

Toolkit # 17: Scientific Notation

Standard Form	Factorial Form	Power of 10
10,000	10 · 10 · 10 · 10	10 ⁴
1,000	10 · 10 · 10	10 ³
100	10 · 10	10 ²
10	10	10 ¹
* 1	1	10 ⁰
$\frac{1}{10}$ (0.1)	$\frac{1}{10}$	10 ⁻¹
$\frac{1}{100}$ (0.01)	$\frac{1}{10 \cdot 10}$	10⁻¹ 10 ⁻²
$\frac{1}{1000}$ (0.001)	$\frac{1}{10 \cdot 10 \cdot 10}$	10 ⁻³

Scientific Notation: A number written as a product of 2 factors (2 pieces).

$\frac{\text{1st Factor}}{\text{A number between one and ten } 1 \leq x < 10}$
 \times
 $\frac{10^n}{\text{2nd Factor is a power of 10}}$
 \leftarrow Number of places the decimal moves.

Examples

Big #s

$$9,200,000 \rightarrow 9.2 \times 10^6$$

$$1,234 \rightarrow 1.234 \times 10^3$$

Small #s

$$.00431 \rightarrow 4.31 \times 10^{-3}$$

$$0.035 \rightarrow 3.5 \times 10^{-2}$$

Toolkit #18: Scientific Notation Operations

Multiplying w/ Scientific Notation

- ① Use commutative property to "re-arrange" the multiplication
- ② Re-adjust if the decimal place needs to move.

ex. | $(5 \times 10^3)(8.1 \times 10^8)$

$$5(8.1) \times 10^{3+8}$$

$$\underline{40.5} \times 10^{11}$$

$$\underline{4.05 \times 10^{12}}$$

big # \rightarrow smaller #
exponent value \uparrow
small # \rightarrow big #
exponent \downarrow

Dividing w/ Scientific Notation

- ① Separate into 2 fractions + simplify each
- ② Re-adjust if decimal needs to move.

ex. | $\frac{3.5 \times 10^{-3}}{7 \times 10^{-9}} = \left(\frac{3.5}{7}\right) \times \left(\frac{10^{-3}}{10^{-9}}\right) = \underline{.5 \times 10^6}$

$$\begin{array}{r} -3 - (-9) \\ -3 + 9 \\ \hline 6 \end{array}$$

$$\underline{5 \times 10^5}$$