NCLB Math Institute Summer 2011

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School: Hayes Cooper Center

Grade Level: 6th

1. Teaching objective(s) MS. 4.a.The student will convert units within a given measurement system to solve problems. (DOK 1)
   MS 2.a. The student will solve simple equations using guess and check, diagrams, properties, or inspection, explaining the process used.

2 Instructional Activities
Describe completely the class activities for your lesson.

Day 1 Intro:

A. Ask students the following questions:
   - How tall are you?
   - How can you find out?
   - What tools can you use to determine your height?

B. Allow time for student responses.
C. Have students to work in pairs to find their height using both customary and metric measurement. (The students will use adding machine tape to measure themselves then use measurement tools to measure the adding machine tape.)
D. Start a discussion by asking the following questions:
   - What unit of measurement are you using?
   - Why did you choose that unit of measure?
   - What other systems could you use to measure?
   - What would be your height in inches?
   - How many centimeters tall are you?
   - Which unit of measure is most appropriate to measure your height? Why?

E. Allow students to volunteer sharing their answers.

Activity 1:

F. Ask students the following question:

- "Why do we use so many different units of measure…Why not just stick with one unit?"

G. Read the book entitled, "The King's Chessboard."
H. Go back to page 12 and discuss the dilemma that the Weigher faced and ask the following question:
    - Why could the Weigher stop counting grains of rice and just simply weigh one ounce bags?

I. Guide students to the conclusion that we group things in order to make them easier to count and our measurement system is somewhat similar.

Activity 2:

J. By show of hands, allow students to generate a list of measurements that we use every day.
K. Have a student to write the list on the board.
L. Tell students that they are going to develop a Thinking Map. (Attachment #1)
M. Let each student know that their Thinking Map can be as colorful as they want it to be as long as it is neat and meaningful.
N. As the class develops the Tree Map, allow students to volunteer to put a particular measure on the board in the correct place.

3 Materials and Resources

Identify various materials and equipment needed for lesson activities.

- Meter sticks
- rulers
- yard sticks
- adding machine tape
- scissors

Provide complete references (include textbook and additional resources)

- Maletsky, E.M. & McLeod, J. (2009) HSP Math T.E. Volume 3, Orlando, FL: Harcourt. Inc.
- Birch, David. The king's chessboard. New York: Puffin Books, 1993.

4 Assessment

Describe completely the assessment to be used for this lesson.

- Each student will be given a blank Tree Map. (Attachment #1)
- Each student will have to list the units of measure under the correct category. (length, weight/mass, or capacity)

Day 2 Intro:

A. Hold up each of the customary capacity containers (quart, cup, etc.) for this lesson.
B. Ask students the following question:
    - What unit of capacity does each of these containers hold?

C. Allow time for student responses.
D. Put the class into groups of four.
E. Present the following problem to the students using the board or an overhead:
    - Julie knows she needs 8 cups of apple juice for a recipe. The apple juice comes in quart containers. How many containers of apple juice does she need?
F. Have each group to use the measuring cup and quart container to convert quarts to cups.

G. Start a discussion by asking the following questions:
    - How many quarts fit in the quart container?
    - Which container is bigger? Which container would you have to fill more times for the same amount of juice? fewer times?
    - What operation do you perform when you convert a larger unit to a smaller unit? from a smaller unit to a larger unit?

H. Allow students to volunteer sharing their answers.
I. Remind students of the following key points:
    - To convert from a larger unit to a smaller unit, multiply.
    - To convert from a smaller unit to a larger unit, divide.

Activity 1:

J. Ask students the following question:
    - "Why do we use so many different units of measure…Why not just stick with one unit?"

K. Have students to look up the measurements for the following:
    - The length from Home plate to the pitching rubber. (baseball) convert to in.
    - The distance from one base to another. (baseball) *convert to yards*
    - The weight of ten baseballs. (baseball) *convert to pounds*
    - The perimeter of the batter's box. (baseball) *convert to inches*
    - The distance of the service line from the net. (tennis) *convert to yards*
    - The maximum weight of a bowling ball. *convert to ounces*
    - The height of the rim. (basketball) *convert to inches*

L. Allow students to share their answers.

Activity 2:

M. Students will play “Who is Smarter on Study Island.”
N. Divide the class into two teams.
O. Explain the rules of the game.
   - Each team will get three helps. (ask your teammates, 50/50, and a pass to the other team)
   - One team member will come to the computer and answer a Study Island generated question.
   - The team that has the most points at the end of the game wins.
P. Show students the overall class score and encourage them to continue to get it higher.
Q. Allow time for any student questions.

3 Materials and Resources

Identify various materials and equipment needed for lesson activities.

- customary measuring cup
- pint container
- quart container
- gallon container
- LCD Projector
- laptop computer

Provide complete references (include textbook and additional resources)

- Maletsky, E.M. & McLeod, J. (2009) HSP Math T.E. Volume 3, Orlando, FL: Harcourt. Inc.
- Study Island <http://www.studyisland.com/>

4 Assessment

Describe completely the assessment to be used for this lesson.

- Each student will use a diagram of a soccer field to answer the following questions:
  1. The long side of the town soccer field is next to a road. For safety, the town built a fence along the long side of the field. The fencing comes in 6-ft sections. How many sections were used to build the fence? 50 sections
  2. An American football field is 160 ft wide. Gina claims this is wider than the soccer field shown. Is her claim correct? Explain. No. 160 ft = 53⅓ yd; 53⅓ yd 60 yd

3. There are 11 players on a soccer team. Is a case of twenty-four 1-c bottles enough for each player to have 1 pt? Explain. 24 c = 12 pt; 12 11.

4. The area of a soccer field is 600 sq yd. Explain how to calculate the area of the soccer field in square inches. Possible answer: convert 600 square yards to square feet. Then convert the square feet to square inches by multiplying by 144, since 12 12 = 144.

Day 3 Intro:

A. Pair up the class and give each pair a meter stick.
B. Have the students to measure the following items to the nearest millimeter.
    - the length of a desk top
    - the length of a table top
    - the length of the door
    - the vertical width of a computer monitor
    - the length of the white board.

C. Have students to do the following:
    - Convert from millimeters to decimeters.
    - Convert from decimeters to centimeters.

D. Tell students to use clues from the meter stick in order to determine whether they are going from a smaller unit of measure to a larger unit of measure or vise versa.
E. Allow time for students to complete task.
F. Start a discussion by asking the following questions:
    - What were your results when you converted millimeters to decimeters?
    - What did you notice when you converted from decimeters to centimeters?

G. Allow students to volunteer sharing their answers.
H. Tell students that you can see the relationship among metric units to quickly convert among the units.
I. Also remind students that you can find the product or quotient when multiplying or dividing with powers of ten by moving the decimal point to the right or to the left.
J. Remind students of the following key points:
    - To convert from a larger unit to a smaller unit, multiply.
    - To convert from a smaller unit to a larger unit, divide.
K. Guide the students in developing a Thinking Map to help them learn the metric prefixes. (The students will use the meter sticks to get each metric measure.)

Activity 1:

L. Tell the students that they are going to play a game called “Measurement Memory.”
M. Pair the class up into groups of two.
N. Give each team a set of measurement cards.
O. Have each team to shuffle their cards and place them face down on their table in a 4 by 6 array.

P. Tell each group that player one will select 2 cards. If the cards are a match if they represent the same measurement. If cards are not a match then player one puts them back on the table face down.
Q. Player 2 will then select 2 cards and the process repeats all over again.
R. The player who has the most number of matches at the end of the game is the winner.

Activity 2:

S. Students will play "Who's got the Color."
T. Explain the rules of the game.
    - Each student will be given 4 color cards. (a=red, b =yellow, c = blue, and d = green)
    - Teacher will generate a Study Island question.
    - The students will then work out the problem.
    - When the teacher says, 'Who's Got the Color," the students will hold up the color card that represents the letter of the correct answer.
U. Show students the overall class score and encourage them to continue to get it higher. (Score will be based on the mean of the percentage of correct answers)
V. Allow time for any student questions.

3 Materials and Resources

Identify various materials and equipment needed for lesson activities.

- measurement cards
- LCD Projector
- laptop computer

Provide complete references (include textbook and additional resources)

- Maletsky, E.M. & McLeod, J. (2009) HSP Math T.E. Volume 3, Orlando, FL: Harcourt. Inc.
- Study Island <http://www.studyisland.com/>

4 Assessment

Describe completely the assessment to be used for this lesson.

- Each student will take the study island quiz which will consist of the topics covered in this lesson.
- The quiz will be composed of 10 questions that are computer generated.
- Immediate feedback will be available for the student and teacher once the student submits his or her test

Day 4 Intro:

A. Pair up the class and give each pair a ruler and a paper clip.
B. Have the students to measure the following items with the paper clip representing one unit and record their data.
    - the length of a desk top
    - the length of a table top
    - the width of a piece of paper
    - the length of a pencil

C. Now have students to use the ruler to measure the same items to the nearest ― of an inch.
D. Ask the students to respond to the following:
    - About how many inches long is a paper clip?

E. Tell students that the measurement using the paper clip represents an estimate.
F. Start a discussion by asking the following questions:
    - Compare the estimate with the actual measure of each item. In each case, which was greater?
    - Justify the difference in measurements.

G. Allow students to volunteer sharing their answer.
H. Write the following problem on the board:
    - You have 3 coins. Two coins have the same weight, and the third is heavier than the other 2. If you have a balance scale, what is the minimum number of times you must use the scale to find the heaviest of the 3 coins? Explain. One time. Place 1 coin in each of the two pans. If they balance, then the unweighted coin is the heaviest. If they do not balance, the heavier coin on the scale is the heaviest of the 3 coins.

Activity 1:

I. Tell students that they are going to work in pairs and use what they know about customary and metric measure to estimate length, capacity, and weight or mass.
    - Get a sheet of pre cut butcher paper.
    - Copy the table.
    - Estimate the measurement in customary units of each object in the table.
    - Record your estimates in the table.
    - Repeat for metric units.
J. Use the following for a reference:
    - A paper clip is about 1 inch long

- A slice of bread weighs about 1 oz.
- The capacity of a drinking glass is about 1 c.
- A needle is about 1 mm wide.
- A raisin's mass is about 1 g.
- The capacity of an eyedropper is about 1 mL.

K. Allow students to compare answers.

L. Ask students the following questions:
   - Are any of your estimates much greater or much less than your classmates' estimates? Answers will vary
   - Which type of measurement is easiest to estimate? Answers will vary

Activity 2:

M. Have students to measure each object that is listed in the table (Attachment #2) and record the measurements in the table.
   - Measure length to the nearest sixteenth in and to the nearest millimeter.
   - Measure capacity to the nearest quarter cup and to the nearest millimeter.
   - Measure weight and mass to the nearest ounce and to the nearest gram.
   - Measure distance to the most appropriate unit. Have students to compare the estimated and accurate measure for each of the items in the chart under customary measure and metric measurement.

N. Ask the students to explain how making actual measurements could improve their estimating skills? Possible answer: I will have a better understanding of the actual measure.

O. Explain the rules of the game.

P. Allow time for any student questions.

3 Materials and Resources

Identify various materials and equipment needed for lesson activities.

- customary and metric ruler
- customary and metric tape measure
- spring scale
- balance
- customary and metric measuring cup
- small containers
- bag of rice
- eraser
- small notebook

Provide complete references (include textbook and additional resources)

- Maletsky, E.M. & McLeod, J. (2009) HSP Math T.E. Volume 3, Orlando, FL: Harcourt. Inc.

4 Assessment

Describe completely the assessment to be used for this lesson.

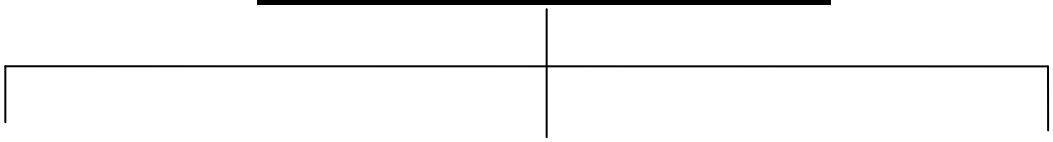
- Each student will take the study island quiz which will consist of the topics covered in this lesson.
- The quiz will be composed of 10 questions that are computer generated.
- Immediate feedback will be available for the student and teacher once the student submits his or her test.

Day 5 Assessment:

- The student will be given a computer based assessment that will consist of 20 computer generated items on the Study Island website. (The items will reflect the topics taught during the unit.)
- Once the student has submitted the assessment he/she along with the teacher will be given immediate feedback.
- Students who score below 80% will meet with teacher about a remediation plan.

TREE MAP

Customary Measurement



Length	Weight	Capacity
inches (in)	ounces (oz)	cups (c)
feet (ft)	pounds (lb)	pints (pt)
yards (yd)	ton (t)	quarts (qt)
miles (mi)		gallons (gal)

Metric Measurement

Length	Weight	Capacity
millimeters (mm)	grams (g)	liters (L)
centimeters (cm)	kilograms (kg)	milliliters (ml)
meters (m)		
kilometers (km)		

Attachment #1

NAME _____ DATE _____ # ____

Comparing Measurements

Measurement					
Object/Description	Type of Measure	Customary (Estimate)	Customary (Measured)	Metric (Estimate)	Metric (Measured)
Pencil	Length				
Edge of desk	Length				
1st container	Capacity				
2nd container	Capacity				
Eraser	Weight/Mass				
Small notebook	Weight/Mass				
Your desk to a wall	Distance				
Width of your classroom	Distance				

Attachment #2