

# Scientific notation

Scientific notation, also known as *standard notation*, is a way for writing numbers in science and engineering when writing large and small numbers.

A number expressed in scientific notation has benefits that make it convenient to use.

Scientific notation considers two aspects of any number:

1. its value (to a specified number of significant figures), and
2. its magnitude.

Scientific notation is generally expressed in the form:

$$a \times 10^p$$

where the coefficient  $a$  is any real number with an absolute value between one and ten and the exponent  $p$  is an integer.

i.e.  $a: 1 \leq |a| < 10$  and  $p \in \mathbb{Z}$

## Examples

- a. If you are studying Chemistry then you will come across Avogadro's number. It is often quoted as  $6.02 \times 10^{23}$  (correct to 3 significant figures). If you were to write this out in full you would have:

602,000,000,000,000,000,000,000

That is a lot of zeros and very cumbersome to write.

Some other examples are:

- b.  $89 = 8.9 \times 10$
- c.  $-253 = -2.53 \times 10^2$
- d.  $\frac{1}{8} = 1.25 \times 10^{-1}$
- e.  $1.8 \times 10^3$
- f.  $1.800 \times 10^3$

Note that examples e and f have the same value **BUT** example f has more significant figures and, therefore, greater precision.