Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from

Standard K.OA.1 Represent addition and subtraction with objects, fingers, mental images, simple drawings, or sounds. For example, use clapping, act out situations, and use verbal explanations, expressions, or equations.

Key Elements:
Students act out adding and subtracting situations by representing quantities in the situation in a variety of ways. To do this, students must mathematize a real-world situation focusing on the quantities and their relationships rather than the non-mathematical aspects of the situation. Student math drawings preserve the mathematical thinking that occurred and enable discussion. These concrete methods that show all of the objects are called Level 1 methods. When students make up their own problems and explain their representation and solutions, they are able to develop informal and formal mathematical vocabulary.

Addition and Subtraction situations by grade level

	Result Unknown	Change Unknown	Start Unknown
Add To	*A* bunnies sat on the grass. *B* more bunnies hopped there. How many bunnies are on the grass now? $A + B = \_$	*A* bunnies were sitting on the grass. Some more bunnies hopped there. Then there were *C* bunnies. How many bunnies hopped over to the first *A* bunnies? $A + \_ = C$	Some bunnies were sitting on the grass. *B* more bunnies hopped there. Then there were *C* bunnies. How many bunnies were on the grass before? $\_ + B = C$
Take From	*C* apples were on the table. I ate *B* apples. How many apples are on the table now? $C - B = \_$	*C* apples were on the table. I ate some apples. Then there were *A* apples. How many apples did I eat? $C - \_ = A$	Some apples were on the table. I ate *B* apples. Then there were *A* apples. How many apples were on the table before? $\_ - B = A$

	Total Unknown	Both Addends Unknown[1]	Addend Unknown[2]
Put Together/ Take Apart	*A* red apples and *B* green apples are on the table. How many apples are on the table? $A + B = \_$	Grandma has *C* flowers. How many can she put in her red vase and how many in her blue vase? $C = \_ + \_$	*C* apples are on the table. *A* are red and the rest are green. How many apples are green? $A + \_ = C$ $C - A = \_$

Darker shading indicates the four Kindergarten problem subtypes. Grade 1 and 2 students work with all subtypes and variants. [1]This can be used to show all decompositions of a given number, especially important for numbers within 10. Equations with totals on the left help children understand that = does not always mean "makes" or "results in" but always means "is the same number as." Such problems are not a problem subtype with one unknown, as is the Addend Unknown subtype to the right. These problems are a productive variation with two unknowns that give experience with finding all of the decompositions of a number and reflecting on the patterns involved. [2]Either addend can be unknown; both variations should be included.

Add To with Result Unknown and Take From with Result Unknown highlight situations that are action oriented. These situations are easily modeled. The situations start with an amount (Example: 5 bunnies). The amount then changes either by adding to or taking from the initial amount (Example: 3 bunnies are added for a result of 8 bunnies; or 3 bunnies hop away for a result of 2 bunnies). The final result is the unknown amount. Students work with small numbers first. This allows them to use the count on and count back strategy. As students develop a greater understanding of the count sequence and one-to-one correspondence with larger numbers students can work with larger numbers.

In Put Together/Take Apart situations students compose and decompose items depending on the unit given. There is not an actual action that occurs, but an abstract joining of two subcategories (for example seeing boys and girls as children, or seeing two different color groups by the defining characteristic of the main group.)
Or thinking about a number as part of a set. (Example 1: a Set number of students, identify how many of them are girls, identify how many are boys?; Example 2: Set of colored marbles, how many are green? How many are blue?)

Methods used for solving single-digit addition and subtraction problems

Level 1. Direct Modeling by Counting All or Taking Away. Represent situation or numerical problem with groups of objects, a drawing, or fingers. Model the situation by composing two addend groups or decomposing a total group. Count the resulting total or addend.

Level 2. Counting On. Embed an addend within the total (the addend is perceived simultaneously as an addend and as part of the total). Count this total but abbreviate the counting by omitting the count of this addend; instead, begin with the number word of this addend. Some method of keeping track (fingers, objects, mentally imaged objects, body motions, other count words) is used to monitor the count.

For addition, the count is stopped when the amount of the remaining addend has been counted. The last number word is the total. For subtraction, the count is stopped when the total occurs in the count. The tracking method indicates the difference (seen as an unknown addend).

Level 3. Convert to an Easier Problem. Decompose an addend and compose a part with another addend.

See Appendix for examples and further details.

Please Note:

- Kindergarten is within 10 and First grade is within 20
- Kindergarten and First grade involves only one-step word problems

Progression of Word Problems:

1. Practice with manipulatives
2. Use pictures or models
3. Do equations (they should understand the concept from using manipulatives and pictures before they do equations.