Grade 1: Unit 1.OA.A.1-2 Represent and Solve Problems involving Addition and Subtraction

Overview: *The overview statement is intended to provide a summary of major themes in this unit.*

In this unit, students apply and extend their understanding of addition and subtraction from their work in Kindergarten. They extend their understanding of addition as putting together and adding to and subtraction as taking apart, taking from, and comparing. In Kindergarten, students solved word problems within 10 using objects or drawings. They learned to decompose and compose numbers up to 10. Now students in Grade 1 will use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions. They will use objects, drawings, and equations with a symbol for the unknown number to represent the problem. They will also solve word problems that require the addition of three whole numbers whose sum is less than or equal to 20. They should use objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Teacher Notes: *The information in this component provides additional insights which will help the educator in the planning process for the unit.*

- Review the Progressions for Grades K-5 Counting and Cardinality; K-5 Operations and Algebraic Thinking at *http://commoncoretools.files.wordpress.com/2011/05/ccss_progression_cc_oa_k5_2011_05_302.pdf* to see the development of the understanding of addition and subtraction as stated by the Common Core Standards Writing Team, which is also the guiding information for the PARCC Assessment development.
- When implementing this unit, be sure to incorporate the Enduring Understandings and Essential Questions as a foundation for your instruction.
- See Table 1 on page 88 of the Common Core State Standards to see explanations and examples of the various addition and subtraction situations that students should experience during this unit at http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf, and page 7 of the Progressions for Grades K-5 Counting and Cardinality; K-5 Operations and Algebraic Thinking (see link above).
- It is vital that students have many varied experiences building number sentences (equations) through the use of concrete manipulatives. This incorporates the tactile, visual, and abstract experiences and assists in developing conceptual understanding.
- Continue to develop number sense by reinforcing early number relationships. These early number relationships include but are not limited to anchors to 5 and 10, part-part-total, one more/two more, one less/two less, and spatial relationships. Students should be able to decompose numbers and see 12 as $6 + 6$, $5 + 7$, $4 + 8$, etc.
- It is important for students to view number sentences (equations) in two ways throughout all instruction: $7 + 8 = 15$ and $15 = 7 + 8$. This helps to eliminate the misunderstanding that the answer <u>always</u> follows the equal sign.
- As students work with concrete materials to solve problems, they should begin to record their problem and then the solution in an equation. For example, if Ted caught 6 fish and Sally caught 5 fish, how many fish did they catch all together? A student might write one of these equations to represent the problem:
  - $5 + 6 = ?$
  - $6 + 5 = ?$
  - $? = 6 + 5$
  - $? = 5 + 6$

- When working with three addends, encourage the students to decide which two of the three are best to add together first, adding the remaining one last. For example, when adding 6 + 7 + 4, it is much easier to add the 6 and 4 first to get the benchmark number of 10 and then add the 7 to 10 to get 17. Choose problems carefully for students. For example, determine if you wish to focus on using doubling and halving, or on using landmark numbers. Specific types of problems typically elicit certain strategies.
- Focusing on 'Key Words' limits a child's ability to successfully solve problems since it locks them into one and only one approach, which is not necessarily the best for that problem, and possibly not even correct.
- Classroom discussions, "think-alouds", and recording students' ideas as they share them during group discussions are integral in developing algebraic thinking as well as building on students' computational skills. It is important to record a student's method for solving a problem both horizontally and vertically.

Enduring Understandings: *Enduring understandings go beyond discrete facts or skills. They focus on larger concepts, principles, or processes. They are transferable and apply to new situations within or beyond the subject.*

- Operations create relationships between numbers.
- The relationships among the operations and their properties promote computational fluency.
- Real world situations can be represented symbolically and graphically.
- There can be different strategies to solve a problem, but some are more effective and efficient than others.
- The context of a problem determines the reasonableness of a solution.
- The ability to solve problems is the heart of mathematics.
- The problem in front of you is a member of a larger class of problems.
- Computation involves taking apart and combining numbers using a variety of approaches.
- Flexible methods of computation involve grouping numbers in strategic ways.
- Proficiency with basic facts aids estimation and computation of larger and smaller numbers.

Essential Questions: *A question is essential when it stimulates multi-layered inquiry, provokes deep thought and lively discussion, requires students to consider alternatives and justify their reasoning, encourages re-thinking of big ideas, makes meaningful connections with prior learning, and provides students with opportunities to apply problem-solving skills to authentic situations.*

- Why do I need mathematical operations?
- How do mathematical operations relate to each other?
- How do I know which mathematical operation (+, -) to use?
- How do I decide which representation to use when solving problems (concrete manipulatives, pictures, words, or equations)?
- How do I know which computational method (mental math, estimation, paper and pencil, and calculator) to use?
- What is meant by equality in mathematics?
- How do I know where to begin when solving a problem?

- How does explaining my process help me to understand a problem's solution better?
- How do I decide which strategy will work best in a given problem situation?
- What do I do when I get stuck?
- How do I know when a result is reasonable?
- What is the relationship between solving problems and computation?
- Why is the ability to solve problems the heart of mathematics?
- What are efficient methods for finding sums and differences?
- What questions can be answered using addition and/or subtraction?

Content Emphasis by Cluster in Grade 1: *According to the Partnership for the Assessment of Readiness for College and Careers (PARCC), some clusters require greater emphasis than others. The table below shows PARCC's relative emphasis for each cluster. Prioritization does not imply neglect or exclusion of material. Clear priorities are intended to ensure that the relative importance of content is properly attended to. Note that the prioritization is in terms of cluster headings.*

Key:
- ■ *Major Clusters*
- ☐ *Supporting Clusters*
- ○ *Additional Clusters*

Operations and Algebraic Thinking

- ■ Represent and solve problems involving addition and subtraction.
- ■ Understand and apply properties of operations and the relationship between addition and subtraction.
- ■ Add and subtract within 20.
- ■ Work with addition and subtraction equations.

Number and Operations in Base Ten

- ■ Extend the counting sequence.
- ■ Understand place value.
- ■ Use place value understanding and properties of operations to add and subtract.

Measurement and Data

- ■ Measure lengths indirectly and by iterating length units.
- ○ Tell time and write time
- ☐ Represent and interpret data.

Geometry

- ○ Reason with shapes and their attributes.

Focus Standards: *(Listed as Examples of Opportunities for In-Depth Focus in the PARCC Content Framework documents for Grades 3-8):*
According to the Partnership for the Assessment of Readiness for College and Careers (PARCC), this component highlights some individual standards that play an important role in the content of this unit. Educators from the State of Maryland have identified the following Standards as Focus Standards. Should PARCC release this information for Prekindergarten through Grade 2, this section would be updated to align with their list. Educators may choose to give the indicated mathematics an especially in-depth treatment, as measured for example by the number of days; the quality of classroom activities for exploration and reasoning, the amount of student practice, and the rigor of expectations for depth of understanding or mastery of skills.

- **1.OA.A.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- **1.OA.A.2** Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Possible Student Outcomes: *The following list provides outcomes that describe the knowledge and skills that students should understand and be able to do when the unit is completed. The outcomes are often components of more broadly-worded standards and sometimes address knowledge and skills necessarily related to the standards. The lists of outcomes are not exhaustive, and the outcomes should not supplant the standards themselves. Rather, they are designed to help teachers delve deeply into the standards and augment as necessary, providing added focus and clarity for lesson planning purposes. This list is not intended to imply any particular scope or sequence.*

The student will:
- Quickly solve $b + a = c$, if they know $a + b = c$.
- Combine pairs of numbers that make 20 or less or easy combinations within a larger problem to arrive at the solution efficiently.
- Quickly solve $c - a = ?$ by making it a missing addend problem of $a + ? = c$.
- Explain how they solved the problem or identify the strategy used to solve the problem.
- Justify their solution by using concrete materials to model the problem and solution.
- Identify different ways to solve the same problem.
- Identify the most efficient strategy to use when solving a problem and explain why it was chosen.
- Become engaged in problem solving that is about thinking and reasoning.
- Collaborate with peers in an environment that encourages student interaction and conversation that will lead to mathematical discourse about addition and subtraction.

Grade 1: Unit 1.OA.A.1-2 Represent and Solve Problems involving Addition and Subtraction

Progressions from Common Core State Standards in Mathematics: *For an in-depth discussion of the overarching, "big picture" perspective on student learning of content related to this unit, see:*

The Common Core Standards Writing Team (29 May 2011). *Progressions for the Common Core State Standards in Mathematics (draft),* accessed at: http://commoncoretools.files.wordpress.com/2011/05/ccss_progression_cc_oa_k5_2011_05_302.pdf

Vertical Alignment: *Vertical curriculum alignment provides two pieces of information: (1) a description of prior learning that should support the learning of the concepts in this unit, and (2) a description of how the concepts studied in this unit will support the learning of additional mathematics.*

- **Key Advances from Previous Grades:** Students enlarge their concept of and capabilities with addition and subtraction by applying their understanding of the following:

  Students in Kindergarten:
  o Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
  o Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects, drawings, and mental math to represent the problem.
  o Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects, drawings, and mental math and then record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).
  o When given any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects, drawings, and mental math and then record the answer with a drawing or equation.
  o Fluently add and subtract within 5. (Students in Kindergarten work with addition and subtraction to 10 but must be fluent up to 5.)

- **Additional Mathematics:** Students will use their knowledge of addition and subtraction to:

  Students in Grade 2:
  o Add and subtract within 1000.
  o Fluently add and subtract within 100.
  o Add up to four two-digit numbers.
  o Explain why addition and subtraction strategies work.

Students in Grade 3:
o   Lay the foundation for the properties of multiplication and division (Commutative, Associative, and Distributive).
o   Lay the foundation for the understanding that division can be thought of as the unknown-factor problem.
o   Use the four operations with whole numbers to solve problems, gain familiarity with factors and multiples, and to generate and analyze patterns.
o   W rite and interpret numerical expressions and analyze patterns and relationships.

Possible Organization of Unit Standards: *This table identifies additional grade-level standards within a given cluster that support the over-arching unit standards from within the same cluster. The table also provides instructional connections to grade-level standards from outside the cluster.*

Over-Arching Standards	Supporting Standards within the Cluster	Instructional Connections outside the Cluster
1.OA.A.1: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.		**1.OA.B.3:** Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known (Commutative property of addition). To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 which equals 12 (Associative property of addition).* **1.OA.B.4:** Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.* **I.OA.C.5:** Relate counting to addition and subtraction (e.g. by **counting on** 2 to add 2). **1.OA.C.6:** Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as **counting on**, making ten (e.g., 8 + 6 =

		8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 − 4 = 13 − 3 − 1 = 10 − 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 − 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the know equivalent 6 + 6 + 1 = 12 + 1 = 13). **1.OA.D.7:** Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 − 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.* **1.OA.D.8:** Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = ? − 3, 6 + 6 = ?.*
1.OA.A.2: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.		

Connections to the Standards for Mathematical Practice: *This section provides examples of learning experiences for this unit that support the development of the proficiencies described in the Standards for Mathematical Practice. These proficiencies correspond to those developed through the Literacy Standards. The statements provided offer a few examples of connections between the Standards for Mathematical Practice and the Content Standards of this unit. The list is not exhaustive and will hopefully prompt further reflection and discussion.*

In this unit, educators should consider implementing learning experiences which provide opportunities for students to:

1. **Make sense of problems and persevere in solving them.**
    a. Determine what the problem is asking for: the unknown result/total, missing addend, or unknown start of the problem.
    b. Determine whether concrete or virtual models, pictures, mental mathematics, or equations are the best tools for solving the problem.
    c. Determine if more information is needed. Identify information not needed.
    d. Check the solution with the problem to verify that it does answer the question asked.

2. **Reason abstractly and quantitatively**
    a. Use manipulatives or drawings to show the relationship of the numbers within the problem and identify the unknown.
    b. Identify relationships between the numbers in the problem that will help to find the solution (e.g., combinations that make ten).
    c. Use the relationship between addition and subtraction to solve problems.

3. **Construct Viable Arguments and critique the reasoning of others.**
    a. Compare the equations or models used by others with yours.
    b. Examine the steps taken that produce an incorrect response and provide a viable argument as to why the process produced an incorrect response.

4. **Model with Mathematics**
    a. Construct visual models using concrete or virtual manipulatives, pictures, or equations to justify thinking and display the solution.

5. **Use appropriate tools strategically**
    a. Use base ten materials, snap cubes, counters, hundred charts, or other models, as appropriate.
    b. Use drawings and/or pictures to represent the problem.

6. **Attend to precision**
    a. Use mathematics vocabulary such as addend, difference, digit, equation, etc. properly when discussing problems.
    b. Demonstrate their understanding of the mathematical processes required to solve a problem by carefully showing all of the steps in the solving process.
    c. Correctly write and read equations.

    d. Use +, -, and = appropriately to record equations.

7. **Look for and make use of structure.**
    a. Make observations about the relative size of numbers or sets of objects.
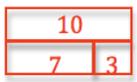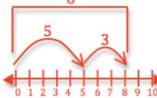   b. Make use of the Part-Part-Total mat, as appropriate in solving problems.
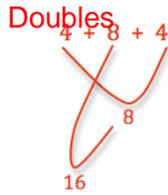
8. **Look for and express regularity in reasoning**
    a. Use models to demonstrate various combinations to make 20 or another specific number.
    b. Use models to demonstrate the composition and decomposition of numbers.

Content Standards with Essential Skills and Knowledge Statements and Clarifications: *The Content Standards and Essential Skills and Knowledge statements shown in this section come directly from the Maryland State Common Core Curriculum Frameworks. Clarifications were added as needed. Educators should be cautioned against perceiving this as a checklist. All information added is intended to help the reader gain a better understanding of the standards.*

Standard	Essential Skills and Knowledge	Clarification

1.OA.A.1: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	• **Ability to represent the problem in multiple ways including drawings and or objects/manipulatives (e.g., counters, connecting cubes, base ten materials, number lines)**
	• **Ability to take apart and combine numbers in a wide variety of ways**
	• **Ability to make sense of quantity and be able to compare numbers**
	• **Ability to use flexible thinking strategies to develop the understanding of the traditional algorithms and their processes**
	• **Ability to solve a variety of addition and subtraction word problems (CCSS, Page 88, Table 1)**
		1.OA.A.1 - Teachers should pose a variety of word problems to students:
		  ○ **Join Problems Include:**
		    • **Start Unknown** $\square + 6 = 11$
		    • **Change unknown** $5 + \square = 11$
		    • **Result/Whole Unknown** $5 + 6 = \square$
		  ○ **Separate Problems Include:**
		    • **Start Unknown** $\square - 5 = 4$
		    • **Change unknown** $9 - \square = 11$
		    • **Result/Whole Unknown** $9 - 5 = \square$
		  ○ **Part-Part-Whole Problems Include:**
		    • **Part Unknown**
		      10
		      △
		      $\square$ 6
		    • **Part Unknown**
		      10
		      △
		      4 $\square$

	• **Ability to use ☐ or ? to represent an unknown in an equation**	• **Whole Unknown** ☐ ╱ ╲ 4 6 ○ **Students should be able represent the problem in multiple ways including drawings and or objects/manipulatives (counters, connecting cubes, number lines, etc…):** ○ **Examples of various types of addition and subtraction problem types can be found in Table 2, on Page 88 in the Common Core at http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf**
1.OA.A.2: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	○ **Ability to add numbers in any order and be able to identify the most efficient way to solve the problem** • **Ability to solve a variety of addition and subtraction word problems (CCSS, Page 88, Table 1)**	**1.OA.A.2 - Students should realize they can add numbers in any order and be able to identify the most efficient way to solve the problem:**

Evidence of Student Learning: *The Partnership for the Assessment of Readiness for College and Careers (PARCC) has awarded the Dana Center a grant to develop the information for this component. This information will be provided at a later date. The Dana Center, located at the University of Texas in Austin, encourages high academic standards in mathematics by working in partnership with local, state, and national education entities. Educators at the Center collaborate with their partners to help school systems nurture students' intellectual passions. The Center advocates for every student leaving school prepared for success in postsecondary education and in the contemporary workplace.*

Fluency Expectations and Examples of Culminating Standards: *This section highlights individual standards that set expectations for fluency, or that otherwise represent culminating masteries. These standards highlight the need to provide sufficient supports and opportunities for practice to help students meet these expectations. Fluency is not meant to come at the expense of understanding, but is an outcome of a progression of learning and sufficient thoughtful practice. It is important to provide the conceptual building blocks that develop understanding in tandem with skill along the way to fluency; the roots of this conceptual understanding often extend one or more grades earlier in the standards than the grade when fluency is finally expected.*

- Fluently add and subtract within 10.

Common Misconceptions: *This list includes general misunderstandings and issues that frequently hinder student mastery of concepts regarding the content of this unit.*

- Student misunderstands what is asked for in the problem. Example: Problem: "Shawn has 7 pencils and Tiara has 4. How many more pencils does Shawn have?" The student responds "7' because Shawn has 7 which is more than 4. The student misses the fact that they were asked to determine how many more pencils Shawn has.
- Students rely on "**Key Words**" which do not always lead to a correct solution. For example: Kendra took the 8 stickers she no longer wanted and gave them to Juan. Now Kendra has 9 stickers *left*. How many stickers did Kendra have to begin with? In this problem the key word **'left'** indicates subtraction, but in fact, the student needs to add 8 + 9 to find the correct solution of 17.
- In the equation 5 + 2 = 7, students tend to think that 5 + 2 is the problem and the equal sign means "the answer is next." However, in an equation such as 5 + 2 = 7, it should be thought of as 5 + 2 is the same as 7.
- Adding when subtraction is needed or subtracting when addition is needed. Example: 17 – 3 = 20, when it should be 17 – 3 = 14.
- Always finding the total regardless of the question asked.

Interdisciplinary Connections: *Interdisciplinary connections fall into a number of related categories:*
- *Literacy standards within the Maryland Common Core State Curriculum*
- *Science, Technology, Engineering, and Mathematics standards*
- *Instructional connections to mathematics that will be established by local school systems, and will reflect their specific grade-level coursework in other content areas, such as English language arts, reading, science, social studies, world languages, physical education, and fine arts, among others.*

Available Model Lesson Plan(s)

The lesson plan(s) have been written with specific standards in mind. Each model lesson plan is only a MODEL – one way the lesson could be developed. We have NOT included any references to the timing associated with delivering this model. Each teacher will need to make decisions related to the timing of the lesson plan based on the learning needs of students in the class. The model lesson plans are designed to generate evidence of student understanding.

This chart indicates one or more lesson plans which have been developed for this unit. Lesson plans are being written and posted on the Curriculum Management System as they are completed. Please check back periodically for additional postings.

Standards Addressed	Title	Description/Suggested Use
1.OA.A.1	Use Addition & Subtraction within 20 to Solve Word Problems	Four activities that provide the opportunity for students to solve various types of addition and subtraction problems.

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Available Lesson Seeds		
The lesson seed(s) have been written with specific standards in mind. These suggested activity/activities are not intended to be prescriptive, exhaustive, or sequential; they simply demonstrate how specific content can be used to help students learn the skills described in the standards. Seeds are designed to give teachers ideas for developing their own activities in order to generate evidence of student understanding. This chart indicates one or more lesson seeds which have been developed for this unit. Lesson seeds are being written and posted on the Curriculum Management System as they are completed. Please check back periodically for additional postings.		
Standards Addressed	**Title**	**Description/Suggested Use**
1.OA.A.1-2	Combinations to 20	Students use double ten frames and counters to make combinations up to 20.
1.OA.A.1	Counters on a Double Ten Frame	Students use 'think addition' to solve a missing number subtraction problem.
1.OA.A.1-2	Visit to a Restaurant	Enrichment Lesson Seed with two activities
1.OA.A.2	Solve Addition Word Problems with Three Addends.	Students solve problems and visit centers that revolve around solving addition word problems with three addends.

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Sample Assessment Items: *The items included in this component will be aligned to the standards in the unit and will include:*
- *Items purchased from vendors*
- *PARCC prototype items*
- *PARCC public released items*
- *Maryland Public release items*
- *Formative Assessment*
- *Online Assessment/Tasks:*

Topic	Standards Addressed	Link	Notes
Problem Types for Addition & Subtraction	1.OA.A.1	http://illustrativemathematics.org/illustrations/160 http://illustrativemathematics.org/illustrations/161 http://illustrativemathematics.org/illustrations/195 http://illustrativemathematics.org/illustrations/194 http://illustrativemathematics.org/illustrations/162 http://illustrativemathematics.org/illustrations/197 http://illustrativemathematics.org/illustrations/2 http://illustrativemathematics.org/illustrations/163 http://illustrativemathematics.org/standards/k8	Each link listed takes you to a new assessment item for addition and subtraction. These tasks include different problem types as described in Table 1 on page 88 of the CCSSM. The Table offers a succinct overview of all addition and subtraction problem types. Please see the Illustrative Mathematics site at http://illustrativemathematics.org for a variety of tasks for use with your students
Addition Task with 3 Addends	1.OA.A.2	http://illustrativemathematics.org/illustrations/468	This is an open-ended task that which can be thought of as a sequel to K.OA.3, which asks students to consider all the decompositions of a number into two addends. We have incorporated this task into Lesson Seed 1.OA.A.1-2: Visit to a Restaurant.

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Interventions/Enrichments: *(Standard-specific modules that focus on student interventions/enrichments and on professional development for teachers will be included later, as available from the vendor(s) producing the modules.)*

Vocabulary/Terminology/Concepts: *This section of the Unit Plan is divided into two parts. Part I contains vocabulary and terminology from standards that comprise the cluster which is the focus of this unit plan. Part II contains vocabulary and terminology from standards outside of the focus cluster. These "outside standards" provide important instructional connections to the focus cluster.*

Part I – Focus Cluster:

inverse operations: two operations that undo each other. Addition and subtraction are inverse operations. Multiplication and division are inverse operations.   Examples: $4 + 5 = 9; 9 - 5 = 4$ $6 \times 5 = 30; 30 \div 5 = 6$

Counting All: the very first addition counting strategy in which a student counts all of the objects, pictures, or items in a problem to determine the total and solve the problem. This is the least efficient counting strategy to use and should lead to the more efficient Counting On strategies. Example: Bobby has two counters and Susie has three. How many do they have all together?



```
  ●   ●        ●   ●   ●
  1   2        3   4   5
```

Counting On: an addition counting strategy in which a student starts with one set of objects and counts up to solve the problem. Example: Bobby has two counters and Susie has three. How many do they have all together?
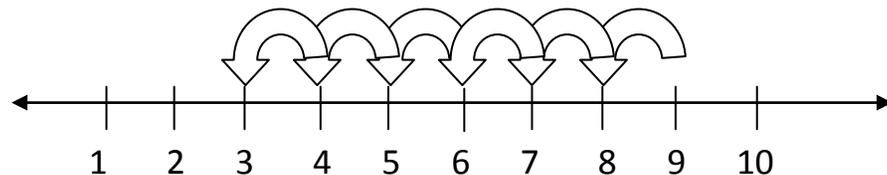


```
  ●   ●        ●   ●   ●
      2        3   4   5
```

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Counting On from the Larger Number: an addition counting strategy in which a student starts with the largest set of objects and counts up to solve the problem. Example: Bobby has two counters and Susie has three. How many do they have all together?

3   4   5

1   2   3   4   5   6   7   8   9   10
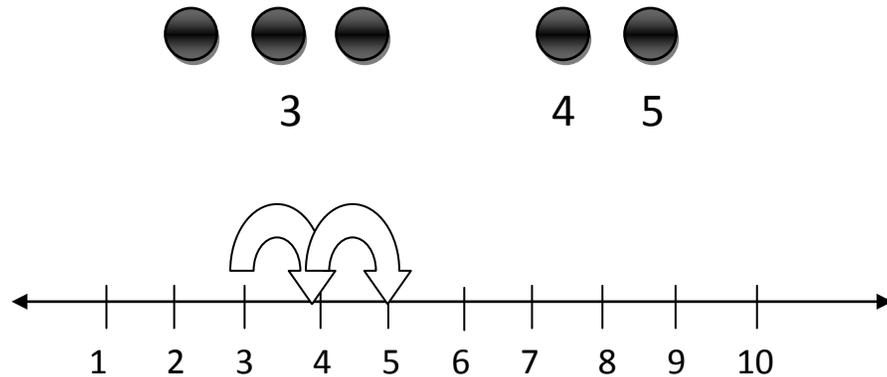
Counting Up: a subtraction counting strategy in which a student counts up from one part to the whole in order to find the missing part. Example: 9 − 6 = ? The student would count starting at 6, saying "7, 8, 9" determining that, by counting up three numbers, the missing part of the number sentence is '3'.

Counting Back: a subtraction counting strategy in which a student counts back from the total in order to find the missing part. Example: 9 − 6 = ? The student would count starting at 9, saying "8, 7, 6" determining that, by counting back three numbers, the missing part of the number sentence is '3'.
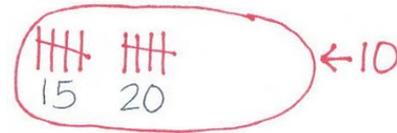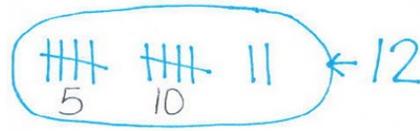
1   2   3   4   5   6   7   8   9   10

visual representations of numerals: concrete materials or pictures that represent specific numerals, showing the quantity represented by those numerals. Examples:
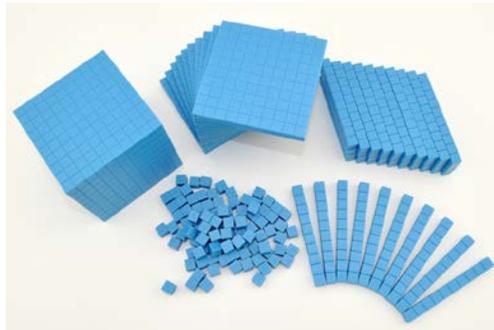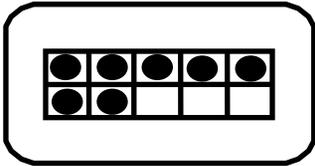
Part II – Instructional Connections outside the Focus Cluster

cardinality: is the understanding that when counting a set, the last number counted represents the total number of objects in the set.
Example:

This is a set of 3 stars.

Invented, flexible algorithms: algorithmic thinking that includes strategies such as the use of expanded form, partial sums, move some to make tens, using nicer numbers and compensating, etc. rather than relying on the standard algorithm.

Grade 1: Unit 1.OA.A.1-2 Represent and Solve Problems involving Addition and Subtraction

Resources:

Free Resources:

- http://wps.ablongman.com/ab_vandewalle_math_6/0,12312,3547876-,00.html Reproducible blackline masters
- http://lrt.ednet.ns.ca/PD/BLM_Ess11/table_of_contents.htm mathematics blackline masters
- http://yourtherapysource.com/freestuff.html Simple activities to encourage physical activity in the classroom
- http://www.mathsolutions.com/index.cfm?page=wp9&crid=56 Free lesson plan ideas for different grade levels
- http://digiblock.com/ Lesson plans for using Digi-Blocks
- http://sci.tamucc.edu/~eyoung/literature.html links to mathematics-related children's literature
- http://www.nctm.org/ National Council of Teachers of Mathematics
- www.k-5mathteachingresources.com Extensive collection of free resources, math games, and hands-on math activities aligned with the Common Core State Standards for Mathematics
- http://elementarymath.cmswiki.wikispaces.net/Standards+for+Mathematical+Practice Common Core Mathematical Practices in Spanish
- http://mathwire.com/ Mathematics games, activities, and resources for different grade levels
- http://www.pbs.org/teachers/math/ interactive online and offline lesson plans to engage students. Database is searchable by grade level and content
- http://www.k8accesscenter.org/training_resources/MathWebResources.asp valuable resource including a large annotated list of free web-based math tools and activities.
- http://www.cast.org/udl/index.html Universal Design for Learning
- http://engageny.org/wp-content/uploads/2012/05/Shifts-for-Students-and-Parents.pdf Information for parents and students about the Shifts associated with the CCSS.
- http://havefunteaching.com/ Various resources, including tools such as sets of Common Core Standards posters.
- http://michellef.essdack.org/links Numerous mathematics links.
- http://illustrativemathematics.org/ Tasks that align with the MD CCSS.
- http://www.aimsedu.org/Puzzle/categories/topological.html Puzzles to challenge students of various ages.
- http://www.insidemathematics.org/index.php/home Mathematics resources for teachers.
- http://www.fotosearch.com/photos-images/order-pad.html. A link to a host of pictures of restaurant items and workers
- http://www.fuelthebrain.com/Game/play.php?ID=1 – Interactive website with 'Ace of Numbers' game
- http://schools.nyc.gov/documents/teachandlearn/ss/census/Grade_1_GT_Curriculum_Edit_09_1_final.pdf Gifted and talented resource from NYC
- http://www.nctm.org/standards/mathcommoncore/ Math Common Core Coalition
- http://www.ccsstoolbox.org/. Common Core State Standards toolbox.
- http://www.parcconline.org/ PARCC Resources

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Math Related Literature:

- Afromsky, Ryan. I Have a Restaurant
  Notes: Readers are take on a tour of a restaurant by the owner, Ryan. Students learn learning everything that goes on in a restaurant, from the time the restaurant opens and gets ready to serve its customers, to taking a person s order and preparing it, to when the food arrives.

- Derubertis, Barbara. A Collection for Kate.
  Notes: Kate participates in Collection Week at school. The focus of this book is on addition: the meaning of addition; counting on to add; using doubles; fact families; mental math strategies; estimating sums; three and four addends; and regrouping.

- London, Jonathan. Froggy Eats Out.
  Notes: Froggy dines at a fancy restaurant with his parents, but has a difficult time behaving properly.

- Marsico, Katie. Good Manners in a Restaurant (Good Manners Matter!)
  Notes: Students learn which behaviors to use and which to avoid to make eating in a restaurant enjoyable for everyone.

- Moss, Marissa. *Mel's Diner*.
  Notes: The main character Mabel enjoys helping her father and mother run their diner.

- Murphy, Stuart J. Animals on Board
  Notes: Students can join in as trucker Jill and her dog add up the animals zooming by.

- Snyder, Laurel. Inside the Slidy Diner.
  Notes: The main character, Edie, helps readers avoid the wigglepedes and steer clear of the pumpkin asparagus pie with crunchy-bit topping (nobody knows what the crunchy bits are).

- Walters, Alice. L. Fanny at Chez Panisse: A Child's Restaurant Adventures with 46 Recipes.
  Notes: Chez Panisse is a restaurant in Berkeley, California, run by Alice Waters and her large group of friends. Her daughter Fanny's stories of this busy place are a friendly and funny introduction to the delights of real restaurant life in the words of a seven-year-old.

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