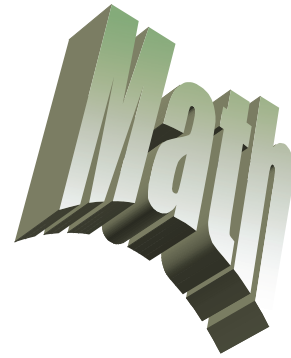


Algebra/Geometry Institute Summer 2005

Why and How We Use Units



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School: Friars Point Elementary

Grade Level: 6th

1. Teaching objective(s)

Students will discuss the U.S. Customary units of length, determine the length of various objects in the school, and estimate the measurements of various objects in the school.

Many times, when students are asked to give the measurement of something, students often provide teachers with a number value and neglect to include the actual unit of measurement. For example, a student may say that the length of a shoe is 10 without including inches, or the weight of a box is 4 without including grams. A theoretical reason for this lack of identifying the unit is that students do not have any understanding of the necessity of the units. Many students do not understand the units neither can they visualize the units because they have not had very many experiences working with the units nor the tools needed to determine the measurements.

The following activities will provide the students with an introduction to the U.S. Customary System of measurements, an understanding of the units necessary to make reasonable estimations of length using the U.S. Customary System, and the ability to work with the tools needed to determine the length and width of various objects.

2. Instructional Activities

The teacher will begin the lesson by showing students different objects such as a hula-hoop, a basketball, and a box. The teacher will then say, "This basketball is 20

around, this hula-hoop is 15 across, and this box weighs about 10.” Then, the teacher will ask the students if they understood what was said and how it sounds for the teacher to say that this basketball is 20, this hula-hoop is 15 across, and this box weighs 10. The students will probably comment that it sounds a little funny, and it seems like that there should be something more to the description of the dimensions of those objects. They will probably say, “15 what or 20 what”. Then, the teacher will say, “Precisely!”

Then, the teacher will say, “Today, class, you are going to learn the importance of units of measurement, measure some items, and make reasonable estimations using those units of measurement.” Then, the teacher will tell the students that today’s lesson will start with finding the dimensions of something for which they are very familiar. The teacher will tell the students that they are going to see who has the longest and widest right hand in the class. Then, the students will number off from one to four for grouping. Each group will select only one object from the table to use to determine the length and width of each group member’s hand. The objects that the students will choose from to use to measure each member’s hand will include small and large paper clips, baby shoe strings, 20 ounce bottle caps, and a variety of beans, Pinto, Lima, White, and Red Kidney Beans. The students will be told that the length is how long their hand is and the width is how wide their hand is. The students will be told to have each person lay his or her hand flat on a sheet of typing paper and trace the student’s hand and to use the tracing for the measurement. The students will be told not to include the fingernails in determining the length. After the students have measured each person’s hand using the chosen object, each group will list the information on chart paper and explain to the classmates the

dimensions of each group member's hand and inform the class of who in their group had the longest and widest hand.

After each group has made their presentation, the teacher will ask the students, "From the information that has been presented to us on each chart, who in the class has the longest and widest hand?" Some students will look completely puzzled, and others will attempt to make an educated guess by looking at the length and the width of the various objects used to determine the measurement although no one will be able to tell who had the longest and widest hand. The teacher will ask, "Why can't we answer this question?" One of the students may say, "Because every group used a different object to determine the length and width." The teacher will say, "Exactly!" The teacher will then say, "What word have you heard previously that we can substitute for object?" One student may say that the word unit can be substituted for the beans, the shoestrings, or whatever object was used to take the measurement. The teacher will comment that the students are so smart and say, "Yes, to compare any type of measurement, you need a standard unit." The teacher will explain to the students that a standard unit of measurement is one that the majority has agreed will be used to approximate the measurement so comparisons can be made. Therefore, it would be very inappropriate for me to say that this basketball is 20, this hula-hoop is 15, and this box weighs 10.

Next, the teacher will explain to the students about the U.S. Customary units of measurement and the Metric System. The teacher will explain that people in the United States use the U. S. Customary system as well as the Metric System. The teacher will provide the students with a list of the U.S. Customary Units (See Appendix C). The teacher will tell the students that the first category of measurement that they are going to

work with will be the U.S. Customary units of length, inches, feet, yards, and miles. The teacher will pass out rulers that have inches and centimeters and give the students an opportunity to examine the rulers. The teacher will also pass out a few yard sticks for the students to pass around and examine. The teacher will stand before the class and hold up the ruler and the yard stick and indicate that the yard stick has 36 inches which is also equal to 3 feet. The students will be able to physically take their rulers and place them on the yard stick three times as illustrated by the teacher in front of the class to show that the three rulers do indeed equal one yard.

The teacher will show the students how to use the ruler by passing out index cards and having them to measure the length and width of the index cards. The teacher will tell the students that they are going to measure on the inch side and that they are to begin at 0. The teacher will walk around to ensure that the students are measuring correctly and assist them whenever necessary. After everyone has had an opportunity to measure the index card, the teacher will call on one student to give the length and the width.

To illustrate one's ability to make comparisons when one has a standard unit, the students will be instructed to determine how tall each person in their group is in inches. Again, students will be randomly placed in groups of no more than four. Each student will stand next to a wall in the classroom, and one of his/her group members will mark off his/her height using an erasable marker. Then, he/she will use the rulers to measure the distance from the floor to the mark, vertically, to determine each student's height. After determining each group member's height, one of the group member's will list each group member's height on the board in inches. Then, the students will be asked, "Who is the tallest and how tall is that person?" The students will respond, and the teacher will

reiterate how difficult it would have been to determine who was the tallest without an established unit of length to make the comparison.

Thereafter, the students will remain in their groups and complete a chart by determining the measurement of several objects in the room using rulers (Appendix A). After completing the chart, each student will come to the front of the class and present their information. After completing that chart, the students will complete another chart where they will have to estimate the measurement of an object prior to determining the measurement to see how close their estimations come to the actual measurement, which will indicate their familiarity with the unit (See Appendix B). All students in the group will give estimations prior to the group determining the actual measurement. The journey of estimation and determination will begin in the class room, venture out into the hallways, into the gymnasium, and finally, out onto the playground. Students will be taken outside and taken on a mile walk, so they may have a realistic perspective of a mile. The mile will be marked off prior to the day by the physical education teacher. After completing the adventure of estimation and measurement, the students will return and each group will discuss their findings.

3. Materials and Resources

Geddes, Dorothy. *Measurement in the Middle Grades*. National Council of Teachers of Mathematics, 1994.

Bright, George W. *Navigating through Measurement for grades 6-8*. National Council of Teachers of Mathematics, 2005.

rulers, yard sticks, small and large paper clips, baby shoe strings, 20 ounce bottle caps, a variety of beans (Pinto, Lima, White, and Red Kidney Beans),erasable markers, dry erase

board, index cards, a hula hoop, a box, a basketball, the file cabinet, the bulletin board, the desk, the computer desk, and the physical education teacher.

4 Assessment

The completion of the measurement charts, the oral reports, and the observation of the students actually taking the measurements.

Appendix A

Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Measurement</u>
1. Length of the Window	in.	
2. Height of the Window	in.	
3. Length of the Dry Erase Board	feet	
4. Width of the Dry Erase Board	feet	



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Measurement</u>
1. Length of a board eraser	inches	
2. Width of a board eraser	inches	
3. Height of Your Desk	inches	
4. Length of the top of your desk	inches	



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Measurement</u>
1. Width of the top of your desk	inches	
2. Height of the file cabinet	feet	
3. Width of the file cabinet	feet	
4. Length of the file cabinet	feet	



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Measurement</u>
1. Length of the bulletin board	feet	
2. Width of the bulletin board	feet	
3. Length of the computer table	feet	
4. Width of the computer table	feet	

**Appendix B
Journey of Estimation**



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Estimates</u>	<u>Measurement</u>
<u>1. Length of the classroom door</u>	<u>feet</u>		
<u>2. Width of the classroom door</u>	<u>feet</u>		
<u>3. Length of the classroom</u>	<u>yards</u>		
<u>4. Width of the classroom</u>	<u>yards</u>		



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Estimates</u>	<u>Measurement</u>
<u>1.Length of the sixth grade hall</u>	<u>yards</u>		
<u>2. Width of the sixth grade hall</u>	<u>yards</u>		
<u>3. Length of the basketball court</u>	<u>yards</u>		
<u>4. Width of the basketball court</u>	<u>yards</u>		



Group Members: _____

Date: _____ Topic: Measurement

<u>Object</u>	<u>Unit</u>	<u>Estimates</u>	<u>Measurement</u>
<u>1. Distance from the Freethrow line</u>			
<u>To the baseline of the basketball court</u>	<u>feet</u>		
<u>2.The horizontal distance of the court</u>	<u>yards</u>		
<u>3. Length of the stage</u>	<u>yards</u>		
<u>4.Width of the stage</u>	<u>feet</u>		

Appendix C

United States Customary Units of Measurement

Units of Length

1 foot(ft)= 12 inches (in.)

1yard(yd)= 3 feet (ft)

1 yard(yd)=36 inches(in)

1 mile(mi)= 5,280 feet(ft)

1 mile (mi)= 1, 1760 yards(yd)

Units of Liquid Volume (Capacity)

1 cup © =8 fluid Ounces (fl oz)

1 pint (pt) = 2 cups or 16 fluid ounces (fl oz)

1 quart(qt) = 2 pints, 4 cups, or 32 fluid ounces (fl oz)

1 gallon(gal)= 4 quarts(qt)

Units of Weight

1 pound(lb)=16 ounces (oz)

1 ton(T)=2000 pounds(lb)