SCAFFOLDING TASK: Order is Important

Approximately 2 Days

STANDARDS FOR MATHEMATICAL CONTENT

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

STANDARDS FOR MATHMATICAL PRACTICE

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.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

BACKGROUND KNOWLEDGE

This task serves as a scaffolding task; however, similar work was done in first grade. You may feel like your students can accomplish all three parts of this task in one day or perhaps you may use this task as an intervention only for those students who are still struggling with basic understanding of addition and subtraction. The suggested conversations in this task are important for further developing the concept of addition and subtraction.

The focus of the task is on the CONCEPT and application of the commutative property…not on the definition or words. Students are also revisiting fact families as well as understating what strategies to use when solving an equation. Students are usually proficient when they focus on a strategy relevant to one particular fact. When these facts are mixed with others (as in a fact family), students may revert to counting as a strategy and ignore the efficient strategies they learned. Provide a list of facts from two or more strategies and ask students to name a strategy that would work for that fact. Students need to explain why they chose that strategy, then show how to use it to solve the equation. Additionally, they need to understand how to attach an equation to a particular story problem.

Be sure to discuss the concept of 0 and what happens when it is added or subtracted from a given amount. Students may overgeneralize the idea that answers to addition problems must be bigger. Adding 0 to any number results in a sum that is equal to that number. Provide word problems involving 0 and have students model them, using drawings with an empty space for 0.

Special comment- When students are building the towers – make sure they keep the colors snapped together and they do not mix the colors up making a color pattern. Keeping the colors together will allow for them to visually see how numbers can be added and taken away for the connection to fact families. Repeat this task as a class until students are able to answer these questions and explain their reasoning.

ESSENTIAL QUESTIONS

- How do we solve problems in different ways?
- How is addition and subtraction alike and how are they different?
- How are problem-solving strategies alike and different?
- How can problem situations and problem-solving strategies be represented?
- How can different combinations of numbers and operations be used to represent the same quantity?

MATERIALS

- Connecting cubes (Individual bags of 18 cubes – 9 each of 2 different colors)
- Large number line (using masking tape or other materials)
- *Ready, Set, Hop* by Stuart Murphy or similar book

GROUPING

Large group

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Gather students in meeting area. Read, *Ready Set Hop,* by Stuart Murphy or a similar book. Encourage students to act out the story using a large number line on the floor. Ask students, "What happens if the frog hops forward? Backwards?" Be aware this may be some student's first experience using a number line to locate and compare numbers.

Teacher models addition and subtraction stories using 2 towers of different colored cubes. Have students build two towers of 9 cubes each – each tower should contain 9 cubes of the same color but the two towers should be two different colors. Call out any addition problem using single digits such as 7+4. Have students build 7+4 using their towers (represent 7 in one color and 4 in a different color). Discuss that the sum of 7+4 is 11. Ask students how they can prove this? (by counting the cubes). What if we wanted to know what 4+7 was? What could we do? Take ideas from the students…if no one mentions it, ask if they could flip their tower. Would that show 4+7? Yes. What is the sum of 4+7? It is still 1l. Write these problems using a number sentence on the board.

$7 + 4 = 11$

4 + 7 = 11

Have students model the action of adding these amounts together on the number line. Make sure to use vocabulary like putting together, combining, adding to, and joining when discussing the action of addition with students.

While students still have the tower built, tell them to look at the 11 they have in front of them and take 4 of one color away – They will see the difference is 7 – write that number sentence on the board 11 – 4 = 7. Say, "We had 11 and removed 4, now what do we have? How do you know?" Then snap the 4 cubes back on the 7 and ask, "What is our total?" Why did it change? Take off 7 to model 11-7. Ask, "How is this different from what we just did?" The difference is 4. Write that on the board.

11 – 4 = 7
11 – 7 = 4

Have students model the action of subtracting these amounts on the number line. Make sure to use vocabulary like comparing, separating, removing, taking away, and counting back when discussing the action of subtraction with students.

Ask students to look at the numbers on the board and see what all problems have in common. Allow time for discussion. After discussions, test some more numbers to see if this is true with other problems. Use the related terms, facts, and fact family to discuss this concept. Students should recall from previous work in 1st grade that they are creating fact families. See interventions if students are having difficulty with this part of the task.

Make sure to encourage discussion about addition and subtraction being inverse operations (opposite of one another). The action of addition generates a total whereas in the action of subtraction a total is already known.

Part II

Say to students, "Today you will determine if the order of the numbers affects the solution for addition and subtraction." Provide each student with a set of Unifix cubes. Say to students, "Use your cubes to represent the numbers 12 and 3 (12 first then 3)." Allow students time to create towers, then say "Find the sum by linking the cubes and discuss your solution with the class. Watch as your teacher writes a number sentence to represent the sum you found. Now arrange your cubes so that they represent 3 and 12 (3 first then 12). Find the sum by linking the cubes and discuss your solution with the class. Watch as your teacher writes a number sentence to represent the sum you found. Did you get the same result both times? Participate in the class discussion about what happens to the sum of two numbers when you change the order of the numbers. Now, represent the number 12 using the cubes. Remove three of the cubes and discuss your result with the class. Watch as your teacher writes a number sentence to represent the difference you found. Now arrange your cubes so that they represent the number 3. Can you remove 12 cubes? Discuss your answer with the class. Did you get the same result both times?

Participate in the class discussion about what happens to the difference between two numbers when you change the order of the numbers. As in Part I of this task, continue to have discussions with students that encourage them to notice the relationship between addition and subtraction. Invite continued discussion about addition and subtraction being inverse operations (opposite of one another) and talk about the action of addition generates a total whereas in the action of subtraction a total is already known.

FORMATIVE ASSESSMENT QUESTIONS

- What patterns do you see when you create a fact family?
- How is a number affected when we add or take away zero?
- Will changing the order of the numbers in an equation change the result, or answer, to the problem? If snot why, if so when?
- How can you represent the same amount using different combinations of numbers?
- In what ways are addition and subtraction similar? In what ways are they different?
- How do you know, or decide, what equation to write to represent a story problem?
- What is another way to solve this problem?

DIFFERENTIATION

Extension

- Use a deck of cards and dominoes to write fact families.

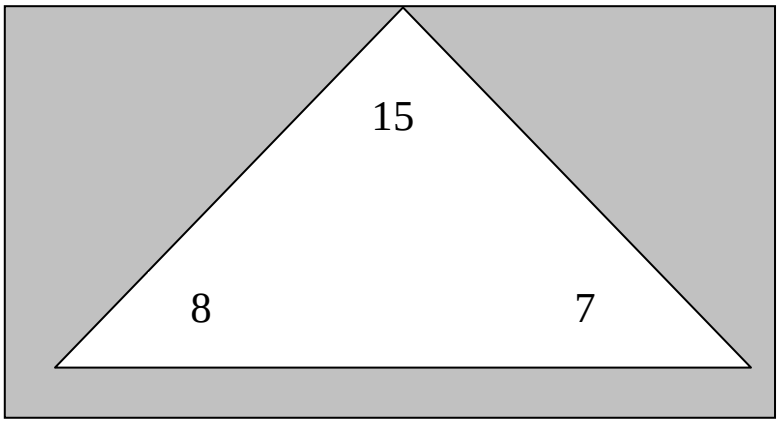
Intervention

- http://illuminations.nctm.org/LessonDetail.aspx?ID=L57

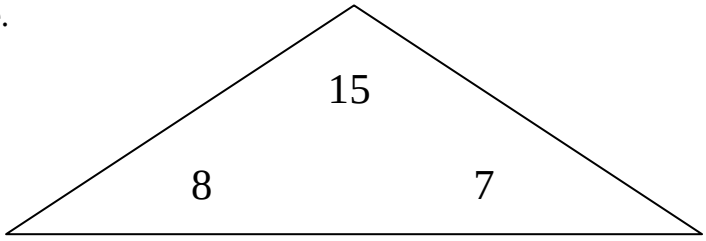
In this lesson, the relationship of subtraction to addition is introduced with a book and with dominoes.

- Make a simple pattern of a house (triangle on top of a square) for your students to trace and cut out of construction paper. They may choose whatever color they wish. They will need to have 2 copies that they have traced to serve as the front and back covers of their fact family book. They may design the cover of their book but will need to label it "[Student's name]'s Fact Family House." You may want to cut out white paper in the shape of the house for the pages inside of the book. Each student will need at least 5 white pages for the inside of their book. Have the students choose 4 or 5 numbers between 10 and 18 and write one of the numbers on the top of each "roof." You may wish to demonstrate each of these steps as the children begin so they can see what you are doing. The number the children choose will serve as the largest member of each fact family, and there will be a different fact family on each page of the book.

For example, say you chose 15. You would write 15 at the top of your roof on one of your white pages of paper. In each of the other corners of the roof, you would write a number smaller than 15 so that the two numbers have a sum of 15. If you chose 8, then 7 would be your other number and the roof would look like this.



Next, students will list the addition and subtraction fact family members in the box under the "roof." Then they will use one of the fact family members to write a story problem at the bottom of the page. The reader will have to decide which fact was used to write the story. Students should write the answer on the back of the page. They will continue doing this with the other numbers they have chosen until they have 4 – 5 pages with a different fact family on each page.



8 + 7 = 15	15 – 8 = 7
7 + 8 = 15	15 – 7 = 8

15 children went swimming in the ocean. 8 children had blue rafts. The rest had red rafts. How many children had red rafts?

Answer: back of the page