Density of Various Objects

Some formulas you may need:

Volume of a cube: $V = l \cdot w \cdot h$

Volume of a cylinder: $V = \pi \cdot r^2 \cdot h$

Density: $D = m/V$

Show all calculations in lab format on the back of this sheet.

Table of Densities	
Aluminum	$=2.70\ g/cm^3$
Copper	$= 8.90\ g/cm^3$
Lead	$= 11.3\ g/cm^3$
Iron	$= 7.86\ g/cm^3$
Brass	$= 9.60\ g/cm^3$
Zinc	$= 7.14\ g/cm^3$

Calculation #1: Finding the Density of the Brass Cylinder

1. Get a metal cylinder of type "B".
2. Calculate the density of a metal cylinder using rulers and a balance.
3. Calculate the density of the same metal cylinder using water displacement and a balance.
4. Determine the metal from which the cylinder is made, using the table above. It should be closest to Brass.

Calculation #2: Short Metal Cylinders (Large and Small)

1. Calculate the density of the wider metal cylinder using rulers and a balance.
2. These cylinders are made from the same metal, so they have the same density. Using the value of density calculated for the large cylinder, measure the volume of the smaller cylinder (with rulers or graduated cylinders), and calculate the mass of the smaller cylinder. After you have calculated the mass using the density, and volume, weigh the small cylinder to see how close your calculation was.

Calculation #3: Pennies

- Some time in the past twenty years the U.S. government stopped making pennies out of copper. Today a mixture of metals is used that has a lower density.

1. Without measuring the density of every coin, determine the year in which the pennies were no longer made from copper. Describe how you did it.
2. Calculate the volume of a penny using the density for copper and the mass of a copper penny. Show your work. (Hint: You will need to use one of the all copper older pennies for this.)
3. What is the density of the new metal mixture for pennies? (Assume the volume of a new penny is the same as an old penny.)