Teacher Guide to Clarification

**2.NBT.6**

**Use place value understanding and properties of operations to add and subtract.**

2.NBT.6 Add up to four two-digit numbers using strategies based on place value strategies and properties of operations**.**

**Addition of four two-digit numbers using Place Value Strategies and Properties of Operations**

Students at this grade level will be working on combining up to four two-digit numbers using different strategies. It is important for students to be able to add numbers based on place value and properties of operations.

Place Value strategies would include but are not limited to:

* Combining tens and ones
* Counting up by tens and then by ones
* Decomposing and composing to make a ten
* Using base-ten blocks or pictures of base-ten blocks

Properties of Operation strategies would include but not limited to:

* Associative Property – rearranging numbers to get closer to a ten or hundred. When three or more numbers are added, the sum is the same regardless of the grouping of addends. Ex. 36 + 14 + 12 = (36 + 14 ) + 12 students would group 36 and 14 to make 50 and then add the 12.
* Commutative Property – the sum is the same regardless of the order of the addends. This can be used in true or false equations 12 + 24 + 36 = 70 + 2

At this grade level it is not important to know the Property Names but to know how to rearrange addition problems to make the problem more manageable and utilize the strategies

Check out the examples from FLIPBOOKS



Kansas Association of Teachers of Mathematics (KATM) Flipbooks. Questions or to send feedback: melisa@ksu.edu. Retrieved from: <http://katm.org/wp/wp-content/uploads/flipbooks/2FlipBookedited.pdf>

Have students continue to use Place Value Strategies and Properties of Operations to add numbers. Now students can build upon what they know about decomposing, making 10 and using properties of operations such as the Associative, Distributive and Commutative properties.

Feel free to work your way up to these kinds of problems. Perhaps start with 3 two-digit numbers. These examples are expectations of mastery.

Examples of four two-digit addition:

*These numbers are chosen strategically 78 + 34 + 41 + 12*

**Student 1 Place Value and Making 10 Student 2 Associative Property**

70 + 30 + 40 + 10 78 + 34 + 41 + 12

I can think of it as 70 + 30 which = 100 78 + 12 = 90

and 40 + 10 which equals 50 34 + 41 = 75

So 150 plus my ones 90 + 75 =

8 + 4 + 1 + 2 90 + 10 + 65 = 165

I can see 8 + 2 = 10 and 4 + 1 = 5

So 150 plus 10 plus 5

The answer is 165

**Coherence and Connections: Need to Know**

|  |  |  |
| --- | --- | --- |
| Below Grade Level | At Grade Level | Above Grade Level |
| 1.NBT.21.NBT.4 | **2.NBT.6**2.NBT.12.NBT.7 | 3.NBT.2 |

**Strategies and Algorithms**

The Standards distinguish strategies from algorithms.\* For example, students use strategies for addition and subtraction in Grades K-3, but are expected to fluently add and subtract whole numbers using standard algorithms by the end of Grade 4. Use of the standard algorithms can be viewed as the culmination of a long progression of reasoning about quantities, the base-ten system, and the properties of operations. This progression distinguishes between two types of computational strategies: special strategies and general methods. For example, a special strategy for computing 398 + 17 is to decompose 17 as 2 + 15, and evaluate (398 + 2) + 15. Special strategies either cannot be extended to all numbers represented in the base-ten system or require considerable modification in order to do so. A more readily generalizable method of computing 398 + 17 is to combine like base-ten units. General methods extend to all numbers represented in the base-ten system. A general method is not necessarily efficient. For example, counting on by ones is a general method that can be easily modified for use with finite decimals. General methods based on place value, however, are more efficient and can be viewed as closely connected with standard algorithms.

Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common
 Core State Standards in Mathematics(draft). K-5 Number and Operations in Base 10.* Tucson, AZ: Institute for Mathematics and Educations, University of Arizona.

**Computation strategy.** Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another. See also: computation algorithm.

**Computation algorithm.** A set of predefined steps applicable

to a class of problems that gives the correct result in every case

when the steps are carried out correctly. See also: computation

strategy.

**Check out these definitions from the Progression Documents NBT. Pg. 3. It is important to understand the difference between algorithm and strategy. Both are important for our students to know.**

**Use place value understanding and properties of operations to add and subtract**

Students become fluent in two-digit addition and subtraction (2.NBT.5, **2.NBT.6**). Representations such as manipulative materials and drawings may be used to support reasoning and explanations about addition and subtraction with three-digit numbers. When students add ones to ones, tens to tens, and hundreds to hundreds they are implicitly using a general method based on place value and the associative and commutative properties of addition.

Drawings and diagrams can illustrate the reasoning repeated in general methods for computation that are based on place value. These provide an opportunity for students to observe this regularity and build toward understanding the standard addition and subtraction algorithms required in Grade 4 as expressions of repeated reasoning (MP.8). At Grade 2, composing and decomposing involves an extra layer of complexity beyond that of Grade 1. This complexity manifests itself in two ways. First, students must understand that a hundred is a unit composed of 100 ones, but also that it is composed of 10 tens. Second, there is the possibility that both a ten and a hundred are composed or decomposed. For example, in computing 398 + 7 a new ten and a new hundred are composed. In computing 302 - 184, a ten and a hundred are decomposed.

Common Core Standards Writing Team. (2013, September 19). *Progressions for the Common
 Core State Standards in Mathematics(draft). K-5 Number and Operations in Base 10.* Tucson, AZ: Institute for Mathematics and Educations, University of Arizona.

FYI:

2.NBT.6 is from the 2.NBT.B cluster

**Examples of Major Within-Grade Dependencies**

* Understanding place value (cluster 2.NBT.A) is the foundation for using place value understanding and the properties of operations to add and subtract (cluster 2.NBT.B). (Mastery of the two clusters can grow over time in tandem with one another.) Adding and subtracting within 1,000 (2.NBT.B.7) involves adding or subtracting hundreds with hundreds, tens with tens and ones with ones, sometimes composing or decomposing tens or hundreds. These ideas and methods rest on an understanding of the place value units (2.NBT.A.1, building on 1.NBT.A.2).

*PARCC Draft Model Content Frameworks: Mathematics Grades K-2* (2013, December).
 Retrieved May 10, 2014, from <http://parcconline.org/sites/parcc/files/PARCCMCFMathematicsNovember2012V3_FINAL_0.pdf>

**Classroom Resources**

Use the Power Point to have discussions about how students think to add four 2-digit numbers.

**HOT Questions**

1. I added the following numbers to get a total sum. Is this correct? Show how you might solve this addition problem.

48 + 24 + 12 + 26

I combined 48 + 12 to get 60

I combined 24 + 26 to get 50

My total sum is 120

1. I want to use what I know about place value. How can place value help me to solve the following problem? Find the total.

47 + 38 + 26 + 16

1. True or False – How do you know?

65 + 12 + 15 + 8 = 80 + 20

1. What number would make this equation true? How did you solve it?

34 + ? + 25 + 15 = 90

**Additional Resources**

Illustrative Mathematics
<https://www.illustrativemathematics.org/illustrations/755>

Inside Mathematics
<http://www.insidemathematics.org/common-core-math-tasks/2nd-grade/2-2009%20Apple%20Farm%20Field%20Trip.pdf>

<http://www.insidemathematics.org/common-core-math-tasks/2nd-grade/2-2008%20Pocket%20Money.pdf>

Hawaii Tasks
<http://standardstoolkit.k12.hi.us/common-core/mathematics/mathematics-assessments/mathematics-grade-2-assessments/>

Learnzillion

<https://learnzillion.com/lessons/2784-add-up-to-four-2-digit-numbers-by-making-a-ten>