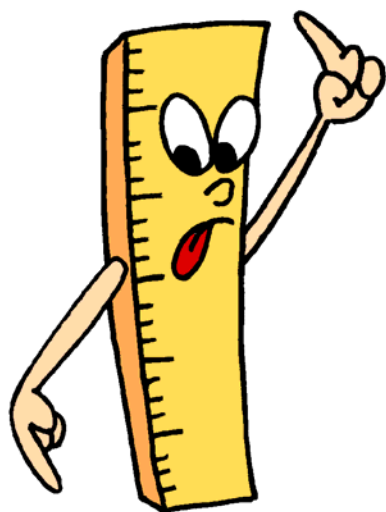


# The Significance of Significant Figures

Qualitative  
Measurements  
use adjectives, like:  
tall, huge, cool

Quantitative  
Measurements  
use numbers & units like  
68 inches, 2505 pounds,  
or 23.2° centigrade

**In Chemistry Class we will most often measure  
with Quantitative measurements with**



**Numbers & Units**

**Our tools limit how exact  
our measuring can be.**

**Our math must never increase,  
or decrease, how exact we can be.**

**There are rules concerning  
significant figures in measuring  
that we need to know!**

When our thermometer measures to the nearest degree, we estimate this measurement one more place, our temperature would be 23.0°C rather than just 23°C. We could not measure the temperature to be 23.094°C unless we had an extremely accurate device.

If our electronic balance reads 45.89 grams, we don't estimate at all, since this device provides us with an as exact a reading that is possible. We would not "round down" to 45 grams, nor up to 46 grams. Our scale gives us an exact measure to the hundredth's place.

We must always measure to the best of our ability, and limit our exactness to exactness of our tools. We should never give our exactness away with math, nor can we get more exact because our calculations allow for more decimal places than we could accurately measure .

# The Rules for Significant Figures

- Any digit 1 to 9 will always be a significant figure.
- All zeros between significant figures will be significant.
- Zeros before significant figures are not significant.
- Zeros before a "missing" decimal point are not significant, but if the decimal point is included, then the zeros before it are significant.
- Zeros at the far right of a decimal are significant.
- Unlimited significant figures happen in 2 situations:  
Equalities, such as 12 inches = 1 foot, both are unlimited  
Counting, such as 24 students, no different measure exists for "whole" numbers of students.
- When doing any math, answers must have the same number of significant figures as the LEAST number of sig figs in the math problem.
- With Scientific Notation, significant figures are counted only in the co-efficient (the first part)

23 grams has 2 SF 23.5 grams has 3 SF 23.54 grams has 4 SF	1000 has 1 SF 1001 has 4 SF 1001001 has 7 SF	100 has 1 SF 100. has 3 SF 90 has 1 SF 99. has 2 SF
0.005 kJ has 1 SF 1.005 has 4 SF  0.000000000001 has just 1 SF	12.00 inches has 4 SF 1.00 g/cm <sup>3</sup> has 3 SF	5 fingers has unlimited SF  three pigs has unlimited SF
454 grams = 1 pound both have unlimited SF	6.02 x 10 <sup>23</sup> has 3 SF  3.550 X 10 <sup>-4</sup> has 4 SF	2.5 X 5.6788 = ? the answer has just 2 SF