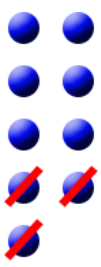
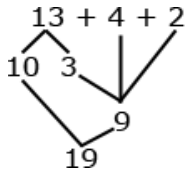
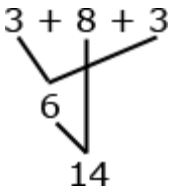
Grade/Subject	1st Grade/Math
Unit Title	Fluency with Addition and Subtraction Within 10
Overview of Unit	In this unit, the focus of instruction is on reasoning and making sense of situations in order to develop addition and subtraction strategies within ten. Concentration on conceptual understanding will build upon prior work with smaller numbers (fluency to 5). A variety of models (ex. ten frames, counters, drawing, diagrams, and equations) will be used to develop a connection between counting and addition and subtraction. Students will apply these skills to real world problems in the Sand Castle Performance Task.
Pacing	5 weeks (September, beginning of October)

Essential Questions (and Corresponding Big Ideas)

1. In what ways can mathematical problems be solved? Why is it important to know more than one way to solve?
   - Problems can be solved in many ways, such as using inverse operations, properties of operations, patterns and equations. Knowing different ways can allow me to choose the most efficient strategy for the situation and help me to check and explain my work.
2. How do number patterns help solve equations?
   - Learning number patterns helps with math fluency (i.e. +/- 0 or 1; doubles)
3. How can mathematics be used to represent everyday situations?
   - Many situations in life can be represented using equations with numerals and symbols. Depending on the situation, the equation takes a different form. For example, some situations and corresponding equations show action, or something being added to or taken away.)
4. How does placement of a digit in a number identify the value of the number?
   - Number value is determined within the base 10 system.

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
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. *within 10 for Unit 1	1.OA.1: Contextual problems that are closely connected to students' lives should be used to develop fluency with addition and subtraction. Table 1 describes the four different addition and subtraction situations and their relationship to the position of the unknown. Students use objects or drawings to represent the different situations. • Take From example: Abel has 9 balls. He gave 3 to Susan. How many balls does Abel have now? 

	• Compare example: Abel has 9 balls. Susan has 3 balls. How many more balls does Abel have than Susan? A student will use 9 objects to represent Abel's 9 balls and 3 objects to represent Susan's 3 balls. Then they will compare the 2 sets of objects. Note that even though the modeling of the two problems above is different, the equation, 9 - 3 = ?, can represent both situations yet the compare example can also be represented by 3 + ? = 9 (How many more do I need to make 9?) 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 Unknown and versions of Bigger and Smaller Unknown (compare problems). Students may use document cameras to display their combining or separating strategies. This gives them the opportunity to communicate and justify their thinking.
1.OA.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. *within 10 for Unit 1	1.OA.2: To further students' understanding of the concept of addition, students create word problems with three addends. They can also increase their estimation skills by creating problems in which the sum is less than 5, 10 or 20. They use properties of operations and different strategies to find the sum of three whole numbers such as: • Counting on and counting on again (e.g., to add 3 + 2 + 4 a student writes 3 + 2 + 4 = ? and thinks, "3, 4, 5, that's 2 more, 6, 7, 8, 9 that's 4 more so 3 + 2 + 4 = 9." • Making tens (e.g., 4 + 8 + 6 = 4 + 6 + 8 = 10 + 8 = 18) • Using "plus 10, minus 1" to add 9 (e.g., 3 + 9 + 6 A student thinks, "9 is close to 10 so I am going to add 10 plus 3 plus 6 which gives me 19. Since I added 1 too many, I need to take 1 away so the answer is 18.) • Decomposing numbers between 10 and 20 into 1 ten plus some ones to facilitate adding the ones 

	• Using doubles  Students will use different strategies to add the 6 and 8. • Using near doubles (e.g.,5 + 6 + 3 = 5 + 5 + 1 + 3 = 10 + 4 =14) Students may use document cameras to display their combining strategies. This gives them the opportunity to communicate and justify their thinking.
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.)*	1.OA.3: Students should understand the important ideas of the following properties: • Identity property of addition (e.g., 6 = 6 + 0) • Identity property of subtraction (e.g., 9 – 0 = 9) • Commutative property of addition (e.g., 4+5 = 5+4) • Associative property of addition (e.g., 3+9+1=3+10 = 13) Students need several experiences investigating whether the commutative property works with subtraction. The intent is not for students to experiment with negative numbers but only to recognize that taking 5 from 8 is not the same as taking 8 from 5. Students should recognize that they will be working with numbers later on that will allow them to subtract larger numbers from smaller numbers. However, in first grade we do not work with negative numbers.
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.*	1.OA.4: When determining the answer to a subtraction problem, 12 - 5, students think, “If I have 5, how many more do I need to make 12?” Encouraging students to record this symbolically, 5 + ? = 12, will develop their understanding of the relationship between addition and subtraction. Some strategies they may use are counting objects, creating drawings, counting up, using number lines or 10 frames to determine an answer.
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.*	1.OA.7: Interchanging the language of “equal to” and “the same as” as well as “not equal to” and “not the same as” will help students grasp the meaning of the equal sign. Students should understand that *“*equality*”* means “the same quantity as”. In order for students to avoid the common pitfall that the equal sign means “to do something” or that the equal sign means “the answer is,” they need to be able to: • Express their understanding of the meaning of the equal sign

	• Accept sentences other than a + b = c as true (a = a, c = a + b, a = a + 0, a + b = b + a) • Know that the equal sign represents a relationship between two equal quantities • Compare expressions without calculating These key skills are hierarchical in nature and need to be developed over time. Experiences determining if equations are true or false help student develop these skills. Initially, students develop an understanding of the meaning of equality using models. However, the goal is for students to reason at a more abstract level. At all times students should justify their answers, make conjectures (e.g., if you add a number and then subtract that same number, you always get zero), and make estimations. Once students have a solid foundation of the key skills listed above, they can begin to rewrite true/false statements using the symbols, < and >. Examples of true and false statements: • 7 = 8 – 1 • 8 = 8 • 1 + 1 + 3 =7 • 4 + 3 = 3 + 4 • 6 – 1 = 1 – 6 • 12 + 2 – 2 = 12 • 9 + 3 = 10 • 5 + 3 = 10 – 2 • 3 + 4 + 5 = 3 + 5 + 4 • 3 + 4 + 5 = 7 + 5 • 13 = 10 + 4 • 10 + 9 + 1 = 19 Students can use a clicker (electronic response system) or interactive whiteboard to display their responses to the equations. This gives them the opportunity to communicate and justify their thinking.
1.OA.8: Determine the unknown whole number in an addition or subtraction equation relating 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.8: Students need to understand the meaning of the equal sign and know that the quantity on one side of the equal sign must be the same quantity on the other side of the equal sign. They should be exposed to problems with the unknown in different positions. Having students create word problems for given equations will help them make sense of the equation and develop strategic thinking. Examples of possible student “think-throughs”: • *8 + ? = 11*: “8 and some number is the same as 11.

	8 and 2 is 10 and 1 more makes 11. So the answer is 3." • *5* = ? – *3*: "This equation means I had some cookies and I ate 3 of them. Now I have 5. How many cookies did I have to start with? Since I have 5 left and I ate 3, I know I started with 8 because I count on from 5. . . 6, 7, 8." Students may use a document camera or interactive whiteboard to display their combining or separating strategies for solving the equations. This gives them the opportunity to communicate and justify their thinking.
1.NBT.1: Count to 120*, starting at any number less than 120*. In this range, read and write numerals and represent a number of objects with a written numeral. *within 10 for Unit 1	1.NBT.1: Students use objects, words, and/or symbols to express their understanding of numbers. They extend their counting to 10 by counting forward and backward by ones starting points. In later units, students will explore counting to 120. Students read and write numerals to 10 in this unit.
1.MD.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	1.MD.4: Students create object graphs using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students. Counting objects should be reinforced when collecting, representing, and interpreting data. Students describe the object graphs they create. They should also ask and answer questions based on the graphs that reinforce other mathematics concepts such as sorting and comparing. The data chosen or questions asked give students opportunities to reinforce their understanding of place value, identifying ten more and ten less, relating counting to addition and subtraction and using comparative language and symbols. Students may use an interactive whiteboard to place objects onto a graph. This gives them the opportunity to communicate and justify their thinking.
Standards for Mathematical Practice	**Explanations and Examples**
1. Make sense of problems and persevere in solving them	1. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.

2. Reason abstractly and quantitatively	2. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
3. Construct viable arguments and critique the reasoning of others	3. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
4. Model with mathematics	4. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
5. Use appropriate tools strategically	5. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
6. Attend to precision	6. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
7. Look for and make use of structure	7. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*
8. Look for and express regularity in repeated reasoning	8. In the early grades, students notice repetitive actions in counting and computation, etc.

	When children have multiple opportunities to add and subtract “ten” and multiples of “ten” they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, “Does this make sense?”

ISTE Standards
http://www.iste.org/standards/nets-for-students.aspx N/A

K-U-D	
KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes*
• Counting and writing numbers within 10 • Strategies and appropriate tools for addition and subtraction • Addition and subtraction fact families within 10 (within 5 fluently) • Meaning of the equal sign (balance, same) • Unknown numbers in equations • Representations of data • Vocabulary: add, subtract, equal, addend, sum, difference, decompose, more than/greater than, less than/fewer than, column, row, graph, data	• Count (to 10 starting at any number less than 10) • Write (numerals 0 -10 and represent a number of objects with a written numeral) • Represent (addition and subtraction with symbols in equation form) • Count (on and count back to add and subtract within 10) • Add & subtract (within 10 to solve word problems with 2 and/or 3 addends) • Solve (adding to/taking from/putting together/taking from/putting together/comparing problems) • Solve (problems with unknowns in all positions) • Use (a symbol for unknowns) • Use (objects to solve problems) • Use (drawings to solve problems) • Apply (properties of operations: Commutative and Associative) • Determine (unknown-addend through subtraction) • Make (10 using different addition equations) • Decompose (a number to develop addition and subtraction fluency within 10) • Use (known sums to develop addition and subtraction fluency)

	• Determine (if an addition or subtraction equation is true or false based on understanding of the equal sign) • Identify and solve (an unknown # in addition/subtraction equations) • Interpret and compare (data presented on a graph)

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand that:

- Quantity is represented by a number.
- Numbers can be composed and decomposed in a variety of combinations.
- The equal sign represents the balance of quantities on each side of the equal sign.
- Addition and subtraction are related through the commutative and associative properties.
- Problems can be solved using multiple tools and strategies.

Unit Assessment/Performance Task

Students will use their knowledge of addition and subtraction to solve real world word problems about 2 children building sand castles at a beach. Students will solve these word problems using more than one operation and also explain their thinking in words and pictures. Students analyze and interpret a graph to answer questions about the sandcastles.

Vocabulary

Academic Vocabulary: apply analyze build chart	Choose compare data demonstrate describe explain	identify illustrate label manipulate model organize
Domain Specific: equal symbol counting on unknown sum addend represent counting back	sum addition subtraction join less fewer put together take apart	the same as balance strategy

Digit: Any one of the ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.
Equation: A statement that shows two mathematical expressions are equal. n + 7 = 13 means that n + 7 must have the same value as 13.
Numerals: A symbol (not a variable) used to represent a number.
Numbers: The symbols used to represent a given quantity.
Number sentence: An equation or inequality with numbers ex. 3 + 8 =11 9 +2 < 16
Think Addition: Student uses known addition facts to produce the unknown quantity or part. (What goes with this part to make the total? When a child sees 9 – 4, the child thinks "What goes with the 4 to make 9?")

Interdisciplinary Connections

Reading

- Listening to, comprehending and discussing suggested read-alouds

Science

- Collecting, organizing and collecting Data

Kinesthetic Learning

- Act out word problems and show movement(counting on, back) by walking up or down a large number line using

Grade/Subject	Grade 1/Math
Unit Title	Unit 2: Exploring Addition and Subtraction Within 20
Overview of Unit	In this unit the focus of instruction is on reasoning and making sense of situations in order to develop an understanding of addition and subtraction strategies within 20. Concentration on conceptual understanding will continue based on work with smaller numbers (fluency to 10). A variety of models (ex. ten frames, counters, drawing, diagrams, and equations) will be used to develop a connection between counting and addition and subtraction. Students will apply these skills to real world problems in the "All Aboard the Train" performance task.
Pacing	3 weeks

Essential Questions (and Corresponding Big Ideas)
5. In what ways can mathematical problems be solved? Why is it important to know more than one way to solve? • Problems can be solved in many ways, such as using inverse operations, properties of operations, patterns and equations. Knowing different ways can allow me to choose the most efficient strategy for the situation and help me to check and explain my work. 6. How do number patterns help solve equations? • Learning number patterns helps with math fluency (i.e. +/- 0 or 1; doubles) 7. How can mathematics be used to represent everyday situations? • Many situations in life can be represented using equations with numerals and symbols. Depending on the situation, the equation takes a different form. For example, some situations and corresponding equations show action, or something being added to or taken away.) 8. How does placement of a digit in a number identify the value of the number? • Number value is determined within the base 10 system.

Core Content Standards	**Explanations and Examples** (Developed by Arizona DOE)
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.	1.OA.1: Contextual problems that are closely connected to students' lives should be used to develop fluency with addition and subtraction. The following list describes the four different addition and subtraction situations and their relationship to the position of the unknown. Students use objects or drawings to represent the different situations. • Take From example: Abel has 9 balls. He gave 3 to Susan. How many balls does Abel have now?

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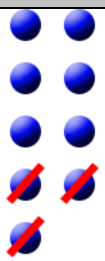
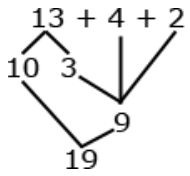
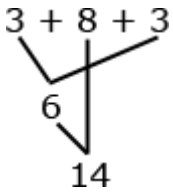
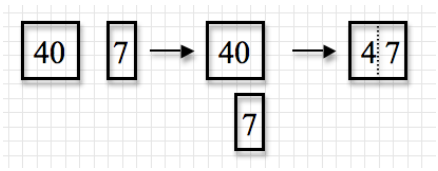
	 • Compare example: Abel has 9 balls. Susan has 3 balls. How many more balls does Abel have than Susan? A student will use 9 objects to represent Abel's 9 balls and 3 objects to represent Susan's 3 balls. Then they will compare the 2 sets of objects. Note that even though the modeling of the two problems above is different, the equation, 9 – 3 = ?, can represent both situations yet the compare example can also be represented by 3 + ? = 9 (How many more do I need to make 9?). 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 Unknown and versions of Bigger and Smaller Unknown (compare problems). Students may use document cameras to display their combining or separating strategies. This gives them the opportunity to communicate and justify their thinking.
1.OA.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.	1.OA.2: To further students' understanding of the concept of addition, students create word problems with three addends. They can also increase their estimation skills by creating problems in which the sum is less than 5, 10 or 20. They use properties of operations and different strategies to find the sum of three whole numbers such as: • Counting on and counting on again (e.g., to add 3 + 2 + 4 a student writes 3 + 2 + 4 = ? and thinks, "3, 4, 5, that's 2 more, 6, 7, 8, 9 that's 4 more so 3 + 2 + 4 = 9." • Making tens (e.g., 4 + 8 + 6 = 4 + 6 + 8 = 10 + 8 = 18) • Using "plus 10, minus 1" to add 9 (e.g., 3 + 9 + 6 A student thinks, "9 is close to 10 so I am going to add 10 plus 3 plus 6 which gives me 19. Since I added 1 too many, I need to take 1 away so the answer is 18.") • **Decomposing** numbers between 10 and 20 into 1 ten plus some ones to facilitate adding the ones

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	 • Using doubles  Students will use different strategies to add the 6 and 8. • Using near doubles (e.g.,5 + 6 + 3 = 5 + 5 + 1 + 3 = 10 + 4 =14) Students may use document cameras to display their combining strategies. This gives them the opportunity to communicate and justify their thinking.
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**.)*	1.OA.3: Students should understand the important ideas of the following properties: • Identity property of addition (e.g., 6 = 6 + 0) • Identity property of subtraction (e.g., 9 – 0 = 9) • Commutative property of addition (e.g., 4+5 = 5+4) • Associative property of addition (e.g., 3+9+1=3+10 = 13) Students need several experiences investigating whether the commutative property works with subtraction. The intent is not for students to experiment with negative numbers but only to recognize that taking 5 from 8 is not the same as taking 8 from 5. Students should recognize that they will be working with numbers later on that will allow them to subtract larger numbers from smaller numbers. However, in first grade we do not work with negative numbers.
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.*	1.OA.4: When determining the answer to a subtraction problem, 12 – 5, students think, "If I have 5, how many more do I need to make 12?" Encouraging students to record this symbolically, 5 + ? = 12, will develop their understanding of the relationship between addition and subtraction. Some strategies they may use are counting objects, creating drawings, counting up, using number lines or 10 frames to determine an answer
1.OA.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2)	1.OA.5: Students' multiple experiences with counting may hinder their understanding of counting on and counting back as connected to addition and subtraction. To help them make these connections when students count on 3 from 4, they should write this as 4 + 3 = 7. When students count back (3) from 7, they should connect this to 7-3=4. Students often have difficulty knowing where to begin their count when counting backward.
1.OA.6 Add and subtract within 20,	**1.OA.6**: This standard is strongly connected to all the standards in this domain. It

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
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).	focuses on students being able to fluently add and subtract numbers to 10 and having experiences adding and subtracting within 20. By studying patterns and relationships in addition facts and relating addition and subtraction, students build a foundation for fluency with addition and subtraction facts. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. The use of objects, diagrams, or interactive whiteboards and various strategies will help students develop fluency.
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.*	1.OA.7: Interchanging the language of "equal to" and "the same as" as well as "not equal to" and "not the same as" will help students grasp the meaning of the equal sign. Students should understand that *"*equality*"* means "the same quantity as". In order for students to avoid the common pitfall that the equal sign means "to do something" or that the equal sign means "the answer is," they need to be able to: • Express their understanding of the meaning of the equal sign • Accept sentences other than a + b = c as true (a = a, c = a + b, a = a + 0, a + b = b + a) • Know that the equal sign represents a relationship between two equal quantities • Compare expressions without calculating These key skills are hierarchical in nature and need to be developed over time. Experiences determining if equations are true or false help student develop these skills. Initially, students develop an understanding of the meaning of equality using models. However, the goal is for students to reason at a more abstract level. At all times students should justify their answers, make conjectures (e.g., if you add a number and then subtract that same number, you always get zero), and make estimations. Once students have a solid foundation of the key skills listed above, they can begin to rewrite true/false statements using the symbols, < and >. Examples of true and false statements: • 7 = 8 – 1 • 8 = 8 • 1 + 1 + 3 =7 • 4 + 3 = 3 + 4 • 6 – 1 = 1 – 6 • 12 + 2 – 2 = 12 • 9 + 3 = 10 • 5 + 3 = 10 – 2 • 3 + 4 + 5 = 3 + 5 + 4 • 3 + 4 + 5 = 7 + 5

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	• 13 = 10 + 4 • 10 + 9 + 1 = 19 Students can use a clicker (electronic response system) or interactive whiteboard to display their responses to the equations. This gives them the opportunity to communicate and justify their thinking.
1.OA.8: Determine the unknown whole number in an addition or subtraction equation relating 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.8: Students need to understand the meaning of the equal sign and know that the quantity on one side of the equal sign must be the same quantity on the other side of the equal sign. They should be exposed to problems with the unknown in different positions. Having students create word problems for given equations will help them make sense of the equation and develop strategic thinking. Examples of possible student "think-throughs": • *8 + ? = 11*: "8 and some number is the same as 11. 8 and 2 is 10 and 1 more makes 11. So the answer is 3." • *5 =* ? *– 3*: "This equation means I had some cookies and I ate 3 of them. Now I have 5. How many cookies did I have to start with? Since I have 5 left and I ate 3, I know I started with 8 because I count on from 5. . . 6, 7, 8." Students may use a document camera or interactive whiteboard to display their combining or separating strategies for solving the equations. This gives them the opportunity to communicate and justify their thinking.
1.NBT.1: Count to 120**, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. **Count to 20	1.NBT.1: Students use objects, words, and/or symbols to express their understanding of numbers. They extend their counting beyond 100 to count up to 120 by counting by 1s. Some students may begin to count in groups of 10 (while other students may use groups of 2s or 5s to count). Counting in groups of 10 as well as grouping objects into 10 groups of 10 will develop students' understanding of place value concepts. Students extend reading and writing numerals beyond 20 to 120. After counting objects, students write the numeral or use numeral cards to represent the number. Given a numeral, students read the numeral, identify the quantity that each digit represents using numeral cards, and count out the given number of objects.  Students should experience counting from different starting points (e.g., start at 83; count to 120). To extend students' understanding of counting, they should be given

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	opportunities to count backwards by ones and tens. They should also investigate patterns in the base 10 system.
1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 10 can be thought of as a bundle of ten ones — called a "ten." The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.	1.NBT.2: Understanding the concept of 10 is fundamental to children's mathematical development. Students need multiple opportunities counting 10 objects and "bundling" them into one group of ten. They count between 10 and 20 objects and make a bundle of 10 with or without some left over (this will help students who find it difficult to write teen numbers). Finally, students count any number of objects up to 99, making bundles of 10s with or without leftovers. As students are representing the various amounts, it is important that an emphasis is placed on the language associated with the quantity. For example, 53 should be expressed in multiple ways such as 53 ones or 5 groups of ten with 3 ones leftover. When students read numbers, they read them in standard form as well as using place value concepts. For example, 53 should be read as "fifty three" as well as five tens, 3 ones. Reading 10, 20, 30, 40, 50 as "one ten, 2 tens, 3 tens, etc." helps students see the patterns in the number system. Students may use the document camera or interactive whiteboard to demonstrate their "bundling" of objects. This gives them the opportunity to communicate their thinking.
1.MD.4: Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	1.MD.4: Students create object graphs and tally charts using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students. Counting objects should be reinforced when collecting, representing, and interpreting data. Students describe the object graphs and tally charts they create. They should also ask and answer questions based on these charts or graphs that reinforce other mathematics concepts such as sorting and comparing. The data chosen or questions asked give students opportunities to reinforce their understanding of place value, identifying ten more and ten less, relating counting to addition and subtraction and using comparative language and symbols. Students may use an interactive whiteboard to place objects onto a graph. This gives them the opportunity to communicate and justify their thinking.

Standards for Mathematical Practice	Explanations and Examples
9. Make sense of problems and persevere in solving them	1. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.

10. Reason abstractly and quantitatively	2. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
11. Construct viable arguments and critique the reasoning of others	3. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
12. Model with mathematics	4. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
13. Use appropriate tools strategically	5. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
14. Attend to precision	6. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
15. Look for and make use of structure	7. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*
16. Look for and express regularity in repeated reasoning	8. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards

(http://www.iste.org/standards/nets-for-students.aspx)

N/A

K-U-D	
KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• Counting, reading and writing numbers within 20 • Strategies and appropriate tools for addition and subtraction • Addition and subtraction fact families within 20 (within 10 fluently) • Meaning of the equal sign (balance, same) • "Unknown numbers" in equations • Representations of data • Variety of problem types (CCSS pg. 88, Table 1) • Variety of strategies (counting on, make ten, etc.) • Commutative property (though formal name not required) • Associative property (though formal name not required) • Place value concepts: ○ 10 can be thought of as a bundle of ten 1's – called a "ten". ○ Numbers from 11 – 19 are composed of a ten and some ones. • Vocabulary: add, subtract, equal, addend, sum, difference, decompose, more than/greater than, less than/fewer than, column, row, graph, data, digit/number, some more, tens, ones	• Count (to 20 starting at any number less than 20) • Write/read (numerals 0 -20) • Represent (a number of objects with a written numeral) • Represent (numbers 11 – 19 as 10 and some more) • Demonstrate (an understanding of place value) • Represent (addition and subtraction in equation form) • Add/subtract (within 20 to solve word problems with 2 and/or 3 whole numbers) • Solve (adding to/taking from/putting together/taking from/putting together/comparing problems) • Solve (problems with unknowns in all positions) • Use (a symbol for unknowns) • Use (objects to solve problems) • Use (drawings to solve problems) • Apply (properties of operations: commutative and associative) • Count on/back (to add and subtract within 20) • Determine (unknown-addend through subtraction) • Decompose (a number to develop addition and subtraction within 20) • Add/subtract (fluently within 10) • Use (known sums to develop addition and subtraction fluency) • Determine (if an addition or subtraction equation is true or false) • Demonstrate (understanding of the equal sign) • Identify and solve (an unknown # in addition/subtraction equations) • Interpret and compare (data presented on a graph) • Use (a variety of strategies: counting on/making ten/decomposing/inverses/etc.) • Apply (place value concepts to explain value of numbers 0-20)

UNDERSTAND *Big ideas, generalizations, principles, concepts, ideas that transfer across situations*
Students will understand **that** • Quantity is represented by a numeral. (Number is synonymous with quantity. Numeral is the written symbol representing the amount (quantity/number). • Numbers can be composed and decomposed in a variety of combinations. • The equal sign represents the balance of quantities on each side of the equal sign. • Addition and subtraction are related through the commutative and associative properties • Problems can be solved using multiple tools and strategies. • The value of a number is identified by placement of the digits within the base 10 system.

Unit Assessment/Performance Task	**DOK**
Students will use their knowledge of addition and subtraction to solve real world word problems about trains. Students will solve these word problems using more than one operation and also explain their thinking in words, pictures and equations. Students will also analyze and interpret a graph to answer questions about the trains.	

Vocabulary		
Academic Vocabulary: apply analyze build chart compare explain Domain Specific: equal symbol counting on unknown sum addend represent counting back	Choose compare data demonstrate describe explain commutative property associative property addition subtraction join less fewer put together take apart	identify illustrate label manipulate model organize the same as balance strategy digit equation numeral number number sentence anchor to 10

Interdisciplinary Connections
Reading • Listening to, comprehending and discussing suggested read-alouds and how they relate to the featured math concepts Science • Collecting, organizing and interpreting data Kinesthetic Learning • Act out word problems and show movement (counting on, back) by walking up or down a large number line using Technology: • overhead or document camera used in flash game

Grade/Subject	Grade 1/Math
Unit Title	Unit 3: Counting and Place Value
Overview of Unit	In this unit, students will extend the counting sequence to 120. Students will understand that a two-digit number represents tens and ones. Students will use place value understanding to add and subtract numbers within 100. Students will apply these skills to help count and place fish in tanks appropriately at a pet store in the performance task.
Pacing	5 weeks

Essential Questions (and Corresponding Big Ideas)

Essential Question (Corresponding Big Idea)

1. Why do we count?

- Counting tells how many there are in a group regardless of their arrangement. The last number said when counting tells the total number of objects counted.

2. How are numerals (numbers) used?

- Numerals are the symbols we read and write to communicate quantities (numbers).

3. How does a numeral's position affect its value?

- One quantity is either greater than, less than or equal to other.

4. How do numbers show more or less?

- Numbers can be greater than, less than, and equal to other numbers.

5. Can numbers always be related to tens?

- Numbers can be formed in groups of tens and ones.

6. Why not always count by 1?

- There are many ways to count. (Including by ones, twos, fives, and tens)

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
1. NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral	**1.NBT.1** Students use objects, words, and/or symbols to express their understanding of numbers. They extend their counting beyond 100 to count up to 120 by counting by 1s. Some students may begin to count in groups of 10 (while other students may use groups of 2s or 5s to count). Counting in groups of 10 as well as grouping objects into 10 groups of 10 will develop students understanding of place value concepts.

	Students extend reading and writing numerals beyond 20 to 120. After counting objects, students write the numeral or use numeral cards to represent the number. Given a numeral, students read the numeral, identify the quantity that each digit represents using numeral cards, and count out the given number of objects.
1.NBT.2 Understand that two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of tens and ones – called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90, refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	**1.NBT.2** Students should experience counting from different starting points (e.g., start at 83; count to 120). To extend students' understanding of counting, they should be given opportunities to count backwards by ones and tens. They should also investigate patterns in the base 10 system. Understanding the concept of 10 is fundamental to children's mathematical development. Students need multiple opportunities counting 10 objects and "bundling" them into one group of ten. They count between 10 and 20 objects and make a bundle of 10 with or without some left over (this will help students who find it difficult to write teen numbers). Finally, students count any number of objects up to 99, making bundles of 10s with or without leftovers.
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 <	**1. NBT.3** As students are representing the various amounts, it is important that an emphasis is placed on the language associated with the quantity. For example, 53 should be expressed in multiple ways such as 53 ones or 5 groups of ten with 3 ones leftover. When students read numbers, they read them in standard form as well as using place value concepts. For example, 53 should be read as "fifty-three" as well as five tens, 3 ones. Reading 10, 20, 30, 40, 50 as "one ten, 2 tens, 3 tens, etc." helps students see the patterns in the number system.
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.	**1.NBT.5** Students may use the document camera or interactive whiteboard to demonstrate their "bundling" of objects. This gives them the opportunity to communicate their thinking. Students use models that represent two sets of numbers. To compare, students first attend to the number of tens, then, if necessary, to the number of ones. Students may also use pictures, number lines,

	and spoken or written words to compare two numbers. Comparative language includes but is not limited to more than, less than, greater than, most, greatest, least, same as, equal to and not equal to. This standard requires students to understand and apply the concept of 10 which leads to future place value concepts. It is critical for students to do this without counting. Prior use of models such as base ten blocks, number lines, and 100s charts helps facilitate this understanding. It also helps students see the pattern involved when adding or subtracting 10. Examples: • 10 more than 43 is 53 because 53 is one more 10 than 43 • 10 less than 43 is 33 because 33 is one 10 less than 43 Students may use interactive versions of models (base ten blocks,100s charts, number lines, etc.) to develop prior understanding.
1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	**1.MD.4** Students create object graphs and tally charts using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students. Counting objects should be reinforced when collecting, representing, and interpreting data. Students describe the object graphs and tally charts they create. They should also ask and answer questions based on these charts or graphs that reinforce other mathematics concepts such as sorting and comparing. The data chosen or questions asked give students opportunities to reinforce their understanding of place value, identifying ten more and ten less, relating counting to addition and subtraction and using comparative language and symbols. Students may use an interactive whiteboard to place objects onto a graph. This gives them the opportunity to communicate and justify their thinking.

Standards for Mathematical Practice	Explanations and Examples
17. Make sense of problems and persevere in solving them	9. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
18. Reason abstractly and quantitatively	10. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
19. Construct viable arguments and critique the reasoning of others	11. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
20. Model with mathematics	12. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
21. Use appropriate tools strategically	13. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
22. Attend to precision	14. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their

23. Look for and make use of structure 24. Look for and express regularity in repeated reasoning	discussions with others and when they explain their own reasoning. 15. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.* 16. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards
(http://www.iste.org/standards/nets-for-students.aspx) *N/A*

K-U-D	
KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• Numbers to 120 • A number of objects can be represented with a numeral. • Two-digit numbers represent amounts of tens and ones (place value). • A comparison of two numbers is represented with the symbols =, <, or >. • A ten is a bundle of ten ones. • The teen numbers consist of a ten with additional ones	• Count (quantities up to 120.) • Represent (numbers in multiple ways, including words, models, and numerals.) • Compare (two numbers by examining the amount of tens and ones in each number using words, models and symbols greater than (>), less than (<) and equal to (=).) • Identify and understand (numbers and their relation to other numbers using a 120 chart). • Compose and decompose (numbers from 11 to 19 into tens and some further ones.) • Represent and understand (numbers between 10 and 100 in terms of tens and ones.) • Mentally add and subtract (10 within 120 using place value strategies.) • Organize, represent and interpret (data using charts and tables). • Pose (questions with 3 possible responses and

	then interpret the data).

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand **that:**

- Counting tells how many there are in a group regardless of their arrangement. The last number said when counting tells the total number of objects counted.
- Numerals are the symbols we read and write to communicate quantities (numbers).
- One quantity is either greater than, less than or equal to other.
- Numbers can be greater than, less than, and equal to other numbers.
- Numbers can be formed in groups of tens and ones.
- There are many ways to count (including by ones, twos, fives, and tens)

Unit Assessment/Performance Task	DOK
In this task, students will be "hired" to work at a friend's pet store for the day. A fish delivery will come. Students must count to find the total number of fish that the store has in stock and then appropriately place the fish into new fish tanks. At the end of the day, students will compare the number of fish to the number of hamsters in the pet store and explain their thinking to prove that their answer is correct.	2

Vocabulary

Numeral, Digit, Place value, Tens, Ones, Value, Trading, Regroup, Greater than, Less than, Equal to, Pattern, Expanded form, Compare, Compose, Decompose, Counting on

Vocabulary Cards can be found at:
http://www.graniteschools.org/depart/teachinglearning/curriculuminstruction/math/Pages/MathematicsVocabulary.aspx

Interdisciplinary Connections

- Teacher may state page numbers by using tens and ones to represent the number
- Science: Collecting data, counting, and graphing

Writing

- Journaling responses/reasoning with word problems
- Writing word problems
- Writing riddles

Reading

- Listening to, comprehending and discussing suggested read-alouds and how they relate to the featured math concepts

Suggested Formative Assessment Practices/Processes
Counting - Teacher cuts apart numeral cards and places cards face down in front of student. Students will flip a card and reads the number and counts on from the number until instructed to stop. Comparison of numbers – On an exit slip, students will write the numbers modeled by base 10 blocks, and draw the <,>, = between the numbers. Exit slip will include one of each type of comparison. Relationships between numbers – Students will complete an empty section of the number grid that asks them to apply their knowledge of 10 more, 10 less, 1 more, 1 less than the given number. Representation of numbers - On an exit slip, students will match numbers with models of numbers from 1 – 100. Mental math – Teacher cuts apart numeral cards and places cards face down in front of student. Student will flip a card and tells teacher 10 more, 10 less, 1 more, 1 less several times each. Student will explain how each answer was achieved.

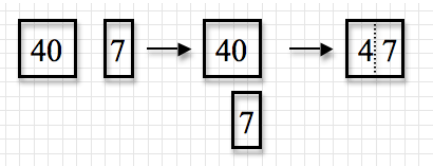
Grade/Subject	Grade 1/ Math
Unit Title	Unit 4: Exploring Addition and Subtraction within 100
Overview of Unit	The conceptual focus of this unit is place value understandings that support addition and subtraction within 100. Students will learn how to represent numbers with manipulatives, compose and decompose numbers, compare numbers, and develop mental math strategies in order to solve real world problems. Students will apply these skills in order to exchange tickets for prizes at a carnival.
Pacing	5 weeks

Essential Questions (and Corresponding Big Ideas)

Essential Questions:
How do mathematical understandings help solve problems?
How do we express a number?
Why do mathematicians need to determine the value of a number?

Big Ideas:
Problems can be solved using multiple tools and strategies within the base ten system.
Numbers can be composed and decomposed into parts and wholes in real world situations.
Our number system is organized by place value.

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
1.NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	**1.NBT.1**: Students use objects, words, and/or symbols to express their understanding of numbers. They extend their counting beyond 100 to count up to 120 by counting by 1s. Some students may begin to count in groups of 10 (while other students may use groups of 2s or 5s to count). Counting in groups of 10 as well as grouping objects into 10 groups of 10 will develop students understanding of place value concepts. Students extend reading and writing numerals beyond 20 to 120. After counting objects, students write the numeral or use numeral cards to represent the number. Given a numeral, students read the numeral, identify the quantity that each digit represents using numeral cards, and count out the given number of objects.



Students should experience counting from different starting points (e.g., start at 83; count to 120). To extend students' understanding of counting, they should be given opportunities to count backwards by ones and tens. They should also investigate patterns in the base 10 system.

1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

CCSS.Math.Content.1.NBT.B.2a 10 can be thought of as a bundle of ten ones — called a "ten."

CCSS.Math.Content.1.NBT.B.2b The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.

CCSS.Math.Content.1.NBT.B.2c The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

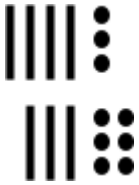
1.NBT.2: Understanding the concept of 10 is fundamental to children's mathematical development. Students need multiple opportunities counting 10 objects and "bundling" them into one group of ten. They count between 10 and 20 objects and make a bundle of 10 with or without some left over (this will help students who find it difficult to write teen numbers). Finally, students count any number of objects up to 99, making bundles of 10s with or without leftovers.

As students are representing the various amounts, it is important that an emphasis is placed on the language associated with the quantity. For example, 53 should be expressed in multiple ways such as 53 ones or 5 groups of ten with 3 ones leftover. When students read numbers, they read them in standard form as well as using place value concepts. For example, 53 should be read as "fifty-three" as well as five tens, 3 ones. Reading 10, 20, 30, 40, 50 as "one ten, 2 tens, 3 tens, etc." helps students see the patterns in the number system.

Students may use the document camera or interactive whiteboard to demonstrate their "bundling" of objects. This gives them the opportunity to communicate their thinking.

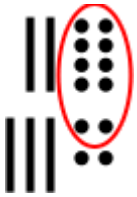
1.NBT.3: Students use models that represent two sets of numbers. To compare, students first attend to the

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 <. **1.NBT.4** Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	number of tens, then, if necessary, to the number of ones. Students may also use pictures, number lines, and spoken or written words to compare two numbers. Comparative language includes but is not limited to more than, less than, greater than, most, greatest, least, same as, equal to and not equal to. **1.NBT.4**: Students extend their number fact and place value strategies to add within 100. They represent a problem situation using any combination of words, numbers, pictures, physical objects, or symbols. It is important for students to understand if they are adding a number that has 10s to a number with 10s, they will have more tens than they started with; the same applies to the ones. Also, students should be able to apply their place value skills to decompose numbers. For example, 17 + 12 can be thought of 1 ten and 7 ones plus 1 ten and 2 ones. Numeral cards may help students decompose the numbers into 10s and 1s. Students should be exposed to problems both in and out of context and presented in horizontal and vertical forms. As students are solving problems, it is important that they use language associated with proper place value (see example). They should always explain and justify their mathematical thinking both verbally and in a written format. Estimating the solution prior to finding the answer focuses students on the meaning of the operation and helps them attend to the actual quantities. This standard focuses on developing addition - the intent is not to introduce traditional algorithms or rules. Examples: • 43 + 36 Student counts the 10s (10, 20, 30…70 or 1, 2, 3…7 tens) and then the 1s.

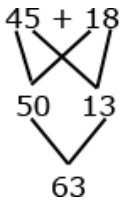


28
+34

Student thinks: 2 tens plus 3 tens is 5 tens or 50. S/he counts the ones and notices there is another 10 plus 2 more. 50 and 10 is 60 plus 2 more or 62.



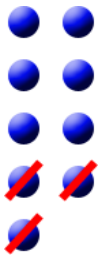
- 45 + 18
  Student thinks: Four 10s and one 10 are 5 tens or 50. Then 5 and 8 is 5 + 5 + 3 (or 8 + 2 + 3) or 13. 50 and 13 is 6 tens plus 3 more or 63.



- 29
  +14

  Student thinks: "29 is almost 30. I added one to 29 to get to 30. 30 and 14 is 44. Since I added one to 29, I have to subtract one so the answer is 43."

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. **1.NBT.6** Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or	**1.NBT.5**: This standard requires students to understand and apply the concept of 10 which leads to future place value concepts. It is critical for students to do this without counting. Prior use of models such as base ten blocks, number lines, and 100s charts helps facilitate this understanding. It also helps students see the pattern involved when adding or subtracting 10. Examples: • 10 more than 43 is 53 because 53 is one more 10 than 43 • 10 less than 43 is 33 because 33 is one 10 less than 43 Students may use interactive versions of models (base ten blocks,100s charts, number lines, etc) to develop prior understanding. **1.NBT.6**: This standard is foundational for future work in subtraction with more complex numbers. Students should have multiple experiences representing numbers that are multiples of 10 (e.g. 90) with models or drawings. Then they subtract multiples of 10 (e.g. 20) using these representations or strategies based on place value. These opportunities develop fluency of addition and subtraction facts and reinforce counting up and back by 10s. Examples: • 70 - 30: Seven 10s take away three 10s is four 10s • 80 - 50: 80, 70 (one 10), 60 (two 10s), 50 (three 10s), 40 (four 10s), 30 (five 10s) • 60 - 40: I know that 4 + 2 is 6 so four 10s + two 10s is six 10s so 60 - 40 is 20

zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	Students may use interactive versions of models (base ten blocks,100s charts, number lines, etc.) to demonstrate and justify their thinking.
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.[1]	**1.OA.1**: Contextual problems that are closely connected to students' lives should be used to develop fluency with addition and subtraction. Table 1 describes the four different addition and subtraction situations and their relationship to the position of the unknown. Students use objects or drawings to represent the different situations. • Take From example: Abel has 9 balls. He gave 3 to Susan. How many balls does Abel have now?  • Compare example: Abel has 9 balls. Susan has 3 balls. How many more balls does Abel have than Susan? A student will use 9 objects to represent Abel's 9 balls and 3 objects to represent Susan's 3 balls. Then they will compare the 2 sets of objects. Note that even though the modeling of the two problems above is different, the equation, 9 - 3 = ?, can represent both situations yet the compare example can also be represented by 3 + ? = 9 (How many more do I need to make 9?) It is important to attend to the difficulty level of the problem situations in relation to the position of the

1.OA.3 Apply properties of operations as strategies to add and subtract.[2] *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.)*	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 Unknown and versions of Bigger and Smaller Unknown (compare problems). Students may use document cameras to display their combining or separating strategies. This gives them the opportunity to communicate and justify their thinking. **1.OA.3**: Students should understand the important ideas of the following properties: • Identity property of addition (e.g., 6 = 6 + 0) • Identity property of subtraction (e.g., 9 – 0 = 9) • Commutative property of addition (e.g., 4 + 5 = 5 + 4) • Associative property of addition (e.g., 3 + 9 + 1 = 3 + 10 = 13) Students need several experiences investigating whether the commutative property works with subtraction. The intent is not for students to experiment with negative numbers but only to recognize that taking 5 from 8 is not the same as taking 8 from 5. Students should recognize that they will be working with numbers later on that will allow them to subtract larger numbers from smaller numbers. However, in first grade we do not work with negative numbers. **1.OA.6**: This standard is strongly connected to all the standards in this domain. It focuses on students being able to fluently add and subtract numbers to 10 and

	having experiences adding and subtracting within 20. By studying patterns and relationships in addition facts and relating addition and subtraction, students build a foundation for fluency with addition and subtraction facts. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. The use of objects, diagrams, or interactive whiteboards and various strategies will help students develop fluency.
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). **1.MD.4** Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	**1.MD.4:** Students create object graphs and tally charts using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students. Counting objects should be reinforced when collecting, representing, and interpreting data. Students describe the object graphs and tally charts they create. They should also ask and answer questions based on these charts or graphs that reinforce other mathematics concepts such as sorting and comparing. The data chosen or questions asked give students opportunities to reinforce their understanding of place value, identifying ten more and ten less, relating counting to addition and subtraction and using comparative language and symbols. Students may use an interactive whiteboard to place objects onto a graph. This gives them the opportunity to communicate and justify their thinking.
Standards for Mathematical Practice	**Explanations and Examples**
25. Make sense of problems and persevere in solving them	1. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve

	problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
26. Reason abstractly and quantitatively	2. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
27. Construct viable arguments and critique the reasoning of others	3. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
28. Model with mathematics	4. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
29. Use appropriate tools strategically	5. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
30. Attend to precision	6. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
31. Look for and make use of structure	7. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*

32. Look for and express regularity in repeated reasoning	8. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards
(http://www.iste.org/standards/nets-for-students.aspx) *N/A*

K-U-D	
KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• Counting, reading and writing two-digit numbers • Place value (groups of tens and ones) • Commutative and associative properties • Meaning of the equal sign in an equation • Unknown numbers in equations • Symbols for greater than, less than and equal to • Steps for composing and decomposing numbers (breaking apart or making tens) • Models of one and two-digit numbers (pictorial representation) • Steps to solve word problems • Multiples of ten • Representations of data • Addition and subtraction facts to and from 10 • Vocabulary (See Domain-Specific	• Count (to 120, starting at any number less than 120) • Read and write (numerals 1-120 and represent a number of objects with a written numeral) • Compare (two numbers by examining the amount of tens and ones in each number, using words, models and symbols >, <, or =) • Add and subtract (within 100 using concrete models, drawings and place value strategies) • Use (addition and subtraction within 20 to solve problems) • Solve (a word problem) • Use (a symbol for unknowns) • Use (objects to solve problems) • Use (drawings to solve problems) • Apply and explain (strategies used to determine solutions to problems) • Represent (two-digit numbers) • Represent (addition and subtraction with symbols in equation form) • Apply (properties of operations to solve for unknown numbers, in all positions, in addition and subtraction

Vocabulary section)	equations) • Compose and decompose(a number to develop addition and subtraction within 100 and fluently within 10) • Identify (10 more or 10 less of any given number using mental math strategies) • Subtract (multiples of 10 in the range 10-90) • Read and compare (information from a graph) • Pose and answer (questions to interpret data)

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand that:

- it is necessary to compose and decompose parts and wholes.
- problems can be solved using multiple tools and strategies.
- real world problems can be solved by using a variety of operations.

Vocabulary

Academic Vocabulary

apply	describe	record
analyze	explain	represent
build	identify	show
chart	illustrate	solve
choose	label	survey
compare	manipulate	value
data	model	write
demonstrate	organize	reasoning

Domain-Specific Vocabulary

add	digit	number sentence
subtract	multiples of 10	equivalent
difference	compare	strategies
sum	addend	equation
symbol	ones	number/numeral
place value	tens	

Unit-Specific Vocabulary

less than	data	tally chart
fewer than	t-chart	decompose
greater than	bar graph	compose
pictograph		

Interdisciplinary Connections

Reading

- Listening to, comprehending and discussing suggested read-alouds and how they relate to the featured math concepts
- Comprehending word problems

Writing

- Journaling responses/reasoning with word problems
- Writing word problems
- Writing riddles

Science

- Collecting, organizing and graphing data

Social Studies

- Seasonal-based themes
- Cooperative learning/partner games to reinforce community-themed topic

Art

- Draw word problems
- Making pictorial representations of two-digit numbers

Music

- Creation of mnemonics to remember symbols
- Write place value songs

Kinesthetic Learning

- Act out word problems
- Make large-scale hundred chart (perhaps in meeting space) on which students can stand in order to interact
- Build numbers with bodies
- Create place value dances

Suggested Formative Assessment Practices/Processes

- *Students will sort equations into a t-chart labeled true and false according to the accuracy of the equation.*
- *Students will make a number line 1-120.*
- *Students will model two digit numbers with base ten blocks.*
- *Students will complete story problems with two digit numbers.*
- *Students will create a bar graph with three categories and interpret the data.*
- *Properties of operations booklet*
- *Continual anecdotal notes during independent and collaborative work time.*
- *Students complete a "math exit slip" at the end of any lesson.*
- *Assessment of math journal*

Work Cited

Common Core State Standards Initiative. (2010). Common core state standards for English language arts & literacy in history/social studies, science, and technical subjects. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.

Common Core Standards Writing Team. (2013, March 1). Progressions for the Common Core State Standards in Mathematics (draft). Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

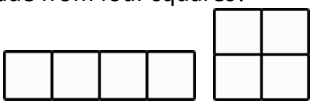
Van de Walle, J. A., Lovin, L. H., Karp, S. K., & Bay-Williams, J. M. (2014). *Teaching student-centered mathematics*, grades Pre-k-2. (Vol. 1). New Jersey: Pearson.

Georgia Department of Education Georgiastandards.org

Grade/Subject	Grade 1/Geometry
Unit Title	Unit 5: Defining attributes of 2D and 3D shapes
Overview of Unit	In this unit the focus of instruction is on understanding both 2 dimensional and 3 dimensional shapes and distinguishing them by their defining attributes. While building on their understanding of shapes, students will explore composing and decomposing shapes to make new shapes. The unit will culminate with the students designing a robot by drawing specified 2 dimensional shapes.
Pacing	2 weeks

Essential Questions (and Corresponding Big Ideas)
1. How are shapes alike and different? 2. How are shapes described and defined? 3. How can new shapes be created?

Core Content Standards	**Explanations and Examples** (Developed by Arizona DOE)
1.G.A.1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.	1.G. A.1 Attributes refer to any characteristic of a shape. Students use attribute language to describe a given two-dimensional shape: number of sides, number of vertices/points, straight sides, closed. A child might describe a triangle as "right side up" or "red." These attributes are not defining because they are not relevant to whether a shape is a triangle or not. Students should articulate ideas such as, "A triangle is a triangle because it has three straight sides and is closed." It is important that students are exposed to both regular and irregular shapes so that they can communicate defining attributes. Students should use attribute language to describe why these shapes are not triangles.  Students should also use appropriate language to describe a given three-dimensional shape: number of faces, number of vertices/points, number of edges. **Example**: • A cylinder may be described as a solid that has two circular faces connected by a curved surface (which is not considered a face). Students may say, "It looks like a can." Students should compare and contrast two-and three-dimensional figures using defining attributes. **Examples**: • List two things that are the same and two things that are different between a triangle and a cube. • Given a circle and a sphere, students identify the sphere as being three-dimensional but both are round.

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	• Given a trapezoid, find another two-dimensional shape that has two things that are the same. Students may use interactive whiteboards or computer environments to move shapes into different orientations and to enlarge or decrease the size of a shape still keeping the same shape. They can also move a point/vertex of a triangle and identify that the new shape is still a triangle. When they move one point/vertex of a rectangle they should recognize that the resulting shape is no longer a rectangle.
1.G.A.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. (Students do not need to learn formal names such as "right rectangular prism.")	1.G.A.2 The ability to describe, use and visualize the effect of composing and decomposing shapes is an important mathematical skill. It is not only relevant to geometry, but is related to children's ability to compose and decompose numbers. Students may use pattern blocks, plastic shapes, tangrams, or computer environments to make new shapes. The teacher can provide students with cutouts of shapes and ask them to combine them to make a particular shape. **Example**: • What shapes can be made from four squares?  Students can make three-dimensional shapes with clay or dough, slice into two pieces (not necessarily congruent) and describe the two resulting shapes. For example, slicing a cylinder will result in two smaller cylinders.

Standards for Mathematical Practice	Explanations and Examples
33. Make sense of problems and persevere in solving them	17. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
34. Reason abstractly and quantitatively	18. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
35. Construct viable arguments and critique the reasoning of others	19. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
36. Model with mathematics	20. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or

	list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
37. Use appropriate tools strategically	21. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
38. Attend to precision	22. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
39. Look for and make use of structure	23. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*
40. Look for and express regularity in repeated reasoning	24. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards
(http://www.iste.org/standards/nets-for-students.aspx) *N/A*

K-U-D	
KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• 2d shapes • 3d shapes • Open/closed figures • Circle • Half circle • Quarter circle • triangle • Square • Rectangle • Trapezoid • hexagon • sides • vertices • angles	• identify (2d and 3d shapes) • Name (2d and 3d shapes) • Identify (defining and non-defining attributes) • Sort and define shapes (using defining attributes) • Build and draw shapes (according to their defining attributes) • Compare (shapes) • Compose(new shapes using known 2d shapes) • Compose (new shapes using known 3d shapes) • Decompose (complex 2d and 3d shapes to find known shapes)

• defining attributes • non-defining attributes • faces • compose/decompose • cone • cube • cylinder • rectangular prism	

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand **that**

- Our world is made up of shapes that can be recognized by defining attributes
- The properties of shapes make them alike or different
- New shapes can be made from composing/decomposing complex shapes.

Unit Assessment/Performance Task	DOK
In this task, students are hired by Futures INC., a robot designing company. Students must follow guidelines from their boss to design and draw a robot using and composing specified 2 dimensional shapes. Then students must convince their boss that they were able to draw squares accurately by identifying defining attributes.	

Vocabulary

Shape
Two-dimensional shape
Three-dimensional shape
Compose
Decompose
Attribute
Closed figure
Open figure
Side
Vertex/vertices
Face
Circle
Triangle
Trapezoid
Square
Rectangle
Hexagon
Half-circle

Quarter-circle
Cone
Cube
Cylinder
Rectangular prism

Interdisciplinary Connections

Science: Students take a nature walk and observe/ record 2d and 3d shapes that they see in nature

Computer/technology: students use a drawing app/ game (ex. http://www.coloring4all.com/drawing_game_online.htm) to make a scene using 2d and 3d shapes. Student can print their pictures and label them to show the shapes they used.

Language arts: read literature cited in the literature section. Discuss to ensure comprehension

Work Cited

Common Core State Standards Initiative. (2010). Common core state standards for English language arts & literacy in history/social studies, science, and technical subjects. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.

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Clements, Douglas, Sarama, Julie, Learning and Teaching Early Math: The Learning Trajectories Approach (Studies in Mathematical Thinking and Learning Series) (2009)

Georgia Department of Education Georgiastandards.org

Mentoring Minds (2013). Motivation Math: Teacher Addition

Mentoring Minds (2013). Motivation Math: Student Addition

Grade/Subject	Grade 1/Math
Unit Title	Unit 6: Partitioning Circles and Rectangles
Overview of Unit	This geometry unit is focused on partitioning shapes into equal shares. While throughout the unit, students will understand how to partition various shapes and sets into equal shares, CCSS focus for grade 1 calls for students to understand how to partition circles and rectangles into halves and fourths. The culminating task in this unit requires students to design a birthday cake that is partitioned, and frosted, in equal shares so that each family member can have a piece with his/her favorite frosting.
Pacing	2 weeks

Essential Questions (and Corresponding Big Ideas)
4. What does it mean to have equal shares and how can we define this? 5. How can a quantity be shared? 6. Why is it important to divide into equal parts?

Core Content Standards	**Explanations and Examples** (Developed by Arizona DOE)
1.G.A.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.	1.G. A.1 Students need experiences with different sized circles and rectangles to recognize that when they cut something into two equal pieces, each piece will equal one half of its original whole. Children should recognize that halves of two different wholes are not necessarily the same size. Also they should reason that decomposing equal shares into more equal shares results in smaller equal shares. **Examples**: • Student partitions a rectangular candy bar to share equally with one friend and thinks "I cut the rectangle into two equal parts. When I put the two parts back together, they equal the whole candy bar. One half of the candy bar is smaller than the whole candy bar."  • Student partitions an identical rectangular candy bar to share equally with 3 friends and thinks "I cut the rectangle into four equal parts. Each piece is one fourth of or one quarter of the whole candy bar. When I put the four parts back together, they equal the whole candy bar. I can compare the pieces (one half and one fourth) by placing them side-by-side. One fourth of the candy bar is smaller than one half of the candy bar.  • Students partition a pizza to share equally with three friends. They recognize that

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	they now have four equal pieces and each will receive a fourth or quarter of the whole pizza. 

Standards for Mathematical Practice	Explanations and Examples
41. Make sense of problems and persevere in solving them	25. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
42. Reason abstractly and quantitatively	26. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
43. Construct viable arguments and critique the reasoning of others	27. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
44. Model with mathematics	28. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
45. Use appropriate tools strategically	29. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
46. Attend to precision	30. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
47. Look for and make use of structure	31. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two*

48. Look for and express regularity in repeated reasoning	*numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.* 32. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards

(http://www.iste.org/standards/nets-for-students.aspx)

N/A

K-U-D

KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• Equal shares • Half of • halves • fourth of • fourths • quarter of • quarters • whole • circle • rectangle • whole	• identify (equal shares) • identify (unequal shares) • identify and represent (halves) • identify and represent (fourths) • partition (shapes into halves) • partition (shapes into fourths) • Name (fractional parts as fourths, quarters, a fourth of) • Name (fractional parts as halves, half of) • Identify (a whole as two halves) • Identify (a whole as four fourths)

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand **that**

- Shapes can be partitioned into fractional parts or equal shares.
- When a shape is partitioned to show a fraction, all shares must be equal.
- Two halves and four fourths are equivalent to one whole

Vocabulary

Equal shares
Half of
Halves
Fourth of
Fourths
Quarter of
Quarters
Whole

Interdisciplinary Connections
Science: Take a walk and find objects in nature (or in school) that are partitioned into equal parts Language arts: read literature cited in the literature section. Discuss to ensure comprehension

Suggested Formative Assessment Practices/Processes
Show students different shapes, some cut into equal parts and some cut into unequal parts. Have student sort shapes into shapes partitioned equally and unequally. Show students shapes cut into 2 and 4 parts (not all equal). Students find the shapes that are cut into halves and fourths and sort. Students explain why they did not choose all shapes (some are not cut into equal parts and therefore do not illustrate fractions) Give students a circle and a rectangle. Ask students to show and label fourths and halves.

Work Cited

Common Core State Standards Initiative. (2010). Common core state standards for English language arts & literacy in history/social studies, science, and technical subjects. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.

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Georgia Department of Education Georgiastandards.org

Mentoring Minds (2013). Motivation Math: Teacher Addition

Mentoring Minds (2013). Motivation Math: Student Addition

Grade/Subject	Grade 1/Math
Unit Title	Unit 7: Measuring Length with Non-Standard Units
Overview of Unit	In this unit, the focus of instruction is on understanding and measuring length using non-standard units. Students will develop an understanding of length through comparing items and ordering them according to size (longest to shortest or shortest to longest). Students will also learn to measure objects using non-standard units and express an item's length as a whole number of units. The unit will culminate with the students serving as judges in a Fishing Derby. Students must measure the fish, award the winning ribbons and justify their thinking in a written statement.
Pacing	2 weeks

Essential Questions (and Corresponding Big Ideas)
7. Why is it important to measure the length of an object? Measurement affects our daily lives. We must have an understanding of length and measurement to be successful in daily situations (Will my car fit in this parking space? What size picture frame must I buy to hang my artwork?) 8. Why do different units give us different measurements of the same item? The study of measuring with non-standard units will emphasize the need to use a standardized system to be able to communicate the most accurate measurement to others. 9. How do you measure accurately?

Core Content Standards	**Explanations and Examples** (Developed by Arizona DOE)
1.MD.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.	**1.MD.1** In order for students to be able to compare objects, students need to understand that length is measured from one end point to another end point. They determine which of two objects is longer, by physically aligning the objects. Typical language of length includes taller, shorter, longer, and higher. When students use bigger or smaller as a comparison, they should explain what they mean by the word. Some objects may have more than one measurement of length, so students identify the length they are measuring. Both the length and the width of an object are measurements of length. **Examples for ordering**: • Order three students by their height • Order pencils, crayons, and/or markers by length • Build three towers (with cubes) and order them from shortest to tallest • Three students each draw one line, then order the lines from longest to shortest

Core Content Standards	Explanations and Examples (Developed by Arizona DOE)
	Example for comparing indirectly: • Two students each make a dough "snake." Given a tower of cubes, each student compares his/her snake to the tower. Then students make statements such as, "My snake is longer than the cube tower and your snake is shorter than the cube tower. So, my snake is longer than your snake." Students may use an interactive whiteboard or document camera to demonstrate and justify comparisons.
1.MD.2. Express the length of an object as a whole number of length units by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*	**1.MD.2** Students use their counting skills while measuring with non-standard units. While this standard limits measurement to whole numbers of length, in a natural environment, not all objects will measure to an exact whole unit. When students determine that the length of a pencil is six to seven paperclips long, they can state that it is about six paperclips long. **Example**: • Ask students to use multiple units of the same object to measure the length of a pencil. (How many paper clips will it take to measure how long the pencil is?)  Students may use the document camera or interactive whiteboard to demonstrate their counting and measuring skills.

Standards for Mathematical Practice	Explanations and Examples
49. Make sense of problems and persevere in solving them	33. In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
50. Reason abstractly and quantitatively	34. Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
51. Construct viable arguments and critique the reasoning of others	35. First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
52. Model with mathematics	36. In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical

	language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
53. Use appropriate tools strategically	37. In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
54. Attend to precision	38. As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
55. Look for and make use of structure	39. First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15,* then they also know *3 + 12 = 15. (Commutative property of addition.)* To add *4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*
56. Look for and express regularity in repeated reasoning	40. In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

ISTE Standards

(http://www.iste.org/standards/nets-for-students.aspx)

N/A

K-U-D

KNOW *Facts, formulas, information, vocabulary*	**DO** *Skills of the discipline, social skills, production skills, processes (usually verbs/verb phrases)* *Hint: Use the standards!*
• Length • Unit • Rules of measuring (no gaps, no overlays, same size units) • Longer/longest • Shorter/shortest • Taller/tallest • Order • Compare	• Order (objects by length) • Compare (length of objects indirectly) • Choose (non-standard tools that are the same size (all same size paperclips) and appropriate for the item to be measured) • Measure (using non-standard units with accurate placement and no gaps or overlays) • Express (length as whole number of non-standard units)

UNDERSTAND

Big ideas, generalizations, principles, concepts, ideas that transfer across situations

Students will understand **that**

- Measurement is important and relevant in daily life
- Length can be measured using any same-sized unit when lined up accurately.
- Different sized units will give us different measurement results. This will emphasize the reasoning for

standard units.

Unit Assessment/Performance Task	DOK
Students will serve as judges in a Fishing Derby, judging to see which fish is the longest. Students must measure each fish, award the winning ribbons (1st, 2nd, and 3rd prize) and justify their thinking in a written statement.	

Vocabulary	
Measurement	Longer/longest
Compare	Shorter/shortest
Length	Taller/tallest
Height	Units (non-standard)
Long	Tools

Interdisciplinary Connections

Science

- Measurement of plants or other topics that measurement can show growth or change

Language Arts

- Read literature cited in the literature section. Discuss to ensure comprehension

Work Cited

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