Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Measurement & Graphing Lab

**Purpose:**

This experiment will give you an opportunity to:

* practice following a controlled experiment.
* use some common lab equipment.
* gather and display data.
* make predictions based on your data.
* produce a graph using proper graphing technique.

**Materials:**

2 Beakers (1 large, 1 medium) ~ 100ml water

1 triple-beam balance ~ 100ml sand

1 50mL graduated cylinder 1 funnel

**Procedure:**

**Part 1: SAND**

1. Start by “zeroing” your balance.

2. Place ~100mL of sand into the large beaker. Label this as Beaker 1. Leave the other empty. Label the empty beaker as Beaker 2.

3. Measure and record the mass of Beaker 2, with correct precision.

4. Measure 20ml of sand from Beaker 1 using the graduated cylinder and pour into Beaker 2.

5. Measure themass of beaker 2 and the sand. Record the total mass in the data table.

6. **Pour the sand back into the large beaker.** Make sure Beaker 2 is completely empty.

7. Measure 30ml of sand from Beaker 1 using the graduated cylinder and pour into Beaker 2.

8. Measure themass of beaker 2 and the sand. Record the total mass.

9. Repeat steps 6-8 for the remaining sand volumes.

**Part 2: WATER**

10. Repeat steps 1 through 9 with water, making sure in step 6 to dry Beaker 2 each time.

**Data:**

**Mass of Beaker B: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| Volume of Material (mL) | **SAND (and beaker)**Mass (g) | **WATER (and beaker)**Mass (g) |
| 20  |  |  |
| 30  |  |  |
| 40  |  |  |
| 50 |  |  |
| 60 |  |  |
| 80 |  |  |

**Analysis:**

1. Correctly identify the independent and dependent variables in this experiment:

Part 1: Independent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Part 2: Independent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Plot a **single graph** showing Sand Mass vs. Volume and Water Mass vs. Volume

1. Plot the 6 “sand” points and draw and label the “sand” line.

2. Plot the 6 “water” points and draw and label the “water” line.

**Questions:**

1. Find the y-intercept of each line, **as read from the graph.**

2. Find the slope of each line. Include units.

3. Which of your 2 lines is the steepest? Explain why. *(Do NOT say because one has a greater slope. What is the PHYSICAL REASON?)*

4. If you measured a beaker filled with iron filings rather than sand or water, would its graph be steeper or flatter than the water and sand lines on your graph? Explain why.

5. What physical quantity does the slope represent?

6. The 2 lines you drew **SHOULD** have the same y-intercept.

 a) Explain why.

 b) What does this point represent?

 c) If the two lines did not have the same y-intercept, provide a reasonable explanation.

7. **From your graph** predict the following:

a) The mass of your beaker with 10 ml of **water**

 b) The mass of your beaker with 70mL of **water**

 c) The mass of your beaker with 45 mL of **sand**

 d) The mass of your beaker with 65 ml of **sand**

 e) The volume of **water** in your beaker if it is 140 grams

 f) The volume of **sand** in your beaker if it is 140 grams

1. the mass of your beaker if it were empty

8. Compare the mass of the beaker found from your graph (5g) to the measured value of the mass of the beaker.

9. Explain why it is important to pour the sand back into beaker 1 after each measurement, rather than simply adding additional sand.

**Sample Data:**

**Mass of Beaker B: 126.646g**

|  |  |  |
| --- | --- | --- |
| Volume of Material (mL) | **SAND (and beaker)**Mass (g) | **WATER (and beaker)**Mass (g) |
| 20  | 162.491 | 147.102 |
| 30  | 181.332 | 156.544 |
| 40  | 202.154 | 166.688 |
| 50 | 215.782 | 181.254 |
| 60 | 235.228 | 188.723 |
| 80 | 260.665 | 212.480 |