Scientific Notation

- more convenient way to express very large or very small numbers.
- to express values with the correct number of significant digits (more about this later.....)

format:

$$n \times 10^{x}$$

$1 \leq n < 10$ $\quad x \in$ integers $(x \in I)$

Examples:

$1525\ g = 1.525 \times 10^{3}\ g$

$0.00471\ m = 4.71 \times 10^{-3}\ m$

$7.81 \times 10^{-2}\ km = 0.0781\ km$

6.02×10^{23} atoms = 602 + 21 zeroes

$565 \times 10^{-9}\ m = 5.65 \times 10^{-7}\ m$

Calculations Involving Scientific Notation

Multiplication + Division

$\frac{x^5}{x^2} = x^3$

$\left(\frac{6.6 \times 10^{-8}}{3.3 \times 10^{-4}}\right) = 2.0 \times 10^{-4}$

$-8-(-4)$

Subtract exponents when dividing.

$(2.5 \times 10^{-6})(3.0 \times 10^{-7}) = 7.5 \times 10^{-13}$

$-6+(-7)$

add the exponents when multiplying.

Addition + Subtraction

$(2.67 \times 10^{-3}) - (9.5 \times 10^{-4})$

↓ Change to 10^{-4}

$(26.7 \times 10^{-4}) - (9.5 \times 10^{-4})$ place value is the same.

$= 17.2 \times 10^{-4}$

$= 1.72 \times 10^{-3}$

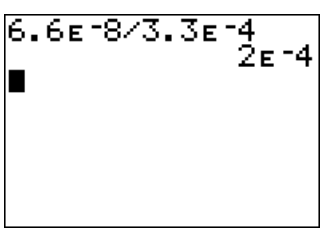
$$\begin{array}{r} 1250 \\ 4.25 \\ 32.1 \\ +\ 518.159 \\ \hline \end{array}$$

↑ lined up the place values.

On your calculator:

Scientific calculator: EXP EE

Graphing calculator: 2nd EE



6.6 [2nd] [EE] [+/-] 8

Homework

1. a) $4.5 \times 10^7 + 6.45 \times 10^7$

b) $5.4 \times 10^7 + 7.8 \times 10^6$

c) $7.8 \times 10^{-6} - 8.4 \times 10^{-7}$

d) $2.3 \times 10^4 - 4.2 \times 10^3$

e) $6.7 \times 10^{-8} + 8.2 \times 10^{-7}$

2 a) $(4.5 \times 10^2)(2.3 \times 10^{-4})$

b) $(2.0 \times 10^6)(3.5 \times 10^{-9})$

c) $(1.2 \times 10^7)(1.2 \times 10^4)$

d) $\dfrac{6.0 \times 10^7}{1.5 \times 10^2}$

e) $\dfrac{7.2 \times 10^{-4}}{1.2 \times 10^{-4}}$

f) $\dfrac{(5.5 \times 10^{-5})(6.0 \times 10^4)}{(2.1 \times 10^4)}$