern that follows a given rule.

Geometric Reasoning and Logic

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles. In this cluster, the terms students should learn to use with increasing precision are **classify shapes/figures, properties, point, line, line segment, ray, angle, vertex/vertices, right angle, acute, obtuse, perpendicular, parallel, right triangle, isosceles triangle, equilateral triangle, scalene triangle, line of symmetry, symmetric figures, two dimensional, regular,** and **irregular.**

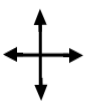
4.GL.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** 3.GL.A.1 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** 4.DM.C.5	Conceptual Understanding, Procedural Skill and Fluency

Examples and Explanations

This standard asks students to draw specific geometric figures and to identify them in two-dimensional figures. This is the first time that students are exposed to rays, angles, and perpendicular and parallel lines. Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students may not easily identify lines and rays because they are more abstract.

right angle		line	
acute angle		ray	
obtuse angle		parallel lines	
straight angle		perpendicular lines	
segment			

Examples:

- Draw two different types of quadrilaterals that have two pairs of parallel sides.
- Is it possible to have an acute right triangle? Justify your reasoning using pictures and words.
- How many acute, obtuse, and right angles are in this shape?

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Lines, Angles, and Shapes 4.GL.A.1 4.GL.A.2 4.GL.A.3	**Fluently** identifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **or describe** two-dimensional figures.	Identifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **two-dimensional figures**.	Identifies and **uses** points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles **to classify quadrilaterals and triangles**.	Identifies points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles.

4.GL.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.

a. Recognize right triangles as a category, and identify right triangles.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.GL.A.1 **4th Grade Standard Taught Concurrently:** 4.DM.C.5	Procedural Skill and Fluency

Examples and Explanations

Two-dimensional figures may be classified using different characteristics, such as parallel or perpendicular lines, or by angle measurement. It also calls for students to sort objects based on parallelism, perpendicularity, and angle types.

Parallel or Perpendicular Lines:

Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect at right angles (90°).

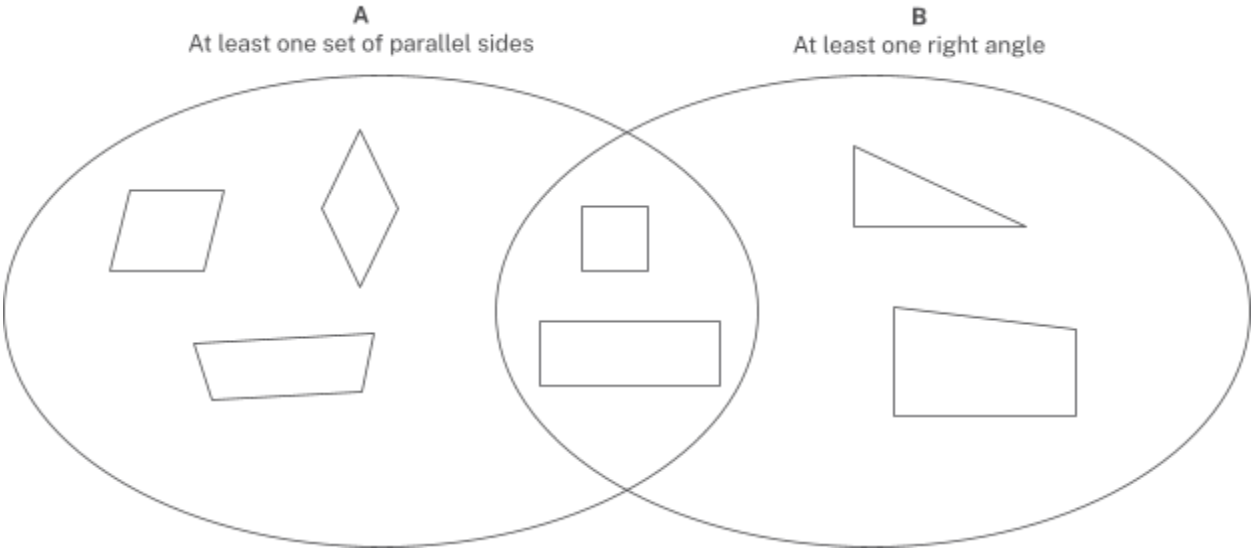
Students may use transparencies with lines to arrange two lines in different ways to determine that the 2 lines might intersect at one point or may never intersect. These types of explorations may lead to a discussion on angles.

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.

A **trapezoid** is a quadrilateral with at least one pair of parallel sides. (There are two definitions commonly used in different curricula in the U.S. This is the definition that Louisiana has chosen to use.) With this definition, parallelograms are also trapezoids.

Example:

- Do you agree with the label on each of the circles in the Venn diagram below? Explain why some shapes fall in the overlapping sections of the circles.

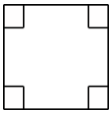


Example:

- Identify which of these shapes have perpendicular or parallel sides and justify your selection.

The following is a possible justification that students might give:

The square has perpendicular sides because the sides meet at a corner, forming right angles. It also has parallel sides that are opposite to each other. I know this because if I changed the sides to lines that never end, the lines would never intersect and be the same distance apart. Segments are just parts of lines.



Angle Measurement:

This expectation is closely connected to 4.DM.C.5, 4.DM.C.6, and 4.GL.A.1. Students' experiences with drawing and identifying right, acute, and obtuse angles support them in classifying two-dimensional figures based on specified angle measurements. They use the benchmark angles of 90°, 180°, and 360° to approximate the measurement of angles.

Right triangles can be a category for classification. A right triangle has one right angle. There are different types of right triangles. An isosceles right triangle has two sides that are the same length, and a scalene right triangle does not have any sides that are the same length.

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Lines, Angles, and Shapes 4.GL.A.1 4.GL.A.2 4.GL.A.3	**Fluently** identifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **or describe** two-dimensional figures.	**I**dentifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **two-dimensional figures**.	Identifies and **uses** points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles **to classify quadrilaterals and triangles**.	Identifies points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles.

4.GL.A.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.

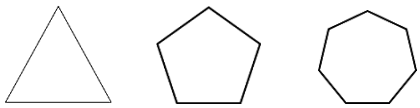
Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** 1.GL.A.2 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Conceptual Understanding, Procedural Skill and Fluency

Examples and Explanations

Students need experiences with figures that are symmetrical and non-symmetrical. Figures include both regular and irregular polygons. Folding cut-out figures will help students determine whether a figure has one or more lines of symmetry. The standard does not address rotational symmetry.

Example:
For each figure, draw all of the lines of symmetry. What pattern do you notice? How many lines of symmetry do you think there would be for regular polygons with 9 and 11 sides? Sketch each figure and check your predictions.



Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Lines, Angles, and Shapes 4.GL.A.1 4.GL.A.2 4.GL.A.3	**Fluently** identifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **or describe** two-dimensional figures.	**I**dentifies and uses points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles to classify **two-dimensional figures**.	Identifies and **uses** points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles **to classify quadrilaterals and triangles**.	Identifies points, lines, line segments, rays, angles (right, obtuse, and acute), perpendicular lines, parallel lines, lines of symmetry, and right triangles.

Data Analysis and Measurement

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. In this cluster, the terms students should learn to use with increasing precision are **measure, metric, customary, convert/conversion, relative size, liquid volume, mass, length, distance, kilometer (km), meter (m), centimeter (cm), kilogram (kg), gram (g), liter (L), milliliter (mL), inch (in), foot (ft), ounce (oz), pound (lb), time, hour, minute, second, equivalent, operations, add, subtract, multiply, divide, fractions, decimals, area,** and **perimeter.**

4.DM.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.

a. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit.
b. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.)

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** 3.NOF.B.4, 3.DM.A.1 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** 4.AR.A.2	Conceptual Understanding, Procedural Skill and Fluency

Examples and Explanations

The units of measure that have not been addressed in prior years are pounds, ounces, kilometers, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time. Students did not convert measurements. Students need ample opportunities to become familiar with these new units of measure.

Relating units within the metric system is another opportunity to think about place value. Relating units within the traditional system provides an opportunity to engage in mathematical practices, especially "look for and make use of structure" and "look for and express regularity in repeated reasoning." For example, students may use a two-column chart such as the one below to convert from larger to smaller units and record equivalent measurements. They make statements such as, if one foot is 12 inches, then 3 feet has to be 36 inches because there are 3 groups of 12.

Example:

kg	g
1	1000
2	2000
3	3000

ft	in
1	12
2	24
3	36

lb	oz
1	16
2	32
3	48

Foundational understandings to help with measurement concepts include the following:

- Understand that larger units can be subdivided into equivalent units (partition).
- Understand that the same unit can be repeated to determine the measure (iteration).
- Understand the relationship between the size of a unit and the number of units needed (the larger the unit, the fewer units needed to determine the measure of an object).

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Measurement and Conversion 4.DM.A.1 4.DM.A.2 4.DM.A.3	Solves measurement word problems with whole numbers, including calculating area and perimeter **(when side lengths are not provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves measurement **word** problems with whole numbers**, including calculating area and perimeter (when information about side lengths is provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves mathematical measurement problems with whole numbers using all four operations, and using addition, subtraction, **and multiplication** of simple fractions.	Solves mathematical measurement problems with whole numbers, using all four operations, and using addition and subtraction of simple fractions.
	Records measurement equivalents in a two-column table.	Records measurement equivalents in a two-column table.	**Records measurement equivalents in a two-column table.**	
	Uses knowledge of measurement units within one system to solve problems by converting from larger units to smaller units.	Uses knowledge of measurement units within one system to **solve problems by** converting from larger units to smaller units.	Uses knowledge of measurement units within one system to convert from larger units to smaller units.	
	Represents measurement quantities using diagrams	**Represents measurement quantities using diagrams**		

	and provides the appropriate measurement scale given the context.	**with a given measurement scale.**		

4.DM.A.2 Use the four operations to solve multi-step real-world mathematical tasks involving:

- distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving whole numbers and/or simple fractions, and
- problems that require expressing measurements given in a larger unit in terms of a smaller unit.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.NOF.E.12, 4.NOF.E.13, 4.DM.A.1 **4th Grade Standard Taught Concurrently:** 4.AR.A.3	Conceptual Understanding, Application
Foundational Skills: 1. Fluently add and subtract up to 1,000,000. 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

This standard includes multi-step word problems related to expressing measurements from a larger unit in terms of a smaller unit (e.g., feet to inches, meters to centimeters, and dollars to cents). Students should have ample opportunities to use number line diagrams to solve word problems. Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include a ruler, a diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container.

Examples:

- **Addition:** Mason ran for 1 hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran?
- **Multiplication:** Mario and his 2 brothers are selling lemonade. Mario brings one and a half liters, Javier brings 2 liters, and Ernesto brings 450 milliliters. How many total milliliters of lemonade do the boys have?
- **Multiple Operations:** Mr. Miller told the people in his office that he would buy a hamburger or a salad for their lunch. The restaurant told Mr. Miller that hamburgers cost $6 each and a salad was twice as much. Both costs included tax. Hamburgers were requested by 13 people, and 7 people wanted salads. Mr. Miller gave the cashier three $50 bills and a $20 bill. How much change should Mr. Miller receive?

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Measurement and Conversion 4.DM.A.1 4.DM.A.2 4.DM.A.3	Solves measurement word problems with whole numbers, including calculating area and perimeter **(when side lengths are not provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves measurement **word** problems with whole numbers**, including calculating area and perimeter (when information about side lengths is provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves mathematical measurement problems with whole numbers using all four operations, and using addition, subtraction, **and multiplication** of simple fractions.	Solves mathematical measurement problems with whole numbers, using all four operations, and using addition and subtraction of simple fractions.
	Records measurement equivalents in a two-column table.	Records measurement equivalents in a two-column table.	**Records measurement equivalents in a two-column table.**	
	Uses knowledge of measurement units within one system to solve problems by converting from larger units to smaller units.	Uses knowledge of measurement units within one system to **solve problems by** converting from larger units to smaller units.	Uses knowledge of measurement units within one system to convert from larger units to smaller units.	
	Represents measurement quantities using diagrams	**Represents measurement quantities using diagrams**		

	and provides the appropriate measurement scale given the context.	**with a given measurement scale.**		

4.DM.A.3 Apply the area and perimeter formulas for rectangles in real-world mathematical tasks.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** 3.AR.A.4, 3.DM.D.7 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency, Application
Foundational Skills: 1. Fluently add and subtract up to 1,000,000. 4. Multiply multi-digit numbers with products up to 100.		

Examples and Explanations

Students developed an understanding of area and perimeter in third grade by using visual models. **While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work.** The use of abstract formulas by students underscores the importance of distinguishing between area and perimeter in grade 3 and maintaining the distinction in grade 4 and later grades, where rectangle perimeter and area problems may get more complex, and problem-solving can benefit from knowing or being able to rapidly remind oneself of how to find an area or perimeter. By repeatedly reasoning about how to calculate areas and perimeters of rectangles, students can come to see area and perimeter formulas as summaries of all such calculations. **"Apply the formula" does not mean write down a memorized formula and put in known values because students do not evaluate expressions until grade 6.** In fourth grade, working with perimeter and area of rectangles is still grounded in specific visualizations and numbers. By repeatedly reasoning about constructing situation equations for perimeter and area involving specific numbers and an unknown number, students will build a foundation for applying area, perimeter, and other formulas by substituting specific values for the variables in later grades. Students should generate and discuss advantages and disadvantages of the various formulas for finding the perimeter of a rectangle and make connections between them (i.e., $l + w + l + w$ or $2l + 2w$ or $2(l + w)$, including the fact that perimeter is measured in linear units). For area, students need to connect counting squares in a rectangle to the formula $A = l \times w$. The numbers used can be any of the numbers allowed in fourth grade (for addition and subtraction for perimeter, and for multiplication and division for area).

Students should apply these understandings and formulas to the solution of real-world mathematical tasks.

Example:

A rectangular garden has an area of 80 square feet. It is 5 feet wide. How long is the garden?
Here, specifying the area and the width creates an unknown factor problem. Similarly, students could solve perimeter problems that give the perimeter and the length of one side and ask for the length of the adjacent side.

Students should be challenged to solve multi-step problems.

Example:

Karl's Garden

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): LEAP.I.4.6 (jointly with 4.NOF.B.4 - tasks must combine both)

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Measurement and Conversion 4.DM.A.1 4.DM.A.2 4.DM.A.3 LEAP.1.4.6	Solves measurement word problems with whole numbers, including calculating area and perimeter **(when side lengths are not provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves measurement **word** problems with whole numbers**, including calculating area and perimeter (when information about side lengths is provided),** using all four operations, and using addition, subtraction, and multiplication of simple fractions.	Solves mathematical measurement problems with whole numbers using all four operations, and using addition, subtraction, **and multiplication** of simple fractions.	Solves mathematical measurement problems with whole numbers, using all four operations, and using addition and subtraction of simple fractions.
	Records measurement equivalents in a two-column table.	Records measurement equivalents in a two-column table.	**Records measurement equivalents in a two-column table.**	
	Uses knowledge of measurement units within one system to solve problems by converting from larger units to smaller units.	Uses knowledge of measurement units within one system to **solve problems by** converting from larger units to smaller units.	Uses knowledge of measurement units within one system to convert from larger units to smaller units.	
	Represents measurement quantities using diagrams	**Represents measurement quantities using diagrams**		

	and provides the appropriate measurement scale given the context.	**with a given measurement scale.**		

B. Represent and interpret data. In this cluster, the terms students should learn to use with increasing precision are **data, line plot, length,** and **fractions.**

4.DM.B.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$).

a. Solve real-world mathematical tasks involving the addition and subtraction of fractions with like denominators by using information presented in line plots.

Standard Overview

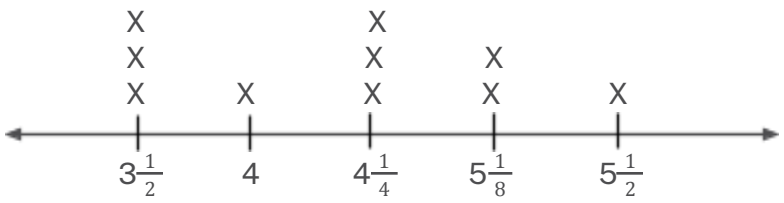
Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** 3.DM.B.3 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency, Application
Foundational Skills: 6. Add and subtract fractions with like denominators.		

Examples and Explanations

This standard provides a context for students to work with fractions by measuring objects to an eighth of an inch. Students make a line plot of this data and then add and subtract fractions based on data in the line plot.

Example:

- Ten students in Room 31 measured their pencils, in inches, at the end of the day. They recorded their results on the line plot below.



The following are possible questions:

- What is the difference in length from the longest to the shortest pencil?
- If the pencils are $5\frac{1}{8}$ inches long and are placed end to end, what would their total length be?

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Represent and Interpret Data 4.MD.B.4	Makes a line plot to display a data set of measurements in fractions of a unit with like denominators of 2, 4, or 8, **(including mixed numbers)** and uses addition and subtraction of fractions to solve problems involving information in the line plots **and evaluates the solution in relation to the data.**	Makes a line plot to display a data set of measurements in fractions of a unit with like denominators of 2, 4, **or 8** and **uses addition and subtraction of fractions to solve problems involving information in the line plot.**	**Makes** a line plot to display a data set of measurements in fractions of a unit with like denominators of 2 or 4.	Identifies a correct line plot that displays a data set of measurements in fractions of a unit with like denominators of 2 or 4.

C. Understand concepts of angle and measure angles. In this cluster, the terms students should learn to use with increasing precision are **measure, point, end point, geometric shapes, ray, angle, circle, fraction, intersect, one-degree angle, protractor, decomposed, addition, subtraction, unknown, obtuse,** and **acute**.

4.DM.C.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 $\frac{1}{360}$ 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.

Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** 4.GL.A.1, 4.GL.A.2	Conceptual Understanding

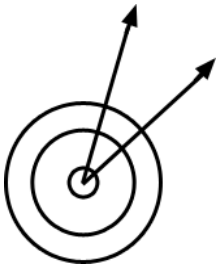
Examples and Explanations

This standard brings up a connection between angles and circular measurement (360 degrees).

Angle measure is a “turning point” in the study of geometry. Students often find angles and angle measure to be difficult concepts to learn, but that learning allows them to engage in interesting and important mathematics. An *angle* is the union of two rays, *a* and *b*, with the same initial point *P*. The rays can be made to coincide by rotating one to the other about *P*; this rotation determines the size of the angle between ray *a* and ray *b*. The rays are sometimes called the *sides* of the angles. Another way of saying this is that each ray shows a direction, and the angle size measures the change from one direction to the other.

Angles are 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 the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and degrees are the unit used to measure angles in elementary school. A full rotation is thus 360°. An *obtuse angle* is an angle with a measure greater than 90° and less than 180°. An *acute angle* is an angle with a measure less than 90°.

The diagram below will help students understand that an angle measurement is not related to an area since the area between the 2 rays is different for both circles yet the angle measure is the same.



Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Geometric Measurement 4.DM.C.5 4.DM.C.6 4.DM.C.7	Understands and applies concepts of angle measurement **recognizing that angles are measured in reference to a circle.**	Understands and applies concepts of angle measurement.	Understands and **applies** concepts of angle measurement.	Understands and identifies concepts of angle measurement.
	Recognizes how angles are formed and that angle measures are additive.	**Recognizes how angles are formed and that angle measures are additive.**		
	Uses a protractor to measure and sketch angles.	Uses a protractor to measure **and sketch** angles.	Uses a protractor to measure angles.	
	Solves mathematical and real-world problems by composing and decomposing angles and **using an equation with a symbol for the unknown angle measure.**	**Solves mathematical and real-world problems by composing and decomposing angles.**		

4.DM.C.6 Measure angles in whole-number degrees using a standard 180 ° protractor.

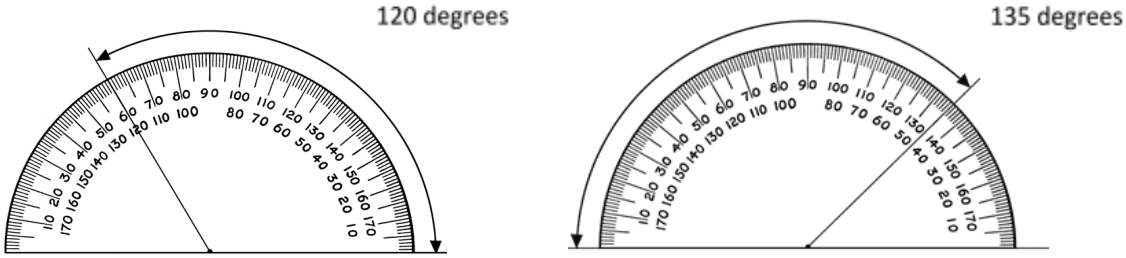
Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** none **4th Grade Standard Taught in Advance:** 4.DM.C.5 **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency

Examples and Explanations

Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360° rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90° and 180°. They extend this understanding and recognize and sketch angles that measure approximately 45° and 30°. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular).

Students should measure angles and sketch angles using a protractor.



As with all measurable attributes, students must first recognize the attribute of angle measure and distinguish it from other attributes. As with other concepts, students need varied examples and explicit discussions to avoid learning limited ideas about measuring angles (e.g., misconceptions that a right angle is an angle that points to the right, or two right angles represented with different orientations are not equal in measure). If examples and tasks are not varied, students can develop incomplete and inaccurate notions. For example, some come to associate all slanted lines with 45° measures and horizontal and vertical lines with measures of 90°. Others believe angles can be “read off” a protractor in “standard” position, that is, a base is horizontal, even if neither ray of the angle is horizontal. Measuring many angles with no horizontal or vertical ray can help students avoid such limited conceptions (see example below).

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Geometric Measurement 4.DM.C.5 4.DM.C.6 4.DM.C.7	Understands and applies concepts of angle measurement **recognizing that angles are measured in reference to a circle.**	Understands and applies concepts of angle measurement.	Understands and **applies** concepts of angle measurement.	Understands and identifies concepts of angle measurement.
	Recognizes how angles are formed and that angle measures are additive.	**Recognizes how angles are formed and that angle measures are additive.**		
	Uses a protractor to measure and sketch angles.	Uses a protractor to measure **and sketch** angles.	Uses a protractor to measure angles.	
	Solves mathematical and real-world problems by composing and decomposing angles and **using an equation with a symbol for the unknown angle measure.**	**Solves mathematical and real-world problems by composing and decomposing angles.**		

4.DM.C.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.

a. Solve addition and subtraction real-world and mathematical tasks to find unknown angles on a diagram, e.g., by using an equation with a letter for the unknown angle measure.

Standard Overview

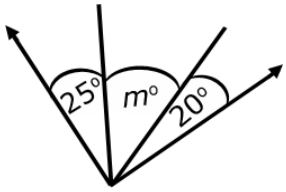
Core Tenets		
Focus	**Coherence**	**Rigor**
Additional Content	**Previous Grade(s) Standard:** 1.AR.C.6 **4th Grade Standard Taught in Advance:** 4.DM.C.5 **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency, Application
Foundational Skills: 1. Fluently add and subtract up to 1,000,000.		

Examples and Explanations

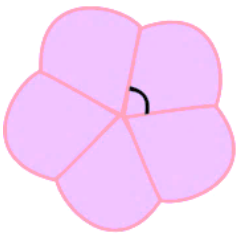
This standard addresses the idea of decomposing (breaking apart) an angle into smaller parts and understanding that angle measures can be added and subtracted.

Examples:

- If the two rays are perpendicular, what is the value of m?
  Solution: 90 — (25 + 20) = 45 degrees



- Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures 30°. What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4?
- The five shapes in the diagram are the exact same size. Write an equation that will help you find the measure of the indicated angle. Find the angle measurement. *Solution:* 360 ÷ 5 = 72 degrees



Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Geometric Measurement 4.DM.C.5 4.DM.C.6 4.DM.C.7	Understands and applies concepts of angle measurement **recognizing that angles are measured in reference to a circle.**	Understands and applies concepts of angle measurement.	Understands and **applies** concepts of angle measurement.	Understands and identifies concepts of angle measurement.
	Recognizes how angles are formed and that angle measures are additive.	**Recognizes how angles are formed and that angle measures are additive.**		
	Uses a protractor to measure and sketch angles.	Uses a protractor to measure **and sketch** angles.	Uses a protractor to measure angles.	
	Solves mathematical and real-world problems by composing and decomposing angles and **using an equation with a symbol for the unknown angle measure.**	**Solves mathematical and real-world problems by composing and decomposing angles.**		

D. Relate area to operations of multiplication and addition. In this cluster, the terms students should learn to use with increasing precision are **decomposing, non-overlapping,** and **adding area**.

4.DM.D.8 Recognize area as additive.

a. Decompose two-dimensional composite figures whose sides meet at right angles into non-overlapping rectangles and squares. Apply area formulas to find the area of each part, and use addition or subtraction to determine the total area of the composite figure.

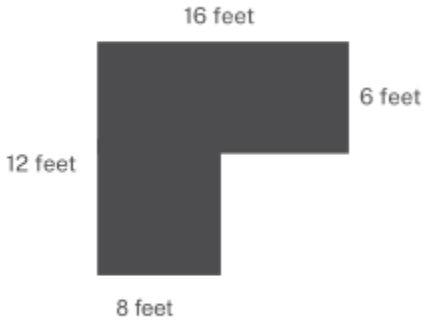
Standard Overview

Core Tenets		
Focus	**Coherence**	**Rigor**
Supporting Content	**Previous Grade(s) Standard:** 3.DM.C.6 **4th Grade Standard Taught in Advance:** none **4th Grade Standard Taught Concurrently:** none	Procedural Skill and Fluency, Application
Foundational Skills: 1. Fluently add and subtract up to 1,000,000.		

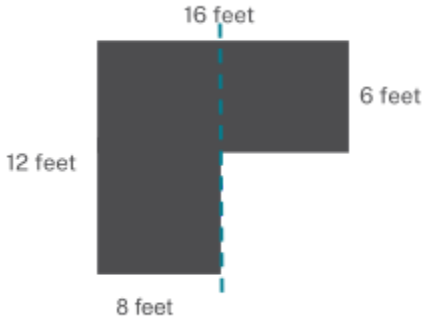
Examples and Explanations

This standard uses the word rectilinear. A rectilinear figure is a polygon that has all right angles. This standard serves as the basis for understanding volume as additive in fifth grade and also connects to angle addition in 4.DM.C.7.

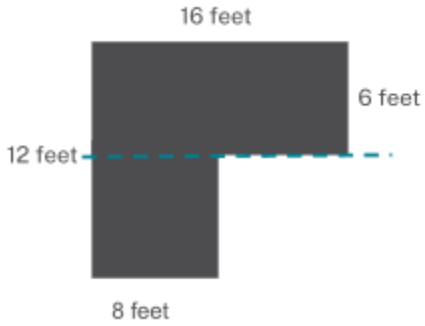
Example: How could this figure be decomposed to help find the area?



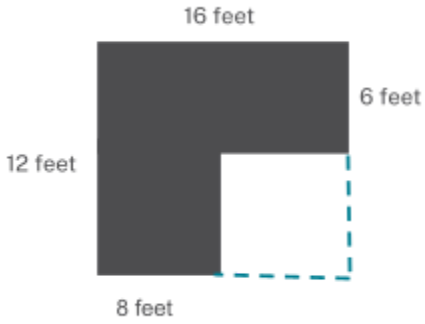
Three solutions are provided below.



I drew a line and made two rectangles. One rectangle is 12 x 8 which is 96. I subtracted 8 feet from the top length to find the missing length for the second rectangle. 16-8 = 8. 8 x 6 = 48. I added 48 to 96 and got 144. Area has to be in square units, so the answer is 144 square feet.



I drew a line and made two rectangles. The top rectangle is 16 x 6 which is 96. I subtracted 6 feet from the side that is 12 feet to find the missing side of the bottom rectangle. 12 – 6 = 6. 8 x 6 = 48. I added 48 to 96 and got 144. Area has to be in square units, so the answer is 144 square feet.



I thought this was a 16 x 12 rectangle with a smaller rectangle cut out. 16 x 12 = 192. Then I had to find the missing sides of the small rectangle that I drew with dotted lines. I can see that the sides are half as long as the big rectangle which gives me 8 and 6 and 8 x 6 = 48. Cutting out is like subtracting, so 192 – 48 = 144. The area of the black part is 144 square feet.

Assessment Connections

Assessment Item Type(s): Type I
Evidence Statement(s): none

Achievement Level Descriptor				
Content	**Advanced**	**Mastery**	**Basic**	**Approaching Basic**
Additive Area 4.DM.D.8	Recognizes area as additive and 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.	Recognizes area as additive and 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.**	**Recognizes area as additive and find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts.**	

Cross Content Connections

Mathematics supports understanding and skills across all disciplines. The ability to apply mathematics learning across disciplines allows students to transform abstract concepts into practical tools, deepen engagement, think critically, and apply mathematics to the real world.

English Language Arts

The connection between math and English language arts (ELA) begins in disciplinary literacy, which requires literacy skills in technical subjects, including the ability to decode complex word problems as narrative structures. Students must master the language of math by using ELA skills like reading comprehension and argumentative writing to explain their reasoning, prove theorems, and articulate the logic behind their numerical solutions.

Science

K-12 math and science are deeply integrated, with mathematics serving as the essential language that allows students to quantify, model, and analyze real-world phenomena they observe in science. As students progress, they use mathematics and computational thinking,ranging from simple data graphing to complex algebraic modeling, to turn raw scientific observations into evidence-based conclusions and predictable patterns. Explicit connections between the LSSM and Louisiana Student Standards for Science (LSSS) can be found on the Connections to K-12 ELA and Math document within the LSSS files.

Computer Science

The integration of mathematics and computer science is codified through state standards that treat computational thinking as a practical application of algebraic logic and problem-solving. Students use mathematical foundations, such as functions and data analysis, to build algorithms and write code that solves real-world challenges in Louisiana's growing technology and energy sectors. The Louisiana CS Frameworks make explicit connections and embed technology tools such as artificial intelligence to support students as they engage in math and computer science learning. Students can strategically use artificial intelligence tools to explore math ideas, test conjectures, analyze patterns and trends, and refine their thinking. The appropriate and skillful use of artificial intelligence in math requires students to use their mathematical reasoning to validate and critique artificial intelligence outputs in addition to naming how the use of artificial intelligence

supports and extends their thinking, understanding, and reasoning about concepts, ensuring the student maintains ownership of the mathematics, and leverages artificial intelligence as a resource.

Social Studies

The intersection of math and social studies is most evident in the analysis of historical data and economic trends, allowing students to quantify the impact of events such as the Great Flood of 1927 or the evolution of Louisiana's energy industry. By applying statistical tools to demographic shifts and geographic mapping, students move beyond historical content standards to demonstrate understanding of the skills and practices standards for social studies. Identifying and interpreting mathematical patterns strengthens students' ability to recognize trends that have shaped the geographical, economic, political, and cultural landscape of our state, nation, and world.

Leveraging Lower Grade Standards to Support Student Learning

Grade 1 Standards

■ **1.AR.B.3** Apply properties of operations to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.) Return to* ■ 4.NOF.D.9

■ **1.AR.B.4** Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
Return to ■ 4.NOF.D.9

■ **1.AR.C.6** Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = ? – 3, 6 + 6 = ?. Return to* ■ 4.NOF.D.9, ○ 4.DM.C.7

○ **1.GL.A.2** Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
Return to ○ 4.GL.A.3

Grade 2 Standards

■ **2.AR.A.1** Use addition and subtraction within 100 to solve one- and two-step real-world mathematical tasks involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions for one or two operations.

a. Represent these situations using models and equations, elevating the concrete-representational-abstract instructional framework.

Return to ■ 4.NOF.D.9

■ **2.NOF.B.2** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

- 100 can be thought of as a bundle of ten tens — called a “hundred.”
- The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). *Return to* ■ 4.NOF.A.1

Grade 3 Standards

■ **3.AR.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* ■ 4.AR.A.1

■ **3.AR.A.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. *Return to* ■ 4.AR.A.1, ■ 4.AR.A.2

■ **3.AR.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ? Return to* ◘ 4.DM.A.3

■ **3.AR.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* ■ 4.NOF.B.5,, ■ 4.NOF.B.6

■ **3.NOF.B.4** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
Return to ◘ 4.NOF.B.5, ■ 4.AR.B.4, ■ 4.NOF.B.6, ◘ 4.DM.A.1

■ **3.AR.C.7** Solve real-world mathematical tasks involving at least two steps and using at least two of the four operations.

a. Represent these problems using equations with a letter standing for the unknown quantity.
b. Assess the reasonableness of answers using mental computation and estimation strategies, including rounding.

Return to ■ 4.AR.A.3

■ **3.AR.C.8**Identify, create, and extend arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations without the formal language of the properties. *Return to* ○ 4.AR.C.5

○ **3.NOF.C.5** Use place value understanding to round whole numbers to the nearest 10 or 100. *Return to* ■ 4.NOF.A.3

○ **3.NOF.C.6** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. *Return to* ■ 4.NOF.B.4, ■ 4.NOF.B.5, ■ 4.NOF.B.6

○ **3.NOF.C.7** 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. *Return to* ■ 4.NOF.B.5

3.NOF.A.1 Understand and interpret a fraction with denominators 2, 3, 4, 6, and 8.

a. Understand a unit fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole or a set is partitioned into *b* equal parts where *b* is a non-zero whole number.
b. Understand a fraction $\frac{a}{b}$ as the quantity formed by *a* parts of size $\frac{1}{b}$.
c. Represent fractions greater than zero and less than or equal to one using concrete objects, number lines, or pictorial models.
d. Read and write fractions in standard form and written unit form.
e. Solve real-world mathematical tasks involving partitioning an object or set of objects, identifying a fraction as parts of a whole.

Return to 4.NOF.D.9

3.NOF.A.2 Understand a fraction with denominators 2, 3, 4, 6, and 8 as a number on a number line diagram.

a. Represent a fraction $\frac{1}{b}$ 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 $\frac{1}{b}$ and that the endpoint of the part, based at 0, locates the number $\frac{1}{b}$ on the number line.
b. Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off *a* lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line.

Return to 4.NOF.D.9

3.NOF.A.3 Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 as fractions that have different numerators and denominators but are equal to the same value, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line.
b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model or number line.
c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model or number line.

Return to 4.NOF.C.7

3.DM.A.1 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. *Return to* 4.DM.A.1

3.DM.B.3 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units — whole numbers, halves, or quarters. *Return to* 4.DM.B.4

3.DM.C.6 Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.
b. Multiply side lengths to find areas of rectangles with whole- number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a + b and a + c. Use area models to represent the distributive property in mathematical reasoning.

Return to 4.DM.C.7

3.DM.D.7 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. *Return to* 4.DM.A.3

3.GL.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* 4.GL.A.1

Table 2. Common multiplication and division situations.[1]

	Unknown Product **3 x 6 = ?**	Group Size Unknown ("How many in each group?" Division) **3 x ? = 18, and 18 ÷ 3 = ?**	Number of Groups Unknown ("How many groups?" Division) **? x 6 = 18, and 18 ÷ 6 = ?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[2] Area[3]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	General $a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[1]The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

[2]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.
[3]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.