A hint in calculating fractional uncertainties with small error bars: say you measure 1.0 cm ± .001mm. That's a fractional uncertainty of 10^-4m or .01%. It may make sense if all your uncertainties are this small to factor them out before putting things in the square roots. So you might record the uncertainties as say δx = .04% δy = .03% etc, but do a calculation by taking out the big factor like this (effectively a unit change in the uncertainties, by factoring out the scale of .01%):

$Q = x\ y$

$\delta Q/Q = \sqrt{[\ (.01\%)^2\ \{\ 4^2 + 3^2\}\ ]} = .01\%\ \sqrt{\{\ 4^2 + 3^2\}}$

or $\delta Q/Q = .01\%\ \sqrt{25} = .05\%$

Here are some concrete suggestions about how to use tables to organize your calculations and results for Experiment 1. In future experiments, you will be expected to come up with such an organization on your own. The fractional errors are important (for you and the grader) to help assess whether the fractional errors of your calculated quantities are sensible. You of course should be suspicious if your % error goes down from one step to another (why?). For a reminder on the t value calculation (something very important you will use over and over this term), please refer to the Taylor handout elsewhere on the course web site.

Input data Tables: (note: give the units for the table and you won't have to write them on the values or headings.

Table units: cm for lengths and uncertainties

object	method	l	δl	δl(%)	w	δw	δw(%)	h	δh	δh(%)

Make one row per measurement. You will have similar columns for the cylinder and pipes.

Calculated data (assuming you call the density r)

Table units: cm^3 for volume and uncertainties; grams for mass; $gram/cm^3$ for density

object	method	V (cm^3)	δV (cm^3)	δV(%)	m(gm)	δm(gm)	δm(%)	r	δr	δr(%)

Again, use one row per measurement.

Then summarize in a final table:

Table units: density in $grams/cm^3$

object	method	r(g/cm^3)	δr(g/cm^3)	δr(%)	r(alloy)	t value	alloy name

You might need more than one row per measurement if 2 or 3 alloys match your measured density with a reasonable t value,
Or if there are many others with $|t| < 2$, you could list the alloys.