Constructing Task: Kangaroo Jumps

(Approximately 2 Days)

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

MCC2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

MCC2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

MCC2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.

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.

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

BACKGROUND KNOWLEDGE

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, page 322)

Students should begin to understand that a ruler is a representation of a consistent row of units. Students should have experience measuring the length of the same object using different tools (ruler with inches, ruler with centimeters, a yardstick, or meter stick). This will help students learn which tool is more appropriate for measuring a given object. They describe the relationship between the size of the measurement unit and the number of units needed to measure something. For instance, a student might say, “The longer the unit, the fewer I need.” Multiple opportunities

to explore provide the foundation for relating metric units to customary units, as well as relating within customary (inches to feet to yards) and within metric (centimeters to meters). The more students work with a specific unit of measure, the better they become at choosing the appropriate tool when measuring.

Estimation helps develop familiarity with the specific unit of measure being used. To measure the length of a shoe, knowledge of an inch or a centimeter is important so that one can approximate the length in inches or centimeters. Students should begin practicing estimation with items which are familiar to them (length of desk, pencil, favorite book, etc.).

For additional information on measurement see chapter 8 in Teaching Student Centered Mathematics by John A. Van de Walle.

One way to organize the data collected within this task is to use a bar graph or a line plot. Bar graphs are widely used and many students find them easy to read. One type of graph that students may have less exposure to is a line plot graph.

"*Line plots* are useful *counts* of things along a numeric scale. To make a line plot, a number line is drawn and an X is made above the corresponding value on the line for every corresponding data element. One advantage of a line plot is that every piece of data is shown on the graph. It is also a very easy type of graph for students to make. It is essentially a bar graph with a potential bar for every possible value. A simple example is shown in Figure 11.6." Van de Walle, *Teaching Student Centered Mathematics, K-3 pg 322*

ESSENTIAL QUESTIONS

- How can we decide on appropriate units of measurement (i.e. inch, foot, yard)?
- Why is it important for me to know how to measure different objects using different tools of measurement?
- Why is it important to be able to organize and graph data?

MATERIALS

- Rulers with inches and feet, centimeters and meter
- Student task sheet

GROUPING

Large Group, Small Groups (four)

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

Gather students together in your classroom meeting area. Brainstorm a list of ways we get from place to place without a vehicle. Some examples are: run, walk, hop, jump etc. Then concentrate student's attention to a discussion on the word jump. Create a word web of animals that jump. If kangaroo is not an animal they share, then lead them to name this animal. Explain to them, "Today we will do some jumping like the kangaroo!" Have someone demonstrate a kangaroo jump.

Explain to the students they are going to measure their jumps from a standing position five times. Place the students in groups of four. Ask children to record their information on the task sheet chart. They will need to decide on the unit of measurement (centimeters, inches, feet, or meter) and fill that in on the task sheet. Students will come up with the rules for the jumping. (Do they start with toes on the starting line? Are they going to measure to the heel or the toes of the foot once they have landed? Will there be a practice jump or will the first jump count?)The distance jumped can be marked with a piece of chalk or tape. Children will record their information on the task sheet. Students should estimate jump distance before measuring the distance.

Students might start out using a unit of measurement and then decide they want to change their unit. They might come to ask you, as the teacher, if this is ok. You can use this at your closing of the lesson letting that group share why they asked that and what they changed to for the task. You can allow them to change the unit BUT they need to be questioned about how they will record that data on the graph. (Watch them discuss this as you might see them convert the measurements or start all over). Either choice is another great thing to discuss at closing.

**You might want to *tell* them what to do if they come to this problem...it is imperative that you allow this mathematical discussion to take place between them as a group and you simply listen and watch.

As indicated by the Mathematical Practice Standards, this type of mathematical discourse should be the goal of every task.

Students order their jumps from longest to shortest on the back of the task sheet. After students have completed their chart, lead them in a discussion about how measuring in various units is different, which is more practical for this experiment, why they think this way, and how many inches are in a foot, centimeters are in a meter?

Part II
Students will work together in their group to create a line plot to display the information from their jumps**.** After groups have created their graphs demonstrating their data for their jumps, they should create 3-5 questions that can be answered using the line plot. The teacher may ask students to trade graphs with another group and answer questions created. Student's graph and questions should be presented to the class. Guide students in discussion about comparisons between graphs.

FORMATIVE ASSESSMENT QUESTIONS

- How do I know if an estimate is close to the actual measurement?
- Why do we need to be able to estimate a measurement or value?
- How do you organize the data from your jumps?
- How do you use a line plot? What can you tell using your line plot.

DIFFERENTIATION

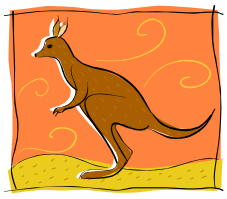
Extension

- Challenge students to add up all the jumps together to see how far the group jumped. Challenge them to tell how many inches it would be all together, and how many feet it would be.
- As a group create two line plots, one of the longest jump everyone did and another one the use the longer from each person.

Intervention

- Students can lay rulers in a line to measure the jumps if they are having a difficult time measuring lengths that are larger than one foot.
- Students can also use measuring tapes to help them measure distances longer than a foot.

Kangaroo Jumps!



Name _____

Jump #	Unit _____	Estimate before jumping	Estimate after jumping	Actual Measurement of jump
1				
2				
3				
4				
5				

Create 3 number sentences using your data.

1._____

2._____

3._____

Write three statements about your data.

4._____

5._____

6._____