



# **A9- Calculating with Exponential Numbers**



# Previous Modules

Before taking this module make sure you have reviewed the following modules:

- A4 (Significant Figures)
- B9 (Writing Exponential Notation)



# What will you learn?

How to perform calculations with numbers written in standard exponential form (scientific notation).

Make sure you have a **calculator** with you before reviewing this packet. If you do not have one, feel free to ask an SLC consultant.



# Parts of an Exponential Number



The diagram shows the exponential number  $3.26 \times 10^5$ . A green arrow points from the word "Coefficient" to the number 3.26. A grey arrow points from the word "Base" to the number 10. A red arrow points from the word "Exponent" to the superscript 5.

$$3.26 \times 10^5$$

Coefficient      Base      Exponent

## How to Enter Scientific Notation into a Calculator

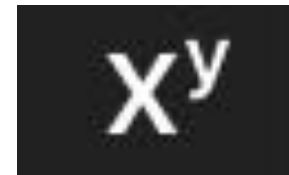
On paper you will see scientific notation written in this format

$$5.58 \times 10^4$$

To enter this into a calculator you will need to convert it to this format

$$5.58 \times 10^4$$

In order to write the exponent on your calculator you will need to use the exponent button which will look like one of the following:



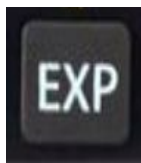
## How to Enter Scientific Notation into a Calculator

Most calculators also have a “shortcut” key, labeled “EE”, “EXP” or “x10<sup>x</sup>”

This button replaces the “x”, “10” and “^” keys

So to enter  $5.58 \times 10^4$  you would just type

5.58 “EE” 4 or 5.58 “EXP” 4 or 5.58 “x10<sup>x</sup>” 4





## How to Calculate in Scientific Notation Using a Calculator

When plugging scientific notation into a calculator it is important to use parentheses

Example:

$(5.58 \times 10^4)$  or  $(5.58E4)$

If you have any questions about how to use your specific calculator, just ask an SLC consultant!



## How to Calculate in Scientific Notation Using a Calculator

Now that you know how to plug scientific notation into your calculator, simply type in the expression

Example:  $(5.42 \times 10^7) \times (7.22 \times 10^3)$

Plug into your calculator as:  $(5.42 \times 10^7) \times (7.22 \times 10^3)$

Try it! You should get  $3.91 \times 10^{11}$



## Converting the Calculator's Answer to Scientific Notation


If the calculator gives us an answer that is not in scientific notation,

We move the decimal point to the left or right to get a coefficient between 1 and 10

The exponent matches how far we moved the decimal


$$569000 = 5.69 \times 10^5$$

Move five (to left)


$$0.0006874 = 6.87 \times 10^{-4}$$

Move four (to right)



## The Exponent is the Most Important Part of the Number

Notice that a **positive** exponent means a very **large** number

$$569000 = 5.69 \times 10^5$$

and a **negative** exponent means a very **small** number

$$0.0006874 = 6.87 \times 10^{-4}$$



## How to Calculate in Scientific Notation with Fractions

For fractions, we have to add more parentheses to separate the numerator and the denominator. Here's an example :

$$\frac{(3.54 \times 10^2) \times (6.75 \times 10^5)}{(1.42 \times 10^4) \times (7.32 \times 10^8)}$$

Written in your calculator as:

`((3.54x10^2)x(6.75x10^5))/((1.42x10^4)x(7.32x10^8))`



Try it! You should get  $2.30 \times 10^{-5}$



## Checking your calculations

One way to quickly estimate whether your answer is reasonable:

When **multiplying** numbers, the exponents are **added**  
 $(1.52 \times 10^{-2}) \times (2.75 \times 10^5) = 4.18 \times 10^{(-2+5)} = 4.18 \times 10^3$

When **dividing** numbers, the exponents are **subtracted**  
 $(8.36 \times 10^4) / (1.93 \times 10^{-3}) = 4.33 \times 10^{(4-(-3))} = 4.33 \times 10^7$



# Practice

Calculate the following expressions and give your answer in scientific notation:

1.  $10^{-3} \times 10^5$  (same as  $1 \times 10^{-3} \times 1 \times 10^5$ )

2.  $(2.44 \times 10^7) + (5.75 \times 10^8)$

3.  $(9.0 \times 10^{-5}) - (8.2 \times 10^{-4})$

4. 
$$\frac{(7.0 \times 10^4)}{(6.8 \times 10^5)}$$

5. 
$$\frac{(8.0 \times 10^3) \times (5.6 \times 10^{-1})}{(4.4 \times 10^{-4}) \times (3.9 \times 10^6)}$$



## Practice Answers

1.  $10^2$

2.  $5.99 \times 10^8$

3.  $-7.3 \times 10^{-4}$

4.  $1.03 \times 10^{-1}$

5. 2.61



**When you feel ready come to the  
front desk to take the post test**

**Please ask if you have any  
questions!**