Standard Form (Scientific Notation)

Generally, standard form is used to represent very large and very small numbers.

In standard form, a number is written as a number between 1 and 10 multiplied by a power of 10

Examples

$$346 = 3.46 \times 10^2$$

$$41,000 = 4.1 \times 10^4$$

$$1,000,000 = 1 \times 10^6$$

$$0.000643 = 6.43 \times 10^{-4}$$

$$0.000000732 = 7.32 \times 10^{-7}$$

Real world examples

$$\text{Mass of Earth} = 5.972 \times 10^{24} \text{ kg}$$

$$\text{Mars} = 6.39 \times 10^{23} \text{ kg}$$

$$\text{Jupiter} = 1.898 \times 10^{27} \text{ kg}$$

$$\text{Sun} = 1.989 \times 10^{30} \text{ kg}$$

$$\text{Mass of electron} = 9.11 \times 10^{-31} \text{ kg}$$

$$\text{proton} = 1.67 \times 10^{-27} \text{ kg}$$

Arithmetic in Standard Form (Non-calculator)

Addition

$$6.2 \times 10^5 + 3.4 \times 10^4$$

$$
\begin{array}{r}
620000 \\
34000\ + \\
\hline
654000
\end{array}
$$

$$= 6.54 \times 10^5$$

Subtraction

$$8.1 \times 10^7 \div 2.4 \times 10^5$$

$$
\begin{array}{r}
8\,{}^0\!1\,0\,0\,0\,0\,0\,0 \\
24\,000\,0\ - \\
\hline
80760000
\end{array}
$$

$$= 8.076 \times 10^7$$

Multiplication

$$\left(3 \times 10^8\right) \times \left(4 \times 10^5\right)$$

$$= 12 \times 10^{13}$$

$$= 1.2 \times 10^{14}$$

Division

$$\left(8 \times 10^5\right) \div \left(2 \times 10^9\right)$$

$$\frac{8 \times 10^5}{2 \times 10^9} \qquad = 4 \times 10^{-4}$$