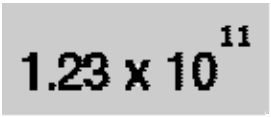
Part 1: How Do we Multiply numbers in Scientific Notation?

Scientific Notation is based on powers of the base number 10.

The number 123,000,000,000 in scientific notation is written as :



The first number 1.23 is called the coefficient. It must be greater than or equal to 1 and less than 10.

The second number is called the base . It must always be 10 in scientific notation. The base number 10 is always written in exponent form. In the number 1.23 x 10^{11} the number 11 is referred to as the exponent or power of ten.

Rules for Multiplication in Scientific Notation:

1) Multiply the coefficients

2) Add the exponents (base 10 remains)

Example 1: $(3 \times 10^4)(2 \times 10^5) =$ **6×10^9**

What happens if the coefficient is more than 10 when using scientific notation?

Example 2: $(5 \times 10^3)(6 \times 10^3) = 30. \times 10^6$

While the value is correct it is not correctly written in scientific notation, since the coefficient is not between 1 and 10. We then must move the decimal point over to the left until the coefficient is between 1 and 10. For each place we move the decimal over the exponent will be raised 1 power of ten.

$30.x10^6 = 3.0 \times 10^7$ in scientific notation.

Example 3:

$(2.2 \times 10^4)(7.1 \times 10^5) = 15.62 \times 10^9 = 1.562 \times 10^{10}$

Example 4:

$(7 \times 10^4)(5 \times 10^6)(3 \times 10^2) = 105. \times 10^{12}$ --now the decimal must be moved two places over and the exponent is raised by 2. Therefore the value in scientific notation is: 1.05×10^{14}

Now Try these:

(write your answers in the form of coefficientx10^exponent) If your answer is 3.5 x 10^3 you should type **3.5x10^3** in the box then click the submit button).

$(2\times10^{3})(4\times10^{4}) =$

$(6\times10^{5})(7\times10^{6}) =$

$(5.5\times10^{7})(4.2\times10^{4}) =$

What happens when the exponent(s) are negative?

We still add the exponents, but use the rules of addition of signed numbers.

Example 5: (3 x 10^{-3}) (3x 10^{-3}) = 9. x 10^{-6}

Example 6: (2 x 10^{-3}) (3x 10^{8}) = 6. x 10^{-5}

Now Try these:

(write your answers in the form of coefficient x 10^exponent) If your answer is 3.5 x 10^3 you should write **3.5x10^3**). Multiply the following:

$(3\times10^{-6})(2\times10^{-4}) =$

$(5\times10^{-5})(7\times10^{10}) =$

$(5.5\times10^{-7})(4.2\times10^{4}) =$

$(5\times10^{7})(8\times10^{-6})(4.2\times10^{4}) =$