

ACTIVITY 4A: APPLYING THE DENSITY FORMULA

A **variable** is a letter that stands for a number. **Formulas** are equations that use variables. One concept that is defined with a formula is density. **Density** is a ratio of mass to volume. The formula used to calculate density is $D = m/v$. This formula contains three variables: "D" stands for "density," "m" stands for "mass," and "v" stands for "volume."

Example: Suppose that a box has a mass of 30 grams and a volume of 6 cubic centimeters. Find the density.

$$\begin{aligned} m &= 30 \text{ g} \\ v &= 6 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{step 1) } D &= m/v \\ \text{step 2) } D &= 30 \text{ g}/6 \text{ cm}^3 \\ \text{step 3) } D &= 5 \text{ g}/\text{cm}^3 \end{aligned}$$

A. Use the given information to calculate the density.

1. $m = 500 \text{ g}$
 $v = 20 \text{ cm}^3$

2. $m = 1,250 \text{ g}$
 $v = 500 \text{ cm}^3$

3. $m = 306 \text{ g}$
 $v = 45 \text{ cm}^3$

4. $m = 9.8 \text{ g}$
 $v = 2 \text{ cm}^3$

5. $m = 549 \text{ g}$
 $v = 36 \text{ cm}^3$

6. $m = 120 \text{ g}$
 $v = 480 \text{ cm}^3$

B. Volume can also be measured in milliliters (ml). Milliliters are used if you are finding the volume of a liquid or using the displacement method to find the volume of a solid ($1 \text{ ml} = 1 \text{ cm}^3$). Use the information to calculate the density.

7. $m = 9.8 \text{ g}$
 $v = 7 \text{ ml}$

8. $m = 10.4 \text{ g}$
 $v = 8 \text{ ml}$

9. $m = 15 \text{ g}$
 $v = 6 \text{ ml}$

10. $m = 18 \text{ g}$
 $v = 12 \text{ ml}$

11. $m = 45 \text{ g}$
 $v = 90 \text{ ml}$

12. $m = 240 \text{ g}$
 $v = 80 \text{ ml}$

C. Now try these problems:

13. $D = 1.5 \text{ g}/\text{cm}^3$
 $v = 16 \text{ cm}^3$
Find the mass.

14. $D = 3 \text{ g}/\text{cm}^3$
 $m = 48 \text{ g}$
Find the volume.

15. Box 1 and Box 2 have the same mass. If the volume of Box 1 is greater than the volume of Box 2, what do you know about their densities?