

INSTITUTE for
LEARNING



mathematics

K

Addition Situations: Solving for the Sum

A SET OF RELATED LESSONS

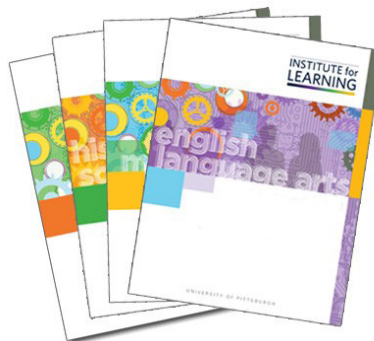
UNIVERSITY OF PITTSBURGH

INSTITUTE for LEARNING

UNIVERSITY OF PITTSBURGH

This is one lesson in a set of related lessons developed by the Institute for Learning. Accompanying student materials and the complete set of lessons are available at:

ShopIFL.com



Please note: The lesson is not meant to be a script to follow, but rather a set of questions that target specific mathematical ideas which teachers can discuss together in professional learning communities.

University of Pittsburgh
Copyright © 2015

Table of Contents

Introduction

Overview	9
Identified CCSSM and Essential Understandings.....	11
Tasks' CCSSM Alignment	13
Lesson Progression Chart	14

Tasks and Lesson Guides

TASK 1: Red and Blue Blocks.....	19
Lesson Guide	21
TASK 2: Seashells.....	27
Lesson Guide	28
TASK 3: Black and White Paper.....	35
Lesson Guide	36
TASK 4: Counting Houses	41
Lesson Guide	42
TASK 5: Donuts.....	47
Lesson Guide	48
TASK 6: Sugar Cookies	54
Lesson Guide	55
TASK 7: Ways to Show	62
Lesson Guide	63
TASK 8: Show Me.....	67
Lesson Guide	68

Name _____

TASK
5

Donuts

Dion has 3 chocolate and 4 vanilla donuts. How many donuts does Dion have altogether? Draw a picture and write a number sentence that tells about Dion's donuts.

Tamika has 3 chocolate, 2 vanilla, and 2 sprinkle donuts. How many donuts does Tamika have altogether? Draw a picture and write a number sentence that tells about Tamika's donuts.

Who has more donuts, Dion or Tamika? How do you know?

Extension:

Tamika claims that she has more donuts than Dion because she has 3 kinds of donuts. She has sprinkle, chocolate, and vanilla donuts. What do you think about Tamika's thinking? Does she have more donuts because she has 3 types of donuts?

**LESSON
GUIDE
5**

Donuts

Rationale for Lesson: Students continue their investigation into the concept of addition by considering situations with two and three addends while solving “put together” situations about donuts. The task is presented in context and asks students to make visual representations (diagrams or manipulative models) and to write number sentences. Counting all, counting on, and known number facts are discussed in this lesson. The intentional choice of numbers allows for student to discuss the idea of equivalency (4 is equal to 2 and 2, $3 + 4$ is equal to $3 + 2 + 2$). For the first time in this set of lessons, the task explicitly asks students to consider a claim and evaluate the reasoning of another person. This occurs during the extensions activity (which also serves as the Quick Write for this lesson) and should only come after the whole class discussion, and it should not be rushed.

Task 5: Donuts

Dion has 3 chocolate and 4 vanilla donuts. How many donuts does Dion have altogether? Draw a picture and write a number sentence that tells about Dion’s donuts.

Tamika has 3 chocolate, 2 vanilla, and 2 sprinkle donuts. How many donuts does Tamika have altogether? Draw a picture and write a number sentence that tells about Tamika’s donuts.

Who has more donuts, Dion or Tamika? How do you know?

Extension:

Tamika claims that she has more donuts than Dion because she has 3 kinds of donuts. She has sprinkle, chocolate, and vanilla donuts. What do you think about Tamika’s thinking? Does she have more donuts because she has 3 types of donuts?

Common Core Content Standards¹

K.OA.A.1

Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.A.2

Solve addition and subtraction word problems* and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

**Progressions for the Common Core: Kindergarten students work with “add to” and “take from” result unknown situations and “put together/take apart” total unknown and both addends unknown situations.*

Standards for Mathematical Practice¹

- MP1 Make sense of problems and persevere in solving them.
- MP2 Reason abstractly and quantitatively.
- MP3 Construct viable arguments and critique the reasoning of others.
- MP4 Model with mathematics.
- MP5 Use appropriate tools strategically.
- MP6 Attend to precision.
- MP7 Look for and make use of structure.
- MP8 Look for and express regularity in repeated reasoning.

¹ National Governors Association Center for Best Practices (NGA Center) and Council of Chief State School Officers (CCSSO). (2014). Mathematics. *Common core state standards for mathematics*. Retrieved from <http://www.corestandards.org/Math>

Essential Understandings	<ul style="list-style-type: none">• Addition and subtraction representations show the part-part-whole relationship because they show how the two parts relate to the whole.• Part-part-whole relationships exist within both addition and subtraction and because of these relationships, when one quantity is unknown, known quantities can then be used to determine the unknown.
Materials Needed	<ul style="list-style-type: none">• Student task reproducible, one per student• Circles cut out of paper (possibly brown, white, and dotted paper), colored counters or other appropriate manipulative, 18 (6 of each color) per student/group of students• Part-part-whole map, one per student

**LESSON
GUIDE
5**

SET-UP PHASE

Today we are going to see what happens when Dion and Tamika pick up some donuts. We are going to figure out how many donuts each of them gets. You can use counters and your part-part-whole maps, these colored circles, or draw pictures to help figure out how many donuts Dion has and how many donuts Tamika has. Now, listen as I read the task. Follow along on your paper. Work by yourself for a few minutes; then you can work with a buddy.

EXPLORE PHASE (SMALL GROUP TIME, APPROXIMATELY 10 MINUTES)

Possible Student Pathways	Assessing Questions	Advancing Questions
Uses the part-part-whole map, creates a picture, or builds a model but indicates no sums.	Tell me about the donuts you showed.	You are showing the parts that we know. How many donuts does Dion have altogether? Write a number sentence to tell about Dion's donuts.
Writes the correct totals but shows no work.	Tell me what 7 means. What did you do to figure out that Dion (Tamika) have 7 donuts?	Thank you for explaining how you figured out s/he has 7 donuts. Now draw a picture and write a number sentence on your paper to show how you solved the problem.
Writes number models. Dion: $3 + 4 = 7$ Tamika: $3 + 2 + 2 = 7$	Tell me about your number sentence. What does it show about the donuts?	You are saying that $3 + 4$ and that $3 + 2 + 2$ are both equal to 7. How can this be? Here you are adding two numbers, and here you are adding three numbers? Think about how you could use your counters or draw a picture to show, to prove, that these both equal 7.
Finishes early.	Tell me how you figured out how many donuts Dion has and how many donuts Tamika has. Who has more?	You worked really hard to figure out the number of donuts that Tamika has and the number of donuts that Dion has. How can both Dion and Tamika have 7 donuts? It looks like Tamika has so many more. What do you think? Think about that, and I'll be back to check in with you.

SHARE, DISCUSS, AND ANALYZE PHASE

LESSON GUIDE 5

Dion's donuts, 3 chocolate and 4 vanilla (repeat discussion cycle and EUs for Tamika's donuts)

EU: Addition and subtraction representations show the part-part-whole relationship because they show how the two parts relate to the whole.

Interpreting the situation, identifying the parts and the whole:

- What do we know about Dion's donuts? *(He has chocolate and vanilla donuts. He has two kinds of donuts. He has 3 chocolate and 4 vanilla donuts. He has 7 donuts.)*
- We just heard several things about Dion's donuts. We know that he has two kinds of donuts. He has 3 chocolate donuts and 4 vanilla donuts. These are the parts we know. **(Marking and Revoicing)**
- I heard someone say that we know Dion has 7 donuts. Is this something we know from the story problem, or is this something we had to figure out? *(We had to figure this out. The story didn't tell us.)*
- That's right. We had to figure out how many donuts Dion has, the whole amount. **(Marking)**
- How can we figure out the whole amount of donuts Dion has? *(We put the chocolate and the vanilla donuts together into one group.)*
- The story tells us that Dion has 3 chocolate donuts and 4 vanilla donuts. We have to figure out the whole, the sum of the two parts. We put the two parts together to figure out the whole. **(Marking)**

Representing the situation, using a picture to model:

- Tell us what your picture shows us about Dion's donuts. *(Here are his chocolate donuts and his vanilla donuts.)*
- You have some numbers written on your picture; what do those numbers mean? *(Here is a 3 for the chocolate donuts and a 4 for the vanilla donuts.)*
- Do you agree? Does this picture show Dion's donuts? Tell us why you agree or disagree that this picture shows Dion's donuts.
- How does the picture with the numbers help us think about Dion's donuts? *(We can see all the donuts together. We don't have to count the donuts because 4 tells us there are 4 donuts.)*
- When we draw pictures, we can write numbers to show the size of each group in the picture. We write 3 to show there are 3 donuts here. We write 4 to show there are 4 donuts here. **(Marking)**

LESSON
GUIDE
5

EU: Part-part-whole relationships exist within both addition and subtraction and because of these relationships, when one quantity is unknown, known quantities can then be used to determine the unknown.

Using a picture and the “counting on” strategy to find the sum (counting from either number):

- Earlier you told us that Dion has 7 donuts. How did you figure out that Dion has 7 donuts? (*I counted.*)
- Can you count for us so we know what you did? (*I knew there were 3 chocolate donuts, so I said 4, 5, 6, 7 when I counted the vanilla donuts.*)
- Who understands how she counted and can show us using a picture of Dion’s donuts?
- Why did we start counting at 3?
- Why did we count on 4, 5, 6, 7?
- What strategy are we using? How do you know? (*Counting all, we would have started at 1. We would have said 1, 2, 3, 4, 5, 6, 7. Counting on doesn’t start at 1.*)
- This is the “counting on” strategy. When we count this way, we start counting from the amount in one of the groups. Here we started with the group of 3 chocolate donuts and thought 3, then we counted on 4 more, 4, 5, 6, 7 for the amount of vanilla donuts. **(Marking)**
- What number sentence can we write to show Dion’s donuts? ($3 + 4 = 7$) (Write the number sentence on the board.)
- Let’s try using the “counting on” strategy, but this time start with the amount of vanilla donuts. Try this with your buddy. **(Challenging)**
- You all did a great job counting on from 4. I heard 4, then 5, 6, 7. Who wants to lead the whole class in counting on from 4, the vanilla donuts?
- When we start with the amount of one of the parts, and then count on the amount of the other part, we are using the “counting on” strategy. We can start with either amount and count on the other amount and our whole will stay the same. Today we started with 3 and counted on 4 to get 7, and then we started with 4 and counted on 3 to get 7. **(Marking and Recapping)**

Dion's donuts and Tamika's donuts

EU: Addition and subtraction representations show the part-part-whole relationship because they show how the two parts relate to the whole.

Relating the two situations, $3 + 4$ and $3 + 2 + 2$:

- Take a look at the two pictures up on the board. This picture shows Dion's donuts, and this picture shows Tamika's donuts. What do you notice is the same about their donuts? *(They both have 3 chocolate donuts. They both have 7 donuts.)*
- What is different about their donuts? *(Dion has 4 vanilla and Tamika has only 2 vanilla, but she has 2 sprinkle. Dion does not have any sprinkle donuts. Dion has 2 types of donuts and Tamika has 3 types.)*
- Hold on, someone just said that Dion and Tamika both have 7 donuts, and now we are saying that Dion has 2 types of donuts and Tamika has 3 types of donuts. How can Tamika have 3 types of donuts and Dion only have 2 types, and somehow they both have 7 donuts? *(They both have 3 donuts and then they have 4 more donuts. Dion has 4 more vanilla. Tamika has 4 more too, but she has two kinds, 2 vanilla and 2 sprinkle donuts.)*
- Who understands this and can come up and show us on the picture?
- Say more about the 4 donuts here and the 2 donuts and 2 donuts here. *(There are 4 donuts in both places. This part shows 4 donuts and this part shows 2 and 2 more donuts, which is 4 donuts.)*
- Using the picture really helped me to understand what you were saying. I can see that the vanilla donuts that Dion has is the same amount of vanilla donuts and sprinkle donuts that Tamika has. Here are Dion's 4 more donuts and here are Tamika's 4 more donuts. **(Marking)**
- Does it matter that these 4 are all vanilla donuts, and that these 4 are vanilla and sprinkle donuts? *(No, the kind of donut doesn't matter; there are 4 here and 4 here. It only matters if you don't like sprinkles.)*
- We wrote $3 + 4 = 7$ to tell about Dion's donuts. How does this number sentence also tell about Tamika's donuts?
- What other number sentence can we write to tell about Tamika's donuts? Turn and talk with a buddy. Work together to write a number sentence for Tamika's donuts. **(Challenging)**
- I saw a group write $3 + 2 + 2 = 7$. (Write the number sentence on the board.) Who can tell us what each of these numbers means? *(3 is the chocolate donuts and the 2 is the sprinkle and vanilla donuts and the 7 is all the donuts.)*
- If we think of the 3 parts, we have chocolate, vanilla, and sprinkle donuts. $3 + 2 + 2 = 7$. If we put two of these parts together, the sprinkle and vanilla donuts, then we have $3 + 4 = 7$. **(Revoicing)**

Application

Complete the Extension activity.

Summary

- When we are trying to find out how many there are altogether, the sum, we put the parts together to make a whole. Sometimes we have two parts coming together and sometimes we have more than two parts.
- When we are adding two parts, we can add them in any order and the whole will stay the same.
- We can find the total by counting, we can count all of the items, or we can start with one of the amounts and count on the other amount.

Quick Write

Make up a story and draw a picture for the number sentence $4 + 2 = 6$.



Institute for Learning

Learning Research and Development Center

University of Pittsburgh
3939 O'Hara Street
LRDC Suite 310
Pittsburgh, PA 15260
T: 412-624-8319

www.instituteforlearning.org