PreIB Science 9 – Spindlove **SCIENTIFIC NOTATION**

* used for very \_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_ numbers
* based on powers of the base number \_\_\_\_\_\_\_\_\_\_\_​
* The number 123,000,000,000 in scientific notation is written as:​

1.23 x 1011

|  |  |  |
| --- | --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* It must be greater than or equal to 1 and less than 10
 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* It must always be 10 in scientific notation.
 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* Tells us how many spots the decimal was moved
 |

**For large numbers …** 6 2 0, 0 0 0, 0 0 0​

* Get \_\_\_\_\_\_\_\_\_\_\_\_: Put the decimal after the \_\_\_\_\_\_\_\_\_\_ digit and \_\_\_\_\_\_\_\_\_\_\_ the zeroes.​
* Add \_\_\_\_\_\_\_\_\_\_\_\_\_ after coefficient
* To find the exponent count the number of places from the \_\_\_\_\_\_\_\_\_\_\_\_\_ to the end of the \_\_\_\_\_\_\_\_\_\_\_\_\_.​
* ***Examples:*** *Write in scientific notation*

*1 000 000 🡪 2 550 000 000 000 🡪*

**For small numbers** …. 0. 000 005

* Get \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Move the decimal to go after the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ digit and drop the zeroes in front.​
* Add \_\_\_\_\_\_\_\_\_\_\_\_ after coefficient
* To find the exponent count the number of places from the \_\_\_\_\_\_\_\_\_\_\_\_\_ decimal to the where you \_\_\_\_\_\_\_\_\_\_\_ it.
	+ It will be a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ exponent!!
* ***Examples:*** *Write in scientific notation*

*0.0345*🡪 *0.000 000 01* 🡪

**Try going the other way...**

Write 1.2 x 10-4 in standard form 🡪

Write 5.0 x 10-5 in standard form 🡪

Write 8.1 x 103 in standard form 🡪

**METRIC CONVERSIONS**

* Based on multiples of \_\_\_\_\_\_\_\_\_\_\_​
* The basic unit of length is the metre ​
* Larger units are based on metres \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by 10, 100, 1000 etc​
* Smaller units are based on metres \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by 10, 100, 1000 etc​
* Each multiple has its own \_\_\_\_\_\_\_\_\_\_\_\_\_ (syllable joined to the beginning of a word)​
* Base units: mass 🡪\_\_\_\_\_\_ ; length 🡪\_\_\_\_\_\_ ; volume 🡪\_\_\_\_\_\_ ; energy 🡪\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| Prefix | Symbol | Relationship to the base unit\* |
| giga- | G | 109 = 1 000 000 000 |
| mega- | M | 106 = 1 000 000 |
| kilo- | k | 103 = 1 000 |
| hecto- | h | 102 = 100 |
| deca- | da | 101 = 10 |
| -- | -- | 100 = 1 |
| deci- | d | 10-1 = 0.1 = $\frac{1}{10}$ |
| centi- | c | 10-2 = 0.01 = $\frac{1}{100}$ |
| milli- | m | 10-3 = 0.001 = $\frac{1}{1 000}$ |
| micro- | μ | 10-6 = 0.000 001 = $\frac{1}{1 000 000}$ |
| nano- | n | 10-9 = 0.000 000 001 = $\frac{1}{1 000 000 000}$ |

**Example #1**: A student measures 459 mL of water. Express this value in L.

1 L = \_\_\_\_\_\_\_\_\_\_\_\_mL          ***Strategy Plan****:  we want to be able to cancel out like units*

 *vertically, so decide what unit factor to use:*

       $\frac{1000 mL}{1 L}$ *or* $\frac{1 L}{1000 mL}$

     459 mL x

**Example #2** : A student needs to measure 0.4 kg of salt. Express this mass in g.