Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_Hour:\_\_\_\_\_\_\_\_

**Measurement Lab**

**Directions:** You will be working in groups to determine what devices we use to measure things and how to use them.

**Pre-lab**

In the space below, brainstorm in your group all of the different quantities (length, mass, etc.) we may need to measure this year, the units we would measure them in, and the tool we should use to make the measurement.

|  |  |  |
| --- | --- | --- |
| **Quantity** | **Unit** | **Tool** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Lab**

Now that you know your roles, your task as a group is to make various measurements around the room together. You will be at each station for approximately 10 mins.

**Station 1—Length of a Plane flight**

**Location:** Hallway

**Materials:** White Paper, Meter Stick

**Procedure:** Create a paper airplane using a piece of paper. Throw the paper airplane down the hallway 3 times, measuring the distance it travels Find the average.

|  |  |  |  |
| --- | --- | --- | --- |
| Throw #1 | Throw #2 | Throw # 3 | Average Throw Length |
|  |  |  |  |

1. What unit did you decide to measure the length in? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why was that the best unit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Station 2—Volume of Water**

**Location: “**Announcements” board

**Materials:** Graduated Cylinder, water

**Procedure:** View the water in the graduated cylinder. Record the volume. Don’t forget to read it from the bottom of the meniscus!

|  |
| --- |
| Volume |
|  |

**Station 3-- Width of the Room**

**Location:** Whole classroom

**Materials:** Meter stick (1)

**Procedure:** Using the meter stick, measure the width of the classroom (from whiteboard to window). Convert your answer so that is presented as meters, centimeters, and millimeters.

|  |  |  |
| --- | --- | --- |
| Length of the Room (m) | Length of the room (cm) | Length of the room (mm) |
|  |  |  |

1. Which unit makes the most sense to measure the width of the room?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why was that the best unit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Station 4--Mass of Two Objects**

**Location:** Table under the “excellence matters” board

**Materials:** Electric Scale, calculator, stapler

**Procedure:** Using the electronic scale, measure the mass mass of each object. Add the masses together and find the average.

|  |  |  |  |
| --- | --- | --- | --- |
| Mass of Stapler | Mass of Calculator | Combined Masses | Average Mass |
|  |  |  |  |

**Station 5-- Time to Roll a Marble**

**Location:** Table near the calendar board

**Materials:** Marble, Light Gate Timer

**Procedure:** The light gates are set certain distance apart. Roll the marble between the light gates and record the time below. Repeat this two more times and find the average.

|  |  |  |  |
| --- | --- | --- | --- |
| Time 1 | Time 2 | Time 3 | Average Time |
|  |  |  |  |

1. What unit did you use to measure the time? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why was that the best unit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Station 6—Pendulum**

**Location:** Front of the classroom

**Materials:**  Pendulum, timer

**Procedure:**  Place a marker below the pendulum. Pull the pendulum back at an angle of at least 30’ and release. Time how long it takes to oscillate 5 times. Repeat this process two more times and calculate the average.

|  |  |  |  |
| --- | --- | --- | --- |
| Time 1 | Time 2 | Time 3 | Average Time |
|  |  |  |  |

Divide the number of oscillations (5) by the average time. This will give you the period of the pendulum! Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Post Lab Questions**

1. List all of the tools that you used to make measurements. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Were there any stations where you believe you could have used a better measuring tool to make a more accurate measurement? If so, which ones?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. When would it be more reasonable to use a clock instead of a light-gate timer? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Predict which 2 quantities you would need to measure if you were interested in finding the speed of a runner? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Convert the following (remember k, h, da, B, d, c, m)
   * + 8.7 m = \_\_\_\_\_\_\_\_\_\_\_\_cm
     + 0.24 g = \_\_\_\_\_\_\_\_\_\_\_ cg
     + 89 mg = \_\_\_\_\_\_\_\_\_\_\_kg
     + 1.1 m = \_\_\_\_\_\_\_\_\_\_\_ hm
6. When measuring the liquid in a graduated cylinder, we measure from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the liquid.
7. List three different measurement errors.
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_