

Me and My Shadow
Pennsylvania Governor's Institute
for Mathematics Educators
2004

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Topic/Theme: Measurement Using Standard Units of Measure
(US customary and metric)

Level: Grade 3

Time Element: 1 day

NCTM Standards Addressed:

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Apply appropriate techniques, tools, and formulas to determine measurements.

PA Math Standards Addressed:

- **2.3.3** Measurement and Estimation
 - A. Compare measurable characteristics of different objects on the same dimensions (e.g., time, temperature, area, length, weight, capacity, perimeter).
 - B. Determine the measurement of objects with non-standard and standard units (e.g., US customary and metric).
 - E. Determine the appropriate unit of measure.
 - G. Estimate and verify measurements.
- **2.4.3** Mathematical Reasoning and Connections
 - B. Use measurements in everyday situations (e.g., determine the geography of the school building).

Math Assessment Anchors Addressed:

- **M3.B.1.2** Use the attributes of length, area, volume and weight of objects.
Reference: 2.3.3.A, 2.3.3.E
- **M3.B.2.1** Determine the measurement of objects with non-standard and standard units.
Reference: 2.3.3.B, 2.3.3.F
- **M3.B.2.2** Estimate measurements of familiar objects.
Reference: 2.3.3.G

Reading Assessment Anchors Addressed:

- **R3.A.1.3** Make inferences and draw conclusions based on text.
Reference: 1.1.3.D, 1.1.3.G

Objectives: Students will estimate and measure their shadow to the nearest $\frac{1}{2}$ inch and the nearest centimeter.

Instructional Strategies and Plan (include strategies used to help different types of learners, i.e. auditory, visual, etc.):

Students have already practiced measuring one another in the classroom for height in both US customary and metric units of measure. Teacher observation has determined that students are capable of measuring to the nearest centimeter and half inch.

1. Explain the following activity orally to accommodate auditory learners. Provide written directions on the response worksheet to accommodate visual learners. Include picture clues or icons as an accommodation for special needs students. Pair students to utilize strengths and to address special needs.
2. On a nice sunny day, read and discuss Bear Shadow by Frank Asch. Take students to the playground. Have one partner stand still while the other partner marks with chalk the beginning and end of the shadow. Estimate the length of the shadow and record on the response sheet. One student measures to the half-inch and the other student measures to the nearest centimeter, measurements are written on a response sheet. Partners will check each other's measurements.
3. Repeat the estimation and measuring procedures later in the day and record the measurements on the response sheet.

Materials/Resources: Yardsticks, meter sticks, chalk, response worksheet, pencil, (book) Bear Shadow by Frank Asch

Interdisciplinary Connections:

- **Reading**
 - Bear Shadow by Frank Asch
 - Reflection Strategy from Teaching Reading in Mathematics 2nd Edition by Mary Lee Barton and Claire Heidema, p. 143.
 - 'The Last Word' – Students spend the last 10 minutes of class writing you a letter about something they do not understand or need help with in the current unit. In addition to revealing to students what they do not know,

this writing task can inform you about what needs to be reviewed or clarified during the next lesson.

- **Technology:**
- www.funbrain.com/measure
- **Other:**
- Science – relate to night occurring because the Earth’s rotation puts us in a shadow in relation to the sun.

Assessment Strategies:

- **Formative Evaluation (checking student understanding during the lesson):**
 - Observe students’ ability to measure to the nearest ½ inch and centimeter
- **Summative Evaluation (how will it be determined that the objectives were achieved?):**
 - Summative evaluations were done previous to the activity

Correctives/Remediation:

- www.funbrain.com.measure – Practice measuring inches and centimeters
- Practice measuring with a ruler at center activities

Extensions/Enrichment:

- Shadow Graphs Anyone Can Make by Phila H. Webb – Students can follow the experiments on page 20-21 to compare large and small shadows.
- What Makes a Shadow? by Clyde Robert Bulla – links shadows to Earth’s rotation.

Special Accommodations (special needs students)

- **Description of the Special Needs Student Selected:**
 - The student is functioning three years below grade level. She is receiving learning support services for language arts and math and ha difficulty following direction in all instructional areas. They have difficulties in language comprehension, vocabulary, direction following, event-sequencing and working memory. They can answer literal comprehension questions in all content areas and usually answers 1 out of 5 inferential questions correctly. They tend to jump into reading tasks without previewing material but have success when instructions are broken down and accompanied by modeling. They have

difficulty with basic math facts for multiplication and division as problems involving multiple steps.

- **Accommodations to use with this Student:**
 1. Partner with the teacher to model procedure for the class
 2. Pair with student partner to provide repetition
 3. Provide icons as clues on response sheet
 4. Break response sheet into four sections in a 'Sequence Folder' to allow student to view one step of the directions at a time.