THEME: Addition and Subtraction Strategies

OERATIONS AND ALGEBRAIC (OA)

Represent and solve problem involving addition and subtraction

1.OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

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

1.OA.3 Apply properties of operations as strategies to add and subtract. For example, if 8 + 3 = 11, then 3 + 8 = 11 is also known. (Commutative Property of Addition); to add 2 + 6 + 4 = 2 + 10 = 12 (Associative Property of Addition). Students need not use formal terms for these properties.

Add and subtract within 20.

1.OA.5 Relate counting to addition and subtraction, e.g., by counting on 2 to add 2.

1.OA.6 Add and subtract within 20, demonstrating fluency with various strategies for addition and subtraction within 10. Strategies may include 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.

Work with addition and subtraction

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.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 + __

Commentary:

As students solve problems with addition and subtraction, they are connecting the counting they did in kindergarten to adding and subtracting numbers. Work with models such as ten frames and linking cubes support the strategy of using ten as a benchmark to solve addition and subtraction problems within 20 by decomposing and composing addends. Experiences in the order of addends is reversed establishes a fundamental property (commutative) of addition and later multiplication. The order of the addends does not change the total (sum). Students explore and use patterns they see to begin to develop an understanding of important properties of addition and subtraction.

First grade students continue to explore and make sense out of number combinations to 20, beginning with extending counting strategies to a larger range of numbers. Through carefully planned experiences, more sophisticated strategies become apparent. For example, once students know doubles in addition, they can begin to work with examples that can be modeled using doubles plus 1 or 2 more (3 + 4 can be thought of as 3 + 3 + 1). Students should have many opportunities to model, draw conclusions, and share their thinking in order to deeply understand and make use of these strategies. Questions posed by the teacher can help students to move from concrete models and pictures to equations and using strategies to practice basic facts.

Students explore solutions to problems using materials such as counters and five and ten frames to model various situations. They develop understanding of each problem situation (Table 1) over time. Problems should include addition and subtraction examples in which the numbers range up to a total (sum) of 20.

It is critical that students understand that the equal sign (=) represents a relationship and not an action. Reading "=" as same as rather than equals is one way to reinforce this important concept.

Instructional Resources

Math Expressions: Unit 1 (Sections: 1.1 – 1.9); Unit 2 (Sections 2.1 – 2.16)

Manipulatives: Student Math White Boards, Hundreds Chart, two-color counters, ten frames, Dot cards, Open number line, Part-Part-Whole chart, Place Value Chart and Dice (1-6, 1-10)

Achieve The Core Fluency Resource

Digital: Think Central – Soar to Success for Below Level and Mega Math for On Level

Differentiated Instructional Activities: Pages: 7, 13, 23, 33, 41, 49, 57, 67, 73, 83, 89, 95, 101, 107, 115, 121, 127, 131, 139, 145, 151, 157, 167, 171 and 177

Assessment Resources

Unit 1: Quick Quiz 1, and 2

Unit 1 Assessment Form A and Form B

Unit 2: Quick Quiz 1, 2, 3, and 4

Unit 2 Assessment Form A and Form B

Formative: "Check for Understanding embedded in each lesson.

Addressing Student Misconceptions and Common Errors

1.OA.1

The vocabulary of comparison situations can cause confusion for students. While the words more than implies addition and fewer than implies subtraction, in comparison situations, that is not always the case. Look at this example:

Patty has 16 tickets for the raffle. She has 8 fewer than Marcus. How many tickets does Marcus have?

Although the problem includes the word fewer, a student would actually add 16 + 8 to find the solution. Modeling with concrete objects to use the information by showing Patty's tickets and 8 more will help students realize that this is actually an addition problem.

Addressing Student Misconceptions and Common Errors Cont.

1.OA.3

Although subtraction is not commutative, it is important not to contribute to a potential student misconception by saying that you cannot take a larger number from a smaller number. It is appropriate to say that $8 - 5 \neq 5 - 8$.

It is possible to take a larger number from a smaller number. The result will be a negative number. Integers are not introduced until middle school.

1.OA.5

Watch for students who may double count a number when adding or subtracting. This may occur with physical objects, pictures or using a hundreds chart. For example, if a student is adding 6 + 4, she may begin with the 6 (6, 7, 8, 9) with a result of 9 rather than counting on to the 6 (7, 8, 9, 10). The same may happen in subtraction. If a student is counting to subtract 8 – 5, he may count the 8 as part of the count (8, 7, 6, 5, 4) with a result of 4 rather than subtracting from the 8 (7, 6, 5, 4, 3) to get the accurate amount. Not only should this be pointed out to students, but it is essential also to provide more explicit experiences with concrete materials in which students are adding on the given addend or subtracting from the total.

1.OA.6

Continue to watch for students who are double counting a number when adding or subtracting.

1.OA.7

Some students may develop the misconception that the equal sign indicates the answer comes next to calls for the action of doing the mathematical operation. When students use calculators, pressing the equal key results in the answer, which can also cause this misconception. Students should have experiences early on that reinforce that the equal sign indicates both sides of the equation represent the amount. Using a balance scale or picture of a balance scale with the equal sign on the center helps students to understand that the equal sign on the enter helps students understand that the equal sign means both sides are balanced. As teachers model writing equations or give students examples to solve, it is important to repeat that the equal sign means “the same as.” It is appropriate in early experiences using the equal sign to have students read it as “is the same as.” For example, students would read 10 – 7 = 3 as “10 minus 7 is the same as 3.”

Addressing Student Misconceptions and Common Errors Cont.

1.OA.8

Although students may be able to model problem situations with materials and pictures, the transition to writing equations using symbols may be more difficult for them, particularly when their reasoning requires finding a missing addend. Asking students to explain their reasoning as they solve the problem with materials will help them to connect what they have done with the materials to the symbolic equation. Be sure that students have multiple experiences solving equations in which the unknown is in different positions.

3 + 8 = __ 3 + ___ = 11 ___ + 3 = 11 11 – 3 = ___ 11 - __ = 8 __ - 3 = 8

Source: The Common Core Mathematics Companion: The Standards Decoded (What They Say, What They Mean, How to Teach Them)
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