Rules for Determining Significant Figures

1. Any non-0 digit is always significant, i.e. an actual part of the measurement. 12,345 g has 5 sig figs
2. 0's between non-0 digits are sig. 102 has 3 sig figs.
3. 0's to the right of the decimal pt. after non-0 digits are significant. 128.0 mg has 4 sig figs. That final "0" is an actual part of the measurement, as opposed to 128.1 mg.
4. A "0" by itself to the left of the decimal pt. is not significant (place holder) 0.23 g has 2sf.
5. 0's to the right of a decimal, but in front of non-0 digits are also just place holders (not significant - not a part of the measurement: 0.00254 g has only 3 sig figs
6. Can't tell about 0's to the right of non-0 digits (no decimal pt.). 1000 can have 1, 2, 3, 4 sig figs. We'll call it 1 sig figs. Write it 1000. to mean 4 sig figs or 1.000×10^3 for 4 sig figs
7. Exact numbers - arise from counting something (7 days/week) or from a definition (1 in = 2.54 cm exactly).

Using sig figs in calculations

When a measurement with high accuracy (many sig figs) is combined with a low-accuracy measurement (few sig figs), the result can't be any more accurate than the least-accurate measurement. It would be meaningless to try to make the result seem more accurate than it really is.

Example: you mass a beaker: 100.3 g. Mass chemical separately: 0.562 g. Put the chemical into the beaker. Total mass can't be expressed any more accurately than 100.9 g.

a. **Addition and Subtraction**

The result can't have more digits to the right of the decimal than the measurement w/ the fewest number of digits:

100.2	98.65
10.35	-33.2877
12.655	+72
123.2	137

b. **Multiplication/Division**

The result can't have more sig figs than the measurement with the fewest sig figs.

$28.3 \times 12.887 \times 0.12 = 44$

c. Exact #'s (something you've counted, p, a conversion factor like 100 cm in 1 m, a formula like $4/3\pi r^3$) have an infinite # of sig figs They won't limit your calculation.
Example: Find the average of 12.35 g, 12.044 g, 11.5834 g. **11.99 g** (the 3 is exact)

d. When perfoming conversions sig figs are to be maintained.

e. Problems where +,- are mixed with x /. Please Excuse My Dear Aunt Sally.
Do problems in parts. Example: $\frac{(42.0\ g + 2.510\ g)}{(3.2\ cm^3 + 6.511\ cm^3)} = \frac{44.5\ g}{9.7\ cm^3} = 4.6\ g/cm^3$