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

In this unit, students continue to expand their understanding of addition and subtraction from their work in Kindergarten and Grade 1. In Grade 1 students solved word problems within 20. They now extend that ability to use addition and subtraction within 100 to solve one- and two-step problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all position. This is the first time they will have dealt with two-step problems. As in Grade 1, they will use drawings and equations with a symbol for the unknown number to represent the problem. It is in second grade that students will be expected to master all types of problems as listed above, including the more difficult problem types introduced in Grade 1.

**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*](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 explanation and examples of the various addition and subtraction situations that students should experience during this unit.
* It is vital that students have many varied experiences building number sentences (equations) through the use of groupable concrete manipulatives, such as Digi-Blocks or snap cubes. This incorporates the tactile, visual, and abstract experiences and assists in developing conceptual understanding. It is important, however, that students use pictures and equations to represent the problems in this unit.
* 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, Terry made 24 cupcakes for the picnic. Sam made 42 cupcakes for the picnic. But Sam ate three of the cupcakes on the way to the picnic. How many cupcakes do they have to share at the picnic? A student might write one of these equations to represent the problem: 24 + 42 - 3 = ? or ? = 42 – 3 + 24.
* 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 always follows the equal sign.
* Students should become comfortable using a symbol to represent the unknown number in an equation.
* It is vital that students have a solid understanding of place value for numbers up to 100 so that they can compose and decompose them correctly by applying that understanding. For example, when adding 34 and 28, students will be able explain that 4 + 8 is greater than 10, so it will make one ten with 2 ones left over. Then that ten will be added to the three tens and two tens to make six tens, making the total 62. Another student might add the 3 tens and 2 tens to get 50 and then add the 4 and 8 to get 12 and arrive at the total of 62.
* It is important that repeated practice is only used after students have developed understanding of a specific strategy and need additional practice. Moving to repeated practice too soon leads to procedural knowledge only rather than conceptual understanding.
* The problem in front of your students is a member of a larger class of problems. It is important to help students see the connections between problems rather than thinking of them as isolated tasks. Asking “What did we do in the last problem that might be helpful again in this one?” and other guiding questions can be very beneficial.

**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 along with concrete understanding of number sense 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 what 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 2:** *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.
* Add and subtract within 20.
* Work with equal groups of objects to gain foundations for multiplication.

Number and Operations in Base Ten

* Understand place value.
* Use place value understanding and properties of operations to add and subtract.

Measurement and Data

* Measure and estimate lengths in standard units.
* Relate addition and subtraction to length.
* Work with time and money.
* 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.*

* **2.OA.A.1** Represent and solve problems involving addition and subtraction.
* **2.OA.B.2** Fluently add and subtract within 20.
* **2.NBT.A.1-4** Understand place value
* **2.NBT.B.5-9** Use place value understanding and properties of operations to add and subtract.

**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:

* Add and subtract within 100 to solve problems.
* Solve one- and two- step word problems using addition and subtraction.
* Draw pictures to solve word problems.
* Determine the best first step when solving a two-step problem.
* Write equations to solve word problems which include a symbol to represent the unknown.
* Compose and decompose numbers to efficiently add and subtract.
* Solve to find the value of the unknown in the equation using at least one method of their choosing.
* Explain how they solved the problem or identify the strategy used to solve the problem.
* Justify their solution by using pictures or equations to model the problem and solution.
* Justify their solution by explaining both their reasoning in creating the equation and their computation.
* 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.
* Identify the error when another students’ solution differs from their own.

**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 (7 April 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 in Kindergarten:

* + Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
  + 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.
  + 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).
  + Find the number that makes 10 when added to the given number from 1 to 9, e.g., by using objects, drawings, and mental math and then record the answer with a drawing or equation.
  + **Fluently** add and subtract within 5. (Students in Kindergarten work with addition and subtraction to 10 but must be fluent up to 5.)

Students in Grade 1:

* Understand and apply properties of operations and the relationship between addition and subtraction to solve problems.
  + **Fluently** add and subtract within 10.
  + Use addition and subtraction within 20 to solve word problems.
  + Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.
  + Understand subtraction as an unknown-addend problem.
  + Relate counting to addition and subtraction (e.g. by counting on 2 to add 2).
  + Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.
  + Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers.
  + Understand that the two digits of a two-digit number represent amounts of tens and ones.
  + Add and subtract multiples of 10 when given a two-digit number.
* **Additional Mathematics:** Students in Grades 3 & 4
  + Add and subtract within 1000.
  + **Fluently** add and subtract within 100.
  + Add up to four two-digit numbers.
  + Explain why addition and subtraction strategies work.
  + Lay the foundation for the properties of multiplication and division (Commutative, Associative, and Distributive).
  + Lay the foundation for the understanding that division can be thought of as the unknown-factor problem.
  + Use the four operations with whole numbers to solve problems, gain familiarity with factors and multiples, ad to generate and analyze patterns.
  + Write and interpret numerical expressions.
  + 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** |
| **2.OA.A.1:** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. |  | **2.OA.B.2:** Fluently add and subtract within 20.  **2.NBT.A.3:** Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.  **2.NBT.B.5:** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.  **2.NBT.B.6:** Add up to four two-digit numbers using strategies based on place value and properties of operations.  **2.NBT.B.9:** Explain why addition and subtraction strategies work, using place value and the properties of operations (may include the use of drawings or objects). |

**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.**
   1. Determine what the problem is asking for:
   2. Determine whether concrete or virtual models, pictures, mental mathematics, or equations are the best tools for solving the problem.
   3. Check the solution with the problem to verify that it does answer the question asked.
2. **Reason abstractly and quantitatively**
   1. Use drawings or equations to show the relationship of the numbers within the problem and identify the unknown.
   2. Identify the relationships between the numbers in the problem that will help to find the solution (e.g., combinations that make ten).
3. **Construct Viable Arguments and critique the reasoning of others.**
   1. Compare the equations or models used by others with yours.
   2. Examine the steps taken that produce an incorrect response and provide a viable argument as to why the process produced an incorrect response.
   3. Use the calculator to verify the correct solution, when appropriate.
4. **Model with Mathematics**
   1. Construct visual models using concrete or virtual manipulatives, pictures, or equations to justify thinking and display the solution.
5. **Use appropriate tools strategically**
   1. Use Digi-Blocks, snap cubes, base ten blocks, counters, addition tables, or other models, as appropriate.
   2. Use the calculator to verify computation.
6. **Attend to precision**
   1. Use mathematics vocabulary such as addend, difference, digit, equation, etc. properly when discussing problems.
   2. Demonstrate their understanding of the mathematical processes required to solve a problem by carefully showing all of the steps in the solving process.
   3. Correctly write and read equations.
   4. Use <, =, and > appropriately to compare expressions.
7. **Look for and make use of structure.**
8. Use the patterns illustrated in addition tables to justify solutions.
9. Make observations about the relative size of the numbers within a problem.
10. Use the relationships demonstrated in the properties of operations to justify solutions.
11. **Look for and express regularity in reasoning**
    1. Use the patterns illustrated in addition tables to justify solutions.
    2. Use models to demonstrate the composition and decomposition of numbers.
    3. Use the relationships demonstrated in the properties of operations to justify solutions.

**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** |
| --- | --- | --- |
| **2.OA.A.1:** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings, and equations with a symbol for the unknown number to represent the problem. | * **Ability to explore addition and subtraction with manipulatives to build their conceptual understanding (e.g., snap cubes, subitizing cards, tens frames, hundreds charts, number lines and empty 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 record their thinking using >, =, and < when comparing quantities** * **Ability to use flexible thinking strategies to develop the understanding of the traditional algorithms and their processes** * **Knowledge of and ability to apply properties of addition and subtraction (CCSS, Page 90, Table 3)** * **Ability to apply the knowledge of addition and subtraction to choose the most efficient strategy to solve a problem** * **Ability to solve various types of addition and subtraction word problems (CCSS, Page 88, Table 1)** * **Ability to use € or ? to represent an unknown in an equation** | It is important to use word problems that are connected to students’ lives in order +to develop fluency with addition and subtraction. Table 1, CCSS, page 88 describes the four different addition and subtraction situations and their relationship to the position of the unknown.  Examples:   * Take From example: Georgia had 52 stickers. She gave 27 to Liam. How many stickers does Georgia have now? 52 – 27 = ? * Add To example: Georgia had $26. Her uncle gave her some money for her birthday. Now she has $61. How much money did Georgia’s uncle give her? $26 + ? = $61 * Compare example: Georgia has 52 stickers. Liam has 27 stickers. How many more stickers does Georgia have than Liam? 52 – 27 = ?   + Even though the modeling of the two problems above is different, the equation, 52 - 27 = ?, can represent both situations (How many more do I need to make 63?) * Take From (Start Unknown) Georgia had some stickers. She gave 27 to Liam. Now she has 25 stickers. How many stickers did Georgia have before?   ? - 37 = 26  It is important to attend to the difficulty level of the problem situations in relation to the position of the unknown.   * Result Unknown, Total Unknown, and Both Addends Unknown problems are the least complex for students. * The next level of difficulty includes Change Unknown, Addend Unknown, and Difference Unknown * The most difficult are Start Unknownand versions of Bigger and Smaller Unknown (compare problems)*.*   Second graders should work on ALL problem types regardless of the level of difficulty. Mastery is expected in second grade. Students can use interactive whiteboard or document camera to demonstrate and justify their thinking.   * This standard focuses on developing an algebraic representation of a word problem through addition and subtraction --the intent is not to introduce traditional algorithms or rules. |

**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 20.
* Fluently add and subtract within 100 (pencil and paper).

**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: “Sara has 37 stickers and Tiara has 14. How many more stickers does Sara have?” The student responds “37’ because Sara has 37 which is more than 14. The student misses the fact that they were asked to determine how many more Sara has or the difference between the two.
* Students rely on “**Key Words**” which do not always lead to a correct solution. For example: Kendra took the 28 stickers she no longer wanted and gave them to Juan. Now Kendra has 19 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 28 + 19 to find the correct solution of 47.
* In the equation 15 + 12 = 27, students tend to think that 15 + 12 is the problem and the equal sign means “the answer is next.” However, in an equation such as 15 +1 2 = 27, it should be thought of as 15 + 12 is the same as 27.
* 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.
* Thinking students should be required to use a specific method when solving a problem, rather than allowing students to freely select from different strategies.
* Only recording methods for problem solving vertically, rather than both vertically and horizontally.
* Thinking of algebra as generalized arithmetic because they use the same symbols and signs.
* In a two-step word problem, thinking that solving one step is all that is necessary and yields the correct answer.

**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 ot 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** |
| 2.OA.A.1 | Addition within 100 | Students work in small groups to create addition problems from real life situations and stories. They justify and model their solutions using place value blocks. Student also discuss the possible strategies that could be used to solve the problems. |

|  |  |  |
| --- | --- | --- |
| **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** |
| 2.OA.A.1 | Path on the Hundred Chart | Students move around the Hundred Chart to solve problems and share their solutions. |
| 2.OA.A.1 | Open Number Line | Students use an open number line to solve addition and subtraction word problems |
|  |  |  |
|  |  |  |

**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*

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Standards Addressed** | **Link** | **Notes** |
| A Pencil & a Sticker | 2.OA.A.1 | <http://www.illustrativemathematics.org/illustrations/1> | Student use a tape diagram to find the unknown addend. |
| Saving Money 1 | 2.OA.A.1 | <http://www.illustrativemathematics.org/illustrations/1292> | Students use popsicle sticks and rubber bands to make groups of tens to figure out how many days it will take Louis to save enough money for school supplies for children in need as well as a pair of shoes for himself. |
| Saving Money 2 | 2.OA.A.1 | <http://www.illustrativemathematics.org/illustrations/1309> | Students figure out how many weeks it will take Louis to save for the school supplies for children in need, the shoes he wants for himself, and a present for his sister’s birthday. |

**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:***

***fluently:*** usingefficient, flexible and accurate methods for computing.

***sums of ten:*** Use knowledge of all the whole number pairs that add up to ten to assist in finding other basic fact solutions. Example: If I know that 4 + 6 = 10, then 4 + 8 would equal two more than 10 or 12.

***making ten:*** When adding 8 + 5, I know that 8 + 2 = 10, so I take 2 from the 5 to make that ten. Then I have 3 left, so 10 + 3 = 13.

***doubles:*** Applying the knowledge that when adding doubles, the sum is twice as much as one of the addends and it is always an even number.

***near doubles:*** When adding 6 + 7, I know that 6 + 6 = 12 and then from the 7 there would be one more, or 13.

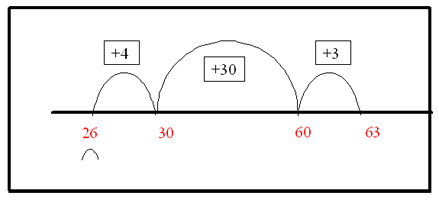
***inside doubles:*** When adding 6 + 8, I can move the 6 one number up to 7 and move the 8 one number back to 7, which gives me the double (inside or between 6 and 8), or 14.

***doubles plus:*** When adding 5 + 9, I know that 5 + 5 = 10, leaving 4 left over. So I add 10 + 4 to get 14. This would also be a sample of using decomposition to solve a problem.

***counting on:*** an addition counting strategy in which a student starts with one number or 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

***empty number line:*** An empty number line, also known as an ‘open number line”, differs from a standard number line in one central point. In contrast to the standard number line, there is neither a scale nor any other pre-given objective landmark on the empty number line. And in the case of the empty number line there is no rule which would require, for example, the same spatial distance between the marks which correspond to two pairs of numbers having an equal arithmetical distance. The empty number line, therefore, is a reproduction of the normal number line that is not faithful to the scale but which respects the order of numbers. Thus one can see the empty number line as a self-made sketch that helps to highlight important considerations about the order of numbers. Example:



***partial sums:*** involves thinking about the place value of the digits in the numbers of the problem. Partial sums are found by adding parts of the numbers together according to their place value and then adding the partial sums together at the end to get the total. To begin, think of the numbers in expanded form. Many students prefer to start with the largest place value first when adding. Example:

Problem: 234 + 457

Expanded Form: 200 + 30 + 4

400 + 50 + 7

Starting with the Hundreds, add:

234

+ 457

hundreds first 200 + 400 = 600

Notice that this method sometimes eliminates the need to regroup.

then tens 30 + 50 = 80

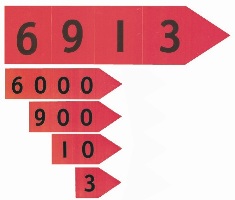
then ones 4 + 7 = 11

finally add all for total 691

***equation:*** is a number sentence stating that the expressions on either side of the equal sign are, in fact, equal.

***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 x 5 = 30; 30 ÷ 5 = 6

***Part II – Instructional Connections outside the Focus Cluster***

[](http://www.everyeducaid.co.nz/files/images/products/BAR136sm.jpg)***place value arrow cards:*** free place value cards found on the Internet (<http://www.senteacher.org/Worksheet/47/PlaceValue.xhtml>) that represent the value of individual digits in various places and allows the student to build a number using their place value understanding. Example:

***value of digits within multi-digit number:*** ability to state how much the digit is worth in different place values within a multi-digit number. Example: In 2,456: the 2 is worth 2,000; the 4 is worth 400; the 5 is worth 50; the 6 is worth 6.

***expanded form:*** a number written as the sum of the values of its digits. Example: 7291 = 7000 + 200 + 90 + 1

***estimate:*** to give an approximate number or answer. Some possible strategies include front-end estimation, rounding, and using compatible numbers. Examples:

Front End estimation Rounding Compatible Numbers

366 → 300 366 → 370 366 → 360

+ 423 → 400 + 423 → 420 + 423 → 420

700 790 780

**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/> Free 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](http://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

**Math Related Literature:**

**References:**

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