

# Measurement Mastery

## Promoting Understanding and Recall

### Month 2

#### **Linear Measurement ~ Non-standard/Customary**

**Vocabulary Development** ~ arrange(d), compare, cube, equal, estimate, few, fewer, fewest, less, long, longer, longest, measure, more, order(ed), place(d), rod, short, shorter, shortest, tall, taller, tallest, same, unit

**Kindergarten** ~ Compare two objects with a common measurable attribute to see which object has more of/less of the attribute and describe the difference. (longer/shorter than or the same). **SE K.10A**

A minimum of twice a week during the routine's second month of implementation, compare two classroom objects according to their lengths. Eventually facilitate a discussion and comparison of three classroom objects ordering them from shortest to longest and vice versa.

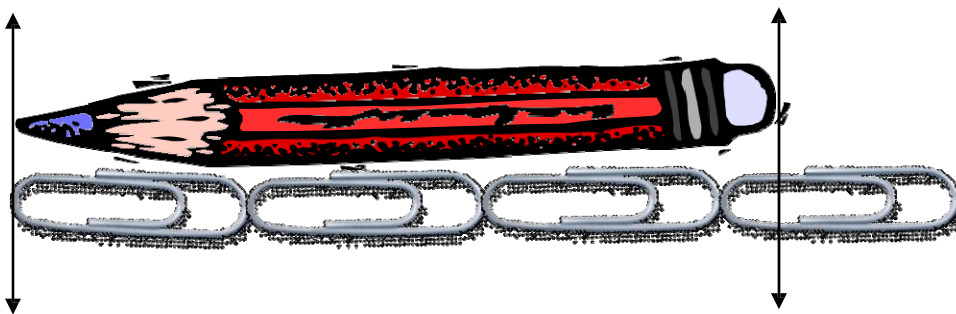
Students engage in a tactile task by constructing a rod using the same colored Unifix cubes. (Limit the number of cubes they may access to five or less.) Once each student has constructed a rod, select two students to present their rod and decide whose rod is tallest and whose rod is shortest. Ask them how they know. Direct the students to place their rod on a flat surface horizontally and compare their lengths. Ask them to decide whose rod is longer and whose rod is shorter. Ask them how they know. Select several pairs of students to repeat the task. Press for vocabulary acquisition and application. Highlight the use of taller to shorter when the rods are displayed vertically versus the use of longer to shorter when comparing the rods horizontally. Reinforce the difference between height and length.

If appropriate, ask students to count the number of Unifix cubes they used to make their rods and prompt the student to use the quantity as a means of justifying which rod is taller and/or shorter when displayed vertically and longer and/or shorter when displayed horizontally.

**First Grade** ~ Use measuring tools to measure of objects to reinforce the continuous nature of linear measurement. **SE 1.7A** ~ Illustrate that the length of an object is the number of same-size units of length that, when laid end-to-end with no gaps or overlaps, reach from one end of the object to the other. **SE 1.7B** ~ Measure the same object/distance with units of two different lengths and describe how and why the measurements differ. **SE 1.7C**

A minimum of twice a week during the routine's second month of implementation, select an object and an attribute of that object to focus on for the week, for instance, the length of a piece of paper, the length of a book, or the length of a new unsharpened pencil—something to which all students have access. On at least two separate occasions during the week, use the object and two different manipulatives such as large paper clips and Unifix cubes to measure the length of the object. Before student measure the selected object, ask them to estimate how many paper clips long they think the object is. Discuss the purpose of estimation. Record the estimates for comparison and discussion of accuracy to actual measurements.

When students measure the object the first time, emphasize the beginning point, the ending point and the alignment of the measurement tool (paper clips). If the object and measurement tool do not align perfectly, discuss how to round up or down to give an approximate measurement. In the illustration below, students decide whether enough of the last paper clip is used in order to say the pencil is approximately 3 paper clips long or 4 paper clips long (see graphic on the next page). Emphasize the same concepts when measuring with the alternate manipulative (cubes) later in the week, but discuss the difference in the number of paper clips needed versus the number of Unifix cubes needed. Press for students to generalize what the relationship is between the size of the unit and the number of units needed to measure the length of an object (SE 1.7B)



**Alternate between having multiple non-standard units (i.e. paper clips) and having only one unit to measure and object's length. When students only have one paper clip, the focus is on the process of measuring by marking intervals. Students are to be proficient with both methods.**

**Second Grade** ~ Find the length of objects using concrete models of standard units of length.

**SE 2.9A** ~ Determine the length of an object to the nearest marked unit using rulers, yardsticks, meter sticks, or measuring tapes. **SE 2.9D**

At the beginning of the routine's second month of implementation, introduce the term and concept of an inch. Ask students to display between their thumb and index finger their concept of an inch's size. Borrow Master Rulers from a grade 3-5 mathematics teacher if possible to introduce the visual of an inch. A standard ruler may be confusing for a student to interpret. Facilitate a discussion that solicits the students' observations about the inch and its relationship to the ruler/foot.

At the beginning of each measurement task, refer students to their own personal "body benchmark" for an inch. The space between the two knuckles of the index finger is similar to the size of an inch. This is a "concrete model that approximates a standard unit of length". Solicit suggestions from students of other objects that approximate an inch.

Each week in October, select two objects and an attribute of each object to focus on for the week, for instance, the length of a piece of paper, the length of a book, or the length of a new unsharpened pencil—something to which all students have access. On at least two separate occasions during the week, direct students to estimate the length of the object. Record the students' estimates and press each student for the reasoning behind his/her estimate.



When students measure each object, emphasize the beginning point, the ending point and the alignment of the ruler. If the object does not measure exactly to a whole inch, discuss how to determine the measurement to the nearest whole inch. Compare the students' estimates to the actual measurement of the object. Facilitate a discussion regarding whether each students' estimate was an over estimation or an under estimation.

