

Grade Level/Course: Grade 2

Lesson/Unit Plan Name: Measurement – Intro to Standard Units

Rationale/Lesson Abstract:

This series of 4 lesson and activities explicitly connects nonstandard measurement to standard measurement. Students need various learning experiences to understand how to measure using standard units. The learning experiences in Kindergarten and 1st grade with nonstandard units should be the starting point for 2nd grade measurement. Students will also explore centimeters and inches and compare measurements using both forms of units for the same object.

Timeframe:

4 50-60 minute Lessons

Common Core Standard(s):

Focus Standards for the Lesson:

2.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.

Additional Standards:

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

2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meter

Activity/Lesson:

Lesson Objectives Grade 1:

- Students will be able to correctly measure an object using nonstandard units by (1) laying the units end-to-end, (2) laying the units with no gaps, (3) use the same unit length to measure
- Students will be able to select the proper sized unit to measure an object how to correctly measure and justify their thinking

Lesson Objectives Grade 2

- Students will be able to explain why a standard unit of measurement is needed.
- Students will measure an object twice, using different length units (bridge from nonstandard to standard)
- Students will create and be able to use a ruler to measure objects.
- Students will be able to explain correct ways to measure using a ruler (starting at 0 to 9 inches, measure from 2 - 11 is 9-inches, measuring from anywhere on the ruler gives you the same measurement)

Instructional Resources/Materials:

- "How Big is a Foot?" by Rolf Myller (Young Yearling Book)
- 1-inch paper squares
- 1-cm paper squares
- paper clips (small and large)
- popsicle sticks
- items to measure (markers, unsharpened pencils, glue sticks, crayons, nametags, etc.)
- cardstock strips (to create a ruler) 12" x 2" strip for each student (inch ruler), 8" x 2" for each student (centimeter ruler)

Before the lessons:

- To build schema about measuring, teacher could **read Measuring Penny by Loreen Leady**. This book describes different ways you could measure an object with standard and non-standard units. It also describes the appropriate tools one would use to measure.
- **Make measurement ziplock baggies for your class.** Decide if they will work in partners or independently. Half of your class should get a ziplock baggie with 15 small paperclips and an unsharpened pencil. The other half will need a ziplock baggie with 10 large paperclips and an unsharpened pencil.
- **Make paper 1 inch squares and 1 centimeter squares** (make sure they are different colors). Decide if your class is going to work in partners or individually. Make bags for pairs or individuals with 12 1-inch squares and 12 1-centimeter squares.

Recommended Sequence of Experiences for Measurement Instruction			
Step	Goal	Type of Activity	Notes
1 – Making Comparisons	Children will understand the attribute to be measured.	Make comparisons based on the attribute, for example, longer/shorter, heavier/lighter. Use direct comparison whenever possible.	When it is clear that the attribute is understood, there is no further need for comparison activities
2 – Using Models of Measuring Units	Children will understand how filling, covering, matching, or making other comparisons of an attribute with measuring units produces a number called a <i>measure</i> .	Use physical models of measuring units to fill, cover, match, or make the desired comparison of the attribute with the unit.	Begin with nonstandard units. Progress to the direct use of standard units when appropriate and certainly before using measuring tools.
3 – Using Measuring Instruments	Children will use common measuring tools with understanding and flexibility.	Make measuring instruments and use them in comparison with the actual unit models to see how the measurement tool performs the same function as the individual units. Be certain to make direct comparisons between the student-made tools and the standard tools. Standard measuring instruments, such as rulers, make the filling, covering, or matching process easier.	Without a careful comparison with the standard tools, much of the value in student-made tools can be lost

Taken from **Teaching Student-Centered Mathematics** (second edition) by John A. Van de Walle, Karen S. Karp, LouAnn H. Lovin, Jennifer M. Bay-Williams- p. 271.

Day 1

Lesson Objectives:

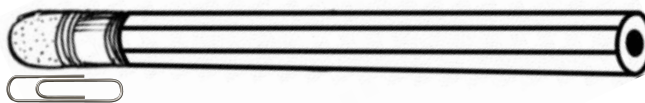
- Students will be able to explain why a standard unit of measurement is needed.
- Students will be able to correctly measure an object using nonstandard units by (1) laying the units end-to-end, (2) laying the units with no gaps, (3) use the same unit length to measure

Materials:

- Baggies with small paperclips (for $\frac{1}{2}$ the class)
- Baggies with large paperclips (for $\frac{1}{2}$ the class)
- Book: "How Big is a Foot?" by Rolf Myller (Young Yearling Book).

Lesson:

1. Give students on one side of the room the baggies with small paperclips and the other side of the room the baggies with large paperclips, taking care that they don't see that they have different sized paper clips.
2. Tell them to work independently or with a partner to measure the pencil with their paperclips by lining them up end to end.
3. Have kids share out in number of paperclips how long the pencil is. (You will get different measurements because some measured with small, some with big paperclips).
4. Discussion....
 - "Why did we get different answers?"
 - "We all measured with paperclips, but we got different answers?"
 - Eventually they should figure out that they all don't have the same sized paperclips.
 - "Does it matter if we have the same unit when we are measuring something?"
5. Read "How Big is a Foot?" by Rolf Myller (Young Yearling Book). Stop after the queen gets the bed and they realize it is the wrong size. Have students discuss in partners what the problem is and write a short letter telling the apprentice why the measurement could be wrong and a suggestion to correct the problem.
6. Discuss as a class the need for standard measurement. Discuss standard and non-standard measurement.



Day 2

Lesson Objectives:

- Students will be able to correctly measure an object using nonstandard units by (1) laying the units end-to-end, (2) laying the units with no gaps, (3) use the same unit length to measure
- Students will be able to select the proper sized unit to measure an object how to correctly measure and justify their thinking

Materials:

- 1-inch squares
- Objects for measuring (pencils, markers, glue sticks, etc.)

Lesson:

Have students pull out one-inch squares. Hold a discussion about the unit. Discussion points and activities include:

1. Naming the unit and discussing standard units vs. non-standard units. Find a benchmark for one inch so that students can start estimating. (from the end of your thumb to your first knuckle is about an inch)
2. Find things in the classroom that are smaller than an inch, about the same size as an inch, and larger than an inch. Students can write the name of the object or draw it. (BLM included)
3. Measure things at their desks using the inch squares. Make sure students line up the inch squares end-to-end, with no gaps or overlapping. Students can measure pencils, markers, glue sticks, etc.
4. Discuss what items are reasonable to measure with the inch squares. Would it be easy to measure the distance of the room with the inch squares? Why or why not?

Day 3

Repeat the same steps from Day 2, but use the centimeter squares.

Day 4

Lesson Objectives:

- Students will be able to explain why a standard unit of measurement is needed.
- Students will be able to correctly measure an object using nonstandard units by (1) laying the units end-to-end, (2) laying the units with no gaps, (3) use the same unit length to measure

Materials:

- Paper cup
- 1-inch paper squares
- 1-centimeter paper squares
- glue
- strip of paper sized 12" x 2" (cardstock or construction paper)
- Object – popsicle stick or unsharpened pencil

Lesson:

1. Display a paper cup and ask how we could easily measure the height of the cup using our inch or centimeter squares? (students should come to realize it is not easy because they are separate inch squares and you cannot stand them on end.)
2. Guide students to the conclusion that they could glue the inches down end to end with no gaps onto a strip of paper and then use the line of inches to measure things around the room.
3. Have students discuss with a partner the benefits of having the strip of inches glued down rather than individual inch squares (you won't lose one, hard to carry around easily, organized in a line so it saves time, can measure the height of objects, etc.)
4. Give students a 12" x 2" long strip of cardstock or construction paper. Model how to glue the squares down end to end with no gaps, starting at the end of the construction paper at the top.
5. Model numerating the inches so it is easy to measure things quickly instead of counting the inches each time. Start with 0 at the end of construction paper and draw a small line right between each inch with a number underneath.
6. Give each student a popsicle stick or unsharpened pencil. Have them measure with their new "ruler" and model how to position the "ruler" next to the stick and counting the inches sweeping over each inch as you count (like jumping on a number line). Record the measurement on the board and keep for later. **students should understand that it is the not the numbers that create the measurement but the **distance** from 0 to the inch mark where the object is being measured.*
7. Create a centimeter "ruler" with the centimeter squares (you may want students to create a centimeter ruler with 20 centimeters since they are significantly smaller). Compare the length of their homemade inch and centimeter ruler. Ask students to discuss and share out why the centimeter ruler is smaller than the inch ruler even though it has more units on it.
8. Ask the students to discuss with a partner if they think it there will be more centimeters needed to measure the popsicle stick or less in comparison with the measurement the students did earlier with the inch ruler.

9. Have students measure the popsicle stick with the centimeter ruler reflect on the two measurements. “Will this hold true for everything we measure? When we measure something with inches and centimeters, will there always be more centimeters than inches for the same object?”
10. Have students measure 3 items of your choosing with both rulers and record the results. What conclusions can they make after this activity? Discuss as a class.

Assessment:

Grade2 - Individual performance assessment:

1. Meet with students 1-on-1 or small groups. Have students measure an object with the inch ruler or centimeter ruler created in the lesson.
2. Look for the following measuring skills:
 - Lining up the end of the object to 0 on the ruler.
 - Lines up the object and the ruler to be parallel.
 - Identifies the correct measurement.
 - Ask students to measure the same object with the other ruler.
 - Will _____ be more/less in centimeters (or inches)?

Measurement (2.MD.2)	
Student Name _____	
Object _____	
Measurement in inches _____	Measurement in centimeters _____
Student was able to following	
<input type="checkbox"/> Lined up the object at 0 on the ruler	
<input type="checkbox"/> Lined up the object and ruler to be parallel	
<input type="checkbox"/> Identifies the correct measurement	
There will be <u>more/less</u> inches then centimeters.	
There will be <u>more/less</u> centimeters then inches.	

Assessment

Grade 1 - Individual performance assessment:

1. Meet with students 1-on-1 or small groups. Have students measure an object with length units used during the lesson (small or larger paperclips, 1-inch or 1-centimeter squares).
2. Look for the following measuring skills:
 - Lining up the length unit end-to-end.
 - Lining up the length unit with no gaps.
 - Identifies the correct measurement.
 - Ask students to measure the same object with the other ruler.
 - Will _____ be more/less in centimeters (or inches)?

Measurement (1.MD.2)	
Student Name _____	
Object _____	
Length Unit A _____	Length Unit B _____
Student was able to following	
<input type="checkbox"/> Lines up the length units end-to-end	
<input type="checkbox"/> Lines up the length units with no gaps	
<input type="checkbox"/> Identifies the correct measurement	

Warm-Up

1.MD. 2 NonStandard Measurement

What is the length of the pencil in paperclips?

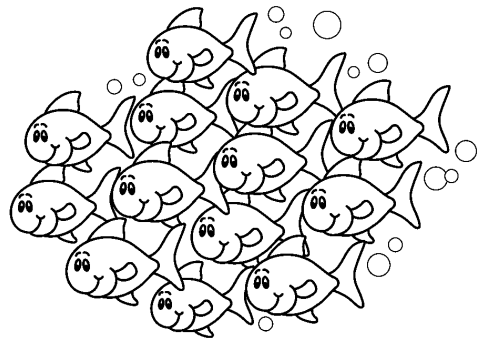


Pencil = _____ large paperclips

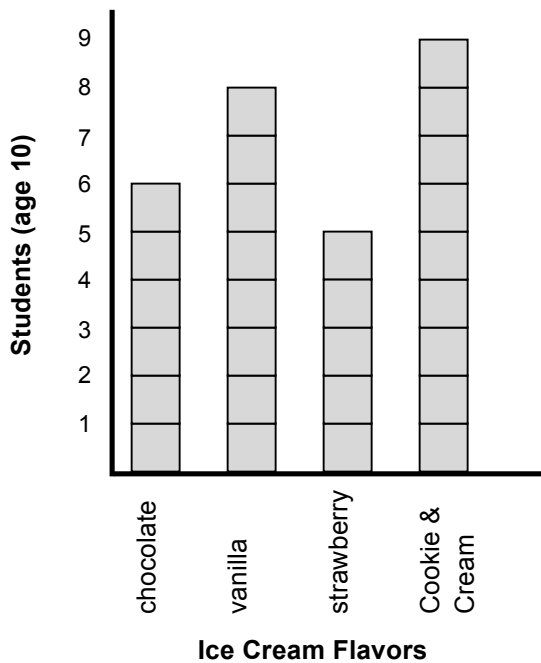
If the pencil is measured with small paperclips, would it take more or less small paperclips?

1.OA.1 & 2.OA.1

Sammy has some fish in his fish tank. He bought 5 fish. Now, Sammy has 13 fish. How many fish did Sammy have start with?



Ice Cream Data – Favorite Flavors



How many more students like chocolate than strawberry?

Class Discussion

What are all the different ways we can measure something?