

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

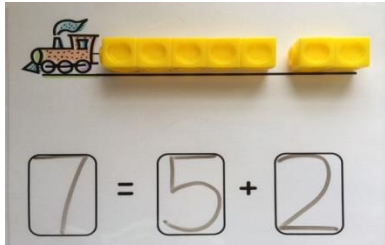
GRADE: K	DOMAIN: Operations & Algebraic Thinking
<p>CLUSTER: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. Students build upon their understanding of counting to develop meanings for addition and subtraction by modeling how they put together or take apart up to ten objects in different ways. As they encounter problem situations, they first use concrete objects, progress to drawing pictures, and then translate these representations into equation form.</p>	
<p>Grade Level Standard: NY-K.OA.1 Represent addition and subtraction using objects, fingers, pennies, drawings, sounds, acting out situations, verbal explanations, expressions, equations, or other strategies. Note: Drawings need not show details but should show the mathematics in the problem.</p>	

PERFORMANCE/KNOWLEDGE TARGETS (measurable and observable)	
<ul style="list-style-type: none"> • Solve a given single digit addition or subtraction numeric problem that involves sums of tens using various manipulatives and strategies (i.e., dice, fingers, drawing, number lines, number grids, mental images, acting out, sounds (claps), verbal explanations). • Describe addition in terms of “putting together”. • Describe subtraction in terms of “taking away”. • Create and explain a model that shows the solution to a given addition or subtraction numeric problem and translate that model into equation form. 	
ASPECTS OF RIGOR	
<div style="display: flex; justify-content: space-around; width: 100%;"> Procedural Conceptual Application </div>	
MATHEMATICAL PRACTICES	<ol style="list-style-type: none"> 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	<p>NY-PK.CC.3 Understand the relationship between numbers and quantities 10 10; connect counting to cardinality. NY-PK.OA.1 Explore addition and subtraction by using objects, fingers and responding to real world situations. NY-K.CC.3 Write number from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). NY-K.CC.5a Answer counting questions using as many as 20 objects arranged in a line, a rectangular array, and a circle. Answer counting questions using as many as 10 objects in a scattered configuration.</p>

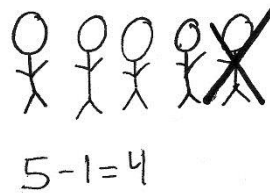
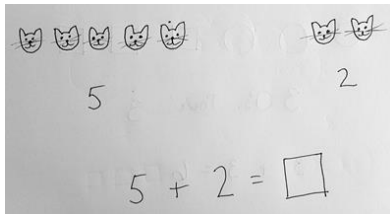
The following pages contain **EXAMPLES** to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

Students begin to harness their practiced counting abilities, knowledge of the value of numbers, and work with embedded numbers to reason about and solve addition and subtraction expressions and equations.

Concrete Objects



Drawings



Example 1: Represent Decomposition and Composition Addition Stories to 8

The following task is taken from [EngageNY Grade K, Module 4, Lesson 15](#).

Materials: (T) Cup containing 8 loose linking cubes or other small masking tape (S) Personal white board

Stretch a line of tape or chalk down the middle of the rug, table, or desk.

T: We are going to play the gravity game today! Let's pretend my cubes are space rocks. Help me count how many rocks I am putting into my cup.

S: 1, 2, 3, 4, 5, 6, 7, 8.

T: I have 8 space rocks in my cup. This side of the tape is the land (point), and this side is the ocean (point).

I will use gravity and my magic tape line to help me find some number sentences about 8. How many space rocks fell on land, and how many fell into the ocean? Let me shake it 8 times, and then, I will pour it out to see what happens! (Demonstrate and pour the cubes onto the surface.) What happened?

S: There are some on that side of the line and some on this side. → There are 6 on that side and 2 on this one!



manipulatives,



**NOTES ON
MULTIPLE MEANS
OF ENGAGEMENT:**

Allow students with disabilities or students working below grade level, who might still need the scaffold, to engage in the lesson by continuing to use number bonds to show what happened when the cubes were poured out. Encourage them to write the number sentences underneath.

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MP.4

- T: Can we make a number sentence about our picture?
- S: We had 8 rocks, but they broke into a 2 and a 6. $\rightarrow 8 = 2 + 6$. $\rightarrow 2 + 6 = 8$.
(Other varying responses.)
- T: Write the number sentence on your personal board.
- T: Did anyone think of a different number sentence that tells how our cubes look right now?
(Allow time for sharing and discussion.)
- T: Let's try it again and see if gravity can help us make another sentence! Student B, would you like to try? I wonder how many different number sentences we can find about 8.

Allow several more iterations of the game, directing students to represent the equations for the situation each time. List the equations on the board to help students appreciate all of their new names for 8. Ensure that students are confident as to the placement of the addends and the total in their number sentences.

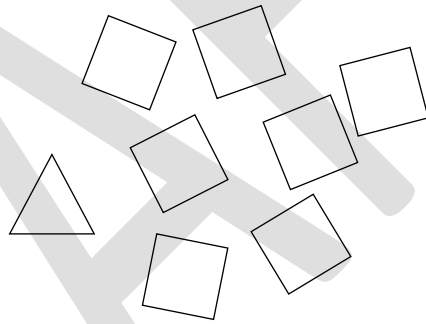
Example 2: Represent Decomposition and Composition Addition Stories to 8

The following task is taken from [EngageNY Grade K, Module 4](#), Lesson 15.

There are 8 shapes. Count and circle the squares. Count and circle the triangle.

$$\square + \square = \square$$

$$\square = \square + \square$$



There are 8 flowers. Some flowers are yellow, and some flowers are red. Draw a picture to go with the story.



$$\square = \square + \square$$

$$\square + \square = \square$$

Create your own story and tell your partner. Have your partner draw a picture of your story and create a number sentence to go with the picture.

Allowing students to generate their own stories provides opportunity for cultural responsiveness and the development of mathematical language.

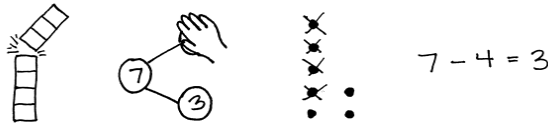
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Example 3: Multiple Representations of Subtraction

The following is taken from lesson 20, [EngageNY K Module 4](#).

Solve “take from with result unknown” expressions and equations using the minus sign with no unknown.

Concrete objects and pictorial representations are tied to or matched to the representative subtraction expression or equation using the minus sign with no unknown. This progression helps students move from concrete processes to reasoning abstractly and quantitatively (MP.2).



Materials: (S) 5 linking cubes, personal white board

- T: Place your linking cubes on the table in front of you. Count them. How many do you have?
 S: There are 5.
 T: Put 3 linking cubes in your hand and take them away. How many are left on the table?
 S: 2.
 T: Yes, 5 take away 3 is 2. There is a special Math Way to write what we just did. We had 5 cubes. I will write the number 5 to show all of the cubes together. (Demonstrate.) There is a special sign we can use when we want to show that we are removing some cubes. It looks like this. (Write the **minus** sign.) How many did we take away?
 S: 3.
 T: I write the 3 here. (Demonstrate.) You know the next part already! Our sign for *is the same as* or *equals*. (Write the equal sign.) How many were left on the table?
 S: 2.
 T: I will write that here: 2. Read with me: 5 take away 3 equals 2.
 S: 5 take away 3 equals 2.
 T: Let’s do another one. This time let’s make a picture on our boards about the cubes. Draw your 5 cubes. Now we want to take away 4. How should we show that we are taking them away?
 S: Cross them out.
 T: Cross out 4 cubes. How many cubes do you have left?
 S: 1.
 T: Let’s write the number sentence together. I will write it on the class board while you write it on your personal white board. 5 cubes take away 4 cubes is 1 cube. $5 - 4 = 1$. Read it with me.
 S: 5 take away 4 is 1.

 T: Erase your board. I have a story for you! 5 students were playing on the slide. Draw a circle for each student on your board. 2 of the students left to go to the swings. In your drawing, cross out the students who went to the swings. How many students were left at the slide?
 S: 3.
 T: Help me write the number sentence, and write it on your board, too. How many students were there at first?



**NOTES ON
 MULTIPLE MEANS
 OF ACTION AND
 EXPRESSION:**

Ask students working above grade level to write their own take away math story and show their solution in writing. Ask early finishers to share their new stories with each other and encourage them to solve as many stories as they come up with.

Vary the use of the term *equals* by sometimes using *is* or *is the same as*. These multiple means of expression keep the meaning of the symbol fresh.

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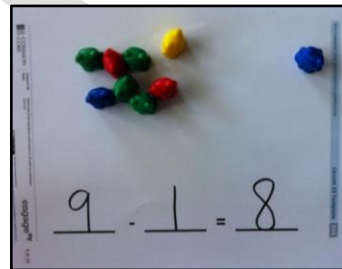
- S: 5.
 T: 5 minus...? How many students went to the swings?
 S: 2.
 T: 5 – 2 equals...?
 S: 3.
 T: Let’s read it all together: $5 - 2 = 3$.
 S: $5 - 2 = 3$.
 T: On your board, draw pictures to make up a take away story of your own. Share your picture with your friend. Can you write the number sentence that tells your story? (Allow time for writing and discussion.)
 T: Who would like to share their story and picture with the class?

Example 4: Writing and Solving “Take From” Equations

The following is taken from lesson 33, [EngageNY Grade K, Module 4](#).

Materials: (S) 9 teddy bears or other counters, 10 linking cubes, subtraction equation (Template), personal white board

- T: (Write $\underline{\quad} - \underline{\quad} = \underline{\quad}$.) Let’s pretend you have a family of 9 bears. Put 9 bears in front of you. One bear is hungry and wants to go to the honey tree! Take 1 bear and scoot him across your desk to show his adventure. 8 are left.
 T: Help me make a number bond about the story. (Allow students to offer guidance in creating the number bond on the board.) Now we want to make a number sentence about this story. Are we adding more bears in this story or taking some away?
 S: Taking away.
 T: Yes, we need to make a take away, or subtraction, number sentence. What number would we put in the first blank?
 S: How many we started with! $\rightarrow 9$.
 T: What goes in the next blank?
 S: The bear that went away. $\rightarrow 1$.
 T: What should we put in the blank after the equal sign?
 S: How many bears are still at home. $\rightarrow 8$.
 T: Great! Let’s write our number sentence. Fill in the blanks on your personal white board and read with me. (Demonstrate.)
 S: 9 minus 1 is 8. $\rightarrow 9$ take away 1 leaves 8.
 T: Send your bear back home. Let’s pretend 2 bears are hungry this time. Send them to the forest. We need to write a new number sentence. What would we write this time? (Ask students to help fill in the blanks again, explaining why they chose each number.) Read the number sentence with me.
 S: $9 - 2 = 7$.



**NOTES ON
 MULTIPLE MEANS
 OF REPRESENTATION:**

Introduce unfamiliar words to English language learners by holding up a counting bear while saying a *family of bears* and showing pictures for *tree* and *forest*. This allows them to focus on the math and expand their vocabulary, which in turn helps them explain their thinking during partner shares.

Continue with the activity several times, repeating the pattern through 9 – 8 and having students write and read the equation each time.

Example 5: Use nursery rhymes and songs to have students model addition and subtractions scenarios. For example, subtraction can be modeled by the lyrics in “Five Little Monkeys Jumping on the Bed”.