Pre-AP Chemistry
Unit #2—Measurement
SIGNIFICANT FIGURES

RULE #1 - **All digits 1 through 9 are significant.**

If the mass of an object is measured as 15.8 g, this means that the mass is known to lie between 15.7 and 15.9g. There are 3 significant figures in 15.8.

If the mass of an object is measured as 12.3456 g, this means that the mass is known to lie between 12.3455 and 12.3457 g. There are 6 significant figures in 12.3456.

Overall, you are counting all of the "certain" digits and a final digit that is uncertain, but nevertheless significant.

RULE #2 - **Zero is significant when it is between two non-zero digits.**

The quantities 306, 30.6, 3.06 and 0.306 all contain 3 significant figures since the 0 between the 3 and 6 is significant. The number 306 means that the true value rests somewhere between 305 and 307, thus, the zero is known with certainty and is significant. **That is, zeros *within* a number are always significant.**

RULE #3 – **All final zeroes to the right of the decimal place are significant.**

The quantities 279.0, 27.90 and 2.790 all contain 4 significant figures. Again, the first three numbers are known with certainty and the final number is always taken as significant.

The quantities 0.2790 and 0.27900 have 4 and 5 significant figures, respectively. In the number 0.27900, it does NOT matter that there are two consecutive zeros. The first zero is known with certainty and the final zero while not known with certainty is still significant. Thus, 4.000 have 4 significant figures.

RULE #4 – **Zeros that act as placeholders are not significant.**

The quantities 0.456, 0.0456 and 0.00456 all contain 3 significant figures. In this case, you need to think in terms of exponential numbers. 0.0456 is 4.56 x 10-2 (only 3 significant figures) and 0.00456 is 4.56 x 10-3 (again, only three significant numbers). Thus, 470,000 has only 2 significant figures and 0.000000004 has only one significant figure; the remaining zeros were used to fix the decimal point.