**Measurement Practice Activity**

*Scientific understanding is based on evidence gathered through observations. The conclusiveness of the scientific explanation is dependent on the accuracy of the observations. Scientists use the common metric measurement system to be able to share units in a common ‘language’ and they are so much easier to convert!*

**Purpose/ Objective:** Practice making precise measurements of length, volume, and mass.

**Data Table 1:** Measurements of classroom items

|  |  |  |
| --- | --- | --- |
| **Classroom Item** | **Measurement (include units)** | **Convert into…** |
| Width of one floor tile | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cm | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mm |
| Length of your thumb | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cm | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m |
| Height of the lab tables | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mm |
| Length of your arm (shoulder to tip of middle finger) | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cm | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m |
| Height of the door | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm |
| Mass of dry erase marker | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kg |
| Mass of a penny | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mg |
| Volume of the water in one test tube | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ml | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ l |
| Volume of a full beaker of water | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ml | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cl |
| Temperature of tap water | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_F | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_C |
| Temperature of ice water | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_F | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_C |

**Data Table 2**: Making Calculations –

Range= smallest to largest (13+13+13+14+19+27+27)= **13-27**

Mean or Average = total of all values divided by the number of values(13+13+13+14+19+27+27/7)=**18**

Median = the exact middle value from numbers written in order (13, 13, 13, **14**, 19, 27, 27)=**14**

Mode = Most frequent (from #’s 13, 13, 13, 14, 19, 27, 27) = **13**

**Record your Arm Length board to create class data then calculate: Show Work Here!**

Range: ­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mean (average): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Median: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mode: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Follow Up Questions:**

1. What are the base units for length, volume and mass?
2. What are the prefixes in order from large to small (Hint: King Henry Died By Drinking Chocolate Milk).
3. How many millimeters in a centimeter? Milligrams in a centigram?

1 cm = \_\_\_\_\_\_\_\_\_mm 1 cg = \_\_\_\_\_\_\_\_\_mg

1. Since water is polar and cohesive it forms a bubble in the graduated cylinder called a ­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and you always measure at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of it.
2. The definition of a calorie comes from water’s high heat capacity. What is the definition of a calorie?
3. The definition of the Celsius scale comes from the range of water’s temperature from boiling to freezing divided into 100 degrees. What is the freeze to boil temperature range for water?
4. Water has a specific density of 1 gram for every 1mL or 1g/mL. How many grams of water would 200milliliters weigh?
5. What are the advantages to using metric over the Imperial system (the current system in the USA)?

Extension:

1. What sampling technique could you use to measure something very large (number of grains of sand on the beach)?
2. How could you use a sampling technique to measure something that is very small (a drop of water)?
3. How could you measure the volume of an odd shaped rock?

Teacher Notes:

Old Questions:

1. **Data Table 2**: Length of arm for each classmate

|  |  |
| --- | --- |
| **Length Range of arm** | **Number of students** |
| Between 50-59 cm |  |
| Between 60-69 cm |  |
| Between 70-79 cm |  |
| Between 80-89 cm |  |
| Between 90-99 cm |  |

1. Independent Variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Graph:**

1. Create a bar graph (histogram) to show the relationship between the length of arm and the number of students with that arm length.