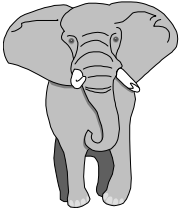
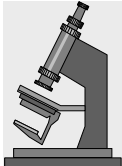


Scientific Notation

Really large,

and really small numbers

Why?

- ◆ Chemistry often deals with very large and very small numbers.
- ◆ There are 602,000,000,000,000,000,000 molecules of water in 18 mL
- ◆ one electron has a mass of 0.000000000000000000000000911 g
- ◆ We need a shorter way of writing these numbers

Standard Exponential Form

- ◆ another name for scientific notation.
- ◆ consists of two parts
- ◆ a number between 1 and 10
- ◆ multiplied by 10, raised to some power
- ◆ 602,000,000,000,000,000,000 = 6.02×10^{23}
- ◆ 0.000000000000000000000000911 g = 9.11×10^{-28}

Putting a number into scientific notation

- ◆ determine how many times you have to move the decimal place to make it into a number between 1 and 10

◆ **3240000**

- ◆ use that as the power of 10

◆ 3.24×10^6

What is the number is smaller?

- ◆ if you make the number bigger by moving the decimal point, make the exponent smaller and visa-versa

◆ **0.00045**

◆ 4.5×10^{-4}

Getting back to original number

- ◆ Move the decimal point the same number of times as the exponent
- ◆ If the exponent gets bigger the number gets smaller

◆ Change 2.99×10^8

◆ Change 4.87×10^{-3}

Using your calculator

- ◆ EE and EXP button stand for x 10 to the
- ◆ 4.5×10^{-4}
- ◆ push 4.5
- ◆ push either EXP or EE
- ◆ push 4 +/- or -4
- ◆ see what your display says.

Practice these problems

- ◆ $(4.8 \times 10^5) \times (6.7 \times 10^{-6})$
- ◆ $\frac{(6.8 \times 10^{-6})}{(3.2 \times 10^4)}$
- ◆ Remember when you multiply you add exponents
- ◆ $10^6 \times 10^{-4}$
- ◆ When you divide you subtract exponents.

Adding and Subtracting

- ◆ You can't add or subtract numbers until they are to the same power of ten.
- ◆ Your calculator does this automatically.
- ◆ $(4.8 \times 10^5) + (6.7 \times 10^6)$
- ◆ $(6.8 \times 10^{-6}) - (3.2 \times 10^{-5})$
- ◆ Remember- standard form starts with a number between 1 and 10 to start.

