

GRADE 2 & 3 MATHEMATICS: Measuring Nature (Non-Standard Units)

Summary of Learning Opportunity

This is the first lesson in our measurement unit. In this lesson, I took students outside to find natural sticks and other natural objects (cones, dandelions, cedar branches, sticks, rocks, etc.) and use the objects as non-standard units to measure their sticks. Students showed me their process and drew their stick and the referents to record their observations. Many students were so engaged that they wanted to measure their sticks at least twice using 2 different non-standard objects. Beyond math learning, I found that students loved being outdoors and enjoyed showing their learning beyond the classroom. Students were eager to share their knowledge of their natural found objects; for example, differentiating between hemlock and fir cones. I also found that doing this activity in nature helped students slow down and notice something different in the environment. There are also wonderful cross-curricular connections, such as using measuring the differences between different cones to investigate biodiversity (Science 3) or learning to care for the environment (Personal and Social Core Competency). I will continue doing activities outside and integrate more “Math Walks” in my teaching.

Mathematics Grade 2 & 3	Learning Standards	Competencies	<p>Reasoning and analyzing</p> <ul style="list-style-type: none"> Estimate reasonably <p>Understanding and solving</p> <ul style="list-style-type: none"> Develop, demonstrate and apply mathematical understanding through play, inquiry and problem solving <p>Communicating and Representing</p> <ul style="list-style-type: none"> Explain and justify mathematical ideas and decisions Represent mathematical ideas in concrete, pictorial and symbolic forms
		Content	<p>Grade 2</p> <ul style="list-style-type: none"> Direct linear measurement, introducing standard metric units <p>Grade 3</p> <ul style="list-style-type: none"> Measurement, using standard units (linear, mass and capacity)

Foundational Math Connections

Instruction and Assessment

MATHEMATICS:
Geometry and
Measurement (Spatial
Sense) – *Measurement*

1. Background:

I introduced the lesson using a picture book, *How Long?: Wacky Ways to Compare Length*, by Jessica Gunderson. In this book, lengths are described using non-standard units (i.e., an elephant’s trunk is 42 peanuts long). This helps students begin to build a mental picture of the relative sizes of objects. The lengths in standard units are given at the bottom of each page. We added more words to our ongoing “Math Vocabulary” anchor chart: long, length, measure, although I did not introduce the term “non-standard units” as I wanted students to use their experiences with non-standard units to contribute to a future Math Talk (see *Measuring in Nature Part 2*).

MATHEMATICS:
Geometry and
Measurement (Spatial
Sense) – *Measurement*

2. Lesson and exploration:

First, we discussed signals and safety rules for learning outdoors. When we arrived in our school's outdoor space, students were asked to each find a stick. Students were then asked to find other objects in nature (referents) to measure the length of their stick. To help students get started, I recalled one of the examples in the book ("the length of a python, a great big snake, was 13 rats").

Students also drew their stick and the referents (cones, dandelions, cedar branches, sticks, rocks, etc.) alongside their stick to show the length using non-standard units. Many students were so engaged that they wanted to measure their sticks at least twice using 2 different non-standard objects. I asked students to write one sentence about measuring the length of their stick and to circle any vocabulary words used.

3. Assessment:

I focused my assessment on students' demonstration and description of their measurement process. Through my observations, conversations and reading through students' written work, I determined that most students were able to express how to estimate length using non-standard units, and describe their process using mathematical vocabulary.

Demonstrations of Student Learning, Teacher's Assessment, and Reflection



Student A: **Proficient**

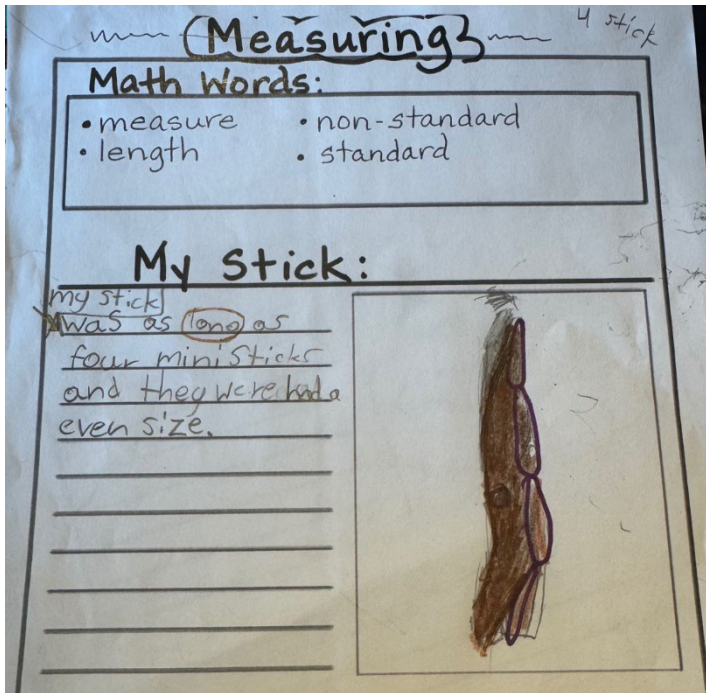
Excerpt of conversation with teacher:

"Show me how you're measuring again? You're using a little cedar bud?"

Student shows how they use their finger to mark the end of the bud, then moves the bud to their finger so that they can accurately count how many buds long their stick is: "1, 2, 3, 4!"

During our time in the forest Student A chose two different items from nature and used these items to measure a stick (cedar bud shown here). Student A demonstrated a process to move their cedar bud along the stick so that there would be no gaps or overlaps in the measurement.

In their worksheet (not shown), Student A explained their measuring process clearly using math words. Here, they demonstrated their measurement in a concrete way. Student A is Proficient in this learning activity.



Student B: Proficient

Excerpt of conversation with teacher:

Teacher: "Show me what you did to measure."

Student: "I used these sticks lined up here. I got some random sticks and I just made sure that they're all even."

Teacher: "What do you mean by all even?"

Student: "Even so it's the exact same size. I wanted all the sticks the same length to measure it [the big stick]."

Teacher: "Ohh. And how many were there again?"

Student: "Four."

Student B, a Grade 2 student, measured their stick with mini sticks. They confidently explained that the mini sticks had to be even in size. In later conversation, they explained that they couldn't use different sized mini sticks and that if they couldn't have found evenly sized sticks, they could just break the sticks to make them even. Student B clearly had an understanding of the importance of uniformity of non-standard units and demonstrated problem-solving skills. Student B can explain their measuring process clearly using math words and can communicate their measurement process in concrete and symbolic forms. They are Proficient in this learning activity.