Grade 2 Mathematics, Quarter 4 Unit 4.2

Addition and Subtraction: Problem Solving and Fluency

Overview

Number of Instructional Days: **10** (1 day = 45-60 minutes)

Content to Be Learned	Mathematical Practices to Be Integrated
• Use strategies to solve one and two-step addition and subtraction problems within 100. • Use visual models and equations to represent and solve problems. • Fluently add and subtract within 20 using mental strategies (see 1.OA.6 standard) • Know from memory all sums of two one-digit numbers. • Fluently add and subtract within 100 using place value strategies, properties of operations and the relationship between addition and subtraction. • Add and subtract within 1,000 using strategies, drawings and concrete models. • Know how to compose and decompose tens and hundreds when adding and subtracting.	**1. Make sense of problems and persevere in solving them.** • Devise a strategy and execute a plan to solve problems. • Determine if results are accurate by checking your work. **6. Attend to precision.** • Compute accurately and efficiently when adding and subtracting. • Check answers by using a different strategy or the relationship between addition and subtraction. • Know sums of all sums of two one-digit numbers. **7. Look for and make use of structure.** • Compose and decompose numbers to solve addition and subtraction problems.

Essential Questions	
• What strategies do you use to solve word problems? • Why is it important to be fluent with operations? • Why is it important to know more than one strategy for addition and subtraction? • How do place value strategies help you solve problems more efficiently?	• What strategies can help you add and subtract numbers? • When would you have to compose a ten or hundred when adding? • When would you have to decompose a ten or hundred when subtracting?

Written Curriculum

Common Core State Standards for Mathematical Content

Operations & Algebraic Thinking 2.OA

Represent and solve problems involving addition and subtraction.
1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]

Add and subtract within 20.
2. Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers.

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[1] See Glossary, Table 1.
[2]See standard 1.OA.6 for a list of mental strategies.

Number & Operations in Base Ten 2.NBT

Use place value understanding and properties of operations to add and subtract.
5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
7. Add and subtract within 1000, 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. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Common Core Standards for Mathematical Practice

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

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

7. Look for and make use of structure.

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

Clarifying the Standards

Prior Learning

Grade 1 Critical Area:
Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

Operations & Algebraic Thinking 1.OA

Represent and solve problems involving addition and subtraction.
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]
Add and subtract within 20.
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] See Glossary, Table 1.

Current Learning

Grade 2 Critical Area:
In grade 2, students fluently add and subtract within 20 using mental strategies. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

Future Learning

In grade 3, students become fluent with addition and subtraction within 1000. This standard is additional content. The primary focus of grade 3 is the development of multiplication and division. These operations can be connected to repeated addition and subtraction.

Number & Operations in Base Ten 3.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.[1]
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Additional Findings

Valuable information can be gained from accessing the following resources:

CCSS Progression Documents:
http://ime.math.arizona.edu/progressions/

Arizona's College and Career Ready Standard (provides examples of each standard):
http://www.azed.gov/azccrs/mathstandards/k-2/

PARCC Model Content Frameworks (K-2):
http://parcconline.org/parcc-model-content-frameworks