

SCSU CRISP CCSA Kit Pages 2016

Title of Module: Measurement and Conversion

Subject or Unit of Study: Measurement and Conversion

Grade Level: 9

Length of Lesson: 80-100 minutes

STUDENT OBJECTIVES:

Students will demonstrate the ability to accurately measure various items and use these measurements to perform specific tasks.

NEXT GENERATION SCIENCE STANDARDS

Use Mathematics and Computational Thinking

Apply ratios, rates, percentages, and unit conversions in the context of complicated measurements problems involving quantiles with derived or compound units (such as mg/ml, Kg/m³, acre-feet, etc.).

NATIONAL STANDARDS AND COMMON CORE

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

MATERIALS

25-foot tape measures, dollar bills, triple beam balance, rulers with 1/16 inch increments, dry erase markers, erasers, (other objects to be measured), thermometers, beakers, ice, hot plate, string, dial calipers, calculators (at teacher's discretion), internet use for research

SAFETY

Teacher should instruct students in the proper use of thermometers. Students must be aware of general lab safety around the hot plate and water.

LEARNER BACKGROUND

Students need to have prior knowledge of using rulers, tape measures, calipers, thermometers and balances.

LEARNING ACTIVITY OR PROCEDURE:

Students will rotate through six stations in which they will work in teams to accurately measure, record and compute the data to answer a specific question.

Station #1: Twenty five foot tape measure. Students will measure the dimensions of the classroom and draw a sketch of the room indicating the length, width and height of the room. Be sure to make your sketch to scale, using ¼ inch to represent 1 foot. Include the doors and windows in your drawing.

Station #2: How much does a dollar bill weigh?

Students use a triple beam balance to determine the mass of the bill. Students will determine in pounds the weight of the money required to purchase a Tesla car in cash.

Station #3: Students will use a 12-inch ruler to measure common objects found in a typical classroom, in inches and fractions, to the nearest sixteenth of an inch.

Length, Height, and Width of a dry eraser

Length, Diameter, and Radius of a pencil, pen, or marker

Paper clip

Screen size of a cell phone, tablet, or computer

Thickness of a biology book

Station # 4: Temperatures: measure the temperature of an ice water bath. What is the scale used?

Measure the temperature of the room.

Measure the temperature of a beaker heating on a hot plate.

Whatever the scale of your thermometer, convert that reading to Fahrenheit, Celsius, and Kelvin.

$$F = 1.8C + 32$$

$$C = 0.55(F - 32)$$

$$K = C + 273$$

Station # 5: Students will receive pieces of string of the same length. They will have to “measure the length” without a measuring device (no rulers, meter sticks, yard stick, etc, in other words nothing with a number on it).

This activity can be setup as a challenge, the group the closest to the real value wins something.

Initially the students are not constraint to the unit they need to report in (cm, inches, thumbs, arm length, etc). Have all the groups put their measurements on the board – comment on the common denominator which most probably will be inches (students tend to use the size of a letter sized paper).

Have students convert their unit to centimeters. Emphasize units matter 1in or 1ft is not the same thing.

Have a student make a “real measurement” in cm and determine the winner.

Comment on the fact that we convert on a daily basis in real life, conversions are not that scary. Also, units matter. It is important to know if you have 200 cents or 200 dollars or 200 thousand dollars in the bank, right?

Station # 6: Students will measure some of the same small objects they measured in Station #3, such as the dry erase marker, pencil, paper clip, etc. This time, they will use a caliper to get measurements to the nearest thousandths of an inch. They will then convert their fractional measurements from Station #3 into decimal measurements and then compare their answers.

ASSESSMENT

Students will complete a packet with questions and instructions as they rotate through the stations. They will record their measurements and calculations on the packet.

TEACHER NOTES

This lesson could be implemented in a variety of contexts. It could be used as a pre-assessment at the beginning of a course to identify gaps in student skills. It could be used as a summative assessment at the end of a unit on measurement.

STEM CAREERS

Engineer, machinist, construction

This lesson is a collaboration of the following individuals:

Alina Britchi

Rich Coburn

Craig Nordlum

Mic O'Reilly

Robyn Porto

Peggy Roach