Rules for Significant Figures PHYS 210 General Physics I
Fall 2003

There are three basic rules for determining the significant figures for a number:

1. Non-zero digits are always significant.
2. Any zeros between two significant digits are significant.
3. Only final zeros or trailing zeros in the decimal portion are significant (*i.e.*, zeros to the right of non-zero digits).

Learn these rules well! They will be used extensively throughout the remainder of this course. It's worth the effort to do some problems to nail down the concept of significant figures tight and then do some more, just to be sure. There are some available tutorials on the web; just do a GOOGLE.COM search on "significant figures."

Keep in mind that, in science, most all numbers are based upon measurements (except for a very few that are defined). Since all measurements are uncertain, we must only use those digits that are meaningful. A common meterstick cannot measure something to have a length of 14.5673822m. . Not all digits have meaning (significance) and, therefore, should not be written down. This is particularly important to bear in mind when calculating a quantity using measured numbers. A calculator or computer may give your result to ten decimal places, but not all of the digits are necessarily significant. In science, only the numbers that have significance (derived from measurement) should be used.

Performing mathematical operations with "sig figs" is relatively simple. There are two rules:

> For multiplication, division, and special functions the LEAST number of significant figures in any number of the problem determines the number of significant figures in the answer.
>
> For addition and subtraction, round the answer to the LEAST number of places in the decimal portion of any number in the problem.

Practice Problems (not being collected!)

Identify the # of significant figures:

1) 3.0800

2) 0.00418

3) 7.09×10^{-5}

4) 91,600

5) 0.003005

6) 3.200×10^{9}

7) 250

8) 780,000,000

9) 0.0101

10) 0.00800

Answers: 1) 5 2) 3 3) 3 4) 3, at least 5) 4 6) 4 7) 2
8) 2 9) 3 10) 3

Do the math!

1) 3.461728 + 14.91 + 0.980001 + 5.2631

2) 23.1 + 4.77 + 125.39 + 3.581

3) 22.101 - 0.9307

4) 0.04216 - 0.0004134

5) $(3.4617 \times 10^{7}) \div (5.61 \times 10^{-4})$

6) $(4.7620 \times 10^{-15}) \div [(3.8529 \times 10^{12}) (2.813 \times 10^{-7}) (9.50)]$

7) [(561.0) (34,908) (23.0)] ÷ [(21.888) (75.2) (120.00)]

Answers: 1) 24.61 2) 156.8 3) 21.170 4) 0.04175
5) 6.17×10^{10} 6) 4.62×10^{-22} 7) 2.28×10^{3}