HOW DO YOU MEASURE UP?

Master Teacher: Gladys Tilley

Grade Level: K - 2

Time Allotment: Four or five 45-minute class periods with student maturity level and pacing considered.

Overview: This lesson provides students with the opportunity to familiarize themselves with nonstandard units of measure, different measurements used in the real world and measurement terminology. Through the use of videos and hands-on activities, students will achieve lesson objectives.

Subject Matter: Math

Learning Objectives:
Students will be able to:

- compare and order two or three objects according to length, capacity or weight.
- find concrete objects that are about the same as, less than, or greater than a given object according to length, capacity or weight.
- estimate and measure length, capacity, or weight of objects using nonstandard units.
- describe the relationship between the size of the unit and the number of units needed in a measurement.
- identify concrete models that approximate standard units of length, capacity, or weight.

Standards:

From *Chapter 111. Texas Essential Knowledge and Skills for Mathematics*

Subchapter A. Elementary

Grades K - 2

www.tea.state.tx.us/teks

§ 111.12. Mathematics, Kindergarten

(K-10) Measurement. The student uses attributes such as length, weight, or capacity to compare and order objects. The student is expected to:

(A) compare and order two or three concrete objects according to length

(shorter or longer), capacity (holds more or holds less), or weight (lighter or heavier); and,

(B) find concrete objects that are about the same as, less than, or greater than a given object according to length, capacity, or weight.

§ 111.13. Mathematics, Grade 1

(1.7) Measurement. The student uses nonstandard units to describe length, weight, and capacity. The student is expected to:

(A) estimate and measure length, capacity, and weight or objects using nonstandard units; and

(B) describe the relationship between the size of the unit and the number of units needed in a measurement.

§ 111.14. Mathematics, Grade 2

(2.9) Measurement. The student recognizes and uses models that approximate standard units (metric and customary) of length, weight, capacity, and time. The student is expected to:

(A) identify concrete models that approximate standard units of length, capacity, and weight;

(B) measure length, capacity, and weight using concrete models that approximate standard units; and,

(C) describe activities that take approximately one second, one minute, and one hour.

Media Components:

Videos

Mathica's Math Shop: *All Star Elf # 102*

Mathica's Math Shop: *Best Wishes # 102*

Mathica's Math Shop 2: *Captain Blunder's Treasure* #201

Web Sites

PBS TeacherSource Math
www.pbs.org/teachersource/math.htm
This web site has lesson plans, online activities, classroom resources, and professional development projects.

The Math Forum - Teacher's Place
http://forum.swarthmore.edu/teachers
This web site has math for all levels - Primary, Secondary, College, University, Special Interest, General Interest (Ask Dr. Math, Teacher2Teacher and otrher topics). The Math Library is extensive.

All Math Homepage
http://www.allmath.com
This web site is a math site for kids and teachers. If more creative and innovative

lesson plans on specific math topics are desired, consult their lesson plans page at www.lessonplanspage.com/Math.htm

Materials:
For each student:

One of the following to be used as a measure - large paper clip, small paper clip, craft stick, pencil, pen, etc. (teacher's choice of items); various classroom objects

For each group:
1 ruler
1 pencil
1 list of some classroom objects (teacher's choice) may include desk, chair, chalk ledge, window width, door width, area rug, etc.
1 - 1 cup measuring cup
1 pint jar
1 gallon jug
source of water

For teacher:
large paper clip
small paper clip
craft stick
ruler
yardstick
measuring tape

Prep for Teachers:
Cue videos to the appropriate starting points. Prepare all hands-on materials and count to make sure there are enough for each student participating.

Introductory Activity: Setting the Stage

The following activities will prepare your students for lessons in measurement, provide them with the ability to use nonstandard units of measure, standard units of measure and the opportunity to use measurement terminology.

Learning Activities:

Lesson 1: *Familiarizing students with nonstandard and standard units of measure*

Tell students they will be learning about measuring and how to measure using nonstandard units. Show students a large paper clip, a small paper clip and a craft stick. Tell students these items will be used as nonstandard units of measure because none of them will measure an object the same. Show them a ruler, a yardstick and a measuring tape. Demonstrate how these three measuring devices will measure a craft stick the same because they are each marked with a standard way of measuring.

Give each student one of the following - large paper clip, small paper clip, craft stick, pencil, pen, etc. (teacher's choice of objects depending upon availability). Ask them to find an object in the room that measures approximately the same as their nonstandard unit of measure. When all have selected an object, they will share with classmates. Model the sentence structure for students to use - "An *index card* is about as long as the *craft stick.*" After sharing, students exchange items for each to compare the length of a classmates object to their nonstandard unit of measure to see which was taller, shorter, longer. If Math Journals are used, students will draw their nonstandard unit, item found of the same approximate length and their classmate's item, labeling it longer than, shorter than, or taller than. Ask students to tell if using nonstandard units of measure would help in constructing a building. Why or why not? Tell students that measuring accurately is a skill everyone needs to learn and that it is a skill that everyone uses. Close this lesson by reviewing the difference between nonstandard and standard units of measure.

Lesson 2: ***Identification of some nonstandard units of measure and how they were used***

Provide students with a **Focus For Media Interaction** by asking them to watch the videos **Mathica's Mathshop's** *All Star Elf and Best Wishes* to see if they can name the nonstandard units of measurement used by Mathica and what Mathica used to compare the measurements.

Begin *All Star Elf* video where Mathica is looking out of the window with binoculars and saying, "Well, sports fans, its been a beautiful day for the All Star Games here in the Land of Tales." **Stop** and **Fast Forward** video to *Best Wishes.* **Begin** video where Mathica is rubbing the lamp and the Math Magician is saying, "Gently." **End** video when Jamil puts on the fisherman's hat and says, "A size 8. Perfect. A thousand thanks."

Ask learners to tell what Mathica used to measure how high Jack jumped. (candles) Ask, "How did Mathica decide which candle was the tallest? (She lined them up from shortest to tallest.) Ask, "What nonstandard unit of measure was used to measure the tallest candle?' (her hands) Ask, "How many hands tall was the tallest candle?" (about 5 hands) Ask, "Do you think that your hands would have measured the candle the same as Mathica's? Why? Why not? (Hands are different sizes.) Ask, "How many hands high did Hare jump?" (10 hands high) Ask, "Why didn't Mathica's hands and Hare's hands measure the candle the same?" (Their hands were not the same size.) Say, "Next was the water-fetching contest. How was the water measured?" (The giant's egg cup was used.) Ask, "How much water did Jack and Jill fetch?" (5 egg cups full.) Ask, "How many giant egg cups did the Hare fill?" (8). Who fetched more water?" (Hare) Ask, "What did Mathica use to compare and show who won the jumping and water fetching contests?" (a graph)

Say, "In *Best Wishes,* what was measured?" (Jamil's head) Ask, "What unit of measurement was used?" (chain links) Ask, "What nonstandard units of measure did Mathica use in the two videos?" (her hands, a giant's egg cup, and chain links)

Lesson 3: ***Volume and capacity***

Provide students with a **Focus for Media Interaction** by telling them that they are going to watch a section of video they have watched before and that you want them to tell you what is being measured and how.

Start the *All Star Elf* video where Mathica is looking out of the window and is saying, "Coming up next is the event we've all been waiting for." **Pause** video when the Math Magician says, "Who fetched the most water - Jack and Jill or the Hare?" Have students look at and discuss the amount of water brought in by the contestants and determine who brought in the least and the most water. When this is decided, **resume** the video where it was paused so that students may check their decisions. **Stop** and **rewind** the video when Mathica says, "Announcing the winner of the water-fetching contest - the Hare. Ask, "What was being measured?" (water) Ask, "How was it being measured?" (by egg cups) Have students tell if egg cups are standard or nonstandard units of measure and why/why not. (They are not standard units of measure. Egg cups come in various sizes.) Tell students when they discuss capacity and volume, they are sometimes talking about how much a container will hold. In the video just watched, volume was how much each contestant brought in as measured by the giant's egg cup. Tell them that in the next video, *Captain Blunder's Treasure,* they are to watch and be able to tell how volume is measured.

Start video where the Math Magician is seated and says, "It has been a peaceful holiday. The first I had taken in many a day." **Pause** and **rewind** video when Captain Blunder tries to pick up the cooler and can't. Ask students to tell what was used to measure the volume of the cooler, how many gold bricks did the cooler hold and whether or not volume or capacity always means a liquid. Review the three lessons.

Lesson 4: ***Using standard measurements - rulers and cups***

Give each group of students rulers and 1-cup measures. Give each group the same list of classroom items to measure (desk, chair, chalkboard ledge, door width, window width, area rug, etc.) As each object is measured, the group's reporter writes the measurement beside the name of the object measured. When this is done, give each group the pint jars and a measuring cup. Have them fill the jar using the measuring cup. Again the reporter records how many were used. Then let them use the cup to measure how many cups will fill a gallon jug. When this activity is completed, students return to classroom to discuss and compare their findings.

Culminating Activities:

To give students hands-on experiences using measurement, the following activities may be used.

1. Volume and Capacity

Have several jars (the same size - ex. pint jars) ready for use. Divide class into groups - no more than four per group. Take students outside. Give each group 2-pint jar and a different measuring device (ex., spoon, laundry scoop, thimble, baby food jar, medicine cup, etc.) Have each group fill its pint jar counting how many 'spoons' were used. When each group has completed the counting, they return to the classroom to chart and discuss their findings. Have them discuss why the measurements are all different and now they could make their findings the same. Note: This activity may be done over several days using different type containers and measurers. Then have student groups use the same measurers for the containers and compare the measurements.

2. Have students write math problems involving measurement. They exchange problems with a classmate and solve the problems posed.

3. Ask students to choose a favorite toy to measure at home. Bring the measurement and toy to school and compare measurements to determine whose toy is the longest, tallest, shortest, widest, etc.

4. Have students pair up and estimate each other's hand length. Measure and compare. Change partners and repeat activity.

5. Have students write their names on one-inch graph paper, count the letters to see who has the most letters and use a ruler to see whose name is the longest.

Cross-Curricular Extensions:

VISUAL ART
Have students write their names on one-inch graph paper, color the squares, cut out their names and glue to a poster board to visualize the names from shortest to longest.

VISUAL/KINESTHETIC/MATHEMATICAL
Bring in a melon. Have learners estimate its circumference and cut a length of yarn they think will go around it. Measure the length of yarn around melon. The yarn, with student's name attached, is taped to a chart under one of the following headings - too short, too long, just right.

SCIENCE
When studying plants, have students each grow a plant of their choice from seed. When the seed starts germinating, have each student measure his/her plant weekly and record the growth in his/her science journals. At the end of a month compare them to determine whose plant grew the most.

KINESTHETIC/MATHEMATICAL/VISUAL
Have each student bring two or three containers from home. Measure to see how many is the same size. Compare container heights as they are ordered from tallest to shortest/shortest to tallest.

Community Connections:

- Invite a parent who sews to visit the class to talk about how important accurate measuring is to a seamstress and then show something the parent has made.

- Take a field trip to a local grocery store and look at the different sizes of containers used.

- Invite a quilt maker to visit or visit the quilt maker's shop to see how quilt pieces are measured and cut and to see finished quilts.

- One the local school district's carpentry classes or carpentry teacher may wish to come and demonstrate how measurement is used. Accuracy is discussed.

- A local builder or architect may be invited to show how measurement is used in his/her work. The importance of accuracy is discussed.

- A tailor or dressmaker could be asked to demonstrate how measurement is used in his/her work. The importance of accuracy is discussed.

- A pharmacist/druggist may be asked to visit the class or the class my visit a pharmacy to observe how measurement and accuracy of measurement is used in the preparation of medicines.

- An interior designer may be asked to demonstrate how measure is used in his/her profession.