Kindergarten: Mathematics
Unit 2, Exploring Number
Formative Assessment Task – Assessment FOR Learning

Lesson Title: "Five-ness": Five as an Anchor Number

Formative Assessment	
Students will use linking cubes to construct number pairs for five. **Materials:** • linking cubes, two different colors • Creating Fives recording sheet	This task was done as a lesson with the whole class. This formative assessment explores what students can do and explain when working independently. You will collect this information over several days as you are able to observe and interact with students during math center time. Students will work independently at a center to create their own linking cube "train" for five. They will • construct six different combinations for 5 • group like-colors together, e.g., red, red, red, blue, blue, NOT red, blue, red, blue, red[1] • copy the combinations onto a worksheet as a recording of their work, coloring in the cube trains to match their constructions • explain how they know that they built all possible number pairs Some students may be able to record the numerical expression beneath each combination. [1] This is often a difficult concept for students because they have many experiences creating repeating patterns such as *ababa* patterns. Observe for students who are able to model with the cubes and explain the commutative property. Observe for students who recognize and can explain that taking away one of one color cube and adding one of the other color cube does not change the total number of cubes (compensation). **Five-Trains** * Have baskets of linking cubes available for students, making sure there are only two different colors in each basket. • Explain that they are to make trains of five cubes, just as they did with the class. They should use only the colors in their basket and they should put like-colors together. Every train should show a different way to "make 5." • Explain that, *after they think they have built all the possible different combinations,* they should copy each train combination onto their "5-recording sheet" by coloring the trains to match the trains they built. NOTE: Encourage them to wait until they think they have built all the possible combinations so that they have an opportunity to see the entire set together. One of the behaviors to observe is whether students organize their train in some way before they begin to record. If they do, ask, - *What made you arrange your trains this way?* - *What did you learn when you did this?* - *Are there any trains that are exactly alike?* It's easy for students not to realize that they have built the same combination more than once because the train is oriented as a mirror image, e.g., 4 blues, 1 red is really the same train as 1 red, 4 blues. You may need to demonstrate this if they can't recognize it themselves. This in not the way the commutative property is modeled in this task.

	• Ask questions to elicit students' thinking. - *How many different combinations have you found?* - *Have you found all the possible combinations?* - *How do you know if you've found all the combinations?* - *What patterns do you see?* Look for students who have separated the colors, as in an ababa (1+1+1+1+1) or aabaa (2+1+2) pattern. Even though your focus has been on • two-addend combinations and • putting like colors together to best model the concepts of *compensation* and the *commutative property* and to help students learn to *subitize* 5, students need to know that these combinations still show "five." *They are not incorrect.* This just wasn't the task they were asked to do. - *How do you know that you still have 5 cubes?* - *What number model* (numerical expression) *can you say (or write) for your train?* Students who struggle to understand this task may need small group or one-on-one work so that the task can be more structured and scaffolded for them. It may help to provide practice working with the number 4.
Reengage	
Analyze student work for aspects around which to reengage (e.g., common misconceptions or innovative thinking). Select a subset of representative solutions, either correct or incorrect to prompt a conversation with students. Share with the class a related task and/or student work that you have selected for additional exploration and that will likely support a deepening students' understanding of key mathematical ideas.	Below are two strategies that students might have used to complete this task. Other students may have worked quite randomly. Choose one of these two to explore more deeply. Select one that is different from the ones that most students used to provide an opportunity to focus on a less familiar concept, e.g., *compensation* or the *commutative property*. If no student used either of these strategies, model one of them, and lead a discussion that will elicit student thinking about it. • Look for samples where students have arranged their trains in a pattern that clearly shows *compensation*, e.g., 5+0, 4+1, 3+2, 2+3, 1+4, 0+5. - *How did you organize your trains?* - *What pattern does it show? Say more about that.* - *How is each of these trains different?* - *How are they all alike?* - *How do you know you have all the combinations?* - *Are all your combinations different? How do you know?* - *If I hold up 3 red cubes, how many blue cubes would I need to make a train of 5 cubes? How do you know? How can you check?* - *Can you tell how many cubes there are in a train without counting them? How?* (subitizing) • Look for samples where students have arranged their trains in a way that clearly shows the *commutative property*, e.g., 0+5 and 5+0, 1+4 and 4+1, 3+2 and 2+3. - *How did you organize your trains?* - *What pattern does it show?* - *Are there other train pairs that show the same pattern?* (if they only found one pair) - *Who else can explain this pattern?*

	- *How is each of these two trains different?* - *How are they alike?* - *How do you know you have all the combinations?* - *Are all your combinations different? How do you know?* - *If I hold up 3 red cubes, how many blue cubes would I need to make a train of 5 cubes? How do you know? How can you check?* - *Can you tell how many cubes there are in a train without counting them?* How? (subitizing)
Summary	
Engage the class in a discussion of their findings regarding the selected tasks and prompt students to synthesize their thinking around key mathematical ideas.	Lead a discussion that will elicit students' understanding of *compensation, the commutative property for addition, and subitizing.* - *When you were building your sets of 5-trains, what did you do first?* - *Then what did you do?* - *What did you do with your trains after you had built them all?* - *Did you organize them in any way before you began recording them on paper?* - *How did you organize them?* - *How many of you organized your trains this way?* - *Did anyone organize his or her trains in a different way?* - *How many different combinations were there?* - *How did you know if you had all possible combinations?* - *How could you prove that you had all the possible combinations?* - *What patterns did you see when you looked at all your trains together?* - *Did anyone see a different pattern?* - *Was it possible for you to know how many red/blue cubes you had in a train without counting? How could you do that?* Note: It won't be possible to know from this discussion if students are subitizing, but you can learn whether students are considering that they can know a number of items without counting each of them. This is an important skill and one that can be developed, particularly with the Quick Image activities f found in the Unit Resources. - *What do you know about "5" now?*
Independent practice	
Give students a new mathematical task or set of tasks designed to support the development of lasting understanding.	**5-Center** • Students will continue to work independently at a center where they will create combinations of five, using two colors of linking cubes. They will be able to determine whether they have found all combinations and explain how they know. Students can record what they have built and write the numerical expression or equation below the combinations. **How Many More to Make Five?** • After modeling for the class, have pairs of students play "How Many More to Make Five?" - Students have a set of 5-frame cards with varying numbers of boxes filled in. - One student quickly flashes the card to the other student and asks: *How many boxes are filled in? How many more to make five* (filled in)? - After they have gone through all six cards, the students trade roles.

Ongoing Linking-cube Number Stations

- Students who are secure with number 5 can do the same work with the number 6 and then numbers to 10 by the end of the year. Recording forms for higher numbers can be found at http://www.center.edu/BLACKLINES/blacklines.shtml, Unifix Number Station. To add interest and challenge, have students work within a three-number range, e.g., 4, 5, 6 or 5, 6, 7.

Quick Images

- Continue to do quick image activities with students. When shown a quick image of a 5-frame, students will be able to identify what they see: how many frames are filled in, how many are empty, and how many more dots are needed to have a total of five. Do this with the PowerPoint documents in the Unit Resources as a whole class (5-Frames, Dominos to 5, and Dot Cards) or set up a center activity with a set of dot cards.

Five Frame http://illuminations.nctm.org/ActivityDetail.aspx?id=74

- The games "How Many?" and "Fill" both reinforce an understanding of "five-ness."

The Hand Game, Two Fisted Penny Game, The Cave Game

Called by many different names, this activity builds a strong foundation for number combinations to 10. Students visualize the number that is missing from a number pair for the number 5 (or other target number). The procedure is written for the teacher doing the activity with a student. Later in the year, many students will be able to play the game with a partner.

- **Materials:**
  - 5-10 counters (small enough for all to fit in your hand, e.g., beans, pennies)
  - A recording sheet for keeping track of the combinations shown or the combinations known (optional)
- **Procedure:**
  - Ask student to count 5 counters into your hand.
  - Holding your hand so the student can see the 5 counters, say, *I'm going to show you some of these counters; I want you to tell me how many I'm hiding in my other hand.*
  - Show 3 counters. Ask, *How many do you see? How many am I hiding in my other hand?* When the child says "2" (or whatever the child says), open your hand, showing and saying *3 plus 2 equal 5*. Have the child repeat that.
  - Repeat this procedure, changing the hidden quantity, until you have gone through all six combinations.
  - You may initially show the combinations in order, but when you think a student is ready, show them in a random order, e.g., 3 + (2), 1 + (4), 5 + (0), 2 + (3), 4 + (1), 0 + (5).
  - As a formative assessment, you may choose to check off the combinations a student knows confidently and with little hesitation.
  - If the student is secure with these six combinations, you might want to try the procedure with 6 (or more) counters.
- **End-of-year Common Core Standard:**

  K.OA.A.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*.