Measurement

Using Scientific Tools

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877-409-2929

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Measurement Using Scientific Tools

Sequence

- Measurement Using Scientific Tools-(MST)
- Prefixes for Metric system sorting
- Nomenclature for Measurement Definitions- (Meas. Def.)
- Sorting Tools Used for Measurement
- Task Cards for Safety Procedures
- Task Cards for-
    a) Length
    b) Temperature
    c) Volume
    d) Weight
- Task Cards for Experimental Design
- Nomenclature for Geological Time (Geo. Time)
- Experiments for Rock Layers
- Nomenclature for Dendrochronology (Dend.)
- Activities for Dendrochronology

Measurement Using Scientific Tools

Introductory Lesson

Age

8-10 years old

Materials

Book, Counting on Frank, by Rob Clement, nomenclature for Measurement Using Scientific Tools (MST), dictionary, paper slips

Procedure

1) Read the book, Counting on Frank, and discuss the different items that were used to measure and what was measured.
2) Indicate to the students that when scientists are working together, they need to communicate in the same "language."
3) Lay out the nomenclature 1-6 and discuss the need for measurement, the standards, and the metric system.
4) Ask the children if they have ever heard of a kilobyte, a nanosecond, or a megaton. Write these words on separate pieces of paper, and underline each prefix.
5) Using the dictionary, have a child look up these definitions. Indicate that the prefixes for each of these measurements come from either Greek or Latin and are a form of counting.

Follow Up

Sorting exercise for measurement prefixes.

Measurement Definitions

Age

8-10 years old

Materials

Nomenclature for measurement definitions (Meas. Def.) ruler, thermometer, beaker, scale, slips of paper, control charts for tools

Procedure

1) Start with the base unit definition.
2) Continue with the remaining definitions.
3) Discuss the different measuring units that are used in science.
4) Explain that for our classroom purposes, we will be using the units for temperature, mass, volume, and length.
5) Ask what tool would be used to measure each one of the above. Place each tool out and label what it measures.

Follow Up

Sorting measurement tools

*Note: Children should use control charts for tools to use the correct name for recording the tools in the correct category.

Task Cards

Age

8-10 years old

Materials

Task cards, materials for different science experiments

Procedure

Each set of task cards is self-contained. It is suggested that the safety procedure task cards be introduced first. Below is the suggested order of task cards.

1. Safety First
2. Length Measurement
3. Temperature Measurement
4. Volume Measurement
5. Weight Measurement
6. Experimental Design

Safety First

Age

8-10 years old

Materials

Safety First poster, goggles, apron, gloves, hair tie for long hair

Procedure

1. Introduce the Safety First poster and read through the rules.
2. Point out where the fire extinguisher is available in the room or building.
3. Indicate the safety equipment necessary as you go through the rules for safety.
4. When discussing how to smell unknown substances, demonstrate how to hold the container away from the body and, with the other hand, waft the vapors towards the face. Discuss why this is a safer way to smell unknown substances than moving the face over the container.
5. Explain why it is necessary to wash hands before leaving the lab.

Follow Up

Use the safety first task cards.

Geological Time

Age

8-10 years old

Materials

Nomenclature geological time (Geo. Time), 4 squares of different-colored felt, shell, or some item that could be used as a fossil

Procedure

1. "Time can be measured by using the earth. Time is a "man-made" unit but it is based upon observations of the earth.
2. How many days does it take the earth to rotate around the sun? How many hours does it take the earth to revolve on its axis?
3. Geologists can also measure time by using the crust and soil of the earth, but they do not measure in days, weeks, months, or even years. They measure the passage of time in millions of years."
4. Introduce the nomenclature 1-4.
5. Demonstrate the principles of stratigraphy by placing one square of colored felt on a flat surface. Place another piece of colored felt on top of the first and demonstrate the Law of Original Horizontality.
6. Place a fossil on top of the two felt squares and cover it with a third and fourth colored felt square.
7. Ask the children where the oldest layer of rock is. Ask the children where the newest layer is and demonstrate the Laws of Superposition. (The etymology of *super* as a prefix means above. Discuss the word superposition and how this word describes the position of the layers.)
8. Place your hands on either end of the layers of felt and move your hands together, causing the layers of felt to fold on top of each other. Discuss what has happened to the layers and the fossil that is within the layers.
9. Explain The Principle of Lateral Continuity with this demonstration. (Lateral – meaning existing or pertaining to the sides; Continuity- meaning the state of being unbroken.)

Follow Up

Rock Layer Experiments

Rock Layer Experiments

Teacher Preparations

Recipe for Edible Rock Layers

Make 1-3 days before. A great "Strike the Imagination" lesson for the whole class.

Three different flavors of gelatin (6 oz. each)

Water (cold and boiled)

One container of whipped topping (8 oz.)

Graham crackers (approximately 8 whole crackers)

Fossils (can be candy such as gummy bears or worms, jelly beans, or sweet-tarts)

One 13 X 9 glass or metal pan (a deep pan works best)

Directions:

1. Mix one box of gelatin according to directions. Pour into pan and put in refrigerator until set.
2. Crumble graham crackers (coal) onto that layer.
3. Mix second flavor of gelatin and pour this into the pan. Add the fossils by spreading them around in the gelatin. Let set.
4. Mix third flavor of gelatin. Pour half of that flavor into a bowl with the whipped topping. Stir together and pour into pan. Let set.
5. Add the rest of that flavor of gelatin to the pan and let set.

<u>Procedure</u>

1. Discuss the terms weathering, erosion, and strata with the children.
2. Explain how the edible rock is like the layers of sedimentary rocks and fossils are not always found throughout the sample.
3. Allow the children to "dig" for their fossils, and observe what happens when "weathering" is performed on the sample. (Pouring water on the sample)
4. Ask the children to draw and write how the edible rock sample is similar to the rock layers.

<u>Follow Up</u>

Core Samples experiment

Preparation for Core Samples

1. Assemble six colors of play dough, flour, and plastic container.
2. Sprinkle a small amount of flour at the bottom of the container. (This helps the cores to be retrieved more easily during the first part of the exercise.)
3. Create layers of dough according to the cross section below. The lower three layers are tilted. The top tilted layer (3 in the cross section below) goes all the way across the container, while the lowest two layers (1 and 2) do not. The upper three layers (4, 5, and 6) are horizontal. The top layer goes across the entire container, thus giving a uniform

Cross section along dip of layers

   appearance from the top view.
4. Tape painters tape to the outside of the container so that students cannot see the layers from the side.
5. Put the lids on the containers and store in a refrigerator until time to use. Refrigerating helps cores to come out smoothly.

Earth Friendly Play Dough

- 1 cup flour (not self-rising)
- 1/2 cup salt
- 1 cup water
- 1 tablespoon vegetable oil
- 1-1/2 teaspoons cream of tartar

Mix in saucepan over low heat. (It does not have to heat long.) Dough is ready when it rolls into a ball. Keep dough fresh in an airtight container. If you need to make different colors, add food coloring while mixing over heat.

Dendrochronology

Age

8-10 years old

Materials

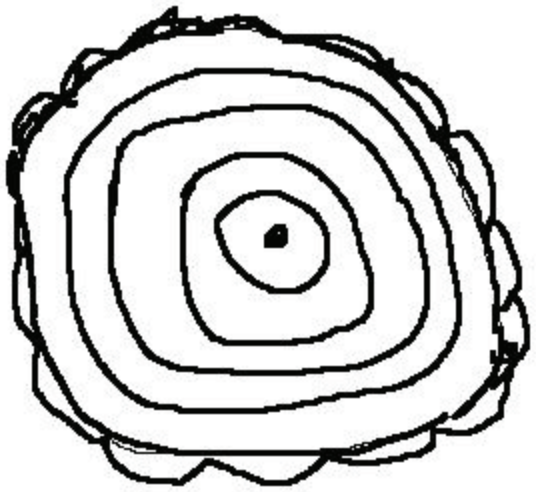
Nomenclature for dendrochronology (Den. 1-8) tree cookie samples

Procedure

1. Introduce the nomenclature for dendrochrology and discuss the terms used in the nomenclature.
2. Use the pictures below to discuss the growth of the trees, the age, and the conditions during growth.

Reading Tree Cookies

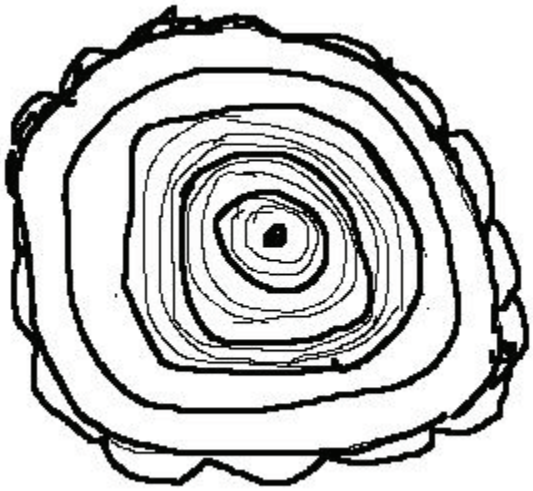
This tree is 9 years old, but it is growing off center. It may be growing on a slope, or maybe pushed against a rock or another tree.



This tree is 5 years old and is growing very fast. It probably has plenty of water, sunlight, space, and nutrients.

This tree is 9 years old, but was injured in its fourth year. There is a scar that the tree is growing around; the damage may have been due to a fire.

This tree is 16 years old, but it is growing very slowly. It is older than the tree that is 5 years old, but it is the same size. It may not be getting enough water, sunlight, or space to grow at a faster pace.



This tree was growing slowly when it was young, but has grown more quickly in the last three years. There may have been a drought, followed by heavy rains, or it may have been in a crowded forest, that was later thinned out.

Follow Up

Activities for dendrochronology

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603 Chedworth Dr. • Houston • TX • 77062