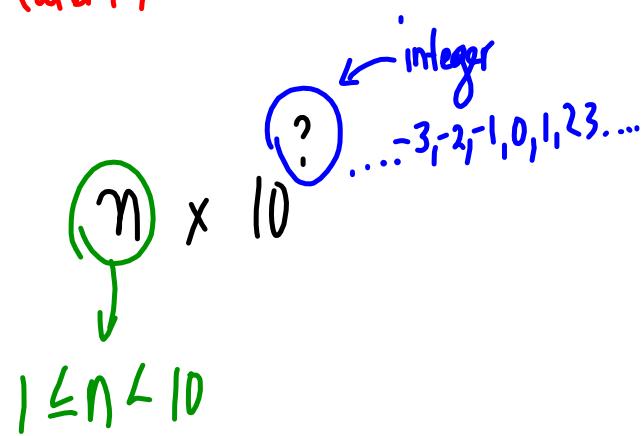


Scientific Notation

- Convenient way to express very large and very small numbers.
- To express a final answer with the correct number of significant digits.
(more about these later!)

✓ 1.2×10^3

$\times 14 \times 10^{-1}$
not in proper
scientific notation



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

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

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

$6.02 \times 10^{23} = 602 + 21 \text{ zees}$

(Avogadro's Number)

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



Calculations involving Scientific notation

Multiplication & Division

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

$$\cancel{-8} - (-4)$$

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

Subtract exponents
for division

$$\begin{array}{r} x \cancel{x} \cancel{x} \\ \hline \cancel{x} \cancel{x} \end{array}$$

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

$\rightarrow -6 + (-7)$
add
exponents
for multiplication.

Addition and Subtraction

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

The place values do not match
We need to make them match

$$= 26.7 \times 10^{-4} - 9.5 \times 10^{-4}$$

Think about

$$1252$$

$$1.573$$

$$128$$

$$+ \quad \underline{17.3}$$

$$= 17.2 \times 10^{-4} \leftarrow \text{not in proper scientific notation}$$

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

$$6.6 \times 10^{-8}$$

$$6.6 \text{ EXP } \cancel{-8}$$

$$6.6 \times 10^{-8}$$

EXP

EE

$$6.6 E - 8$$

$$\div$$

$$3.3 E - 4$$

Homework

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

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

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

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

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

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

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

$$\text{c) } (1.2 \times 10^7)(1.2 \times 10^{-4})$$

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

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

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