PHYS 1111L - Introductory Physics Laboratory I

Laboratory Advanced Sheet
Measurement Lab

---

1. Objective. To introduce three measuring devices used in experiments in classical mechanics.

2. Procedures.

a. Your instructor will describe the proper use of the ruler, vernier caliper and triple-beam balance.

b. You will perform measurements on two objects to determine the density of each. The masses of the objects will be measured using the triple-beam balance. The dimension(s) of the objects will be measured using the ruler or vernier caliper.

c. Record your data in the tables provided. All tabulated data should be recorded in units of centimeters.

d. Use the Excel spreadsheet program to calculate the following quantities:

1) Volumes of the two objects as measured by the two measuring devices.

2) Densities of the two objects as measured by the three measuring devices.

e. Calculate the mass densities of the objects. The mass density of an object is given by:

$$\rho = m/V$$

where
ρ is the mass density of an object,
m is the mass of the object, and
V is the volume of the object.

Useful equations for calculating volumes are:

$$V_{block} = l\ w\ h$$

where
l, w, and h are the length, width and height of the block.

$$V_{sphere} = (4/3)\pi(d/2)^3$$

where
d is the diameter of the sphere.

e. After you have calculated the mass densities of each object, your instructor will provide you their actual densities. Calculate the percent discrepancy between the measured and actual mass densities.

3. Data and Calculations. Tables are provided in Annex A for recording your measurements and calculations.

4. Conclusions. Report the densities of the objects. Report the percent discrepancy for each object.

Annex A

Data and Calculations

1. Rectangular block

measuring device	dimension and uncertainty					
	length		width		height	
	l (cm)	δl (cm)	w (cm)	δw (cm)	h (cm)	δh (cm)
ruler						
vernier caliper						

2. Sphere.

measuring device	dimension and uncertainty	
	diameter	
	d (cm)	δd (cm)

ruler		
vernier caliper		

3. Masses and uncertainties in grams.

block		sphere	
m (g)	δm (g)	m (g)	δm (g)

Last update: June 04, 2007
