



Math & Measurement: *Discussion Guide*

Overview

Measurement rules our lives. It has sliced up our world and helped us impose order and logic on our restless universe. Where would we be without kilograms and grams? Minutes and seconds? Meters and miles?

To help your students understand the importance of measurement to all facets of our lives, use this discussion guide and related videos and activities.

Classroom Activities

1. Show the segment “The Foot” from the *Measure for Measure: Length* video.
 - **Vocabulary:** Ask if anyone can explain how the measurement of “foot” has changed over the centuries; ancient Rome and 16th-century Germany are the examples given. Challenge students to find and share additional definitions for “foot” from other world civilizations using encyclopedias and the Internet.
 - **Activity:** Have small groups of students create their own version of the ancient Roman ruler—a one-pound copper bar with its 12 equal unciae, which served as the basis for both ounce and inch. First, have them brainstorm possible materials—for example, modeling clay weighted with coins or magnets. Then, after they have created their rulers, compare and discuss the groups’ efforts. Was it easier or harder to create than they imagined? Why? Did everyone create a 12-inch ruler? How does an individual uncia compare to a modern ounce?
2. Show the segment “The Inch” from the *Measure for Measure: Length* video. (Access to *unitedstreaming* is required.)
 - **Discussion:** Were students surprised to learn that about the origins of the inch? Why do they think King Edward I proclaimed an inch equal to three corns of barley laid end to end? What does this tell us about barley and its importance in 1305?

- **Math Investigation:** Have students measure their feet and then determine their shoe size (length and width) in U.S./Canada shoe sizes and at least two international systems, such as China and the United Kingdom. For a step-by-step tutorial for on how to measure your feet and multiple conversion charts, send students to this site:
<http://shoes.about.com/od/sizemeasurementcharts/>
3. Show the segments “The Original Yard” and “The New and Improved Standard Yard” from the *Measure for Measure: Length* video. (Access to *unitedstreaming* is required.)
- **Graphic Organizer:** Invite students to make Venn diagrams that convey the similarities and differences between the original standard yard and the new and improved one.
 - **Discussion:** In “The New and Improved Standard Yard,” the narrator states that when scientists “set about building the most sophisticated and precise measuring apparatus ever made, super-sensitive thermometers had to be specially constructed because they now knew that even the tiniest variations in temperature could affect the length of the metal bars.” Were students surprised to learn that temperature could affect the bar’s length? Why do they think this is so?
 - **Activity:** Have students compare classroom rulers and yardsticks to their own measuring tapes or rulers. Are all precisely the same length? By what degree do they vary? Is this difference problematic for the activities you do in the classroom? Why or why not? In what cases would it cause problems?
4. Show the segment “The New and Improved Standard Yard” from *Measure for Measure: Length* video, if you haven’t already. Then show the segment “The Meter” from the same video. (Access to *unitedstreaming* is required.)
- **Pre-Viewing Discussion:** Before showing the segments, ask students to share their knowledge and opinions of the meter. Where did it originate? Is it more or less accurate than the standard yard?
 - **Post-Viewing Discussion:** After viewing the segments, discuss as a class how the meter was developed.
 - **Writing:** After watching the segments, have students write individual essays in which they argue for or against the following statement: The U.S. should fully convert to the metric systems for all weights and measures. Encourage them to conduct research to find facts and opinions to support their argument.

Academic Standards

This discussion guide addresses the following national standards:

National Council of Teachers of Mathematics

<http://standards.nctm.org/document/appendix/numb.htm>

- Measurement Grades 3-5
 - Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems
 - Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement
 - Understand that measurements are approximations and how differences in units affect precision
- Measurement Grades 6-8
 - Understand both metric and customary systems of measurement
 - Understand relationships among units and convert from one unit to another within the same system

Mid-continent Research for Education and Learning (McREL)

<http://www.mcrel.org/compendium/browse.asp>

- Mathematics
 - Uses a variety of strategies in the problem-solving process
 - Understands and applies basic and advanced properties of the concepts of measurement
 - Understands the general nature and uses of mathematics
- Language Arts
 - Writing: Uses grammatical and mechanical conventions in written compositions; Gathers and uses information for research purposes
 - Listening and Speaking: Uses listening and speaking strategies for different purposes
 - Viewing: Uses viewing skills and strategies to understand and interpret visual media