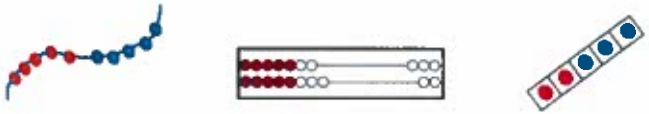
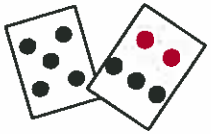
K.4 The student will

a) recognize and describe with fluency part-whole relationships for numbers up to 5; and

b) investigate and describe part-whole relationships for numbers up to 10.

Understanding the Standard	Essential Knowledge and Skills
• Computational fluency is the ability to think flexibly in order to choose appropriate strategies to solve problems accurately and efficiently. • Flexibility requires knowledge of more than one approach to solving a particular kind of problem. Being flexible allows students to choose an appropriate strategy for the numbers involved. • Composing and decomposing numbers flexibly forms a basis for understanding properties of the operations and later formal algebraic concepts and procedures. • Parts of 5 and 10 should be represented in a variety of ways, such as five frames, ten frames, strings of beads, arrangements of tiles or tooth picks, dot cards, or beaded number frames.  • Dot patterns should be presented in both regular and irregular arrangements. This will help students to understand that numbers are made up of parts, and will later assist them in combining parts as well as counting on.  • Numbers can be composed and decomposed using part-part-whole relationships (e.g., 4 can be decomposed as 3 and 1, 2 and 2, 4 and 0).  • Quickly recognizing and naming the number of objects in a small group without counting is called subitizing. The size of the group a student can subitize is dependent upon the arrangement of the dots or objects. At this age, students should subitize regular arrangements up to 5. • When students are able to combine or separate groups to create a number, they are building a foundation for addition and subtraction.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Recognize and describe with fluency part-whole relationships for numbers up to 5 in a variety of configurations. (a) • Investigate and describe part-whole relationships for numbers up to 10 using a variety of configurations. (b)

K.4 The student will

a) recognize and describe with fluency part-whole relationships for numbers up to 5; and

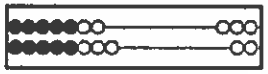
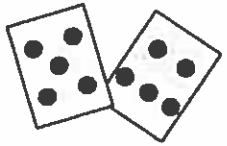
b) investigate and describe part-whole relationships for numbers up to 10.

Understanding the Standard	Essential Knowledge and Skills
• Benchmarks of 5 and 10 are essential in building place value knowledge through the understanding of decomposition of the numbers of 5 and 10. • Accuracy is the ability to determine a correct answer using knowledge of number facts and other important number relationships. • Efficiency is the ability to carry out a strategy easily when solving a problem without getting bogged down in too many steps or losing track of the logic of the strategy being used. • Mathematically fluent students are not only able to provide correct answers quickly but also to use facts and computation strategies they know to efficiently determine answers they do not know.	

1.7 The student will

a) recognize and describe with fluency part-whole relationships for numbers up to 10; and

b) demonstrate fluency with addition and subtraction within 10.

Understanding the Standard	Essential Knowledge and Skills
• Computational fluency is the ability to think flexibly in order to choose appropriate strategies to solve problems accurately and efficiently. • Flexibility requires knowledge of more than one approach to solving a particular kind of problem. Being flexible allows students to choose an appropriate strategy for the numbers involved. • Mathematically fluent students are not only able to provide correct answers quickly but also to use facts and computation strategies they know to efficiently determine answers that they do not know. • Composing and decomposing numbers flexibly forms a basis for understanding properties of the operations and later formal algebraic concepts and procedures. • Parts of numbers to 10 should be represented in different ways, such as five frames, ten frames, strings of beads, arrangements of tiles or tooth picks, dot cards, or beaded number frames.  • Dot patterns should be presented in both regular and irregular arrangements. This will help students to understand that numbers are made up of parts, and it will later assist them in combining parts as well as counting on.  • Accuracy is the ability to determine a correct answer using knowledge of number facts and other important number relationships. • Efficiency is the ability to carry out a strategy easily when solving a problem without getting bogged down in too many steps or losing track of the logic of the strategy being used. • Addition and subtraction should be taught concurrently in order to develop understanding of the inverse relationship.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Recognize and describe with fluency part-whole relationships for numbers up to 10 in a variety of configurations. (a) • Identify + as a symbol for addition, – as a symbol for subtraction, and = as a symbol for equality. (b) • Demonstrate fluency with addition and subtraction within 10. (b)

1.7 The student will

a) recognize and describe with fluency part-whole relationships for numbers up to 10; and

b) demonstrate fluency with addition and subtraction within 10.

Understanding the Standard	Essential Knowledge and Skills
• Manipulatives should be used to develop an understanding of addition and subtraction facts. • Automaticity of facts can be achieved through meaningful practice which may include games, hands-on activities, dot cards, and ten frames. • Subtraction is the inverse of addition. Subtraction can be viewed as a process of taking away or separating, or as a process of comparing two sets to determine the difference between them. • Provide practice in the use and selection of strategies. Encourage students to develop efficient strategies. Examples of strategies for developing the addition and subtraction facts include: – counting on; – counting back; – "one more than," "two more than"; – "one less than," "two less than"; – "doubles" (e.g., 2 + 2 =__; 3 + 3 =__); – "near doubles" (e.g., 3 + 4 = (3 + 3) + 1 = __); – "make ten" (7 + 4 can be thought of as 7 + 3 + 1 in order to make a ten)); – "think addition for subtraction" (e.g., for 9 – 5 = __, think "5 and what number makes 9?"); – use of the commutative property (e.g., 4 + 3 is the same as 3 + 4); – use of related facts (e.g., 4 + 3 = 7 , 3 + 4 = 7, 7 – 4 = 3, and 7 – 3 = 4); – use of the additive identity property (e.g., 4 + 0 = 4); and – use patterns to make sums (e.g., 0 + 5 = 5, 1 + 4 = 5, 2 + 3 = 5, etc.). • Students at this level are not expected to name the properties.	

2.5 The student will

a) recognize and use the relationships between addition and subtraction to solve single-step practical problems, with whole numbers to 20; and

b) demonstrate fluency with addition and subtraction within 20.

Understanding the Standard	Essential Knowledge and Skills
• Computational fluency is the ability to think flexibly in order to choose appropriate strategies to solve problems accurately and efficiently. • Addition and subtraction should be taught concurrently in order to develop understanding of the inverse relationship. • Concrete models should be used initially to develop an understanding of addition and subtraction facts. • Recognizing and using patterns and learning to represent situations mathematically are important aspects of primary mathematics. • An equation (number sentence) is a mathematical statement representing two expressions that are equivalent. It consists of two expressions, one on each side of an 'equal' symbol (e.g., 5 + 3 = 8, 8 = 5 + 3 and 4 + 3 = 9 - 2). • Equations may be written with sums and differences at the beginning of the equation (e.g., 8 = 5 + 3). • An equation can be represented using balance scales, with equal amounts on each side (e.g., 3 + 5 = 6 + 2). • An expression is a representation of a quantity. It contains numbers, variables, and/or computational operation symbols. It does not have an equal sign (e.g., 5, 4 + 3, 8 - 2). It is not necessary for students at this level to use the term 'expression.' • The patterns formed by related facts facilitate the solution of problems involving a missing addend in an addition sentence or a missing part in a subtraction sentence. • Provide practice in the use and selection of strategies. Encourage students to develop efficient strategies. Examples of strategies for developing the addition and subtraction facts include: – counting on; – counting back; – "one more than," "two more than";	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Recognize and use the relationship between addition and subtraction to solve single-step practical problems, with whole numbers to 20. (a) • Determine the missing number in an equation (number sentence) (e.g., 3 + ☐ = 5 or ☐ + 2 = 5; 5 – ☐ = 3 or 5 – 2 = ☐). (a) • Write the related facts for a given addition or subtraction fact (e.g., given 3 + 4 = 7, write 7 – 4 = 3 and 7 – 3 = 4). (a) • Demonstrate fluency with addition and subtraction within 20. (b)

2.5 The student will

a) recognize and use the relationships between addition and subtraction to solve single-step practical problems, with whole numbers to 20; and

b) demonstrate fluency with addition and subtraction within 20.

Understanding the Standard	Essential Knowledge and Skills
– "one less than," "two less than"; – "doubles" (e.g., 2 + 2 = ☐; 3 + 3 = ☐); – "near doubles" (e.g., 3 + 4 = (3 + 3) + 1 =☐); – "make 10" facts (7 + 4 can be thought of as 7 + 3 + 1 in order to make a 10); – "think addition for subtraction," (e.g., for 9 – 5 = ☐, think "5 and what number makes 9?"); – use of the commutative property-(e.g., 4 + 3 is the same as 3 + 4); – use of related facts (e.g., 4 + 3 = 7 , 3 + 4 = 7, 7 – 4 = 3, and 7 – 3 = 4); – use of the additive identity property (e.g., 4 + 0 = 4); and – use patterns to make sums (e.g., 0 + 5 = 5, 1 + 4 = 5, 2 + 3 = 5, etc.) • Grade two students should begin to explore the properties of addition as strategies for solving addition and subtraction problems using a variety of representations. • The properties of the operations are "rules" about how numbers work and how they relate to one another. Students at this level do not need to use the formal terms for these properties but should utilize these properties to further develop flexibility and fluency in solving problems. The following properties are most appropriate for exploration at this level: – The commutative property of addition states that changing the order of the addends does not affect the sum (e.g., 4 + 3 = 3 + 4). – The identity property of addition states that if zero is added to a given number, the sum is the same as the given number (e.g., 0 + 2 = 2). – The associative property of addition states that the sum stays the same when the grouping of addends is changed (e.g., 4 + (6 + 7) = (4 + 6) + 7). • Addition and subtraction problems should be presented in both horizontal and vertical written format. • Models such as 10 or 20 frames and part-part-whole diagrams help develop an understanding of relationships between equations and operations.	