

EXPLORING THE RELATIONSHIP BETWEEN MASS AND VOLUME WITH THE TI-NSPIRE

TEACHER NOTES

- Teaching time:** One class period
- Topic:** Density
- Level:** Physical Science/Chemistry I
- Prerequisite Knowledge:** The student will be expected to have a working knowledge of the concept of density and the units associated with this quantity.
- Materials:** TI-Nspire Calculator
- Objectives:** Students will learn the following skills:
1. enter data into lists
 2. name lists
 3. use formulas to populate data
 4. determine regression equations
 5. graph data
 6. plot regression lines
 7. use the calculator application
- Discussion:**

Density is defined as the mass per unit volume. Density is often measure in g/mL or g/cm³ for solids and liquids and in g/L for gases. Density of a substance is considered to be an identifying physical property. Each substance has its own unique density, therefore substances can be often be identified by determining their density. The density of a substance is calculated by dividing the mass by the volume using the formula:

$$D = \frac{m}{v}$$

Teaching Tips:

Students will need a review prior to the activity on the appropriate units for mass, volume, and density.

Answers:**Part I**

$$m = 2.70 \text{ g/mL}$$

$$b = 0.00$$

$$r = 1.00$$

Part II

$$m = .997 \text{ g/mL}$$

$$b = 0.00$$

$$r = 1.00$$

Questions:

1 & 2. The values of b in Parts I & II are both zero, because when the mass equals zero the volume must be equal to zero, because none of the substance would be present.

3 & 4. The calculated density values are the same because as either mass or volume change, the other changes correspondingly, thus the density is constant.

5 & 6. Changing the mass or volume does not change the density. Density of a given substance is a constant.

7. Calculating density allows the identification of a substance because each substance has its own unique, identifiable density.

8. The silvery metal in Part I is aluminum.

9. The liquid in Part II is water.