

Multiplication and division in scientific notation When numbers expressed in scientific notation are being multiplied, the following general rule is very useful:

$$10^n \times 10^m = 10^{(n+m)}$$

Note that n and m can be any numbers; they are not necessarily integers. For example, $10^2 \times 10^5 = 10^7$, and $10^{1/4} \times 10^{1/2} = 10^{3/4}$. The rule also applies to negative exponents. For example, $10^3 \times 10^{-8} = 10^{-5}$. When dividing numbers expressed in scientific notation, note the following:

$$\frac{10^n}{10^m} = 10^n \times 10^{-m} = 10^{(n-m)}$$

For example, $\frac{10^3}{10^2} = 10^{(3-2)} = 10^1$.

Fractions

The rules for multiplying, dividing, adding, and subtracting fractions are summarized in **Table 1**, where a , b , c , and d are four numbers.

Table 1 Basic Operations for Fractions

Operation	Rule	Example
Multiplication	$\left(\frac{a}{b}\right)\left(\frac{c}{d}\right) = \frac{ac}{bd}$	$\left(\frac{2}{3}\right)\left(\frac{4}{5}\right) = \frac{(2)(4)}{(3)(5)} = \frac{8}{15}$
Division	$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{ad}{bc}$	$\frac{\left(\frac{2}{3}\right)}{\left(\frac{4}{5}\right)} = \frac{(2)(5)}{(3)(4)} = \frac{10}{12} = \frac{5}{6}$
Addition and subtraction	$\frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm bc}{bd}$	$\frac{2}{3} - \frac{4}{5} = \frac{(2)(5) - (3)(4)}{(3)(5)} = -\frac{2}{15}$

Powers

Rules of exponents When powers of a given quantity, x , are multiplied, the rule used for scientific notation applies:

$$(x^n)(x^m) = x^{(n+m)}$$

For example, $(x^2)(x^4) = x^{(2+4)} = x^6$.

When dividing the powers of a given quantity, note the following:

$$\frac{x^n}{x^m} = x^{(n-m)}$$

For example, $\frac{x^8}{x^2} = x^{(8-2)} = x^6$.