Scientific Notation

When scientists work with very large or very small numbers, they use the Scientific Notation.

This notation consists of two parts, one to express the actual value without consideration where the decimal point is located (the digit term) and a second one that defines the location of the decimal point in the form of an integer power of ten (the exponential term).

The digit term always has only one digit in front of the decimal point and can have as many decimal digits as required by the accuracy of the number (significant decimals).

Examples

$10000 = 1 \times 10^4$
$123.45678 = 1.2345678 \times 10^2$
$3100000000000 = 3.1 \times 10^{12}$

By definition $1 = 10^0$

Numbers smaller than 1 can be written with a **negative** power in the exponential term.

$0.723 = 7.23 \times 10^{-1}$ (this is unusual when so close to 1)
$0.000005327 = 5.327 \times 10^{-6}$

The power of ten (the exponent in the exponential term) is the number of places the decimal point must be shifted to the right to obtain the long form when it is positive, and to the left when the exponent is negative.

To illustrate how practical this is, think about the power (energy output per second) of the Sun, 3.83×10^{26} Watt. This is the luminosity standard in astronomy. Would you like to write this in the long form (383000000000000000000000000) ?

Not entirely convinced?
Watch this video

A scientific calculator can handle scientific notation to be able to make calculations with very large and/or very small numbers easily in science and engineering.