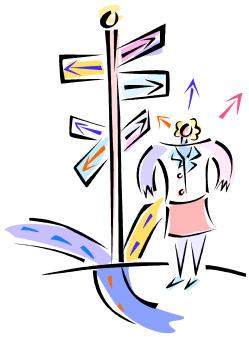

PRACTICE TASK: How Many Ways To Get To 10?

Approximately 2-3 days

STANDARDS FOR MATHEMATICAL CONTENT

MCCK.OA.1 Represent addition and subtraction with objects, fingers, mental image , drawings[1], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

MCCK.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

MCCK.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

MCCK.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

MCCK.OA.5 Fluently add and subtract within 5

STANDARDS FOR MATHEMATICAL 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.

BACKGROUND KNOWLEDGE

Reading and writing the combinations serve as a means of encouraging reflective thought focused on part whole relationship. Writing can be done in the form of drawings, numbers written in the blanks (____ and ____), or addition equations. There is a clear connection between part-part-whole concepts and addition and subtraction ideas.

ESSENTIAL QUESTIONS

- Can patterns be found in numbers?
- Can you describe the patterns you find?

- Are some patterns the same?
- How are the number patterns different?
- How can I prove that groups are equal?
- How can I use different combinations of numbers to represent the same quantity?
- What is a number relationship? How can number relationships help me?
- What is a pattern and where can you find patterns?
- Why is it important that I can build the number combinations for the number 5? 10?

MATERIALS

- *12 Ways to Get to 11*, by Eve Merriam, or a similar book
- Eleven 2 colored (red/yellow) counters per student
- *How Many Ways to get to 10?* Recording sheet

GROUPING

Whole, Individual, Small group task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment: This task will take place over 2 days. Many students are unaware that the total number of paired combinations to make a number is one more than the number itself. *Example: there are 3 paired combinations to make the number 2 (0+2, 2+0, and 1+1) and 6 paired combinations for the number 5 (5+0, 0+5, 3+2, 2+3, 4+1, 1+4).* This task will allow students to develop this generalization for number combinations. It is extremely important that the students recognize this generalization and that it is not pointed out by the teacher.

Part I
Gather students together in a meeting place. Give each student 11 counters and begin reading the story, *12 Ways to Get to 11,* by Eve Merriam. As the story is read, have the students separate their counters into a model that reflects what is happening in the story. After each page, stop, discuss, and record the numerals for the combinations on chart paper or the board. (Example: if there were 9 pinecones and 2 acorns, the students would model a pile of 9 and 2. The teacher would record *9 and 2* on the chart paper after verifying that students were correct.

Comment*:* it is important to note that some combinations in the story will have greater than 2 addends which should be recorded as 3 *and 3 and 3 and 1 and 1.* The important part is that students are able to recognize that 11 can be decomposed into smaller units.

Part II
From the 11 counters that students have, ask them to gather 10. In pairs, have students explore all the possible combinations of 2 numbers when combined to make 10. Have students record their responses on the *How Many Ways to Get to 10?* recording sheet.

Comment*:* there are more squares than possible combinations. This is so students will need to justify and explain how they know they have found all of the possible combinations.

As students work through the task, observe the strategies they are using to find the combinations for 10. Once partners have justified that they have found all the possible combinations to 10, as a group, have students share their number combinations and the strategies they used.

Number combinations to 10:

0 and 10	10 and 0	1 and 9	9 and 1	8 and 2	2 and 8	3 and 7
7and 3	6 and 4	4 and 6	5 and 5			

Part III

In their math journal, have students explore and record all the number combinations for the numbers 1-10. As students explore and identify all the possible number combinations, have record them on the board or chart paper. At this point in the year, some students will be independently able to organize and complete Part III and all students should be encouraged to do so.

Number	1	2	3	4	5	6	7	8	9	10
Number Combinations	2	3	4	5	6	7	8	9	10	11

Have a discussion with students about the pattern they see between the number itself and the total number of combinations for that number. Ask why this information is important and how it can help them going forward.

FORMATIVE ASSESSMENT QUESTIONS

- Are there any more ways to decompose the number 10? How do you know?
- Why did you decide to do it this way?
- Are you sure that you have found them all? Why do you think so? How do you know?
- Did you develop a strategy to find your answers?
- Did you identify any patterns or rules? Explain!

DIFFERENTIATION

Extension

- Have students pick a number from 11-19 and test their generalization. Ask how many combinations of number pairs there are for 16, 19, and 100. Do the students immediately apply the generalization rule they just invented?

Intervention

- Give students a set of playing cards, Ace through 10, of two different colored suits. (hearts and spades, for example) Have them combine a red card with a black card to make the number 10. One a double ten frame, make one 10-frame represent the red cards and the other represent the black cards.

How Many Ways to get to 10? Name:_____

_____ **and** _____	_____ **and** _____	_____ **and** _____	_____ **and** _____
_____ **and** _____	_____ **and** _____	_____ **and** _____	_____ **and** _____
_____ **and** _____	_____ **and** _____	_____ **and** _____	_____ **and** _____