Scientific Notation

Scientific Notation is used by scientists to express very large and very small numbers in a compact fashion.

To express a number in scientific notation, we rewrite the quantity as a number (between 1 and 10) times 10 raised to a power (exponent) that tells us how we moved the decimal point.

- Multiply the number by 10^0 ($10^0 = 1$)

- Move the decimal point to give a number between 1 and 10

- Every time we shift the decimal point to the <u>left</u> by one place
      we <u>increase</u> the value of the exponent by one

- Every time we shift the decimal point to the <u>right</u> by one place
      we <u>reduce</u> the value of the exponent by one

Example: Write 120,000 in scientific notation.

$$120,000 = 120,000 * 10^0 = 1.2 * 10^5$$

Example: Write 0.0000012 in scientific notation.

$$0.0000012 = 0.0000012 * 10^0 = 1.2 * 10^{-6}$$

To express a number that is written in scientific notation as a non-exponential quantity:

- Move the decimal point the same number of places as the value of the exponent and
      eliminate the exponential part of the number.

- If the exponent is <u>positive</u>, we move the decimal to the <u>right</u> to the same number of
      places as the value of the exponent.
      The result should be a number *greater than* 1 **unless** the original number is negative.

- If the exponent is <u>negative</u>, we move the decimal to the <u>left</u> to the same number of
      places as the value of the exponent.
      The result should be a number *less than* 1 **unless** the original number is negative.

Example: Write $1.23 * 10^6$ in non-exponential form.

$$1.23 * 10^6 = 1,230,000$$

Example: Write $1.11 * 10^{-5}$ in non-exponential form.

$$1.11 * 10^{-5} = 0.0000111$$