

Scientific and Standard Notation

Scientific notation is a method of expressing large or small numbers using the base 10.

$$\begin{array}{lll} 10^2 & = 10 \times 10 & = 100 \\ 10^4 & = 10 \times 10 \times 10 \times 10 & = 10\,000 \\ 2 \times 10^2 & = 2 \times 10 \times 10 & = 200 \\ 4 \times 10^3 & = 4 \times 10 \times 10 \times 10 & = 4\,000 \\ 2.5 \times 10^2 & = 2.5 \times 10 \times 10 & = 250 \\ 2.2 \times 10^1 & = 2.2 \times 10 & = 22 \end{array}$$

Any number written in scientific notation consists of 2.2×10^5 exponent
coefficient base

The coefficient of a number written in scientific notation always has only one digit to the left of the decimal place. This digit cannot be a zero.

There is no need, however, to multiply out each number when converting from scientific notation to standard notation. We simply count the number of places the decimal moves by looking at the exponent on the base 10. The empty spaces are then filled with zeros.

If the exponent on the base 10 is positive, then the decimal is moved to the right. If the exponent on the base 10 is negative, then the decimal is moved to the left.

Example: Change to standard notation

a) 2.3×10^4
 $= 23\,000$

b) 9.2×10^{-3}
 $= 0.0092$

Change to scientific notation

a) 47 356 000
 $= 4.735\,6 \times 10^7$

b) 0.000 203 4
 $= 2.034 \times 10^{-4}$

A number with a negative exponent, when written in scientific notation, has a value less than one (1).