Properties of Matter

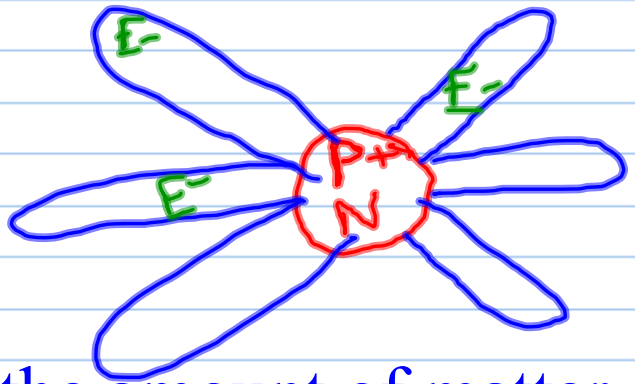
Matter - "the stuff everything is made of" OR anything that has **mass** and takes up space

The "building blocks" of matter

Atoms - the smallest pieces of matter

made of

Protons (+) Neutrons (No charge) Electrons (−)



Nucleus: the center of an atom

-Neutrons and protons are in the nucleus of an atom

-Electrons orbit the nucleus (electron cloud)

Mass - the amount of matter something is made of

-usually measured in grams (g) [1 kg = ~ 2.2 lbs]

-unlike weight which depends on gravity, the mass of an object doesn't change with differences in gravity

-we find mass using a **balance**

1000 g = 1 kg

Gravity - a measure of the amount of attraction between objects

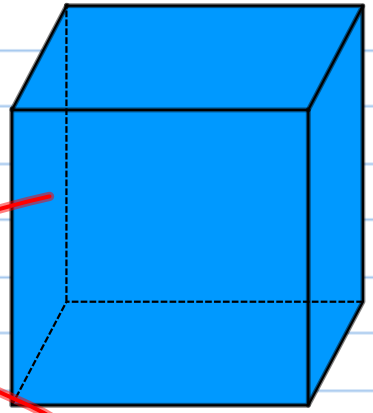
-the more mass something has, the greater the attraction (and stronger gravitational force)

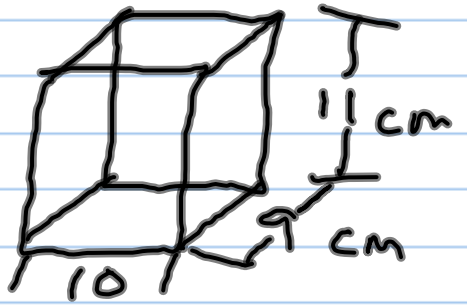
Volume - how much space matter takes up

-the simple math formula for regular geometric shapes is

LENGTH x WIDTH x HEIGHT

length x width x depth





mL is the scientific unit for measuring Volume

9cm x 10 cm x 11 cm

90 cm^2

990 cm^3

We can measure volume in cm^3 or L (liters)

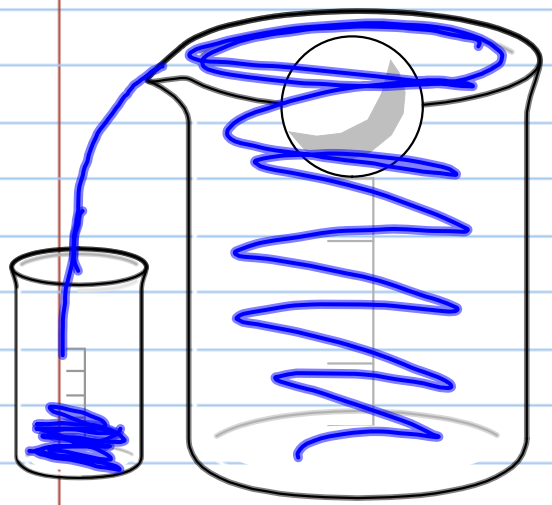
Cubic centimeters

1 cm^3 = 1 mL

Using **Water Displacement** to Find the Volume of an Object

No two objects can occupy the same space at the same time.

You can use overflow to find out the volume of an object because of ***water displacement;*** putting an object in water will push some of the water out of the way... The volume (measure of the amount) of water that was pushed out of the way equals the volume of the object:



1. Fill a container to capacity (all the way to the top)

2. Insert the object you wish to measure and catch the overflow (water that spills out)

3. Measure the amount of the overflow (this equals the object's volume)

Density - the amount of mass of an object compared to its volume (a measure of how closely packed the atoms/molecules are)

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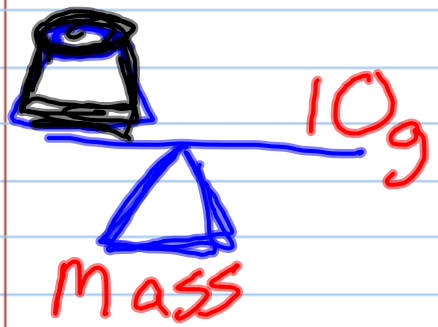
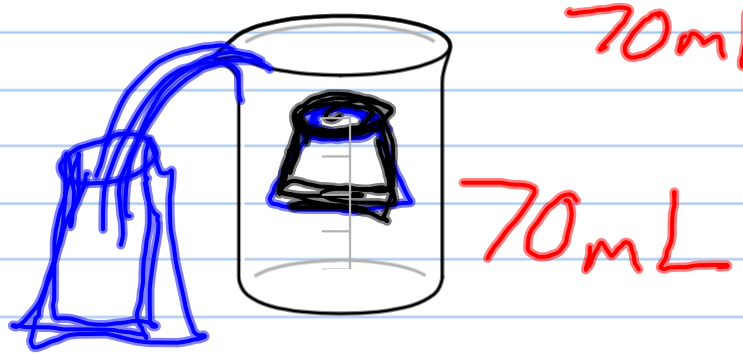
-density is usually measured in g/mL (grams per milliliter)



$\frac{10\,g}{70\,mL} = .143\ g/mL$



-matter that has a higher density than the surrounding matter will...

sink

pure water has a density of 1g/mL

On the back of your Buoyancy Boat Building sheet, record the following

The estimated mass of your boat using the balance and weights

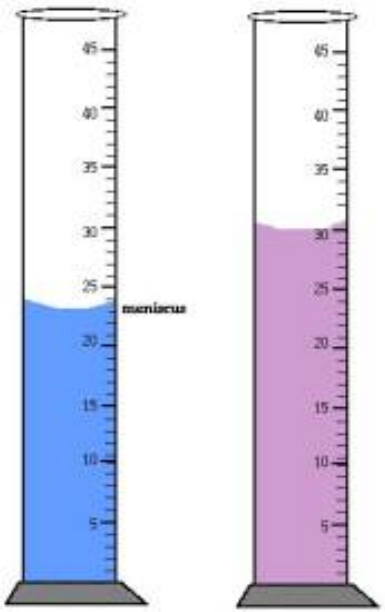
The exact mass of your boat using the triple beam balance to the nearest 5 hundredth of a gram

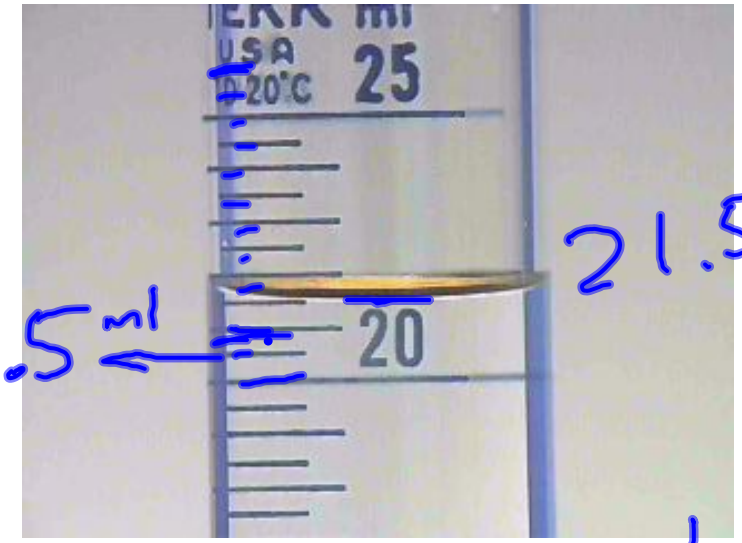
The estimated volume of your boat BEFORE it sinks:

TO find ESTIMATED volume:

1. fill container to the very top, to the point of overflowing.
2. insert your boat and carefully push down just to the point of sinking.
3. collect and measure the water that overflowed.
4. use graduated cylinder to measure the exact volume.

http://www.wisc-online.com/objects/index_tj.asp?objID=GCH202





graduated cylinder use

Please get a sheet of looseleaf paper.

1. How much space an object takes up is called its:

Volume

2. The force of attraction between 2 objects is called:

Gravity

3. The amount of matter something is made of is called:

Mass

4. Anything that has mass and takes up space is called:

Matter

5. The "building blocks of matter" are:

Atoms

6. List the 3 subatomic particles that make up atoms and their charge:

Proton	Neutron	Electron
+	Neutral (no charge)	—

1. Anything that has mass and takes up space is called:

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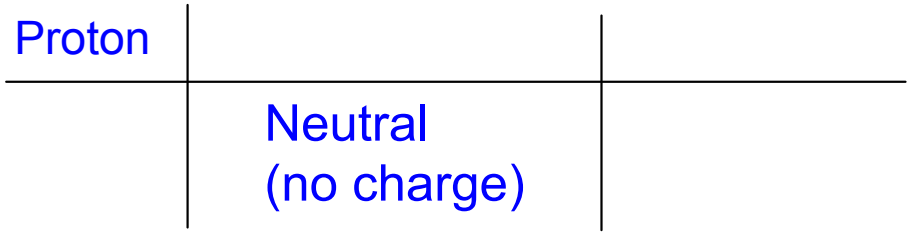

4. How much space an object takes up is called its:

5. The force of attraction between 2 objects is called:

6. The amount of matter something is made of is called:

Calculating density

divide mass (g) by volume(mL)

40 g

250 ml

$$250 \overline{)40.0} \quad .16$$

$$\begin{array}{r} 250 \\ \hline 1500 \\ 1500 \\ \hline 0 \end{array}$$

.16 g/mL

.16 g/cm³

Water has a density of 1 g/mL