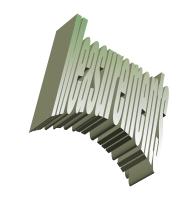# Algebra/Geometry Institute Summer 2005

Converting Measurements

Faculty Name: Martha J. Smith
School: Moorhead Middle School
Grade Level: 6th

1   Teaching objective(s)

Mississippi Framework
4e. Convert units within a measurement system.

Students will be able to apply appropriate techniques to determine measurements.

2   Instructional Activities

- The teacher will define dimensional analysis and how units are used. Dimensional analysis is a method used to show that any number or expression can be multiplied by one without changing its value. Units are treated in the same way that letters are in multiplication or division.

- The teacher will give each student a copy of the customary linear units.

- The teacher will ask the students to give linear measures for customary units, for example: 1 foot is equal to 12 inches; 1 yard is equal to 3 feet… The teacher will proceed by asking the students questions about measurement. For instance, what is equal to what? Does it make a difference on which side of the equal sign the value appears?

- The students will respond to the questions.

- The teacher will illustrate how to find the solution to the equation by using dimensional analysis.

- The teacher will explain that any number divided by 1 will result in that number. Also, in dimensional analysis feet and inches are treated as one unit not an f-e-e-t (individual variables). For example, if a person is 6 feet tall he or she is also tall in inches.

$$\frac{6\,feet}{1} \times \frac{12\,inches}{1\,foot} = 72\,inches$$

- The teacher will ask the student to set it up. After solving it, convert it back to feet showing the steps.

$$\frac{72\ inches}{1} \times \frac{1\ foot}{12\ inches} = 6\ feet$$

- The teacher will give the students 10 minutes to complete the next example:

- Three classmates plan a party in their math class. They will serve barbeque chips and other snacks. Each person will receive 3 ounces of the snack. The snack costs $5.00 for a 20 ounces bag. There will be 20 students at the party. How many bags of chips do the classmates need to purchase? How much will it cost?

- The teacher will asked the students these questions:

    What do you know about the equation?
    What do you want to know?
    How would you set it up?
    What is the answer?

- The students will complete the equation.

- The teacher will ask one of the students to place their solution on the overhead. After the students solve the equation, the teacher will allow for other questions and discussion.

- The teacher will confirm the solution.

$$\frac{20\ students}{1} \times \frac{3\ ounces}{1\ student} = 60\ ounces$$

20 students x 3 ounces/1student = 60 ounces
Each bag contains 20 ounces so 60/20 = 3 bags needed. The cost per bag is $5.00.

$$\frac{5.00}{1\ bag} \times \frac{3\ bag}{1} = \$15.00$$

- The teacher will reemphasize the dimensional analysis guidelines. Always treat units as numbers when using multiplication and division. The factor being used should always be in the denominator. The unit that you are converting to should be in the numerator.

- The teacher will give each student a practice sheet. (All students are required to complete the practice sheet.)

- The students will be given 15 minutes to complete the practice worksheet. (Attachment 1)
- The teacher will group the students according to tables. Each group will be assigned a particular problem to display on the projector.

- The students will keep the practice sheet in their notebook.

- The students will be given a homework sheet to complete that reinforces the lesson. (Attachment 2)

3   Materials and Resources

Workshop Manual: Angela O Bedenbaugh and John H. Bedenbaugh; Department of Chemistry and Biochemistry, University of Southern Mississippi; <u>Mississippi Mathematics and Science Partnership;</u> Copyright 2004.
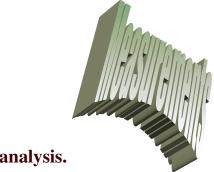
Overhead Projector
Transparencies
Markers
Practice and Homework sheets

4   Assessment

✓ Students will complete homework assignment and turn it in for a grade.

✓ The teacher will observe the students while completing the practice sheet.

✓ Students will go to the overhead projector to solve equations individually.

Complete the following equations using dimensional analysis.

1. 36 inches to feet

2. 27 feet to yards

3. 30 feet to inches

4. 6300 feet to inches

5. 96 feet to yards

6. 5 yards to inches

Homework Sheet

Complete the following using dimensional analysis.

1. 5 feet 5 inches to inches

2. 120 feet to yards

3. 4 miles to feet

4. 16 yards to feet

5. 96 inches to yards

6. 12 feet to yards

7. 99 feet to yards

8. 660 yards to feet

9. 15840 feet to miles

10. 1800 inches to feet