Density Basics
Science

Density is defined as the ratio of the mass of the substance to the volume of a substance:

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

This ratio means that there is a specific number associated with every substance on earth that can be used to identify that substance. There is one small catch – density is temperature dependent. Thus, depending on the temperature, many substances will have slightly different densities. Remember, also, that density should be reported in the appropriate SI units, kg/m^3.

But what is density, really? What does it describe about the substance? Well, you can think about it in several ways. Density describes how much space a certain amount of stuff occupies. In other words, something that has a high density will be small but heavy, and something that has a low density will be large but light. For instance, a pile of gravel has a higher density than a pile of grass.

Another way to describe density is that it is a measure of the fluffiness of a material. The fluffier a material, the less density it is. A rain cloud, for example, is denser and less fluffy-looking than a sunny-sky, cumulus cloud.

In the problems below, calculate the density of the objects based on the masses and volumes reported. Be sure that the measurements are in the appropriate SI units. You may use a calculator, but be sure to show which mathematical processes you performed.

1) $m = 25.71$ kg, $V = 2.2$ m^3

2) $m = 0.079$ kg, $V = 0.351$ m^3

3) $m = 1.003$ kg, $V = 0.008$ m^3

4) $m = 108.33$ kg, $V = 1462.75$ m^3

5) $m = 22.88$ g, $V = 1.391$ m^3

6) $m = 3684.1$ g, $V = 10.007$ m^3

7) $m = 0.4719$ g, $V = 0.0048$ m^3

8) $m = 58.8$ g, $V = 1.58$ m^3