Metric Madness

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BioEd℠

Teacher Resources from the Center for Educational Outreach at Baylor College of Medicine.

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Objective

T apply the skill of estimation and metric measurement in an engaging format. Students rotate from station to station and test their metric measuring skills.

Specific Objectives

Scientific Processes

- Using tools and materials to answer questions
- Interpreting and synthesizing results
- Communicating results
- Working in teams and collaborating
- Exploring connections into other curricular areas
- Demonstrating understanding
- Making real-world connections

Scientific Inquiry

- Plan and implement investigations
- Collect information
- Analyze and interpret
- Communicate
- Construct (tables, graphs and charts) to organize, examine and evaluate

Critical Thinking and Problem Solving

- Analyze, review and critique
- Draw inferences
- Represent using models

Tools and Technology

- Collect and analyze using tools
- Demonstrate that repeated investigation may increase reliability

Concepts

- Observe, describe and record changes in size, mass, color, position, quantity, time, temperature, sound and movement. (SCI.K.9, 1.1, 2.9)
- Describe properties of objects and characteristics of organisms. (SCI.K.1)
- Sort objects and events based on properties and patterns. (SCI.1.5)
- Classify and sequence organisms, objects and events based on properties and patterns. (SCI.2.3)
- Identify characteristics of living organisms. (SCI.2.1)
- Identify characteristics of non-living objects. (SCI.2.2)

Materials

All students will need writing materials

Station 1

- Container marked in ml
- Funnel
- Large sponge
- Plastic tub (large enough to submerge sponge)
- Water

- **Station 2**
- Paper plates
- Metric tape measure marked in cm
- Masking tape

Station 3

- Container marked in liters
- Plastic tub
- Water

Station 4
- Calculator
- Masking tape
- Meter sticks
- Stopwatch or timer (5 seconds)

Station 5
- Balance scale with gm cubes
- Crayons (more than an adult could hold in one hand)

Station 6
- Large can of vegetables (or milk carton full of beans or other objects)
- Kilogram scale

Classroom Setup and Management

1. Have students should work in teams of four, with each student carrying out specific role, such as materials manager, maintenance director, recorder/reporter or principal investigator. Students will rotate jobs at each station, share responsibilities or keep the same role throughout the entire investigation. Al students should assist each other, as needed.
2. Make photocopies of each station sheet (six stations containing different materials and instruction sheet). Setup the stations around the room.
3. Provide each team with the "Metrically Marvelous Madness" worksheet.

Engage

This lesson can be used as an awareness builder to begin to develop students' measurement skills As students, *How well can we estimate and use metric measurements?*

Explore

1. Divide students into teams. Have each team begin at one of the stations. A each team completes one station, it will trade places with another team, so that every team visit ever station. This process will tak some time and patience, but the exploration is worth the effort.
2. This i a team activity and students must come to consensus on their estimates for each activity.

Explain

1. When all the teams have completed the six stations, they should complete the data analysis and calculate the total difference. The team with the smallest total difference i the Metrically Marvelous winner. Almost any award will do, whether a winner badge, pencil or other treat! Giving something to the entire group is advised!
2. Class discussion may include the following.
   - Why did the winning team have the smallest number?

- Which station was most difficult for you to use your estimation skills Easiest? Why?
- Was teamwork helpful?

Elaborate

Ask students, *Where have you seen metric measurement used? Why do you think metric measurements were used instead of standard?* Answers can include: Olympics, liter bottles, road signs in kilometers and miles.

Evaluate and Extend

1. Metric Scavenger Hunt: Students are given several specific measurements and must find items that satisfy the measurements as close as possible, in given period of time.
2. Convert a recipe to metric measurement and prepare it in class.

Note: Check out the excitement an math talk i the classroom-Madness!

Metrically Marvelous Madness

Team Members

_____ _____

_____ _____

Station 1. Super Squeeze (ml)

Estimate _____

Actual _____

Difference _____

Station 2. Soaring Saucers (cm)

Estimate _____

Actual _____

Difference _____

Station 3. Full Fill (L)

Estimate _____

Actual _____

Difference _____

Station 4. Walking Wild (m)

Estimate _____

Actual _____

Difference _____

Station 5. Crayon Caper (gm)

Estimate _____

Actual _____

Difference _____

Station 6. Heavy Duty (kg)

Estimate _____

Actual _____

Difference _____

Total Difference _____

Station 1. Super Squeeze

1. With your team members, observe the sponge soaking in the tub of water. *How many ml of water do you think the sponge holds?*
2. Agree on an estimate for the amount water the sponge holds. Record your estimate on the "Metrically Marvelous Madness" page under Section 1.
3. Using a funnel, squeeze the soaked sponge into a clear beaker that is marked in ml. Record the measured amount of water under "Actual".
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."

Station 2. Soaring Saucers

1. *How far do you think the saucer will fly?*
2. Agree on an estimate for the distance, in centimeters, that the saucer will fly. Record your estimate on the "Metrically Marvelous Madness" page under Section 2.
3. Decide on a method for measuring the flight (considering the path of the saucer). Mark the starting point with masking tape. Fly the saucer and measure the distance it flew in cm. Record the distance under "Actual."
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."

Station 3. Full Fill

1. *How much water do you think the tub will hold?*
2. Agree on an estimate for the number of liters of water the plastic tub will contain. Record your estimate on the "Metrically Marvelous Madness" page under Section 3.
3. Use a liter measure to add water to the tub. Record the amount of full liters of water it took to fill the tub under "Actual."
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."

Station 4. Walking Wild

1. Each member of your team members will estimate the number of meters he or she can walk in five seconds. *How many meters group walk in total?*
2. Calculate the sum of all of estimates and record the total estimate on the "Metrically Marvelous Madness" page under Section 4.
3. Using masking tape, make a starting line. Designate team members to 1) time the walk using a stopwatch and tell the walker when to start and stop [in five seconds], 2) mark the spot where the walker stops, and 3) measure and record the distance walked. Take turns until every team member has walked. Calculate and record the total meters walked under "Actual."
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."

Station 5. Crayon Caper

1. *How many crayons do you think one team member is able to hold in one hand?*
2. Designate the team member who will hold the crayons. Agree on an estimate for the number of crayons he or she can hold in one hand. Record your estimate on the "Metrically Marvelous Madness" page under Section 5.
3. Have the designated team member pick up as many crayons as possible in one hand. Use a balance scale to measure the mass of the crayons. Record the measured amount under "Actual."
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."

Station 6. Heavy Duty

1. *What does the container weigh, in kilograms?*
2. As a group, estimate the number of kilograms in the container. Record your estimate on the "Metrically Marvelous Madness" page under Section 6.
3. Place the container on the scale. Record the measured amount under "Actual."
4. Calculate the difference between your estimate and the measured amount. Record the answer under "Difference."