

## Entering Expressions in Mathematica Applets

- Many expressions are entered the same way you would enter them in a calculator. For example, to enter the function  $1 + x^2 - \frac{x^3}{4!}$ , you would type `1 + x^2 - x^3 / 4!`. The spaces are optional: you could just as well type `1+x^2-x^3/4!`.
- When writing products, use a `*` or a space to mean multiply. So, to enter  $kx$ , you could type `k*x` or `k x`. However, `kx` will **not** work: *Mathematica* will think you're talking about a variable or function named `kx`.  
  
There is one useful exception to this rule: if you are multiplying a number by a variable, like  $2x$ , you may simply type `2x`. This only works if the number comes before the variable; that is, `x2` does not work.
- Functions like `sin`, `cos`, and so on must be capitalized, and they use square brackets `[]` instead of parentheses `()`. Thus, to enter  $\sin(x)$ , you would write `Sin[x]`. The trigonometric functions are `Sin[x]`, `Cos[x]`, `Tan[x]`, `ArcSin[x]`, `ArcCos[x]`, and `ArcTan[x]`.
- For grouping, you must use parentheses `()`, not square brackets `[]`. So, to enter  $[(1 + x)^2 + 5]^3$ , you would type `((1 + x)^2 + 5)^3`.
- The constants  $e$  and  $\pi$  are entered as `E` and `Pi`.
- The natural log  $\ln$  is just called `log`, so  $\ln(1 + x)$  is entered as `Log[1 + x]`.
- The square root function is called `Sqrt`, so  $\sqrt{5x}$  would be `Sqrt[5*x]`.
- *Mathematica* is case-sensitive, so `x` and `X` are different.

Here are some additional examples:

Expression	<i>Mathematica</i> input
$\arcsin(1 + 3x^2)$	<code>ArcSin[1 + 3x^2]</code> or <code>ArcSin[1 + 3*x^2]</code> or <code>ArcSin[1 + 3 x^2]</code>
$e^{-x^2}$	<code>E^(-x^2)</code>
$\frac{(x-\pi)^{2k}}{k^2}$	<code>(x - Pi)^(2k) / k^2</code> or <code>(x - Pi)^(2*k) / k^2</code> or <code>(x - Pi)^(2 k) / k^2</code>
$kx^2$	<code>k*x^2</code> or <code>k x^2</code> (but not <code>kx^2</code> )

In our applets, *Mathematica* will convert most expressions to their “standard *Mathematica* form” after you’re done typing (and have moved the cursor elsewhere). For instance, if you type `Sqrt[E^x - 4 (x - Pi) + x^(2 k)/5!]`, *Mathematica* will then show you something like this:

$$\sqrt{e^x + \frac{x^{2k}}{120} - 4(-\pi + x)}$$

This should help you catch any errors you’ve made.