Louisiana STUDENT STANDARDS MATHEMATICS

Kindergarten

# 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 Kindergarten 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 Kindergarten 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 LouisianaStandards@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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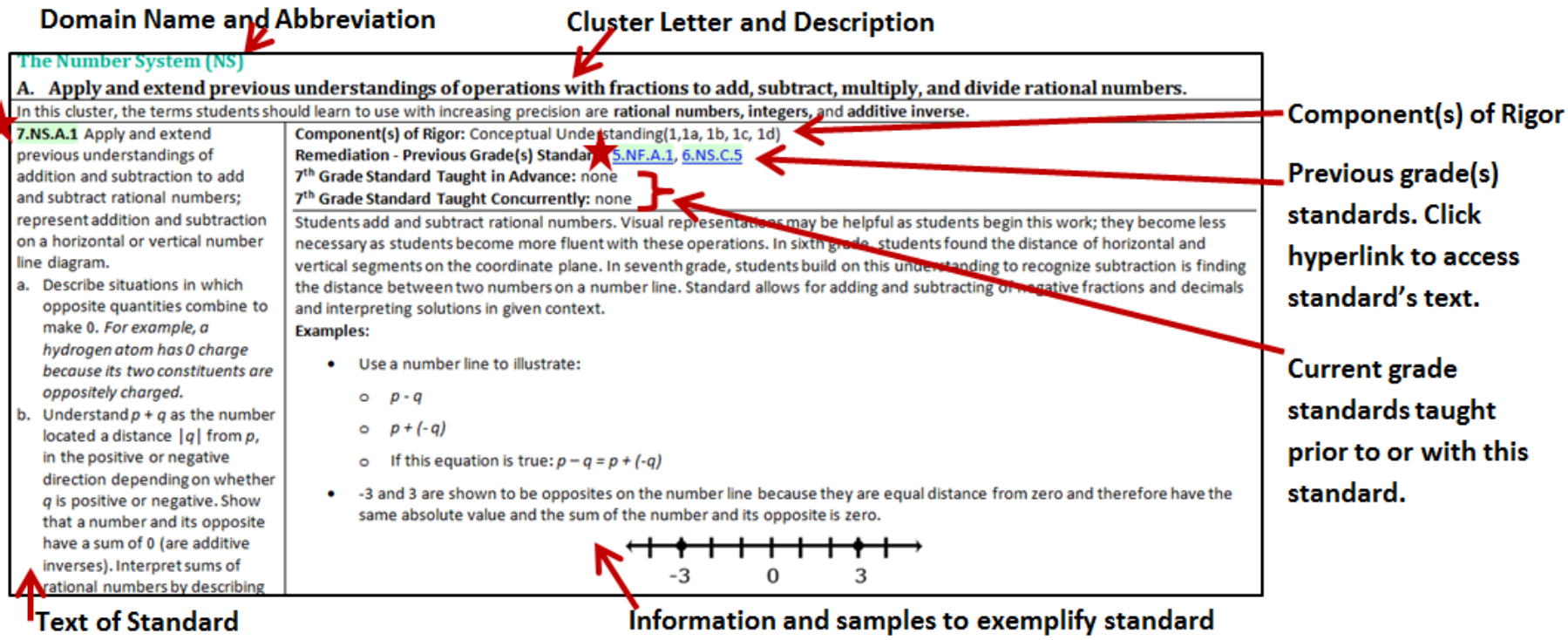
## How-to-Read Guide

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 Practices

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

| Louisiana Standards for Mathematical Practice (MP) | |
|---|---|
| **Louisiana Standard** | **Explanations and Examples** |
| **K.MP.1** Make sense of problems and persevere in solving them. | In kindergarten, students begin to build the understanding 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. Younger students 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?" or they may try another strategy. |
| **K.MP.2** Reason abstractly and quantitatively. | Younger students begin to recognize that a number represents a specific quantity. Then, they connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities. |
| **K.MP.3** Construct viable arguments and critique the reasoning of others. | Younger students construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also begin to develop 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. |
| **K.MP.4** Model with mathematics. | In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, 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. |
| **K.MP.5** Use appropriate tools strategically. | Younger students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergarteners may decide that it might be advantageous to use linking cubes to represent two quantities and then compare the two representations side by side. |
| **K.MP.6** Attend to precision. | As kindergarteners begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. |
| **K.MP.7** Look for and make use of structure. | Younger students begin to discern a pattern or structure. For instance, students recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. They also recognize that 3 + 2 = 5 and 2 + 3 = 5. |
| **K.MP.8** Look for and express regularity in repeated reasoning. | In the early grades, students notice repetitive actions in counting and computation, etc. For example, they may notice that the next number in a counting sequence is one more. When counting by tens, the next number in the sequence is "ten more" (or one more group of ten). In addition, students continually check their work by asking themselves, "Does this make sense?" |

## Counting and Cardinality (CC)

### A. Know number names and the count sequence.

In this cluster, the terms students should learn to use with increasing precision are **Introduce written number words zero, one, two…ten (students are not responsible for being able to read these words, but they should be introduced); know digits and orally count to one hundred.**

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.CC.A.1** Count to 100 by ones and by tens. | **Component of Rigor:** Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.CC.A.2<br>Students engage in rote counting by starting at one and counting to 100. When counting by ones, students need to understand that the next number in the sequence is one more. When students count by tens they are only expected to master counting on the decade (0, 10, 20, 30, 40…). When counting by tens, students need to understand that the next number in the sequence is "ten more" (or one more group of ten). Counting in this standard is focused solely on rote counting and is not tied to recognition of numerals. Use of numerals requires that students have an understanding of the number of objects that the numeral represents so that comparisons can be made. Such understandings are developed in K.CC.A.3 and K.CC.B. |
| **K.CC.A.2** Count forward beginning from a given number within the known sequence (instead of having to begin at 1). | **Component of Rigor:** Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.CC.A.1<br>Students begin a rote forward counting sequence from a number other than 1. Thus, given the number 4, the student would count, "4, 5, 6, 7…" This strategy will be used in addition problems found in K.OA.A.3, K.OA.A.4, and later in Grade 1. This standard does not require recognition of numerals as it is focused on the rote number sequence 0 through 100. |

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| **K.CC.A.3** Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). | **Component of Rigor:** Conceptual Understanding, Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students write the numerals 0 through 20 and use the written numerals 0 through 20 to represent the amount within a set. For example, if the student has counted 9 objects, then the written numeral "9" is recorded. Students can record the quantity of a set by selecting a number card/tile (numeral recognition) or writing the numeral. Students can also create a set of objects based on the numeral presented. For example, if a student picks up the number card "13," the student then creates a pile of 13 counters. While children may experiment with writing numbers beyond 20, this standard places emphasis on numbers 0 through 20.<br><br>Due to varied development of fine motor and visual development, reversal of numerals is anticipated. While reversals should be pointed out to students and correct formation modeled in instruction, the emphasis of this standard is on the use of numerals to represent quantities rather than the correct handwriting formation of the actual numeral itself. |

## Counting and Cardinality (CC)

### B. Count to tell the number of objects.

In this cluster, the terms students should learn to use with increasing precision are **number words (zero - one hundred), how many,** and **count on**.

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.CC.B.4** Understand the relationship between numbers and quantities; connect counting to cardinality.<br><br>**a**. When counting objects in standard order, say the number names as they relate to each object in the group, demonstrating one-to-one correspondence.<br><br>b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.<br><br>c. Understand that each successive number name refers to a quantity that is one larger. | **Component of Rigor:** Conceptual Understanding (4, 4a, 4b, 4c)<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.CC.A.1, K.CC.A.2, K.CC.C.6<br><br>This standard is tightly linked to K.CC.B.5. Students count a set of objects and see sets and numerals in relationship to one another. These connections are higher-level skills that require students to analyze, reason about, and explain relationships between numbers and sets of objects. The expectation is that students are comfortable with these skills with the numbers 1 through 20 by the end of kindergarten.<br><br>Students implement correct counting procedures by pointing to one object at a time (one-to-one correspondence), using one counting word for every object (synchrony/ one-to-one tagging), while keeping track of objects that have and have not been counted. This is the foundation of counting.<br><br>Students answer the question "How many are there?" by counting objects in a set and understanding that the last number stated when counting a set (…8, 9, **10**) represents the total amount of objects: "There are **10** bears in this pile" (cardinality). Since an important goal for children is to count with meaning, it is important to have children answer the question "How many do you have?" after they count. Often times, children who have not developed cardinality will count the amount again, not realizing that the **10** they stated means 10 objects in all.<br><br>Young children believe what they see. Therefore, they may believe that a pile of cubes that they counted may be more if spread apart in a line. As children move toward the developmental milestone of conservation of number, they develop the understanding that the number of objects does not change when the objects are moved, rearranged, or hidden. Children need many different experiences with counting objects, as well as maturation, before they can reach this developmental milestone.<br><br>Another important milestone in counting is inclusion (also known as hierarchal inclusion). Inclusion is based on the understanding that numbers build by exactly one each time and that they nest within each other by this amount. For example, a set of three objects is nested within a set of 4 objects; within this same set of 4 objects is also a set of two objects and a set of one. Using this understanding, if a student has four objects and wants to have 5 objects, the student is able to add one more, knowing that four is within, or a subpart of, 5 (rather than removing all 4 objects and starting over to make a new set of 5). This concept is critical for the later development of part-whole relationships. |

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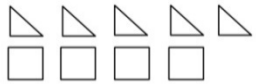
| **K.CC.B.5** Count to answer "How many?" questions.<br>a. Count objects up to 20, arranged in a line, a rectangular array, or a circle.<br>b. Count objects up to 10 in a scattered configuration.<br>c. When given a number from 1-20, count out that many objects. | **Component of Rigor:** Conceptual Understanding (5), Procedural Skill and Fluency (5, 5a, 5b,5c)<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.CC.C.6<br><br>In order to answer "how many?" students need to keep track of objects when counting. Keeping track is a method of counting that is used to count each item once and only once when determining how many. After numerous experiences with counting objects, along with the developmental understanding that a group of objects counted multiple times will remain the same amount, students recognize the need for keeping track in order to accurately determine "how many." Depending on the amount of objects to be counted, and the students' confidence with counting a set of objects, students may move the objects as they count each, point to each object as counted, look without touching when counting, or use a combination of these strategies. It is important that children develop a strategy that makes sense to them based on the realization that keeping track is important in order to get an accurate count, as opposed to following a rule such as "Line them all up before you count," in order to get the right answer.<br><br>As children learn to count accurately, they may count a set correctly one time, but not another. Other times they may be able to keep track up to a certain amount, but then lose track from then on. Some arrangements, such as a line or rectangular array, are easier for them to get the correct answer but may limit their flexibility with developing meaningful tracking strategies, so providing multiple arrangements helps children learn how to keep track. Since scattered arrangements are the most challenging for students, this standard specifies that students only count up to 10 objects in a scattered arrangement and count up to 20 objects in a line, rectangular array, or circle.<br><br>After counting a set of 8 objects, students answer the question "How many would there be if we added one more object?" and answer a similar question when not using objects, by asking hypothetically, "What if we have 5 cubes and added one more? How many cubes would there be then?"<br><br>To help student practice using correct terms for money, the objects counted may be coins of the same type. When providing the count, students should use the correct name for the coins (e.g., pennies, nickels). |

## Counting and Cardinality (CC)

### C. Compare numbers.

In this cluster, the terms students should learn to use with increasing precision are **greater, more, less, fewer, equal, same amount,** and **compare**.

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.CC.C.6** Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.*<br><br>*Include groups with up to ten objects. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.CC.C.5<br><br>Students use their counting ability to compare sets of objects (0 through 10). They may use matching strategies (Student 1), counting strategies (Student 2), or equal shares (Student 3) to determine whether one group is greater than, less than, or equal to the number of objects in another group.<br><br>**Student 1**<br>I lined up one square and one triangle. Since there is one extra triangle, there are more triangles than squares.<br>  <br><br>**Student 2**<br>I counted the squares and I got 4. Then I counted the triangles and got 5. Since 5 is bigger than 4, there are more triangles than squares.<br><br>**Student 3**<br>I put them in a pile. I then took away objects. Every time I took a square, I also took a triangle. When I had taken almost all of the shapes away, there was still a triangle left. That means that there are more triangles than squares. |
| **K.CC.C.7** Compare two numbers between 1 and 10 presented as written numerals. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.CC.C.6<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students apply their understanding of numerals 1 through 10 to compare one numeral from another. Thus, looking at the numerals 8 and 10, a student is able to recognize that the numeral 10 represents a larger amount than the numeral 8. Students need ample experiences with actual sets of objects (K.CC.3 and K.CC.6) before completing this standard with only numerals. |

## Operations and Algebraic Thinking (OA)

### A. Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

In this cluster, the terms students should learn to use with increasing precision are **join, add, putting together, taking apart, taking from, separate, subtract, and, same amount as, equal, less, more, total,** and **count on**.

**Notes on vocabulary:**

1. While some standards use the term "sum," the term "total" is used in the student examples. "Sum" sounds the same as "some," but has the opposite meaning. "Some" is used to describe problem situations with one or both addends unknown, so it is better in the earlier grades to use "total" rather than "sum." Formal vocabulary for subtraction ("minuend" and "subtrahend") is not needed for kindergarten, grade 1, and grade 2, and may inhibit students seeing and discussing relationships between addition and subtraction. At these grades, the recommendation is to use the terms "total" and "addend" as they are sufficient for classroom discussion.
2. Subtraction names a missing part. Therefore, the minus sign should be read as "minus" or "subtract" but not as "take away." Although "take away" has been a typical way to define subtraction, it is a narrow and incorrect definition. (*Fosnot & Dolk, 2001; Van de Walle & Lovin, 2006)

| The Louisiana Standard | Explanations and Examples |
|---|---|
| **K.OA.A.1** Represent addition and subtraction with objects, fingers, mental images, drawings*, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.<br><br>*Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.) | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students demonstrate the understanding of how objects can be joined (addition) and separated (subtraction) by representing addition and subtraction situations in various ways. This objective is focused on understanding the concept of addition and subtraction, rather than reading and solving addition and subtraction number sentences (equations).<br><br>The Grade Level Overview in the Louisiana Student Standards states, "Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required." Please note that it is not until first grade when "Understand the meaning of the equal sign" is an expectation (1.OA.D.7).<br><br>Therefore, before being introduced to symbols (+, -, =) and equations, kindergarteners require numerous experiences using joining (addition) and separating (subtraction) vocabulary in order to attach meaning to the various symbols. For example, when explaining a solution, kindergarteners may state, "Three *and* two *is the same amount as* 5." While the meaning of the equal sign is not introduced as a standard until first grade, if equations are going to be modeled and used in kindergarten, students must connect the symbol (=) with its meaning (is the same amount/quantity as). |

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| **K.OA.A.2** Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. | **Component of Rigor:** Procedural Skill and Fluency, Application<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.OA.A.1<br>**Kindergarten Standard Taught Concurrently:** none<br>Kindergarten students solve four types of problems within 10: *Result Unknown/Add To; Result Unknown/Take From; Total Unknown/Put Together-Take Apart; and Both Addends Unknown/Put Together-Take Apart*. (See **Table 1** at end of document for examples of all problem types.) Kindergarteners use counting to solve the four problem types by acting out the situation and/or with objects, fingers, and drawings.<br><br>**Example:** Nine grapes were in the bowl. I ate 3 grapes. How many grapes are in the bowl now?<br><br>**(Possible solution) Student:** I got 9 "grapes" and put them in my bowl. Then, I took 3 grapes out of the bowl. I counted the grapes still left in the bowl… 1, 2, 3, 4, 5, 6. Six. There are 6 grapes in the bowl. |
| **K.OA.A.3** Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.OA.A.2<br>**Kindergarten Standard Taught Concurrently:** none<br>Students develop an understanding of part-whole relationships as they recognize that a set of objects (5) can be broken into smaller subsets (3 and 2) and still remain the total amount (5). In addition, this objective asks students to realize that a set of objects (5) can be broken in multiple ways (3 and 2; 4 and 1). Thus, when breaking apart a set (decomposing), students use the understanding that a smaller set of objects exists within that larger set (inclusion).<br><br>**Example:**<br>(Provide students with 5 buttons and four copies of a page on which two bears, labeled as Bear 1 and Bear 2, have been drawn.)<br>Tell students that Bobby has 5 buttons that he wants to sew on 2 stuffed bears. Ask students to draw pictures to show how many ways Bobby can sew the 5 buttons on the two bears.<br>*Solution:* Students draw pictures of bears showing the combinations of buttons as 4 and 1, 1 and 4, 2 and 3, and 3 and 2.<br><br>In kindergarten, students need ample experiences breaking apart numbers and using the vocabulary "and" and "same amount as" before symbols (+, =) and equations (5 = 3 + 2) are introduced. **If equations are used, mathematical representations (picture, objects) need to be present as well.** |

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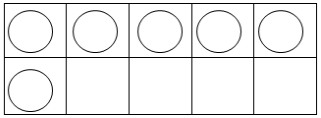
| **K.OA.A.4** For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.OA.A.3<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students build upon the understanding that a number (less than or equal to 10) can be decomposed into parts (K.OA.A.3) to find a missing part of 10. Through numerous concrete experiences, kindergarteners model the various subparts of ten and find the missing part of 10.<br><br>**Example:**<br>When working with 2-color beans, a student determines that 4 more beans are needed to make a total of 10.<br>  "I have 6 beans. I need 4 more beans to have 10 in all."<br><br>In addition, kindergarteners use various materials to solve tasks that involve decomposing and composing 10.<br><br>**Example:**<br>A full case of juice boxes has 10 boxes. There are only 6 boxes in this case. How many juice boxes are missing?<br><br>**Student A:**<br>*Using a Ten-Frame*<br>"I used a ten frame for the case. Then, I put on 6 counters for juice still in the case. There's no juice in these 4 spaces. So, 4 are missing."<br>  <br><br>**Student B:**<br>*Think Addition*<br>"I counted out 10 counters because I knew there needed to be ten. I pushed these 6 over here because they were in the container. These are left over. So there's 4 missing."<br>  <br><br>**Student C:**<br>*Fluently add/subtract*<br>"I know that it's 4 because 6 and 4 is the same amount as 10." |

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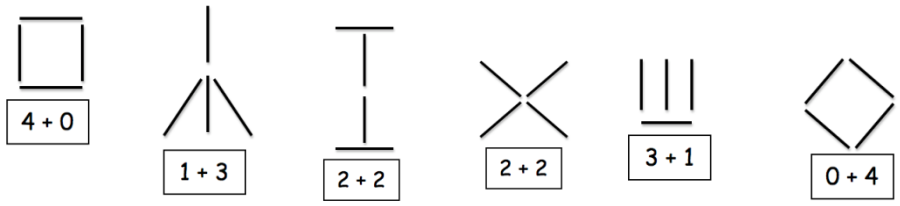
| **K.OA.A.5** Fluently add and subtract within 5. | **Component of Rigor:** Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.OA.A.3<br>**Kindergarten Standard Taught Concurrently:** none |

Students are fluent when they display accuracy (correct answer), efficiency (a reasonable amount of steps in about 3 to 5 seconds* without resorting to counting), and flexibility (using various strategies).

Students develop fluency by understanding and internalizing the relationships that exist between and among numbers. Oftentimes, when children think of each "fact" as an individual item that does not relate to any other "fact," they are attempting to memorize separate bits of information that can be easily forgotten. Instead, in order to fluently add and subtract, children must first be able to see subparts within a number (inclusion, K.CC.B.4c).

Once they have reached this milestone, children need repeated experiences with many different types of concrete materials (such as cubes, chips, and buttons) over an extended amount of time in order to recognize that there are only particular subparts for each number. Therefore, children will realize that if 3 and 2 is a combination of 5, then 3 and 2 cannot be a combination of 6.

**For example,** after making various arrangements with toothpicks, students learn that only a certain number of subparts exist within the number 4:




Then, after numerous opportunities to explore, represent and discuss "4," a student becomes able to fluently answer problems, such as "One bird was on the tree. Three more birds came. How many are on the tree now?" and "There was one bird on the tree. Some more came. There are now 4 birds on the tree. How many birds came?"

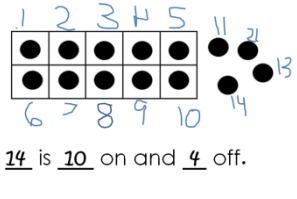
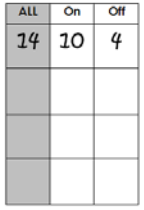
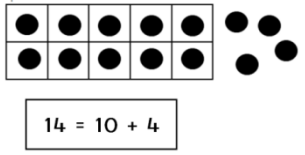
Traditional flash cards or timed tests have not been proven as effective instructional strategies for developing fluency.** Rather, numerous experiences with breaking apart actual sets of objects and developing relationships between numbers help children internalize parts of number and develop efficient strategies for fact retrieval.

* Van de Walle & Lovin (2006). Teaching student centered mathematics K–3 (p.94). Boston: Pearson.
**Burns (2000) *About Teaching Mathematics*; Fosnot & Dolk (2001) *Young Mathematicians at Work;* Richardson (2002) *Assessing Math Concepts*; Van de Walle & Lovin (2006) *Teaching Student-Centered Mathematics*

## Number and Operations in Base Ten (NBT)

### A. Work with numbers 11–19 to gain foundations for place value.

In this cluster, the terms students should learn to use with increasing precision are **number words** (**one, two… thirteen, fourteen, … nineteen**), **leftovers,** and **ones**.

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.NBT.A.1** Gain understanding of place value.<br>a. Understand that the numbers 11–19 are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.<br>b. Compose and decompose numbers 11 to 19 using place value (e.g., by using objects or drawings).<br>c. Record each composition or decomposition using a drawing or equation (e.g., 18 is one ten and eight ones, 18 = 1 ten + 8 ones, 18 = 10 + 8*).<br><br>* Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required. | **Component of Rigor:** Conceptual Understanding (1, 1a, 1b, 1c), Procedural Skill and Fluency (1c)<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.OA.A.3<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students explore numbers 11 through 19 using representations, such as manipulatives or drawings. Keeping each count as a single unit, kindergarteners use 10 objects to represent "10" rather than creating a unit called a ten (unitizing) as indicated in the first-grade standard 1.NBT.A.1: 10 can be thought of as a bundle of ten ones—called a "ten."<br><br>**Example:**<br>**Teacher**: "I have some chips here. Do you think they will fit on our ten frame? Why? Why Not?"<br>**Students**: Share thoughts with one another.<br>**Teacher**: "Use your ten frame to investigate."<br>**Students**: "Look. There's too many to fit on the ten frame. Only ten chips will fit on it."<br>**Teacher**: "So you have some leftovers?"<br>**Students**: "Yes. I'll put them over here next to the ten frame."<br>**Teacher**: "So, how many do you have in all?"<br>**Student A**: "One, two, three, four, five… ten, eleven, twelve, thirteen, fourteen. I have fourteen. Ten fit on and four didn't."<br>**Student B**: Pointing to the ten frame, "See them- that's 10… 11, 12, 13, 14. There's fourteen."<br>**Teacher**: Use your recording sheet (or number sentence cards) to show what you found.<br><br>**Student Recording Sheets Example:**<br>  <br><br>  <br><br>  <br> |

## Measurement and Data (MD)

### A. Describe and compare measurable attributes.

In this cluster, the terms students should learn to use with increasing precision are **length, weight, heavy(ier), light(er), long(er), big(ger), small(er), more of, less of, longer, taller, shorter,** and **compare**.

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.MD.A.1** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students describe measurable attributes of objects, such as length, weight, and size. For example, a student may describe a shoe with one attribute ("My shoe is heavy!") or more than one attribute ("This shoe is heavy! It's also really long.").<br><br>Students often initially hold undifferentiated views of measurable attributes, saying that one object is "bigger" than another whether it is longer, or greater in area, or greater in volume, and so forth. For example, two students might both claim that their block building is "the biggest" when one building may be taller (have a greater length) and another may have a larger base (be greater in area). Through dialog and discussions, students can learn to discriminate and name the measureable attributes of the objects being compared. As they discuss these situations and compare objects using different attributes, they learn to distinguish, label, and describe several measureable attributes of a single object. Thus, teachers listen for and extend conversations about things that are "big," or "small," as well as "long," "tall," or "high," and name, discuss, and demonstrate with gestures the attribute being discussed. |
| **K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.* | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.MD.A.1<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Direct comparisons are made when objects are put next to each other, such as two children, two books, two pencils. For example, a student may line up two blocks and say, "The blue block is a lot longer than the white one." Students are not comparing objects that cannot be moved and lined up next to each other.<br>  <br>Similar to the development of the understanding that keeping track is important to obtain an accurate count, kindergarten students need ample experiences with comparing objects in order to discover the importance of lining up the ends of objects in order to have an accurate measurement. |

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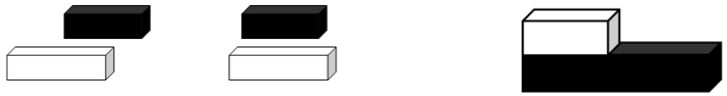
| **K.MD.A.2** *continued* | As this concept develops, children move from the idea that "Sometimes this block is longer than this one and sometimes it's shorter (depending on how I lay them side by side) and that's okay" to the understanding that "This block is always longer than this block (with each end lined up appropriately)." Since this understanding requires conservation of length, a developmental milestone for young children, kindergarteners need multiple experiences measuring a variety of items and discussing findings with one another.<br>  <br>"Sometimes this block is longer and sometimes it's shorter." "The dark block is always longer than this block"<br>As students develop conservation of length, learning and using language such as "It looks longer, but it really isn't longer" is helpful. |

## Measurement and Data (MD)

### B. Classify objects and count the number of objects in each category.

In this cluster, the terms students should learn to use with increasing precision **are color words** (e.g., **blue, green, red,** etc.), descriptive words (e.g., **small, big, rough, smooth, bumpy, round, flat,** etc.), **more, less, same amount, compare, sort,** and **category**.

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.MD.B.3** Classify objects into given categories based on their attributes; count the numbers of objects in each category and sort the categories by count. *(Limit category counts to be less than or equal to 10)* | **Component of Rigor:** Conceptual Understanding, Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.CC.C.6, K.MD.A.2<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students identify similarities and differences between objects (e.g., size, color, shape) and use the identified attributes to sort a collection of objects. Once the objects are sorted, the student counts the amount in each set. Once each set is counted, then the student is asked to sort (or group) each of the sets by the amount in each set. Thus, like amounts are grouped together, but not necessarily ordered.<br><br>**For example, when exploring a collection of buttons the following may occur:**<br>First, the student separates the buttons into different piles based on color (all the blue buttons are in one pile, all the orange buttons are in a different pile, etc.).<br>Then the student counts the number of buttons in each pile: blue (5), green (4), orange (3), purple (4).<br>Finally, the student organizes the groups by the quantity. “I put the purple buttons next to the green buttons because purple also had (4). Blue has 5 and orange has 3. There aren’t any other colors that have 5 or 3. So they are sitting by themselves.”<br><br>This objective helps to build a foundation for data collection in future grades as they create and analyze various graphical representations. |

| Measurement and Data (MD)<br>**C. Work with money.** | |
|---|---|
| In this cluster, the terms students should learn to use with increasing precision are **penny, pennies, nickel, nickels, dime, dimes, quarter, quarters, value,** and **cent**. | |
| **Louisiana Standard** | **Explanations and Examples** |
| **K.MD.C.4** Recognize pennies, nickels, dimes, and quarters by name and value (e.g., This is a nickel and it is worth 5 cents.) | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Given one or a group of one of the indicated coins, students state the name of the coin and its value.<br><br>Given a group of up to 10 coins of mixed type, students separate coins by type and write a numeral to indicate the number of each type of coin.<br><br>To reinforce terminology, students might solve word problems involving no more than 10 coins of the same type, using real coins (or images of real coins) to represent the problem.<br><br>**Example:**<br>• Joe had 6 pennies. He uses 2 pennies to buy gum. How many pennies does Joe have now? |

## Geometry (G)

### A. Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

In this cluster, the terms students should learn to use with increasing precision are **squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, spheres, flat, solid, side, corner, edge, face**, and positional vocabulary (e.g., **above, below, beside, in front of, behind, next to, same, different,** etc.).

| Louisiana Standard | Explanations and Examples |
|---|---|
| **K.G.A.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** K.G.A.2<br><br>Students locate and identify shapes in their environment. For example, a student may look at the tile pattern arrangement on the hall floor and say, "Look! I see squares! They are next to the triangle." At first, students may use informal names (e.g., balls, boxes, cans). Eventually students refine their informal language by learning mathematical concepts and vocabulary and identify, compare, and sort shapes based on geometric attributes.<br><br>Students also use positional words (such as those italicized in the standard) to describe objects in the environment, developing their spatial reasoning competencies. Kindergarten students need numerous experiences identifying the location and position of actual two- and three-dimensional objects in their classroom/school prior to describing location and position of two- and three-dimension representations on paper. |
| **K.G.A.2** Correctly name shapes regardless of their orientations or overall size. | **Component of Rigor:** Conceptual Understanding, Procedural Skill and Fluency<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.G.A.3, K.G.B.4<br>**Kindergarten Standard Taught Concurrently:** K.G.A.1<br><br>Through numerous experiences exploring and discussing shapes, students begin to understand that certain attributes define what a shape is called (number of sides, number of corners, etc.) and that other attributes do not (color, size, orientation). As the teacher facilitates discussions about shapes ("Is it still a triangle if I turn it like this?"), children question what they "see" and begin to focus on the geometric attributes.<br><br>Kindergarten students typically do not yet recognize triangles that are turned upside down as triangles, since they don't "look like" triangles. Students need ample experiences manipulating shapes and looking at shapes with various typical and atypical orientations. Through these experiences, students will begin to move beyond what a shape "looks like" to identifying particular geometric attributes that define a shape. |

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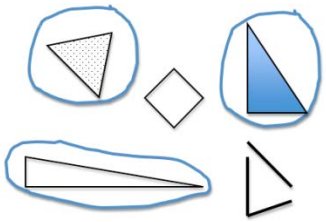
| **K.G.A.3** Identify shapes as two-dimensional (lying in a plane, "flat") or three dimensional ("solid"). | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.G.A.1, K.G.A.2<br>**Kindergarten Standard Taught Concurrently:** K.G.B.4<br>Students identify objects as flat (two-dimensional) or solid (three-dimensional). As the teacher embeds the vocabulary into students' exploration of various shapes, students use the terms two-dimensional and three-dimensional as they discuss the properties of various shapes. Note: A solid does not mean "filled in." A cube that is empty is still called a solid. |

## Geometry (G)

### B. Analyze, compare, create, and compose shapes.

In this cluster, the terms students should learn to use with increasing precision are **compare, compose, attributes, sides, vertices/corners, vertex, two-and three-dimensional, same,** and **different**.

| | |
|---|---|
| **K.G.B.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length). | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.G.A.1, K.G.A.2<br>**Kindergarten Standard Taught Concurrently:** K.G.A.3<br><br>Students relate one shape to another as they note similarities and differences between and among two-dimensional and three-dimensional shapes using informal language.<br><br>For example, when comparing a triangle and a square, they note that they both are closed figures, have straight sides, but the triangle has three sides while the square has four. Or, when building in the Block Center, they notice that the faces on the cube are all square shapes.<br><br>Kindergarteners also distinguish between the most typical examples of a shape from obvious non-examples.<br><br>**For example,** when identifying the triangles from a collection of shapes, a student circles all of the triangle examples from the non-examples.<br>  |

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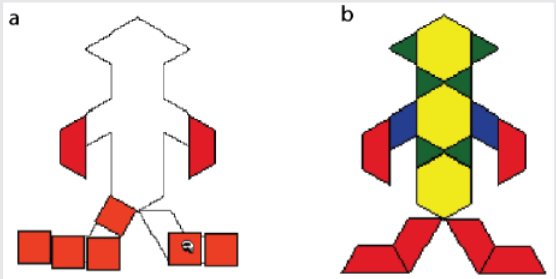
|---|---|
| **K.G.B.5** Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** none<br>**Kindergarten Standard Taught Concurrently:** none<br><br>Students apply their understanding of geometric attributes of shapes in order to create given shapes. For example, students may roll a clump of clay-like material into a sphere or use their finger to draw a triangle in the sand table, recalling various attributes in order to create that particular shape.<br><br>Because two-dimensional shapes are flat and three-dimensional shapes are solid, students may draw or build two-dimensional shapes and only build three-dimensional shapes. Shapes could be built using materials such as clay, toothpicks, marshmallows, gumdrops, straws, and pipe cleaners. Students should understand and identify two-dimensional shapes used to construct three-dimensional shapes. |
| **K.G.B.6** Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"* | **Component of Rigor:** Conceptual Understanding<br>**Remediation - Previous Grade(s) Standard:** none<br>**Kindergarten Standard Taught in Advance:** K.G.A.2<br>**Kindergarten Standard Taught Concurrently:** none<br><br>This standard moves beyond identifying and classifying simple shapes to manipulating two or more shapes to create a new shape. This concept begins to develop as students move, rotate, flip, and arrange puzzle pieces to complete a puzzle. Kindergarteners use their experiences with puzzles to use simple shapes to create different shapes.<br><br>**For example**, when using basic shapes to create a picture, a student flips and turns triangles to make a rectangular house.<br><br>Students also combine shapes to build pictures. They first use trial and error (part a) and gradually consider components (part b).<br><br>Combining shapes to build pictures<br>  |

Table 1. Common addition and subtraction situations.[1]

| | Result Unknown | Change Unknown | Start Unknown |
|---|---|---|---|
| **Add to** | Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?<br>2 + 3 = ? | Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?<br>2 + ? = 5 | Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?<br>? + 3 = 5 |
| **Take from** | Five apples were on the table. I ate two apples. How many apples are on the table now?<br>5 – 2 = ? | Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?<br>5 – ? = 3 | Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before?<br>? – 2 = 3 |
| | **Total Unknown** | **Addend Unknown** | **Both Addends Unknown[3]** |
| **Put Together / Take Apart[2]** | Three red apples and two green apples are on the table. How many apples are on the table?<br>3 + 2 = ? | Five apples are on the table. Three are red and the rest are green. How many apples are green?<br>3 + ? = 5, 5 – 3 = ? | Grandma has five flowers. How many can she put in her red vase and how many in her blue vase?<br>5 = 0 + 5, 5 = 5 + 0<br>5 = 1 + 4, 5 = 4 + 1<br>5 = 2 + 3, 5 = 3 + 2 |
| | **Difference Unknown** | **Bigger Unknown** | **Smaller Unknown** |
| **Compare[4]** | ("How many more?" version):<br>Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?<br><br>("How many fewer?" version):<br>Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?<br>2 + ? = 5, 5 – 2 = ? | (Version with "more"):<br>Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?<br><br>(Version with "fewer"):<br>Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have?<br>2 + 3 = ?, 3 + 2 = ? | (Version with "more"):<br>Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?<br><br>(Version with "fewer"):<br>Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have?<br>5 – 3 = ?, ? + 3 = 5 |

[1]Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).
[2]These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.
[3]Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.
[4]For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.