

Scientific Notation Notes

* All too often in science we have to collect data to support an investigation that look like this:

A) 1 mole = 602,000,000,000,000,000,000 atoms (yup, that's 21 zeros after the #!!!)

Or

B) 1 atom = 0.000000000000000000000602 mole (yup, that's 21 zeros before the #!!!)

Scientific notation is a shorter way to write very large (like in A above) or very small number (like in B above).

TO CONVERT A NUMBER INTO SCIENTIFIC NOTATION:

Step 1 move the decimals left or right until it creates a number between 1 and 9.

Ex) 602,000,000,000,000,000,000 → move the decimal to the left to get **6.02**

Step 2 Now count the number of places you moved the decimal

Ex) in our case above it was **23**.

Step 3 Write the number found in step one multiplied by ten

Ex) in our case it becomes **6.02 x 10**

Step 4 Write the number of places you moved the decimal in step 2 as an exponent on your answer from step 3.

Ex) in our case it becomes **6.02 x 10²³ atoms**

EXAMPLE 2: 3,346,000,000. = _____

The decimal moved 9 places # between 1 & 10 power of ten
Add zeros as needed for place holders.

Answer = **3.346 x 10⁹**

* **Positive** exponents are large numbers, **negative** exponents are small numbers!!!

EXAMPLE 3: 0.000000000736 = _____

Answer = **7.36 x 10⁻¹¹**

TO CONVERT SCIENTIFIC NOTATION INTO STANDARD FORM (Writing it the long way):

Step 1 Look at the decimal value of the number given and move the move the decimals left (if negative exponent) or right (if positive exponent) until you run out of spaces.

Ex) $6.5 \times 10^{-9} \rightarrow$ move the decimal to the left to get **.65**

Step 2 Now determine the number of remaining decimal places from the exponent

Ex) in our case above it was **8** (9 minus 1)

Step 3 Now continue moving the decimal by adding zeros in the correct direction (this case to the left).

Ex) in our case it becomes **0.000000065**



EXAMPLE 2: $1.312 \times 10^6 =$ _____

The decimal moved 6 places to the RIGHT. Add zeros as needed for place holders.

Answer = **1,312,000**

EXAMPLE 3: $7.809 \times 10^{-6} =$ _____

Answer = **0.000007809**

Try These:

Write in Scientific Notation

$$890,000,090 = \underline{\hspace{10em}}$$

$$.000067 = \underline{\hspace{10em}}$$

$$7,060,790 = \underline{\hspace{10em}}$$

Write in Standard Notation

$$8.3 \times 10^5 = \underline{\hspace{10em}}$$

$$9.43 \times 10^{-3} = \underline{\hspace{10em}}$$

$$7.002 \times 10^{-10} = \underline{\hspace{10em}}$$