Grade level/course: 1st Grade/Math

Trimester: 2

Unit of study number 2.7

Unit of study title: Exploring the Relationship Between Addition and Subtraction

Number of days for this unit: 10 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking – 1.OA

Represent and solve problems involving addition and subtraction.
1.OA.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.

NOTE: See Glossary, Table 1.

Add and subtract within 20.
1.OA.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

Work with addition and subtraction equations.
1.OA.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.

Standards for Mathematical Practice

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for
regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2 **Reason abstractly and quantitatively.**

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to [decontextualize](#)—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to [contextualize](#), to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

### Clarifying the Standards

**Prior Learning**

In Kindergarten, students understood addition as putting together and adding to. They understood subtraction as taking apart and taking from. They solved word problems within 10 using objects, pictures, acting out situations, verbal explanations, and expressions. The use of formal equations was recommended, but not required.

**Current Learning**

In Unit 4, students solve addition word problems within 20 involving situations of adding to and putting together using objects and drawing. They determine whether addition equations are true or false.

In this unit, students continue solving addition word problems within 20 using objects and drawings. Students solve subtraction word problems involving situations of taking from and taking apart by using objects and drawings. Students relate counting forward to addition and counting backward to subtraction.

Students understand the meaning of the equal sign. Students solve addition and subtraction problems to determine if the equations are true or false (6=6, 7=8-1, 5+2=2+2).

In Unit 8, 11, and 14 students apply various strategies to solve word problems, incorporate three addends, apply properties of operations, and solve for a missing addend.

**Future Learning**

In second grade, students will use addition and subtraction within 100. They will fluently add and subtract within 20 using mental strategies. By the end of second grade students
will know from memory all sums of two one-digit numbers and fluently add and subtract within 100 using strategies based on place value. Students will add up to four two-digit numbers.

**Additional Findings**

Children develop strategies for adding and subtracting by beginning to work with small numbers. They use various manipulatives such as objects, models, and number lines. Children understand the relationship between counting and operations of addition and subtraction. (*Curriculum Focal Points*, p.13)

Computations within 20 that cross 10 such as 9+8 are important to developing base 10 number sense because they support the development of making a ten strategy for addition and subtraction. (Progression Document K-5 Number and Operations in Base Ten, p. 3)

Learning where the sum is in addition equations in relation to the = sign, helps students develop the building blocks of Algebra. (Progression Document K-5 Operations and Algebraic Thinking, p. 13)

**Content to be learned**

- Solve “adding to” word problems within 20 using objects and drawings*
- Solve “putting together” word problems within 20 using objects and drawings*
- Solve “taking from” word problems within 20 using objects and drawings*
- Solve “taking apart” word problems within 20 using objects and drawings*
- Understand the meaning of the operation symbols “+”, “-“, and “=”
- Solve addition equations to determine whether equations are true or false
- Solve subtraction equations to determine whether equations are true or false
- Understand that counting forward relates to addition
- Understand that counting backward relates to subtraction
*Refer to Common Core State Standard Glossary Table 1, P. 88

**Mathematical practices to be integrated**

1. **Make sense of problems and persevere in solving them.**
   - Use academic vocabulary to explain how a problem is solved
   - Use concrete objects or pictures to solve a problem.
   - Use other known methods to check whether answers are true or false

2. **Reason abstractly and quantitatively.**
   - Represent a problem using pictures, symbols or objects
   - Represent quantities using objects or pictures
Essential Questions

- How do you share your mathematical thinking when you solve a word problem?
- What happens to the sum when you combine two sets of objects?
- What happens when you take some objects away from a set of objects?
- How can counting forward or backward help you solve an addition or subtraction problem?
- How do you know what information is important in a word problem?
- What do the “+”, “-”, and “=” symbols mean?
Grade level/course: 1st Grade/Math

Trimester: 2

Unit of study number 2.8

Unit of study title: Exploring Addition and Subtraction Strategies

Number of days for this unit: 10 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking – 1.OA

Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.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 = 12. (Associative property of addition.)

NOTE: Students need not use formal terms for these properties.

Add and subtract within 20.

1.OA.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 known equivalent 6 + 6 + 1 = 12 + 1 = 13).

Standards for Mathematical Practice

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using
concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

6 **Attend to precision.**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7 **Look for and make use of structure.**

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see $7 \times 8$ equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as $2 \times 7$ and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers $x$ and $y$.

**Clarifying the Standards**

**Prior Learning**

In Kindergarten, students understood addition as putting together and adding to. They understood subtraction as taking apart and taking from. They solved word problems within 10 using objects, pictures, acting out situations, verbal explanations, and expressions. The use of formal equations was recommended, but not required. Students decomposed numbers less than or equal to 10 into pairs by using objects or drawings. Students used the numbers 1-9 to find sums of 10. Students fluently added and subtracted within 5.
Current Learning

Students apply properties of operations as strategies to add and subtract. Specifically, students use the Commutative Property of Addition although students do not need to know the specific term for this property. For example, if a student knows 2+6=8, then 6+2=8 is also known.

Students add and subtract within 20 using strategies such as counting on, decomposing a number leading to a ten (8+6=8+2+4=10+4=14), using the relationship between addition and subtraction (fact families: knowing 8+4=12, one knows 12-8=4), and using known facts to solve (solve 6+7 by using the double 6+6=12+1=13).

In Unit 11 and 14 students apply various strategies to solve word problems, incorporate three addends, apply properties of operations, and solve for a missing addend.

Future Learning

In second grade students will use their knowledge of the properties of operations to develop fluency when adding and subtracting within 100. They will fluently add and subtract within 20 using mental strategies. By the end of second grade students will know from memory all sums of two one-digit numbers and fluently add and subtract within 100 using strategies based on place value and properties of operations. Students will add up to four two-digit numbers.

Additional Findings

Recognizing inverse relationships between addition and subtraction allows for students to use strategies flexibly to solve problems. (Principles and Standards, p. 83)

The use of mathematical properties is a sign young students’ number sense is evolving. (Principles and Standards, p. 84)

Students must be taught a variety of strategies in first grade to solve addition and subtraction problems. It is vital for future grades that first graders learn multiple strategies, besides counting on, to solve problems. Helping first graders use multiple strategies effectively will lead them to solve multi-digit calculations in the future. (A Research Companion to Principles and Standards for School Mathematics, p. 73)

Content to be learned

- Apply the Commutative Property to add
- Apply strategies to add and subtract
- Use counting on to add and subtract
- Decompose numbers leading to a 10 to add and subtract
• Use relationships between addition and subtraction to make problems easier to solve
• Use known facts to solve problems

**Mathematical practices to be integrated**

3 **Construct viable arguments and critique the reasoning of others.**
   • Choose the most efficient strategies and explain their reasoning
   • Work with others to communicate strategies used to solve a problem
   • Analyze and review the efficiency and accuracy of others’ strategies

6 **Attend to precision.**
   • Solve problems with accuracy and efficiency
   • Expresses accurately the symbols used when solving a problem (+, -, =)

7 **Look for and make use of structure**
   • Apply the Commutative Property of Addition
   • Use known facts to make problem solving easier
   • Apply number sense when adding and subtracting

**Essential Questions**

• What are some strategies you can use to solve a math problem?
• How can addition facts help you solve a subtraction problem?
• How can subtraction facts help you solve an addition problem?
Grade level/course: 1st Grade/Math

Trimester: 2

Unit of study number: 2.9

Unit of study title: Exploring Parts and Wholes

Number of days for this unit: 5 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Measurement and Data – 1.MD

Tell and write time.
1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks.

Geometry – 1.G

Reason with shapes and their attributes.
1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Common Core State Standards for Mathematical Practice

2 Reason abstractly and quantitatively.
Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
Clarifying the Standards

Prior Learning

In Kindergarten, students correctly named shapes regardless of their orientations or overall size. Students composed simple shapes to form larger shapes.

Current Learning

Students learn to tell and write time to the half hour using analog and digital clocks. Students continue to review time to the hour, which was mastered in Unit 2.

Students divide circles and rectangles into two and four equal shares. Students describe the equal shares using the words halves, fourths, and quarters. When describing the shares, students use phrases half of, fourth of, and quarter of. Students describe the whole as two of or four of the shares. For example, when putting two halves together it equals one whole and when putting four fourths together, it equals one whole. Students understand when dividing equal shares, smaller equal shares are created.

Future Learning

In grade 2, students will write and tell time using analog and digital clocks to the nearest five minutes as well as use a.m. and p.m. appropriately when telling time.

Students will continue to work with circles and rectangles and learn to partition a rectangle into rows and columns of same-sized squares and count to find the total number of squares. Students will partition circles and rectangles into two, three, or four equal shares. Students will describe the shares using the words “halves”, “thirds”, “half of”, “a third of”, etc. Students will recognize that equal shares of two identical wholes do not have to be the same shape.

Additional Findings

According to Elementary and Middle School Mathematics by John Van De Walle the following suggestions can help students understand and read an analog clock. “Begin with a one-handed clock. A clock with only an hour hand can be read with reasonable accuracy. Use lots of approximate language: ‘It’s a little past 9 o’clock.’ ‘It’s halfway between 2 o’clock and 3 o’clock.’ (p. 301) Measures of time should be used in a real-world context, i.e., “It’s one o’clock time for P.E.”. (p. 104)

Children compose and decompose shapes, building an understanding of part-whole relationships. As they combine shapes they see the shapes from different perspectives and orientations. (Curriculum Focal Points, p. 13)

“With well-designed activities, appropriate tools, and teachers’ support, students can make and explore conjectures about geometry and can learn to reason carefully about geometric ideas from the earliest years of schooling.” (Principles and Standards for School Mathematics, p. 41)
“Fractions are the first place in children’s experiences where a number represents something other than a count. The notion of a fractional part is completely relative to the whole and, in terms of models, may consist of one piece in some instances and many pieces in others. Helping children develop a firm understanding of fractional parts and of all the related nuances is critical if children are to have any number sense with fractions.” (Elementary and Middle School Mathematics Teaching Developmentally, Van de Walle, p. 211)

Content to be learned

- Tell and write time to the hour and half hour using analog and digital clocks
- Divide circles and rectangles into two or four equal parts
- Describe the equal shares using the words halves, fourths, and quarters and use the phrases half of, fourth of, and quarter of
- Understand the whole as multiple parts
- Understand when you equally divide a whole or a half, smaller equal shares are created

Mathematical practices to be integrated

2 Reason abstractly and quantitatively.
- Students make sense of fractional quantities and their relationship to the whole.
- Students use an abstract object (i.e. clock) to represent time symbolically.

Essential Questions

- How can you tell the clock is showing time to the half-hour?
- How can you divide a circle or rectangle into two or four equal shares?
- What happens to the whole when you divide it equally?
Grade level/course: 1st Grade/Math

Trimester: 2

Unit of study number: 2.10

Unit of study title: Comparing Two-Digit Numbers

Number of days for this unit: 9 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten – 1.NBT

Understand place value.
1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.

Use place value understanding and properties of operations to add and subtract.
1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

Common Core State Standards for Mathematical Practice

7 Look for and make use of structure.
Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see $7 \times 8$ equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as $2 \times 7$ and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers $x$ and $y$.

8 Look for and express regularity in repeated reasoning.
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school
students might abstract the equation \((y - 2)/(x - 1) = 3\). Noticing the regularity in the way terms cancel when expanding \((x - 1)(x + 1)\), \((x - 1)(x^2 + x + 1)\), and \((x - 1)(x^3 + x^2 + x + 1)\) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

**Clarifying the Standards**

**Prior Learning**

In Kindergarten, students compared two numbers between 1-10 presented as written numerals. Students identified whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group.

**Current Learning**

In Unit 5, students understand that the two digits of a two-digit number represent amounts of tens and ones for numbers to 99. Students understand the numbers 10, 20, 30, 40, 50, 60, 70, 80 and 90 are represented by 1-9 tens and 0 ones. They compare two digit numbers based on meanings of the tens and ones digits.

In this unit, students use their knowledge of place value to compare two 2-digit numbers. Students learn the meaning of the symbols for less than and greater than. Students record the results of the comparisons with less than, greater than, and equal to symbols (<, > and =).

Students mentally find 10 more or 10 less of a given number without having to count forward or backward by ones. Students explain the reasoning used to add or subtract ten.

In Unit 15, students add a two digit number to a one digit number. Students add a two digit number to a multiple of ten within 100 using concrete models and drawings and strategies based on place value and other strategies. Students subtract multiples of ten in the range of 10 – 90 from multiples of 10 in the range 10 – 90, using concrete models or drawings based on place value and other strategies.

**Future Learning**

In 2nd grade students will compare two 3- digit numbers based on the meaning of hundreds, tens and ones. Students will add up to four 2- digit numbers. Students will add and subtract within 1,000. They mentally add 10 or 100 to a given number 100 – 900. They also mentally subtract from 100 – 900.

**Additional Findings**

“Grade 1 students use their base-ten work to help them recognize that the digit in the tens place is more important for determining the size of a two-digit number. (1.NBT.3) They
Content to be learned

- Apply knowledge of tens and ones to compare two 2-digit numbers
- Learn the meaning of the less than and greater than symbols (< and >)
- Record the results of comparisons by using symbols <, >, and =
- Find 10 more or 10 less than a given number mentally, without having to count
- Explain the reasoning used to find 10 more or 10 less than the given number

Mathematical practices to be integrated

7 Look for and make use of structure.
- Use place value to compare two 2 digit numbers
- Use number sense to determine 10 more or 10 less than a given number

8 Look for and express regularity in repeated reasoning.
- Know that the greater than and less than symbols are used to show quantitative relationships between numbers
- Recognize that when adding or subtracting 10 to or from a given number, that the digit in the tens place increases or decreases by one

Essential Questions

- How can you use the tens and ones digits to compare two 2 digit numbers?
- How can you add or subtract 10 without counting?
- How do you know when to use the greater than, less than, or equal symbol to make an equation true?
Grade level/course: 1st Grade/Math

Trimester: 2

Unit of study number: 2.11

Unit of study title: Understanding and Applying the Relationship Between Addition and Subtraction

Number of days for this unit: 15 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking – 1.OA

Represent and solve problems involving addition and subtraction.
1.OA.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. 

NOTE: See Glossary, Table 1.

Understand and apply properties of operations and the relationship between addition and subtraction.
1. OA.4 Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.

Add and subtract within 20.
1.OA.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 known equivalent 6 + 6 + 1 = 12 + 1 = 13).

Standards for Mathematical Practice

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the
original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

4 Model with mathematics.
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

6 Attend to precision.
Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Clarifying the Standards

Prior Learning
In Kindergarten, students understood addition as putting together and adding to. They understood subtraction as taking apart and taking from. They solved word problems
within 10 using objects, pictures, acting out situations, verbal explanations, and expressions. The use of formal equations was recommended, but not required.

**Current Learning**
In this unit, students continue solving addition word problems and equations within 20. Students solve addition and subtraction word problems within 20 involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions. Students can use objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Students solve addition and subtraction “add to” or “take from” word problems to find the result unknown (2 + 3 = ?), change unknown (5 - ? = 3) and start unknown (? + 3 = 5). Students solve addition and subtraction “put together” or “take apart” word problems to find the total unknown (3 + 2 = ?), addend unknown (3 + ? = 5, 5 – 3 = ?), and both addends unknown (5 = 0 + 5, 5 = 5 + 0). Students solve addition and subtraction “compare” word problems to find the difference unknown (2 + ? = 5, 5 – 2 = ?), bigger unknown (2 + 3 = ?, 3 + 2 = ?), and smaller unknown (5 – 3 = ?, ? + 3 = 5).

Students understand subtraction equations as an unknown-addend problem. For example, to subtract 10 – 8 students count on from 8 to find what makes 10.

They solve equations within 20 focusing on strategies such as counting on, making ten, decomposing a number leading to ten, and creating equivalent but easier or known sums.

**Future Learning**
In second grade, students will use addition and subtraction within 100 to solve one and two step word problems. Students will solve addition and subtraction equations within 1,000. They will fluently add and subtract within 20 using mental strategies. By the end of second grade students will know from memory all sums of two one-digit numbers and fluently add and subtract within 100 using strategies based on place value. Students will add up to four two-digit numbers.

**Additional Findings**
“Although different students may initially use quite different ways of thinking to solve problems, teachers should help students recognize that solving one kind of problem is related to solving another kind. Recognizing the inverse relationship between addition and subtraction can allow students to be flexible in using strategies to solve problems.” *(Principles and Standards for School Mathematics, p. 83)*

Children develop strategies for adding and subtracting by beginning to work with small numbers. They use various manipulatives such as objects, models, and number lines. Children understand the relationship between counting and operations of addition and subtraction. *(Curriculum Focal Points, p. 13)*
Content to be learned

- Solve “taking from” and “taking apart” word problems within 20 using objects, drawings, and equations
- Solve “adding to” and “putting together” word problems within 20 using objects, drawings, and equations
- Solve addition and subtraction equations within 20
- Write an equation with a symbol (i.e. $9 + ? = 10$) for the unknown number to represent the word problem
- Solve subtraction equations using knowledge of addition and its relationship to subtraction (i.e. $10 - 8$ by finding the number that makes 10 when added to 8)
- Add and subtract within 20 using strategies such as counting on, making ten, decomposing a number leading to a ten, using the relationship between addition and subtraction, and creating equivalent but easier or known sums.

Mathematical practices to be integrated

1. Make sense of problems and persevere in solving them.
   - Students solve word problems and equations with appropriate strategies.
   - Students use pictures, objects, and equations to understand and solve a word problem.

4. Model with mathematics.
   - Students write an equation to correctly represent a word problem.
   - Students identify quantities and relevant information in a word problem.
   - Students can make connections between mathematical concepts and everyday life.

6. Attend to precision.
   - Students clearly define and discuss their reasoning.
   - Students use operation symbols precisely.

Essential Questions

- How do you show your mathematical thinking when you solve a word problem?
- How do you show your mathematical thinking when writing an equation?
- How can you use addition to solve subtraction problems?
- How do you find a missing number in an equation?
Grade level/course: 1

Trimester: 2

Unit of study number 2.12

Unit of study title: Understanding 3-D Shapes

Number of days for this unit: 6 days (60 minutes per day)

Common Core State Standards for Mathematical Content

Geometry – 1.G

Reason with shapes and their attributes.
1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.4

NOTE: 4Students do not need to learn formal names such as “right rectangular prism.”

Standards for Mathematical Practice

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation \((y - 2)/(x - 1) = 3\). Noticing the regularity in the way terms cancel when expanding \((x - 1)(x + 1)\), \((x - 1)(x^2 + x + 1)\), and \((x - 1)(x^3 + x^2 + x + 1)\) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifying the Standards

Prior Learning

In Kindergarten, students described objects in the environment using names of shapes, and described the relative positions of these objects using prepositional terms such as above, below, beside, in front of, behind, and next to. They correctly named shapes regardless of their orientation or overall size. They identified shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).

Students analyzed and compared 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). Students modeled shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. Students composed simple shapes to form larger shapes (e.g. Can you join these two triangles with full sides touching to make a rectangle?).

Current Learning

In this unit, students make two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional (cubes, right rectangular prisms, right circular cones, right circular cylinders) shapes to create another shape. Students compose new shapes from the composite shape. They focus on creating and composing shapes, not giving them a formal name.

Future Learning

In second grade, students will recognize and draw shapes having specified attributes (number of angles and number of faces). They will identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
Additional Findings

Children’s knowledge of geometry expands through hands on activities, exploring the environment, and classroom discussions. Students become more proficient at creating and explaining as they investigate their world around them. They should learn to show two-dimensional and three-dimensional shapes by drawing, constructing and words. Students can explore shapes by creating composite shapes from known shapes. (*Principles and Standards for School Mathematics*, p. 97)

Students begin describing and naming shapes using their own vocabulary. Teachers must help students gradually incorporate formal names; however, it should not be the focus. Exposure of geometric concepts in primary grades lays the foundation for a more complex understanding in upper grades. (*Principles and Standards for School Mathematics*, P. 97)

Content to be learned

- Compose two-dimensional or three-dimensional shapes to create a composite shape.
- Compose new shapes from composite shapes.

Mathematical practices to be integrated

5 **Use appropriate tools strategically**
- Students use two-dimensional shapes or three-dimensional shapes to create a new shape.
- Students use resources (i.e. straws, Popsicle sticks, clay, paper) to create shapes.

8 **Look for and express regularity in repeated reasoning.**
- Students recognize common attributes between shapes.
- Students understand the relationship between two-dimensional and three-dimensional shapes.
- Students use their knowledge of two-dimensional to create three-dimensional shapes.

Essential Questions

- How can you use shapes to create a new shape?
- How can you use two-dimensional shapes to make a three-dimensional shape?
- How can you describe a two-dimensional shape?
- How can you describe a three-dimensional shape?
- How are two and three-dimensional shape alike and different?