CONSTRUCTING TASK: How Many Hands?

Approximately 2-3 days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

MCC.1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

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

"It is useful to measure the same object with different-sized units. Results should be predicted in advance and discussed afterwards. This will help students understand that the unit used is as important as the attribute being measured. The fact that smaller units produce larger numeric measures, and vice versa, is hard for young children to understand." (Van de Walle & Lovin 2006)

ESSENTIAL QUESTIONS

- How can we measure the length of an object?
- How can we tell which of two objects is longer than the other?
- How can we order a group of objects by their length?
- Why are the measurements of classmates different?
- Why would an estimate be helpful when measuring?
- When is an estimate good enough? When should I measure instead of using an estimate?

MATERIALS

- Paper for tracing hands

- Sentence strips or strips of tag board
- Various classroom items to measure
- "How Many Hands?" recording sheet (copied twice, front to back)
- *How Tall, How Short, How Far Away?,* by David Adler or similar book

GROUPING

Whole Group/Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Begin the lesson by reading a book similar to *How Tall, How Short, How Far Away?,* by David Adler (or similar measurement story.) Discuss with students the ways in which measuring objects has occurred over time.

Part I
Tell the class they need to measure the width of the classroom. Explain that this means how wide our classroom is from one side to the other. Together, write a list of objects you could possible use. (desks, pencils, etc.) First, use many of the objects-3 desk, 4 kids, 6 pencils, etc, all at once. Ask the class if this is a good measurement. *Why or why not? What if we just try one?* Then, choose one object and make a prediction. How many _____ will it take to get from one side to the other? Discuss. Check prediction. Record results on the board. Do this again with other nonstandard units. Discuss why the amounts are changing depending on the tool.

Part II
After the story, students trace their hand, cut it out and use it as a non-standard unit of measure to measure items in the classroom. Students will estimate the number needed to measure an object before measuring. Using the copy of their own hand, ask students to estimate the length and height of an item in the classroom. Have students record their estimates in crayon on the recording sheet. Emphasize reasonable estimations and model how you estimate. Then, using a cut out of the teacher's hand, measure the item and record the actual measurement on the recording sheet.

Brainstorm a list of at least 10 items for students to estimate and then measure using their own hands. Record this list on the board or chart paper. Pair up students. Pairs of students should select the same 5 items from the list to measure using their own hands as a reference. Be sure to have them estimate first (writing this in crayon) and record their estimations on their own recording sheet. Students should then use their own hands to measure the items they've selected in the class and each student should fill out their own recording sheet.

Be sure to ask each group of students if they measured using the length or the width of their hand. Encourage them to give reasons to support one way over the other but do not discourage them from choosing a particular way. However, make sure to discuss how this might affect their results.

Students will then need to compare their actual measurements with their partner's measurements and answer the comparing question from their recording sheet. Also, have the students place the items they measured in order from longest to shortest or vice-versa. After all groups have completed their recording sheet, take time to share results with the entire class. In addition to sharing the results of their measurements, lead students in a discussion about the unit they used to measure each object with. Use the following questions to lead your discussion:

- *What difficulties did you face using only one unit, your hand print, to measure each object?*
- *What might make it easier for you to measure the next time you measure these objects?*
- *What did you notice about the measurements you determined and those that your partner determined?*

Part III

Once you and your students have discussed the differences between measurements among the students and the difficulties faced using only a single unit, lead students in a discussion of the possibility of creating a measurement tool that has multiple units. Ask questions to probe their thinking such as, "*How would this make measuring objects easier?", "How many units should be on a measuring tool?", "Why?"* Once students have explained their thinking and justified their answers, explain to them how to make a measuring tool. Have each student trace their hand again to make five copies. Have them glue each handprint to a sentence strip and demonstrate for them how to use the new tool to measure objects. Then, have students complete the same activity again using another copy of the recording sheet. Once all students have finished, ask them write in their math journal. Have them compare their results from using only one unit of measure to using a measuring tool to measure the objects. Have students answer the following questions in their journal entry:

- How did you measure the length of each object?
- What did you notice about using a single handprint compared to a set of five handprints?
- Did your measurements change once you used a measurement tool? How?

After students have had a sufficient amount of time to complete their entries, allow them to share with the whole group.

FORMATIVE ASSESSMENT QUESTIONS

- Are students able to describe how they are measuring the length of an object?
- Can students determine which of two objects is longer?
- Are students able to order a group of objects by their length?

DIFFERENTIATION

Extension

- Students will compare the measurement of three classroom objects with someone else in their class. Ask students to answer the question, "Who is…?" Then ask students, "Who has the largest hand, you, your partner, or the new person?" Explain how they know. Assist students in creating a graph comparing their results.

Intervention

- Have the student put together unifix cubes, approximating the same length as their hand. Use the unifix cubes in place of the handprint.
- The teacher can place a strip of masking tape along the objects to help identify the measuring path.
- Allow students to dictate their journal entries to an adult or a capable student so that their math thinking is recorded.

Name _____ Date:_____

How Many Hands?

Classroom Item	My Estimate	Actual Number
1)		
2)		
3)		
4)		
5)		

What did you notice about your measurements and your partner's measurements? _____

_____

Order the objects above and explain how you ordered them.

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