New York State Next Generation Mathematics Learning Standards Unpacking Document (DRAFT)

GRADE: 1	DOMAIN: Operations and Algebraic Thinking

CLUSTER: Represent and solve problems involving addition and subtraction.
Students develop strategies for adding and subtracting whole numbers based on their prior work with composing and decomposing numbers. They use a variety of models, including discrete objects and length-based models (e.g., Unifix cubes), to solve add-to, take-from, put-together, take-apart, and compare situations. This helps students develop meaning for the operations of and relationships between addition and subtraction and develop strategies to solve arithmetic problems with these operations.

Grade Level Standard:
NY-1.OA.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.

PERFORMANCE/KNOWLEDGE TARGETS
(measurable and observable)

- For addition word problems with three addends and sums up to 20:
  - Manipulate objects.
  - Draw visual representations.
  - Represent the problem with an addition equation using a symbol (such as an empty box) to represent the unknown value.
  - Solve.
- Show that when adding three addends, the addends can be added in any order without changing the sum.

ASPECTS OF RIGOR

Procedural   Conceptual   Application

MATHEMATICAL PRACTICES	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
FOUNDATIONAL UNDERSTANDING	**NY-K.OA.2a** Add and subtract within 10. **NY-K.OA.2b** Solve addition and subtraction word problems within 10. **NY-1.OA.1** Use addition and subtraction within 20 to solve one step word problems involving situations of adding to, taking from, putting together, taking apart, and/or comparing, with unknowns in all positions. **NY-1.OA.3** Apply properties of operations as strategies to add and subtract.

The following pages contain EXAMPLES to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

Example 1: Manipulating objects to solve addition problems with three addends, showing that addends can be added in any order without changing the sum. (Parts taken from EngageNY Grade 1 Module 2, lesson 1)

The following shows the steps in manipulating objects (e.g. blocks, pictures and numbers) to solve the word problem below as well as the number sentence 9 + 1 + 4 = _____. Students should see that the addends can be added in any order without changing the total sum.

Ben has 9 green crayons, 1 orange crayon, and 4 red crayons. How many crayons does Ben have?

Concrete
a. Represent each addend with objects.

b. "Add" two addends first by moving an object or objects, then add the third addend.

9+1=10
10+4=14

> Introducing "Making Ten": By solving problems with three addends, students use the associative and commutative properties to compose (or - "make"-) ten, reinforcing grade-level work with standard NY-1.NBT.2. *Understand that the two digits of a two-digit number represent amounts of tens and ones.*
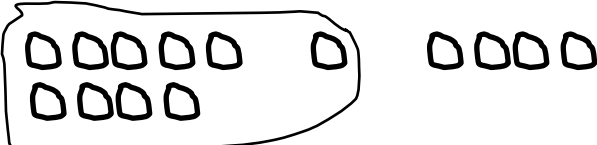>
> ****Discuss which method is the most efficient.**

1+4=5
9+5=14

9+4=13
13+1=14

Pictorial
a. Represent each addend with objects.

b. "Add" two addends first by circling two sets, then add the third addend.

9+1=10   9+4=13
10+4=14   13+1=14

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1+4=5
9+5=14

Abstract
a. In equation form, represent each addend with a number and the unknown with a symbol.
b. "Add" two addends first, then add the third addend. Discuss which method is the most efficient.

$$9 + 1 + 4 = \square$$

$$9 + 1 + 4 = \square$$
$$10 + 4 = 14$$

or

$$9 + 1 + 4 = \square$$
$$9 + 5 = 14$$

or

$$9 + 1 + 4 = \square$$
$$13 + 1 = 14$$

Circle the numbers that make ten, and put them into a number bond. Write a new number sentence.

5.   10
       $3 + 5 + 7 =$ _____   _____ + _____ = _____

6.
       $4 + 8 + 2 =$ _____   _____ + _____ = _____

Challenge: Circle the addends that make ten. Circle the true number sentences.
a. 5 + 5 + 3 = 10 + 3   c. $3 + 8 + 7 = 10 + 6$
b. $4 + 6 + 6 = 10 + 6$ d. $8 + 9 + 2 = 9 + 10$

Example 2: Drawing the story
The following is taken from EngageNY Grade 1 Module 2, lesson 1.

Read the math story. Make a simple math drawing with labels. Circle 10 and solve.

Toby has ice cream money. He has 2 dimes. He finds 4 more dimes in his jacket and 8 more on the table. How many dimes does Toby have?

_____ + _____ + _____ = _____

10 + _____ = _____

Toby has _____ dimes.

Students can be asked how many total cents are in Toby's coin collection, connecting to grade-level work with standard NY-1.MD.3c *Count a mixed collection of dimes and pennies and determine the cent value (total not to exceed 100 cents)* and NY-1.NBT.2c *Understand that the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight or nine tens (and 0 ones).*

The number of dimes would need to be modified so that the cent value does not exceed 100 cents.
He has 2 dimes. He finds 4 more dimes in his jacket and 3 more on the table. How many dimes does Toby have? How many total cents are in Toby's coin collection?

The following pages contain EXAMPLES to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

Example 3: Creating the three-addend problem
The following are taken from EngageNY Grade 1 Module 2, lessons 3 and 11.

- Draw and circle to show you made ten to help you solve the problem.

  Maria has 9 snowballs and Tony has 6. How many snowballs do they have in all?
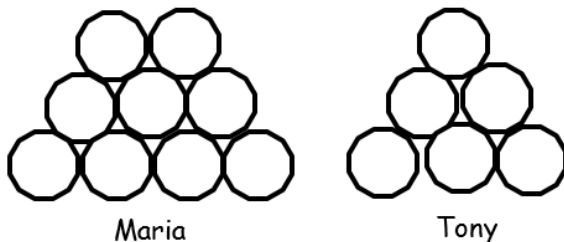
> Have students write an equation that can be used to find the total number of snowballs Maria and Tony have.
> Discuss how their equations are similar/different:
> 9+6=15
> 9+1+5=15
> Have students create their own word problems, with a visual representation of how to solve. Have students write two equations (two addends and three addends) that can be used to model their diagram.

  9 and _____ make _____.
  10 and _____ make _____.
  Maria and Tony have _____ snowballs in all.

- Look at the student work below. Correct the work. If the answer is incorrect, show a correct solution in the space below the student work.

  Todd has 9 red cars and 7 blue cars. How many cars does he have altogether?

  Mary's Work   Joe's Work   Len's Work

  9 + 7 = 16   9 + 7 = 15   9 + 7 = 16

> Have students write an equation using three addends that models the strategy.

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