Louisiana STUDENT STANDARDS MATHEMATICS

Grade 3

Louisiana Student Standards: Companion Document for Teachers 2.0

This document is designed to assist educators in interpreting and implementing Louisiana's new mathematics standards. It contains descriptions of each grade 3 math standard to answer questions about the standard's meaning and how it applies to student knowledge and performance. Version 2.0 has been updated to include information from LDOE's Grade 3 Remediation and Rigor documents. Some examples have been added, deleted or revised to better reflect the intent of the standard. Examples are samples only and should not be considered an exhaustive list.

This companion document is considered a "living" document as we believe that teachers and other educators will find ways to improve the document as they use it. Please send feedback to classroomsupporttoolbox@la.gov so that we may use your input when updating this guide.

Additional information on the Louisiana Student Standards for Mathematics, including how to read the standards' codes, a listing of standards for each grade or course, and links to additional resources, is available at http://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning.

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DEPARTMENT of EDUCATION
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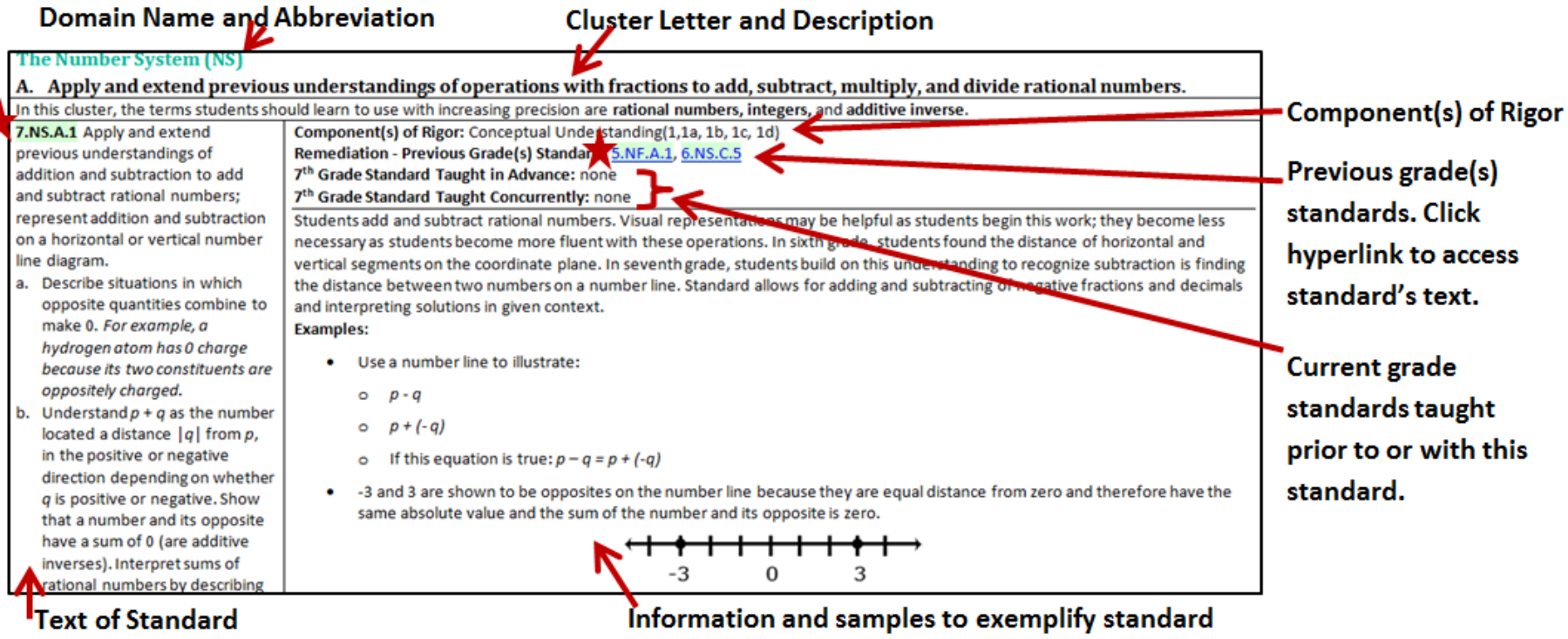
How-to-Read Guide

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



★ **Shading of Standard Codes: Major Work of Grade, Supporting Work, Additional Work**

Codes for previous grade standards and standards taught prior to or with this standard are hyperlinked to the text of the standard.

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

Classification of Major, Supporting, and Additional Work

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

Components of Rigor

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

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

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

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

Standards for Mathematical Practice

The Louisiana Standards for Mathematical Practice are expected to be integrated into every mathematics lesson for all students grades K-12. Below are a few examples of how these practices may be integrated into tasks that students in grade 3 complete.

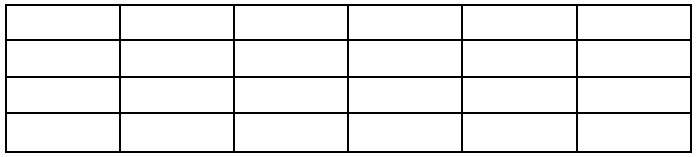
Louisiana Standards for Mathematical Practice (MP)	
Louisiana Standard	**Explanations and Examples**
3.MP.1 Make sense of problems and persevere in solving them.	In third grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Third 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 approaches. They often will use another method to check their answers.
3.MP.2 Reason abstractly and quantitatively.	Third 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.
3.MP.3 Construct viable arguments and critique the reasoning of others.	In third grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. 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.
3.MP.4 Model with mathematics.	Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, 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. Third graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
3.MP.5 Use appropriate tools strategically.	Third 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 to find all the possible rectangles that have a given perimeter. They compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles.
3.MP.6 Attend to precision.	As third 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, when figuring out the area of a rectangle they record their answers in square units.
3.MP.7 Look for and make use of structure.	In third grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).
3.MP.8 Look for and express regularity in repeated reasoning.	Students in third grade should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, "Does this make sense?"

Operations and Algebraic Thinking (OA)

A. Represent and solve problems involving multiplication and division.

In this cluster, the terms students should learn to use with increasing precision are **product, groups of, quotient, partitioned equally, multiplication, division, equal groups, group size, array, equation, unknown,** and **expression**.

Louisiana Standard	Explanations and Examples
3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** 2.OA.C.3, 2.OA.C.4 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.OA.B.6 This standard requires that students interpret products of whole numbers. Students recognize multiplication as a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group. Multiplication requires students to think in terms of groups of things rather than individual things. **Examples:** • Describe a situation in which the total number of objects can be expressed as 8 x 6. *Sample Solution: There 8 books on each of 6 shelves.* • Write a situation that can be represented by the product of 4 and 7. *Sample Solution: Johnny has 4 cars in each of 7 boxes.*
3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.OA.A.1 **3rd Grade Standard Taught Concurrently:** 3.OA.B.6 This standard focuses on two distinct models of division: partition models and measurement (repeated subtraction) models. Partition models provide students with a total number and the number of groups. These models focus on the question, "How many objects are in each group so that the groups are equal?" A context for partition models would be: There are 12 cookies on the counter. If you are sharing the cookies equally among three bags, how many cookies will go in each bag? Measurement (repeated subtraction) models provide students with a total number and the number of objects in each group. These models focus on the question, "How many equal groups can you make?" A context for measurement models would be: There are 12 cookies on the counter. If you put 3 cookies in each bag, how many bags will you fill? *Solution: The student draws a model similar to the one below and indicates that 4 bags of 3 cookies can be made using 12 cookies.* O O O O O O O O O O O O

3.OA.A.2 *continued*	**Examples:** • https://www.illustrativemathematics.org/content-standards/3/OA/A/2/tasks/1540 • https://www.illustrativemathematics.org/content-standards/3/OA/A/2/tasks/1531
3.OA.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. *Table 2 can be found in the Louisiana Student Standards for Mathematics and has been added to the end of this document.	**Component(s) of Rigor:** Application **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.OA.A.1, 3.OA.A.2 **3rd Grade Standard Taught Concurrently:** 3.OA.A.4, 3.OA.B.6 This standard references various problem solving context and strategies that students are expected to use while solving word problems involving multiplication and division. Students should use a variety of representations for creating and solving one-step word problems, such as: If you share 36 brownies among 9 people, how many brownies does each person receive? *(36 ÷ 9= 4).* Table 2* gives examples of a variety of problem solving contexts in which students need to find the product, the group size, or the number of groups. Students should be given ample experiences to explore all of the different problem structures. Students in third grade should use a variety of pictures, such as stars, boxes, or circles s to represent unknown numbers. Letters are also introduced to represent unknowns in third grade (3.OA.D.8). Examples: • https://www.illustrativemathematics.org/content-standards/3/OA/A/3/tasks/365 • There are 24 desks in the classroom. If the teacher puts 6 desks in each row, how many rows are there? This task can be solved by drawing an array by putting 6 desks in each row until there are a total of 24 boxes in the array. This is an array model. *4 rows of 6 desks is 24 desks*  This task can also be solved by drawing pictures of equal groups.  *Solution: 4 groups of 6 equals 24 objects so 4 rows are needed.*

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Max the monkey loves bananas. Molly, his trainer, has 24 bananas. If she gives Max 4 bananas each day, how many days will the bananas last? This example uses measurement division, where the size of the groups is known.

<table>
<tr><td>Starting</td><td>Day 1</td><td>Day 2</td><td>Day 3</td><td>Day 4</td><td>Day 5</td><td>Day 6</td></tr>
<tr><td>24</td><td>24 – 4 = 20</td><td>20 – 4 = 16</td><td>16 – 4 = 12</td><td>12 – 4 = 8</td><td>8 – 4 = 4</td><td>4 – 4 = 0</td></tr>
</table>
Solution: The bananas will last for 6 days. Note: The solution shows as series of steps, but could be complete in one step using 24 ÷ 4 = 6.
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<td>3.OA.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 = ?.</td>
<td>
Component(s) of Rigor: Conceptual Understanding
Remediation - Previous Grade(s) Standard: none
3rd Grade Standard Taught in Advance: none
3rd Grade Standard Taught Concurrently: 3.OA.A.3, 3.OA.C.7
Note that the focus of 3.OA.A.4 extends beyond the traditional notion of fact families, by having students explore the inverse relationship of multiplication and division.

Students extend work from earlier grades with their understanding of the meaning of the equal sign as “the same amount as” to interpret an equation with an unknown. When given 4 × ? = 40, they might think:

4 groups of some number is the same as 40
4 times some number is the same as 40
I know that 4 groups of 10 is 40 so the unknown number is 10
10 is the missing number because 4 times 10 equals 40.

Students should have practice solving both multiplication and division equations with the unknown number in varying positions.

Examples:

24 = ? × 6
72 ÷ △ = 9

This standard is strongly connected to 3.OA.A.3 when students solve problems and determine unknowns in equations. Table 2 at the end of this document shows equations for the different types of multiplication and division problem structures. The easiest problem structure includes Unknown Product (3 × 6 = ? or 18 ÷ 3 = 6). The more difficult problem structures include Group Size Unknown (3 × ? = 18 or 18 ÷ 3 = 6) or Number of Groups Unknown (? × 6 = 18, 18 ÷ 6 = 3).
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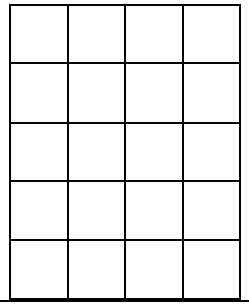
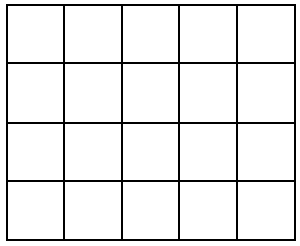
Operations and Algebraic Thinking (OA)

B. Understand properties of multiplication and the relationship between multiplication and division.

In this cluster, the terms students should learn to use with increasing precision are **operation, multiply, divide, factor, product, quotient, unknown,** and **properties**.

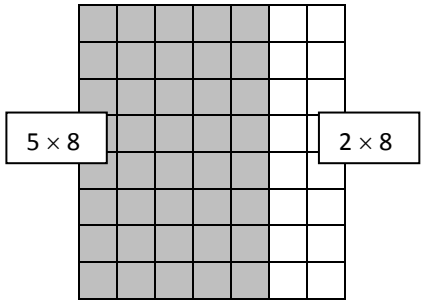
Louisiana Standard	Explanations and Examples
3.OA.B.5 Apply properties* of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 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 of multiplication.)* *Students need not use formal terms for these properties.	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.OA.A.1, 3.OA.A.2 **3rd Grade Standard Taught Concurrently:** none This standard references properties of multiplication. **While students do not need to use the formal terms for these properties, student must understand that properties are rules about how numbers work, and they need to be flexibly and fluently applying each of them in various situations.** Students represent expressions using various objects, pictures, words and symbols in order to develop their understanding of properties. They multiply by 1 and 0 and divide by 1. They change the order of numbers to determine that the order of numbers does not make a difference in multiplication (but does make a difference in division). Given three factors, they investigate changing the order of how they multiply the numbers to determine that changing the order does not change the product. They also decompose numbers to build fluency with multiplication. The associative property (grouping property) states that the sum or product stays the same when the grouping of addends or factors is changed. For example, when a student multiplies 7 × 5 × 2, a student could rearrange the numbers to first multiply 5 × 2 = 10 and then multiply 10 × 7 = 70. The commutative property (order property) states that the order of numbers does not matter when you are adding or multiplying numbers. For example, if a student knows that 5 × 4 = 20, then they also know that 4 × 5 = 20. While rows are horizontal and columns are vertical, there is no "fixed" way to write the dimensions of an array as rows x columns or columns x rows. Students should have flexibility in being able to describe both dimensions of an array. 4 × 5 or 5 × 4   4 × 5 or 5 × 4

3.OA.B.5 *continued*

Students are introduced to the distributive property of multiplication over addition as a strategy for using products they know to solve products they don't know. Students would be using mental math to determine a product. Here are ways that students could use the distributive property to determine the product of 7×6. Again, students should use the distributive property, but can refer to this in informal language such as "breaking numbers apart."

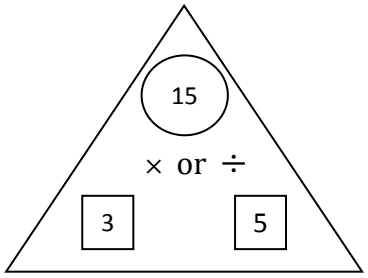
Student 1	Student 2	Student 3
7×6	7×6	7×6
$7 \times 5 = 35$	$7 \times 3 = 21$	$5 \times 6 = 30$
$7 \times 1 = 7$	$7 \times 3 = 21$	$2 \times 6 = 12$
$35 + 7 = 42$	$21 + 21 = 42$	$30 + 12 = 42$

Another example of the distributive property uses an array model to help students determine the products and factors of problems by breaking numbers apart. For example, for the problem $7 \times 8 = ?$, students can decompose the 7 into 5 and 2, and reach the answer by multiplying $5 \times 8 = 40$ and $2 \times 8 = 16$ and adding the two products ($40 + 16 = 56$).



To further develop understanding of properties related to multiplication and division, students use different representations and their understanding of the relationship between multiplication and division **to determine if the following types of equations are true or false.** Students are not required to state the name of the property.

- $0 \times 7 = 7 \times 0 = 0$ (Zero Property of Multiplication)
- $1 \times 9 = 9 \times 1 = 9$ (Multiplicative Identity Property of 1)
- $3 \times 6 = 6 \times 3$ (Commutative Property)
- $8 \div 2 = 2 \div 8$ (Students are only to determine that these are not equal.)
- $2 \times 3 \times 5 = 6 \times 5$
- $10 \times 2 < 5 \times 2 \times 2$
- $2 \times 3 \times 5 = 10 \times 3$
- $0 \times 6 > 3 \times 0 \times 2$

3.OA.B.6 Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.OA.A.1, 3.OA.A.2, 3.OA.A.3 Fact family triangles demonstrate the inverse operations of multiplication and division by showing the two factors and how those factors relate to the product and/or quotient. **Examples:** • $3 \times 5 = 15$ $5 \times 3 = 15$ • $15 \div 3 = 5$ $15 \div 5 = 3$  **Example:** • Sarah did not know the answer to 63 divided by 7, but she does know her multiplication facts. Explain how Sarah can use her multiplication facts to find the answer to 63 divided by 7. This standard refers to unknown-factor problems. It is strongly connected to 3.OA.A.3 when students solve word problems and determine unknowns in equations. These are *Group Size Unknown* and *Number of Groups Unknown* problems as shown in Table 2 found at the end of this document. Since multiplication and division are inverse operations, students are expected to solve word problems as indicated in 3.OA.A.3 and explain their processes of solving division problems that can also be represented as unknown factor multiplication problems. **Example:** • Bob knows that $2 \times 9 = 18$. How can he use that fact to determine the answer to the following question: 18 people are divided into pairs in P.E. class? How many pairs are there? Write a division equation and explain your reasoning.

Operations and Algebraic Thinking (OA)

C. Multiply and divide within 100.

In this cluster, the terms students should learn to use with increasing precision are **operation, multiply, divide, factor, product, quotient, unknown, reasonableness, mental computation,** and **property**.

Louisiana Standard	Explanations and Examples
3.OA.C.7 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.	**Component(s) of Rigor:** Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.OA.B.5, 3.OA.B.6 **3rd Grade Standard Taught Concurrently:** 3.OA.A.4, 3.OA.D.8 This standard uses the word fluently, which means with accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies such as the distributive property). "Know from memory" should not focus only on timed tests and repetitive practice. Students must have numerous experiences working with manipulatives, pictures, arrays, word problems, and numbers to internalize the basic multiplication facts. **Within 100 has been defined to include the facts in the multiplication table from 0 × 0 through 10 × 10. Facts from 0 × 0 to 9 × 9 should be known from memory at the end of the year.** Strategies students may use to attain fluency include: • Multiplication by zeros and ones • Doubles (2s facts), Doubling twice (4s), Doubling three times (8s) • Tens facts (relating to place value, 5 × 10 is 5 tens or 50) • Five facts (half of tens) • Skip counting (counting groups of __ and knowing how many groups have been counted) • Nines (10 groups less one group, e.g., 9 × 3 is ten groups of 3 minus one group of 3) • Decomposing into known facts (6 × 7 is 6 × 6 plus one more group of 6) • Turn-around facts (commutative property) • Fact families (Ex: 6 × 4 = 24; 24 ÷ 6 = 4; 24 ÷ 4 = 6; 4 × 6 = 24) • Missing factors

Operations and Algebraic Thinking (OA)

D. Solve problems involving the four operations, and identify and explain patterns in arithmetic

In this cluster, the terms students should learn to use with increasing precision are **operation, multiply, divide, factor, product, quotient, subtract, add, addend, sum, difference, equation, expression, unknown, reasonableness, mental computation, estimation, rounding, patterns,** and **properties**.

Louisiana Standard	Explanations and Examples
3.OA.D.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.	**Component(s) of Rigor:** Conceptual Understanding, Application **Remediation - Previous Grade(s) Standard:** 2.OA.A.1 **3rd Grade Standard Taught in Advance:** 3.OA.A.3 **3rd Grade Standard Taught Concurrently:** 3.OA.C.7, 3.MD.A.2, 3.MD.B.3, 3.MD.D.8 Students in third grade begin the step to formal algebraic language by using a letter for the unknown quantity in equations for one and two-step problems. However, the symbols of arithmetic, × for multiplication and ÷ for division, continue to be used in Grades 3, 4, and 5. This standard refers to two-step word problems using the four operations. The size of the numbers should be limited to related 3rd grade standards (e.g., **3.OA.C.7** and **3.NBT.A.2**). Adding and subtracting numbers should include numbers within 1,000, and multiplying and dividing numbers should include single-digit factors and products less than 100. This standard calls for students to represent problems using equations with a letter to represent unknown quantities. **Example:** • Mike runs 2 miles a day. His goal is to run 25 miles. After 5 days, how many miles does Mike have left to run in order to meet his goal? Write an equation and find the solution. (*2 × 5 + ? = 25; ? = 15*) This standard refers to estimation strategies, including using compatible numbers (numbers that sum to 10, 50, or 100) or rounding. The focus in this standard is to have students use and discuss various strategies. Students should estimate during problem solving, and then revisit their estimate to check for reasonableness. **Examples of typical estimation strategies:** • On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many total miles did they travel? Student 1 I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500. Student 2 I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundreds that I already had, I end up with 500. Student 3 I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530.

3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

Component(s) of Rigor: Conceptual Understanding
Remediation - Previous Grade(s) Standard: 2.OA.C.3
3rd Grade Standard Taught in Advance: 3.OA.B.5
3rd Grade Standard Taught Concurrently: none

This standard calls for students to examine arithmetic patterns involving both addition and multiplication. Arithmetic patterns are patterns that change by the same rate, such as adding the same number. For example, the series 2, 4, 6, 8, 10 is an arithmetic pattern that increases by 2 between each term. This standard also mentions identifying patterns related to the properties of operations.

Examples:

- Even numbers are always divisible by 2. Even numbers can always be decomposed into 2 equal addends (14 = 7 + 7).
- Multiples of even numbers (2, 4, 6, and 8) are always even numbers.
- On a multiplication chart, the products in each row and column increase by the same amount (skip counting).
- On an addition chart, the sums in each row and column increase by the same amount.
- What do you notice about the numbers highlighted in pink in the multiplication table? Explain a pattern using properties of operations.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Sample Solution: If you look at column 6 and row 5, you are multiplying 6 × 5 and you get 30. If you look at column 5 and row 6, you are multiplying 5 × 6 and you still get 30. The order (commutative) property says the order in which you multiply two numbers doesn't matter and the chart shows that you get a product of 30 either way.

3.OA.D.9 *continued*

- Teacher: What pattern do you notice when 2, 4, 6, 8, or 10 are multiplied by any number (even or odd)?
  Student: The product will always be an even number.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

- Find two patterns in this addition table. Explain why each pattern works the way it does.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	19	11	12	13	14	15	16	17	18	19	20

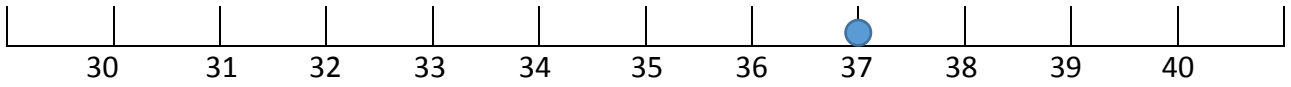
Example Patterns:

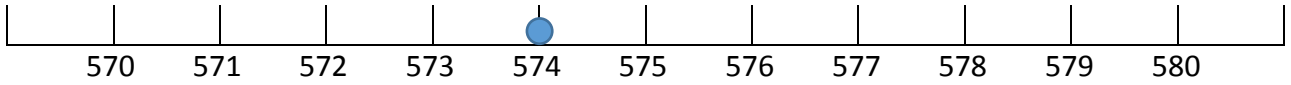
- Any sum of two even numbers is even.
- Any sum of two odd numbers is even.
- Any sum of an even number and an odd number is odd.
- The doubles (2 addends the same) in an addition table fall on a diagonal.

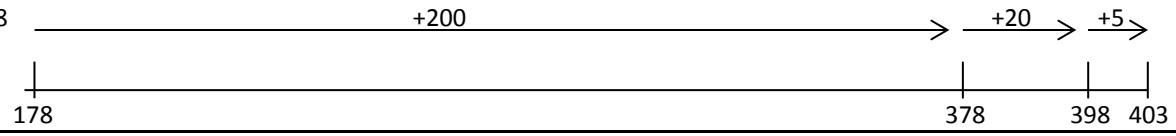
Number and Operations in Base Ten (NBT)

A. 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 **place value, round, addition, add, addend, sum, subtraction, subtract, difference,** and **properties**.

Louisiana Standard	Explanations and Examples
3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** 2.NBT.A.1 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none This standard refers to place value understanding, which extends beyond an algorithm or memorized 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. The number line is a tool that can be used to support students' development related to rounding numbers. For example, round 37 to the nearest ten. **Example:** Teacher: Between which two tens does the number 37 fall? Student: 37 falls between 30 and 40. Teacher: Let's make a number line. Teacher: Where would 37 be on the number line? Students mark 37. Teacher: Is 37 closer to 30 or 40? Student: 40 

3.NBT.A.1 *continued*	With larger numbers a similar approach could be used. Teacher: We want to round 574 to the nearest ten. Between which two tens does 574 fall? Student: Between 570 and 580. Teacher: Let's make a number line. Teacher: Where would 574 be on the number line? Student marks 574. Teacher: Is 574 closer to 570 or 580? 

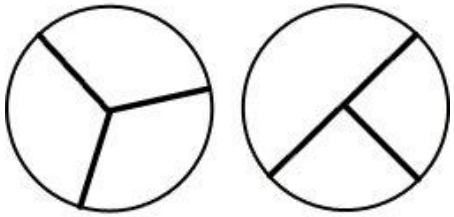
3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms* based on place value, properties of operations, and/or the relationship between addition and subtraction. * A range of algorithms may be used.	**Component(s) of Rigor:** Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 2.NBT.B.7, 2.NBT.B.8 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none This standard refers to fluently, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies such as the distributive property). The word algorithm refers to a procedure or a series of steps. There are algorithms other than the standard algorithm. Third grade students should have experiences beyond the standard algorithm. Problems should include both vertical and horizontal forms, including opportunities for students to apply the commutative and associative properties. Students explain their thinking and show their work by using strategies and algorithms, and verify that their answer is reasonable. **Addition Example:** • Show how to add 178 and 225. Student 1 100 + 200 = 300 70 + 20 = 90 8 + 5 = 13 300 + 90 + 13 = 403 Student 2 I added 2 to 178 to get 180. I added 220 to get 400. I added the 3 left over to get 403. Student 3 I know that 75 plus 25 equals 100. I then added 1 hundred from 178 and 2 hundreds from 275. I had a total of 4 hundreds and I had 3 more left to add. So I have 4 hundreds plus 3 more which is 403. Student 4 178 + 200 = 378 378 + 20 = 398 398 + 5 = 403 

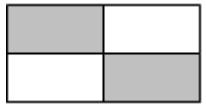
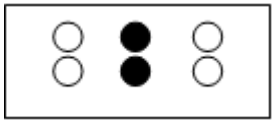
3.NBT.A.2 *continued*	**Subtraction Example**: • Show how to subtract 573 and 399. Students could use several approaches to solve the problem including the standard algorithm. Examples of other methods students could use are listed below: o 399 + 1 = 400, 400 + 100 = 500, 500 + 73 = 573, therefore 1 + 100 + 73 = 174 (Adding up strategy) o 400 + 100 is 500; 500 + 73 is 573; 100 + 73 is 173 plus 1 (for 399 to 400) is 174 (Compensating strategy) o Take away 73 from 573 to get to 500, take away 100 to get to 400, and take away 1 to get to 399. Then 73 +100 + 1 = 174 (Subtracting to count down strategy) o 399 + 1 is 400, 500 (that's 100 more). 510, 520, 530, 540, 550, 560, 570, (that's 70 more), 571, 572, 573 (that's 3 more) so the total is 1 + 100 + 70 + 3 = 174 (Adding by tens or hundreds strategy)
3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10 – 90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 2.NBT.A.1 **3rd Grade Standard Taught in Advance:** 3.OA.B.5 **3rd Grade Standard Taught Concurrently:** none Students use base-ten blocks, diagrams, or hundreds charts to multiply one-digit numbers by multiples of 10 from 10-90. They apply their understanding of multiplication and the meaning of the multiples of 10. The special role of 10 in the base-ten system is important in understanding multiplication of one-digit numbers with multiples of 10. For example, the product 3 × 50 can be represented as 3 groups of 5 tens, which is 15 tens, which is 150. This reasoning relies on the associative property of multiplication: 3 × 50 = 3 × (5 × 10) = (3 × 5) × 10 = 15 × 10 = 150. **Example**: • For the problem 4 × 50, students should think of this as 4 groups of 5 tens or 20 tens. Twenty tens equals 200. Students may use manipulatives or drawings to demonstrate their understanding.

Number and Operations—Fractions (NF)

A. Develop understanding of fractions as numbers.

In this cluster, the terms students should learn to use with increasing precision are **whole, partition(ed), equal parts, fraction, equal distance (intervals), equivalent, equivalence, reasonable, denominator, numerator, comparison, compare, ‹, ›, = , justify,** and **inequality**.

Louisiana Standard	Explanations and Examples
3.NF.A.1 Understand a fraction 1/*b*, with denominators 2, 3, 4, 6, and 8, as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.	**Component(s) of Rigor:** Conceptual Understanding **Remediation - Previous Grade(s) Standard:** 2.MD.A.2, 2.G.A.3 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.NF.A.2, 3.MD.A.2 Students extend the concepts learned in 1.G.A.3 and 2.G.A.3. Some important concepts related to developing understanding of fractions from grades 1 and 2 and their extensions include: • Understand fractional parts must be equal-sized Example: Non-example:  These are thirds. These are NOT thirds. • The number of equal parts tell how many make a whole • As the number of equal pieces in the whole increases, the size of the fractional pieces decreases • The size of the fractional part is relative to the whole o The number of children in one-half of a classroom is different than the number of children in one-half of a school. (the whole in each set is different therefore the half in each set will be different) • When a whole is cut into equal parts, the denominator represents the number of equal parts • The numerator of a fraction is the count of the number of equal parts o ¾ means that there are 3 one-fourths o Students can count *one fourth, two fourths, three fourths* Students express fractions as parts of a whole. They use various contexts (candy bars, fruit, and cakes) and a variety of models (circles, squares, rectangles, fraction bars, and number lines) to develop understanding of fractions and represent fractions.

3.NF.A.1 *continued*	**Examples**: • What fraction of the rectangle is shaded? How might you draw the rectangle in another way but with the same fraction shaded?  *Solution:* $\frac{2}{4}$  *Alternate way to draw and shade the rectangle.* • What fraction of the dots is black?  *Solution*: $\frac{2}{6}$

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

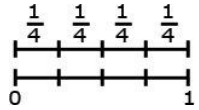
a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.

b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

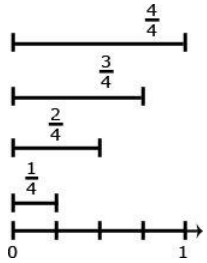
Component(s) of Rigor: Conceptual Understanding (2, 2a, 2b)
Remediation - Previous Grade(s) Standard: 2.MD.B.6
3rd Grade Standard Taught in Advance: none
3rd Grade Standard Taught Concurrently: 3.NF.A.1, 3.MD.B.4

Students transfer their understanding of parts of a whole to partition a number line into equal parts. There are two new concepts addressed in this standard which students should have time to develop.

1. On a number line from 0 to 1, students can partition (divide) it into equal parts and recognize that each segmented part represents the same length.



2. Students label each fractional part based on how far it is from zero to the endpoint.

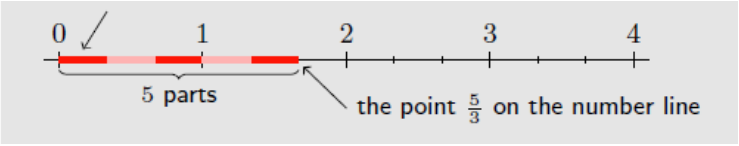


Example:

- Draw a number line representation of 5/3.

  The distance between 0 and 1 is divided into 3 parts of equal length.

  The location of 5/3 is determined by starting at 0 and counting 5 parts of equal length.



3.NF.A.3 Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, 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., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* 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	**Component(s) of Rigor:** Conceptual Understanding (3, 3a,3b,3c,3d) **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.NF.A.1, 3.NF.A.2 **3rd Grade Standard Taught Concurrently:** none An important concept when comparing fractions is to look at the size of the parts and the number of the parts. **Examples:** • For example, $\frac{1}{8}$ is smaller than $\frac{1}{2}$ because when 1 whole is cut into 8 pieces, the pieces are much smaller than when the same whole is cut into 2 pieces. Students recognize when examining fractions with common denominators, the wholes have been divided into the same number of equal parts. So the fraction with the greater numerator has the greater number of equal parts. $\frac{2}{6} < \frac{5}{6}$ • As in all comparisons of fractions, students must understand that comparisons are valid only if the wholes are identical. This is a critical understanding when comparing fractions that have the same numerator but different denominators as indicated in part d. For example, $\frac{1}{2}$ of a large pizza is a different amount than $\frac{1}{2}$ of a small pizza. The goal is to have students see that, for unit fractions, the fraction with the greater denominator is smaller, by reasoning, for example, that in order for more (identical) pieces to make the same whole, the pieces must be smaller. Additionally students must recognize that each fraction has the same number of equal parts, but the size of the parts is different for each fraction. They can infer that the same number of smaller pieces is less than the same number of bigger pieces. After having ample opportunities to use number lines, students should make such comparisons without the visual support. $\frac{3}{8} < \frac{3}{4}$ All parts of this standard call for students to use visual fraction models (area models) or number lines to explore the idea of equivalent fractions. Students should only explore equivalent fractions using models, rather than using algorithms or procedures. Part c includes writing whole numbers as fractions. This standard is the building block for fifth grade where students divide a set of objects into a specific number of groups. Students must understand the meaning of $\frac{a}{1}$. Example 2 above addresses part d.

3.NF.A.3 *continued* 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.	

Measurement and Data (MD)

A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

In this cluster, the terms students should learn to use with increasing precision are **estimate, time, time interval, minute, hour, elapsed time, a.m., p.m., measure, liquid volume, mass, standard units, metric, gram (g), kilogram (kg), liter (l),** and **milliliter (ml)**.

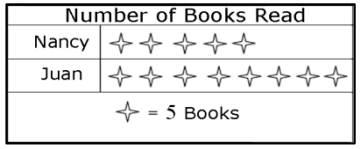
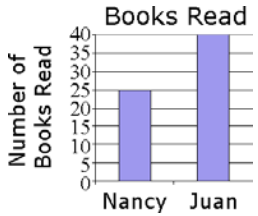
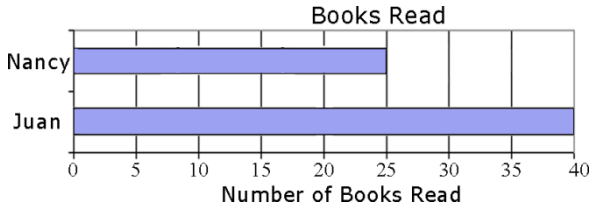
Louisiana Standard	Explanations and Examples
3.MD.A.1 Understand time to the nearest minute. a. Tell and write time to the nearest minute and measure time intervals in minutes, within 60 minutes, on an analog and digital clock. b. Calculate elapsed time greater than 60 minutes to the nearest quarter and half hour on a number line diagram. *c.* Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	**Component(s) of Rigor:** Conceptual Understanding (1, 1a), Procedural Skill and Fluency (1a, 1b), Application (1c) **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none This standard calls for students to solve elapsed time problems, including word problems. Students should use clock models (analog and digital) or number lines. On the number line, students should be given the opportunities to determine the intervals and size of jumps on their number line. Students could use pre-determined number lines (intervals every 5 or 15 minutes) or open number lines (intervals determined by students). **Example:** • At 7:00 a.m. Candace wakes up to go to school. It takes her 8 minutes to shower, 9 minutes to get dressed and 17 minutes to eat breakfast. How many minutes does she have until the bus comes at 8:00 a.m.? Use the number line to help solve the problem. Explain your work.  First I added 8 + 9 + 17 to find out how much time she spent doing what she did. That was 34 minutes which means she was through at 7:34. So I decided to count by fives from 7:35 to 8:00. I counted as I jumped (7:40, 7:45, 7:50, 7:55, then 8:00) which is 25 minutes. I had to add 1 more minute because there is 1 minute between 7:34 and 7:35, so Candace had to wait 26 minutes for the bus. Students should use the same type of number line to calculate elapsed time to the nearest quarter or half hour for times greater than 60 minutes. Students may be required to calculate elapsed time within a 12 hour timespan. For example, Sarah woke up at 9:00 a.m. one morning. She went to bed that same night at 8:15 p.m. Calculate the amount of elapsed time.

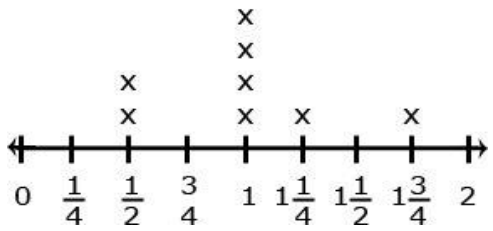
3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).* Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.** * Excludes compound units such as cm^3 and finding the geometric volume of a container. ** Excludes multiplicative comparison problems (problems involving notions of "times as much"). See Table 2 at the end of this document.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency, Application **Remediation - Previous Grade(s) Standard:** 2.MD.A.1 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.NF.A.1, 3.OA.D.8 Students need multiple opportunities filling containers to help them develop a basic understanding of the volume of a liter and using a balance scale to understand grams and kilograms. While not required by the standard, it may beneficial use milliliters to show amounts that are less than a liter. Doing so would emphasize the relationship between smaller and larger units in the same system. Word problems should only be one-step and include the same units. Foundational understandings to help with measure concepts: • 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 (compensatory principal). **Examples**: • This activity helps develop gram benchmarks. o Students identify 5 things that have a mass of about one gram. They record their findings with words and pictures. (Students can repeat this for 5 grams and 10 grams.) o One large paperclip has a mass of about one gram. A box of large paperclips (100 clips) has a mass of about 100 grams so 10 boxes would have mass of about one kilogram. • Jose has 9 nickels. His nickels have a total mass of 45 grams. All nickels have the same mass. What is the mass of one nickel? *Solution: 5 grams* • A water company has two large containers of water. One container has 124 liters of water. The second container has 379 liters of water. What is the total number of liters in the two containers? *Solution: 503 liters* • https://www.illustrativemathematics.org/content-standards/3/MD/A/2/tasks/1929

Measurement and Data (MD)

B. Represent and interpret data.

In this cluster, the terms students should learn to use with increasing precision are **scale, scaled picture graph, scaled bar graph, line plot,** and **data**.

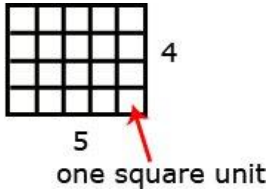
Louisiana Standard	Explanations and Examples
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*	**Component(s) of Rigor:** Procedural Skill and Fluency, Application **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.OA.D.8 Students' work with scaled graphs builds understanding of multiplication and division. The following graphs provided below all use five as the scale interval, but students should experience different intervals to further develop their understanding of scale graphs and number facts. While exploring data concepts, students should pose a question, collect data, analyze data, and interpret data. Students should be graphing data that is relevant to their lives Pictographs: Scaled pictographs include symbols that represent multiple units. Below is an example of a pictograph with symbols that represent multiple units. Graphs should include a title, categories, category label, key, and data.  • How many more books did Juan read than Nancy? Scaled Bar Graphs: Students use both horizontal and vertical bar graphs. Bar graphs include a title, scale, scale label, categories, category label, and data.   Analyze and Interpret Data (use the example single bar graphs on the previous page): • How many more nonfiction books were read than fantasy books? • Did more people read biography and mystery books or fiction and fantasy books? • About how many books in all genres were read? • Using the data from the graphs, what type of book was read more often than a mystery but less often than a fairytale? • What interval was used for this scale?

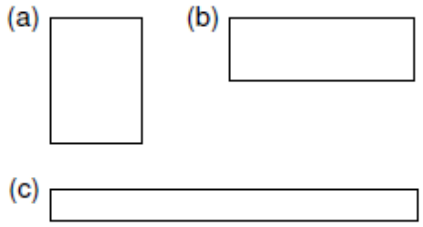
3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** 3.NF.A.2 Students in second grade measured length in whole units using both metric and U.S. customary systems. It's important to review with students how to read and use a standard ruler including details about half and quarter marks on the ruler. Students should connect their understanding of fractions to measuring to one-half and one-quarter inch. Third graders need many opportunities measuring the length of various objects in their environment. Some important ideas related to measuring with a ruler are: • The starting point of where one places a ruler to begin measuring • Measuring is approximate. Items that students measure will not always measure exactly ¼, ½ or one whole inch. Students will need to decide on an appropriate estimate length. • Making paper rulers and folding to find the half and quarter marks will help students develop a stronger understanding of measuring length Students generate data by measuring and create a line plot to display their findings. An example of a line plot is shown below: Number of Objects Measured 

Measurement and Data (MD)

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

In this cluster, the terms students should learn to use with increasing precision are **attribute, area, square unit, unit square, plane figure, gap, overlap, square cm, square m, square in., square ft., nonstandard units, tiling, side length,** and **decomposing**.

Louisiana Standard	Explanations and Examples
3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.	**Component(s) of Rigor:** Conceptual Understanding (5, 5a,5b) **Remediation - Previous Grade(s) Standard:** 1.G.A.2, 2.MD.A.1 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none This standard calls for students to explore the concept of covering a region with "unit squares," which could include square tiles or shading on grid or graph paper. Based on students' development, they should have ample experiences filling a region with square tiles before transitioning to pictorial representations on graph paper. Students develop understanding of using square units to measure area by: • Using different sized square units • Filling in an area with the same sized square units and counting the number of square units 

3.MD.C.6 Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).	**Component(s) of Rigor:** Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 2.G.A.2 **3rd Grade Standard Taught in Advance:** 3.MD.C.5 **3rd Grade Standard Taught Concurrently:** none Using different sized graph paper, students can explore the areas measured in square centimeters and square inches. For example, provide images such as the ones shown below on graph paper. Use masking tape to outline square meters and square feet on the floor of the classroom to help students understand the size of those units of measure. 

3.MD.C.7 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 $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

Component(s) of Rigor: Conceptual Understanding (7, 7a, 7b, 7c), Procedural Skill and Fluency (7a, 7b), Application (7b)
Remediation - Previous Grade(s) Standard: none
3rd Grade Standard Taught in Advance: 3.MD.C.5, 3.MD.C.6
3rd Grade Standard Taught Concurrently: 3.OA.B.5, 3.OA.D.8

Students can learn how to multiply length measurements to find the area of a rectangular region. But, to make sense of these quantities, they must first learn to interpret measurement of rectangular regions as a multiplicative relationship of the number of square units in a row and the number of rows. This relies on the development of spatial structuring. To build from spatial structuring to understanding the number of area-units as the product of number of units in a row and number of rows, students might draw rectangular arrays of squares and learn to determine the number of squares in each row with increasingly sophisticated strategies, such as skip-counting the number in each row and eventually multiplying the number in each row by the number of rows. They learn to partition a rectangle into identical squares by anticipating the final structure and forming the array by drawing line segments to form rows and columns. They use skip counting and multiplication to determine the number of squares in the array.

Examples:

- Given a rectangle with its dimensions labeled, students should draw an array within the rectangle and then multiply the length times the width to show the area is the same as when the squares are counted.

To find the area one could count the squares or multiply $3 \times 4 = 12$.

4

1	2	3	4
5	6	7	8
9	10	11	12

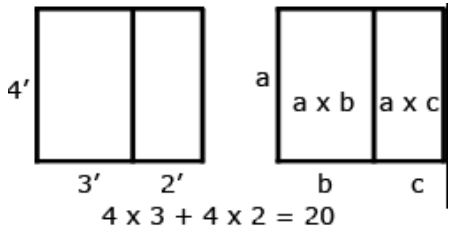
3

- Drew wants to tile the bathroom floor using 1-foot tiles. How many tiles will he need?

8 square feet

6 square feet

- Students might solve problems such as finding all the rectangular regions with whole-number side lengths that have an area of 12 area-units, doing this for larger rectangles (e.g., enclosing 24, 48, 72 area-units), making sketches rather than drawing each square. Students learn to justify their belief they have found all possible solutions.

3.MD.C.7 *continued*	• Joe and John made a poster that was 4’ by 3’. Mary and Amir made a poster that was 4’ by 2’. They placed their posters on the wall side-by-side so that that there was no space between them. How much area will the two posters cover? Students use pictures, words, and numbers to explain their understanding of the distributive property in this context.  4 x 3 + 4 x 2 = 20 4 (3 + 2) = 20 4 x 5 = 20

Measurement and Data (MD)

D. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

In this cluster, the terms students should learn to use with increasing precision are **attribute, perimeter, plane figure, area, polygon,** and **side length**.

Louisiana Standard	Explanations and Examples
3.MD.D.8 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.	**Component(s) of Rigor:** Procedural Skill and Fluency, Application **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.MD.C.5 **3rd Grade Standard Taught Concurrently:** 3.OA.D.8 Students develop an understanding of the concept of perimeter by walking around the perimeter of a room, using rubber bands to represent the perimeter of a plane figure on a geoboard, or tracing around a shape on an interactive whiteboard. They find the perimeter of objects; use addition to find perimeters; and recognize the patterns that exist when finding the sum of the lengths and widths of rectangles. Students use geoboards, tiles, and graph paper to find all the possible rectangles that have a given perimeter (e.g., find the rectangles with a perimeter of 14 cm). They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles. Given a perimeter and a length or width, students use objects or pictures to find the missing length or width. They justify and communicate their solutions using words, diagrams, pictures, numbers, and an interactive whiteboard. Students use geoboards, tiles, graph paper, or technology to find all the possible rectangles with a given area (e.g., find the rectangles that have an area of 12 square units). They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles. Students then investigate the perimeter of the rectangles with an area of 12.

area (sq. in.)	length (in.)	width (in.)	perimeter (in.)
12	1	12	26
12	2	6	16
12	3	4	14
12	4	3	14
12	6	2	16
12	12	1	26

The patterns in the chart allow the students to identify the factors of 12, connect the results to the commutative property, and discuss the differences in perimeter within the same area. This chart can also be used to investigate rectangles with the same perimeter. It is important to include squares in the investigation.

Measurement and Data (MD)

E. Work with money

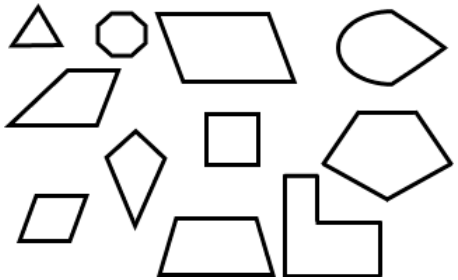
In this cluster, the terms students should learn to use with increasing precision are **penny, nickel, dime, quarter, bill** (as it relates to money)**, dollar symbol ($),** and **cent symbol (¢)**.

Louisiana Standard	Explanations and Examples
3.MD.E.9 Solve word problems involving pennies, nickels, dimes, quarters, and bills greater than one dollar, using the dollar and cent symbols appropriately.	**Component(s) of Rigor:** Application **Remediation - Previous Grade(s) Standard:** 2.MD.C.8 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none This standard requires students to solve problems involving bills which have a value greater than $1 and/or pennies, nickels, dimes, and quarters. **It is important to recognize that third grade students do not have an understanding of decimal place values; therefore, the use of decimals is prohibited.** **Examples:** • Mary wants to buy candy that costs $4 a pound. She has 3 pounds of candy in her bag. When she goes to pay, she gives the clerk a $10 bill and a $5 bill, how much change should Mary get back? Explain two ways the clerk could use to give Mary her change. You should include different combinations of bills and coins in one of your responses. Explain how you know that both of your ways will work. • Sam received $20 bills from 4 of his aunts on his birthday. He has a $10 bill and 12 one dollar bills in his savings box at home. Does Sam have enough money to buy a bike that costs $125? Show your work or explain how you know.

Geometry (G)

A. Reason with shapes and their attributes.

In this cluster, the terms students should learn to use with increasing precision are **attributes, features , quadrilateral, open figure, closed figure , three-sided, 2-dimensional, subcategories of quadrilaterals, polygon, rhombus/rhombi/rhombuses, rectangle, square, partition, unit fraction, kite, parallelogram, examples, right angle,** and **non-examples**.

Louisiana Standard	Explanations and Examples
3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** 2.G.A.1 **3rd Grade Standard Taught in Advance:** none **3rd Grade Standard Taught Concurrently:** none In third grade, students identify and draw triangles, quadrilaterals, pentagons, and hexagons. Third graders build on this experience and further investigate quadrilaterals (technology may be used during this exploration). Students recognize shapes that **are and are not** quadrilaterals by examining the properties of the geometric figures. They conceptualize that a quadrilateral must be a closed figure with four straight sides and begin to notice characteristics of the angles and the relationship between opposite sides. Students should be encouraged to provide details and use proper vocabulary when describing the properties of quadrilaterals. They sort geometric figures (see examples below) and identify squares, rectangles, and rhombuses as quadrilaterals. 

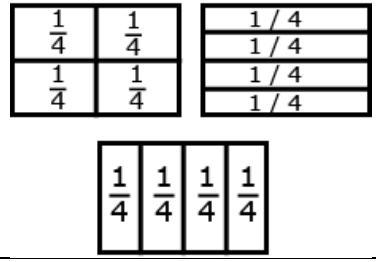
3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.	**Component(s) of Rigor:** Conceptual Understanding, Procedural Skill and Fluency **Remediation - Previous Grade(s) Standard:** none **3rd Grade Standard Taught in Advance:** 3.NF.A.1 **3rd Grade Standard Taught Concurrently:** none In third grade students start to develop the idea of a fraction more formally, building on the idea of partitioning a whole into equal parts. The whole can be a shape such as a circle or rectangle. In Grade 4, this is extended to include wholes that are collections of objects. This standard also builds on students' work with fractions and area. Students are responsible for partitioning shapes into halves, thirds, fourths, sixths and eighths. Given a shape, students partition it into equal parts, recognizing that these parts all have the same area. They identify the fractional name of each part and are able to partition a shape into parts with equal areas in several different ways. 

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

	Unknown Product	**Group Size Unknown** (“How many in each group?” Division)	**Number of Groups Unknown** (“How many groups?” Division)
	3 × 6 = ?	**3 × ? = 18, and 18 ÷ 3 = ?**	**? × 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	$a \times b = ?$	$a \times ? = p$, 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.

Grade 1 Standards

1.G.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* 3.MD.C.5

Grade 2 Standards

2.OA.A.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. *Return to* 3.OA.D.8

2.OA.C.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. *Return to* 3.OA.A.1, 3.OA.D.9

2.OA.C.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends. *Return to* 3.OA.A.1

2.NBT.A.1 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:

a. 100 can be thought of as a bundle of ten tens—called a "hundred."

b. 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 3.NBT.A.1, 3.NBT.A.3

2.NBT.B.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; justify the reasoning used with a written explanation. Understand that in adding or subtracting three- digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
Return to 3.NBT.A.2

2.NBT.B.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900. *Return to* 3.NBT.A.2

2.MD.A.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
Return to 3.MD.A.2, 3.MD.C.5

2.MD.A.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. *Return to* 3.NF.A.1

2.MD.B.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram. *Return to* 3.NF.A.2

2.MD.C.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have? *Return to* 3.MD.E.9

2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. *Return to* 3.G.A.1

2.G.A.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. *Return to* 3.MD.C.6

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. *Return to* 3.NF.A.1