***Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Tools of the Trade***

***Part 1: Count your drops!***

*Hypothesis - How many drops of water will it take to equal 1 milliliter? \_\_\_\_\_\_\_\_\_\_\_\_\_ drops*

Follow the directions to find the number of drops in 1 milliliter of water, then answer the questions. You will need a small graduated cylinder (25 ml), a beaker of water, and an eyedropper for this section.  Remember to read the **bottom of the meniscus** when you are reading the volume of a liquid in a graduated cylinder.

|  |  |
| --- | --- |
| 1. Fill a small graduated cylinder with 10 ml of water.
2. Count the number of drops it takes to raise the water to 11 ml. Record the number in the chart.
3. Leave the water in the graduated cylinder and count the number of drops it takes to raise the water to 12ml. Record the number in the chart.
4. Leave the water in the graduated cylinder and count the number of drops it takes to raise the water to 13ml. Record the number in the chart.
5. Calculate your average and round to the nearest tenth.

  | Picture of graduated cylinder |

|  |  |  |  |
| --- | --- | --- | --- |
| **# of drops to 11 ml** | **# of drops to 12 ml** | **# of drops to 13 ml** | **Average** |
|     |   |   |   |

1. **Based on your average, how close were you to your guess? \_\_\_\_\_\_\_\_\_\_\_\_mL**
2. **Based on your average, how many drops would it take to make 1 liter? \_\_\_\_\_\_\_\_\_\_\_\_\_\_L**

***Part 2: Water Displacement***

*Hypothesis: What is the volume of 3 marbles? \_\_\_\_\_\_\_\_\_\_\_\_mL*

Follow the directions to find the volume of three marbles using water displacement.

1. Add 20 ml of water to a 100 ml graduated cylinder. Record this amount in the chart.
2. Add three marbles to the cylinder and measure the volume. Record this amount in the chart.
3. Find the difference between the two measurements and record in the chart. The difference between the two measurements will be the volume of the three marbles.

|  |  |  |  |
| --- | --- | --- | --- |
| **Volume of Water Before adding Marbles (ml)** | **Volume of Water After Adding Marbles (ml)** | **Difference in Volume (ml)** | **Volume of 3 Marbles** |
|     |   |   |   |

1. **What is the volume of the marbles in cL? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cL**
2. **What is the volume of the marbles and water in kL? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kL**

***Part 3: Mass Mania***

*Hypothesis****:*** *How much will 3 marbles weigh? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g*

The gram is the standard unit of mass in the metric or SI system. The basic instrument used to measure mass is the mass balance.  Some mass measurements can be made using an electronic balance.

|  |  |
| --- | --- |
| 1. Check to see that the **balance** is set to to zero.
2. Place your cylinder on the pan and read & record the mass.
3. After resetting the balance to Zero, measure and record the mass of the empty 50-ml graduated cylinder with the 3 marbles inside.
4. Calculate the mass of the three marbles.
5. Place the empty cylinder on the balance and press zero on the balance.
6. Carefully add the three marble and record the mass in the last space in the data table.
7. What do you notice about the mass of the marbles?
 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Mass of Cylinder (g)** | **Mass of cylinder and marbles (g)** | **Calculated mass of three marbles (g)** | **Weighed mass of the three marbles (g)** |
|  |  |  |  |

1. **What is the mass of the three marbles in mg? \_\_\_\_\_\_\_\_\_\_\_\_mg**
2. **What is the mass of the three marbles in the cylinder in kg? \_\_\_\_\_\_\_\_\_\_\_\_\_\_kg**

***Part 4: Smile!!!!***

*Hypothesis: Who, in your group, has the longest smile? \_\_\_\_\_\_\_\_\_\_\_\_\_\_cm*

1. Using your metric ruler measure and record the length of each person's smile in your group in centimeters(cm).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. Convert each smile to millimeters(mm):

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

1. **If all of the smiles were added up, how many millimeters long would it be? \_\_\_\_\_\_\_\_\_\_mm**
2. **How many meters would it be? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_m**

***Part 5: Color Challenge***

*Hypothesis: What color is formed when red is mixed with yellow? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Perform each step outlined below using **accurate** measurements.

1. Measure 17 ml of RED water from the beaker and pour into test tube A.
2. Measure 21 ml of YELLOW water from the beaker and pour into test tube C
3. Measure 22 ml of BLUE water from the beaker and pour into test tube E.
4. Measure 5 ml of water from test tube A and pour it into test tube B.
5. Measure 6 ml of water from test tube C and pour it into test tube D.
6. Measure 8 ml of water from test tube E and pour it into test tube F.
7. Measure 5 ml of water from test tube C and pour it into test tube B.
8. Measure 2 ml of water from test tube A and pour it into test tube F.
9. Measure 4 ml of water from test tube E and pour it into test tube D.
10. Complete the chart.

|  |  |  |
| --- | --- | --- |
| **Test Tube** | **Color** | **Final Volume (ml)** |
| **A** |   |   |
| **B** |   |   |
| **C** |   |   |
| **D** |   |   |
| **E** |   |   |
| **F** |   |   |

1. **What is the total volume of all colors in the test tubes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mL**
2. **What is the total volume in kL? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kL**