should be rewritten as 6.35×10^9. Please remember to also *include units* when reporting your measurements.

If you make any assumptions, be sure to explain what they are, and why you are making them.

When you make a calculation of some quantity, make sure that it makes sense. For example, if you calculate the mass of Jupiter to be 1.23×10^{-5} kg, you know that something is wrong, so you should try to find where the mistake was made along the way.

Be sure to draw conclusions from your analysis. For example, in this lab you will be producing various graphs. You should always think about these plots and make comments and attempt to interpret what these plots imply. It is *very important* that you include interpretation of analysis and results in your final writeup for each lab.

3 Presentation

Please make **tables** of your data to show and summarize measurements and calculations wherever you may think it appropriate, but *especially* where it says to do so in the lab manual, and including exactly what it says to include in the lab manual.

There are a few things to point out about **graphs**. First, *use a ruler to draw straight lines*. All graphs must be drawn on 1 mm graph paper (the kind you find in the lab book). Make your plots *large* and *clear*. If you wish to draw your plots in Excel, that's fine, but again, make them large enough to be clear, and try to include grid lines on the graph.

When calculating slopes, please show all work, which may include drawing on the graph itself. In Excel, it is preferred that you calculate slopes by hand, but at the very least verify that the slope that Excel calculates for your best fit line is correct, and show your work. Also, use appropriate scaling of axes, whether or not you are using Excel to plot your graphs.

Tips on Writing Lab Reports

1 General Comments

Work in groups of no more than 2 people unless it is not possible, e.g. if there are not enough computers in the lab session. Data is taken together in labs, but do your own calculations and analysis, separate from your partner. Also, please write your partner's name on the top of the first page of each lab you hand in. If you did not work with a partner, write "No partner." Lab reports MUST be written and submitted in the yellow lab books.

Be sure to hand in labs which are *neatly presented and organized*. You may do rough work in your lab books, but rewrite a good copy which will be marked.

Very important: Be as explicit as you can throughout the lab report about everything. This includes, but is not limited to, any explanations, calculations, derivations, and conclusions. This way those marking the labs will not have to second guess as to *how you arrived at a specific result, solution, or conclusion, or whether or not you understand a certain concept*. Also, this is a good way to receive part marks, even if the answer is incorrect. In fact, the process of reaching a conclusion is more important at this stage than the conclusion itself.

2 Analysis

Pay attention to significant figures. For example, if you are calculating an average of 4 numbers:

$$x_1 = 4.12, \ x_2 = 3.4, \ x_3 = 1.650, \ x_4 = 2.1$$

$$\overline{x} = \frac{x_1 + x_2 + x_3 + x_4}{4} = \frac{4.12 + 3.4 + 1.650 + 2.1}{4} = 2.8175.$$

Since the minimum number of significant figures for this data set is 2 (x_2 and x_4), you cannot claim to know the average to better than this number of significant figures. So your average should be:

$$\overline{x} = 2.8,$$

which has 2 significant figures. Remember, exact numbers do not figure in when determining the number of significant figures with which to express your result. Thus, even though you divided by 4 in the above example, the result contained two significant figures instead of one. This is because 4 was an exact number.

Use scientific notation when appropriate. For example, 6345711000 should be written as 6.345711×10^9. Report only significant figures here as well. For example, if the above number is known to only 3 significant figures, then it