

## 14.4: Procedures

You will make comparisons of mass, volume, and density.

### Same Mass

1. Draw a table in which to record your values for same mass. **Do not fill in data until you have read the instructions for obtaining that data.**

Table 14.4.1: Same Mass Data

Measured Water Height	Predicted Sand Height	Measured Sand Height	Difference in Measured Heights

2. Fill the bottle labeled “water”, to just below the point where the bottle begins to taper. Measure and record the height, in centimeters, to which the bottle is filled with water.



Figure 14.4.1

3. Predict the height to which you will need to fill an identical bottle with sand in order to have the bottle of water and the bottle of sand balance each other on the simple balance. Record your prediction.
4. Place the bottle with water on one side of the simple balance, and place an empty bottle on the opposite side of the simple balance. Obtain sand in your beaker. Use the funnel to add sand to the empty water bottle, until the bottle with sand balances the bottle with water.

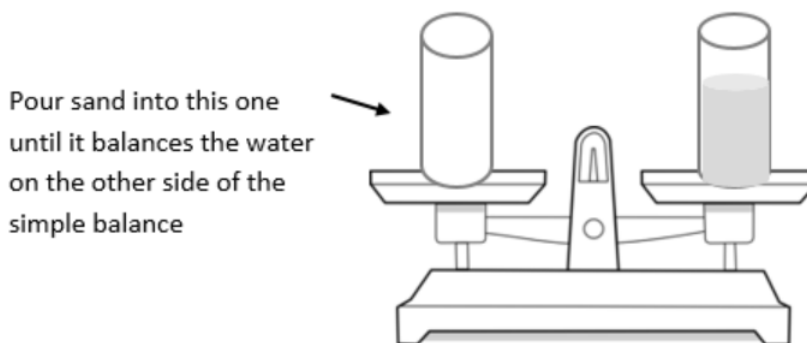


Figure 14.4.2: Balance/ scale by imrolux licensed in public domain

5. Remove both bottles from the simple balance. Measure and record the height to which you filled the bottle labeled “sand”. Calculate and record the difference between the measured fill height of the water and the measured fill height of the sand.

### Same Volume

6. Use the funnel to continue filling the bottle with sand until it is filled to the same height as the bottle with water. Lift both of the bottles a few times, with the bottle of water in one hand and the bottle of sand in the other hand. Record any differences you notice, under your data table.
7. Draw a table in which to record your values for same volume. Read the instructions for obtaining the data.

Table 14.4.2: Same Volume Data

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Type of Material	Mass in Grams	Volume (cm <sup>3</sup> )	Density (g/cm <sup>3</sup> )
Air			
Water			
Sand			

8. Use the appropriate scales to measure the mass, in grams, of an empty water bottle labeled “air”, the bottle with water, and the bottle with sand. Record these values in your data table. Use the mass of the empty bottle as the mass of air.
9. Calculate and record the volume in which you have air, water, and sand; it is the same volume for each bottle. The height (h) is the measured water height from your first data table, and the radius can be measured at the bottom of a bottle.
10. Calculate and record the density for each bottle of matter.

### Clean-up

- Pour sand back into original container
- Use a dry paper towel to remove any sand from the beaker
- Wash and completely dry your beaker
- Discard water outside (water plants)
- Place wet water bottle on the drying rack

### Contributors and Attributions

- Template:ContribCCPhySc101L

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