**Appendix: The Method of Significant Figures**

A simple method for estimating the effect of rounding is to use the method of **significant figures**. Recognizing that a number like 1.25 may have been rounded, we shouldn’t assume the thousandth’s place is a zero. Rather, we should keep track of the fact that we are unsure of any of the digits after the hundredth’s place, e.g., “1.25???” (each question mark represents an unknown number).

Addition and Subtraction

If we add 1.25???? to a number that is more precise, e.g.,
 1.25???
 + 0.33333
 1.55???

the answer cannot be more precise than the hundredth’s place. We say that the “1”, “5” and “5” in the answer are significant. Anything beyond the hundredth’s place is not and thus should not be recorded as such (note: typically this is done by just not writing them).

 Thus, the rule for **adding** or **subtracting** numbers is that the precision of the answer is the precision of the least precise number involved. For example, if we add 0.234 to 1.23, the answer should be 1.46 (not 1.464).

Multiplication and Division

Keeping track of the significant figures during multiplication is a bit more difficult. Consider the following product: 1.25??? × 33333

What we need to do here is made a bit clearer by rewriting the second term as

 3 + 30 + 300 + 3000 + 30000.
The problem then becomes

 1.25???×3 + 1.25???×30 + 1.25???×300 + 1.25???×3000 + 1.25???×30000
which equals (note that the unknown digits are kept as question marks)

 3.75??? + 37.5??? + 375.??? + 375?.?? + 375??.?
This is then an addition problem, which can be written as follows:

 3.75???
 + 37.5???
 + 375.???
 + 375?.??
 + 375??.?

 416??.??????

It turns out that, for **multiplication** or **division**, the product has the same number of significant figures as the least precise number. The number 1.25 has three significant figures and so does the product. (Note: To specify whether a number like 410 has two or three significant digits, use scientific notation, e.g., $4.1×10^{2}$ or $4.10×10^{2}$)