Exponents

$a \times a \times a = a^3$, read as a raised to power 3 where a is base, 3 is exponent

Chart

Scientific notation or standard form

Ex. speed of light = 300000000 m/s is written in standard form as = 3×10^8 m/s

No. in expanded form with the help of exponents

$123.45 = 1\times10^2+2\times10^1+3\times10^0 + 4\times10^{-1} + 5\times10^{-2}$

Laws of exponent

(i) $\left(\frac{a}{b}\right)^m \times \left(\frac{a}{b}\right)^n = \left(\frac{a}{b}\right)^{m+n}$ (ii) $\left(\frac{a}{b}\right)^m \div \left(\frac{a}{b}\right)^n = \left(\frac{a}{b}\right)^{m-n}$

(iii) $\left\{\left(\frac{a}{b}\right)^m\right\}^n = \left(\frac{a}{b}\right)^{mxn}$ (iv) $\left(\frac{a}{b}\times\frac{c}{d}\right)^n = \left(\frac{a}{b}\right)^n \times \left(\frac{c}{d}\right)^n$

(v) $\left\{\frac{(a/b)}{(c/d)}\right\}^n = \frac{(a/b)^n}{(c/d)^n}$ (vi) $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

(vii) $\left(\frac{a}{b}\right)^0 = 1$

$(-1)^{even} = 1$

$(-1)^{odd} = -1$

Q. Find x

If $25^{2x-1} = 625$

Sol. $(5^2)^{2x-1} = 5^4$

$5^{4x-2} = 5^4$

$\therefore 4x - 2 = 4$

$4x = 6$

$x = \frac{6}{4} = \frac{3}{2}$

Q. Find x

If $\left(\frac{2}{7}\right)^{-6} \times \left(\frac{14}{9}\right)^{-6} = \left(\frac{x}{y}\right)^{-6}$

Sol. $\left(\frac{2}{7}\right)^{-6} \times \left(\frac{14}{9}\right)^{-6} = \left(\frac{x}{y}\right)^{-6}$

$\left(\frac{2}{7}\times\frac{14}{9}\right)^{-6} = \left(\frac{x}{y}\right)^{-6}$

$\left(\frac{4}{9}\right)^{-6} = \left(\frac{x}{y}\right)^{-6}$

$\therefore \frac{x}{y} = \frac{4}{9}$

Q. Simplify $\frac{3^{-5}\times10^{-5}\times125}{5^{-7}\times6^{-5}}$

Sol. $\frac{3^{-5}\times10^{-5}\times125}{5^{-7}\times6^{-5}}$

$\frac{3^{-5}\times(2\times5)^{-5}\times5^3}{5^{-7}\times(2\times3)^{-5}}$

$= \frac{3^{-5}\times2^{-5}\times5^{-5}\times5^3}{5^{-7}\times3^{-5}\times2^{-5}}$

$= 2^{-5+5} \times 3^{-5+5} \times 5^{-5+3+7}$

$= 2^0 \times 3^0 \times 5^5 = 3125$