

Help with Solving Density Problems

- ❖ The formula for density is always: $D=m/v$.
 - ✓ D: density
 - ✓ m: mass
 - ✓ v: volume
- ❖ Solving for Density:
 - ✓ The Density or D (in the formula) is often what you will be trying to determine. To do this you will need to identify the mass and identify the volume, then divide the mass by the volume.
 - If you are using a calculator make sure that you put in the numerator (top number/mass) first then the divided by button, then the denominator (bottom number/volume).
 - ✓ The Units for density will always be the **(units for the mass) / (units for the volume)**.
 - g/cm^3
 - g/mL
 - g/cc
 - ✓ **Identifying Mass:** you will need to identify the correct value for the mass so that you put it in the correct spot of the formula.
 - the mass will most often be represented in grams (**g**) or kilograms (**Kg**), but sometime it may be represented as some other unit typically use for weight such as pounds (lbs). The item may even state the mass is...
 - ✓ **Identifying Volume:** This step may be simple identification of the volume in the problem represented by the units milliliter (**mL**) cubic centimeters (cm^3) or (cc). If you are not given the volume of the object in the problem then you will have to solve for the volume before you can use the density equation. The three methods of finding the volume when it is not provided are found in the calculating volume section below.
- ❖ Calculating Volume:
 - ✓ **There are three processes in which you will need to know how to do in order to identify the volume of objects.**
 1. You may have to find the volume of a rectangle, if so you will be given the length, width, and height of the rectangle. To find the volume multiply these three together ($l \times w \times h$)
 2. You may have to find the volume of a cube in which you will only be given the length of one of sides of the cube. Because it is a cube you should know that all sides are equal in length; therefore, use that length given for the width and the height as well.
 3. You may have to find the volume using the water displacement method in which you will be given the volume of a liquid (most often H_2O) and the volume of that same liquid with the object put into it. The volume of the object makes the total volume increase. To solve for the volume of the object you must subtract the volume of the water (volume 1) from the volume of the water and the object (volume 2) this will give you only the volume of the object. $\text{Volume 2} - \text{Volume 1} = \text{Volume}$ Now you are ready to plug this volume into the density equation if need be.
- ❖ Solving for Mass Using the density equation:
 - ✓ You will be given the density (g/cm^3 or g/mL) and the volume (cm^3 , cc, or mL) Set up the density formula with these given variables and solve for M.
 - To solve for M you must multiply both sides by the volume. This will cancel out the volume on the side with the m leaving m on a side of the equal sign by itself (nothing else on the same side as m)
- ❖ Solving for Volume Using the density equation:
 - ✓ You will be given the density (g/cm^3 or g/mL) and the mass (g or Kg). Set up the density formula with the given information and solve for v.
 - To solve for V you must first cross multiply. This will move the V from the denominator under the mass to multiplication with density. The formula now looks like $DV = M$ on the side with the volume leaving volume by itself (nothing else on the same side)