Scientific Notation Study Guide

Scientific Notation is a way to write very large or very small numbers in a way that is easier to work with.

Scientific notation is written as two factors. The first factor must be a number between 1 and 10. The second factor is written as a power of 10. In the example 4.3 x 10^{11}, the first factor is 4.3 and the second is 10^{11}.

You can convert a number from standard notation into scientific notation by using the following steps.

Standard Notation: 430,000,000,000.

Step one: Move the decimal in the number so that the number becomes a number between 1 and 10. (4.3)

Step two: Count how many spaces the decimal moved to get to this location. (eleven spaces)

Step three. Rewrite the two factors using the number of spaces the decimal moved as the exponent. So
   430,000,000,000 = 4.3 x 10^{11}

If the number you start with is very small, like 0.000000234 you will use the same process only the exponent will be a negative number.

Step one: Move the decimal to make it a number between 1and 10 (2.34).

Step two: Count how many spaces you moved the decimal (seven spaces).

Step three: Rewrite using the two factors and a negative exponent, so **0.000000234 = 2.34 x 10^{-7}**

Work the process in reverse to convert numbers from scientific notation into standard.

To convert **4.61 x 10^8** into standard form make the number bigger by moving the decimal 8 spaces to the right. Supply zeros for the extra spaces, so **4.61 x10^8 = 461,000,000**

To convert 3.04 x 10^5 into standard form make the number smaller by moving the decimal to the left 5 spaces. Supply zeros for the extra places, so 3.04 x 10^5 = 0.0000304

To multiply of divide numbers in scientific notation follow these steps:

Step 1: Multiply or divide the first factors.

Step 2. Multiply or divide the powers of 10 using the exponent rules

Step 3. Put the two together into scientific notation form

Ex.1   (2.1 x 10^6) (3 x 10^3)   2.1 x 3 = 6.3 10^6 x 10^3 = 10^{6+3} = 10^9 so   **6.3 x 10^9**

Ex.2   (6.6 x 10^8) / (2.2 x 10^3)   6.6 / 2.2 = 3 10^8 / 10^3 = 10^{8-3} = 10^5 so   **3 x 10^5**