

Lab 01 Comments

1. Calculation errors are NOT experimental errors. You are NOT ALLOWED to make calculator or mental errors and lump those into the experimental error. The experimenter must do everything correctly. This limits discrepancies between experiment and prediction to include only the real sources of error.

Repeat, recheck and recheck again until all the calculations you have performed have been fully verified. You have one full week to get the calculations right and no excuses are accepted for anything less than perfection.

2. It is NOT necessary to keep 12 digits in all your calculations. Be reasonable. At a minimum you must keep 2 more digits than the number of sig figs in your data. More than that is being silly. If all those digits are on your calculator screen it is fine to use them, but there is no need to clutter up the report by repeating them on paper. Put on the paper just the extra 2 or 3 digits sufficient to provide an adequate number of sig figs in the final answer.

In the event that you have to reenter a number in your calculator, make sure that you enter those two extra digits.

3. Measurement mistakes are ALSO NOT experimental errors. Those are all yours. If you don't know the difference between inches, centimeters and meters, then it is past time for you to figure it out.

Proper reading and recording procedure for data includes estimating the last digit. Do not try to estimate two extra digits. Do not forget to estimate the one required digit. If you can't or won't read the scale correctly and record the data properly those errors are yours, all yours.

4. When did the radius of a circle become larger than the circumference? Why are some of you reporting, correctly, that the circumference of the Earth is about 40,000,000 m and then in the next line showing, with apparent blissful ignorance, that the radius of the Earth is near 63,000,000 meters? This is absurd.

Part of the problem is many of you are writing down too many digits and making the numbers hard to read for everyone. The second problem is proper understanding of how to use a calculator. Just because a number appears on the screen does not prove it is correct.

If you try to calculate the circumference from the radius using these keystrokes

$R = 12/2*\pi$ enter. The result is 18.8, i.e., a radius larger than the circumference of 12.

Use parentheses: $12/(2*\pi)$ enter. The correct is now given as 1.91.

5. Rounding errors must not be allowed to limit the accuracy of your calculations. That is why you must keep 2 or 3 extra digits for future calculations. However, there is no reason why you need to keep 10 extra digits. More is not better. It is clutter and useless and can be a source of mistakes.

It is just as bad to use too few as too many digits. If you round your numbers to the point where you are not keeping 2 or 3 extra digits then your calculations will add needlessly to the apparent %Error of the results. We do not need you to add extra error by performing lazy, sloppy calculations. There are enough sources of error in the world without adding your mistakes into the pot.