

# Maple 2015 Quick Reference Card

Macintosh® version

## Document Mode vs. Worksheet Mode

Maple offers two primary modes of problem entry and content creation: Document mode and Worksheet mode. Both modes have respective advantages and you can easily switch from one mode to the other for maximum flexibility. See [worksheet](#) for more information on the worksheet interface.

Document Mode	Worksheet Mode
<ul style="list-style-type: none"> <li>Quick problem-solving and free-form, rich content composition</li> <li>No prompt (&gt;) displayed</li> <li>Math is entered and displayed in 2-D</li> <li>Solve math problems with <b>[Control]</b>-click menu on input and output</li> </ul>	<ul style="list-style-type: none"> <li>Traditional Maple problem-solving environment</li> <li>Enter problems at a prompt (&gt;)</li> <li>Math entered and displayed in 2-D or 1-D</li> <li>Solve math problems with <b>[Control]</b>-click menu on output</li> </ul>

Document mode lets you create rich content. For example, the following solves for $x$ without any commands: $\frac{(x-2)}{\alpha} = 1$ solutions for $x \rightarrow \alpha + 2$	The command to perform the same operation in Worksheet mode is in 2-D (Math) Input: $> \text{solve}\left(\frac{x-2}{\alpha} = 1, x\right)$ $\alpha + 2$ or in 1-D (Maple) Input: $> \text{solve}((x-2)/\alpha=1, x);$ $\alpha + 2$
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Toggle Math/Text entry mode	<b>[F5]</b>  on toolbar	Toggle 2-D/1-D Math entry mode	<b>[F5]</b> 2-D black font, <b>1-D red font</b>
Evaluate math expression and display result inline	<b>[Command] [=]</b>	Evaluate math expression and display result on new line	<b>[Return]</b>
Evaluate math expression and display result on new line	<b>[Return]</b>	Continue on next line without executing	<b>[Shift] [Return]</b>
Switch to Worksheet mode (insert prompt)	 on toolbar	Switch to Document mode	<b>Format</b> → <b>Create Document Block</b>
Show hidden commands	<b>View</b> → <b>Expand Document Block</b>	Hide commands. Show only results.	Highlight commands to be hidden. <b>Format</b> → <b>Create Document Block</b>

## Common Operations Available in Both Document and Worksheet Modes

Display quick help ( <a href="#">Details</a> )	<b>[Command] [Shift] [?]</b> for Quick Help. <b>[Command] [F2]</b> for Quick Reference Card (this guide)
Refer to previous result using equation numbers	<b>[Command] [L]</b> then enter equation number in dialog
Recompute calculations within a line	 on toolbar

Recompute all calculations in a document	 on toolbar
Symbol selection, e.g. $\epsilon$ (epsilon)	Enter leading characters <b>[Esc]</b> (or <b>[Command] [Shift] [Space]</b> ), e.g. <b>eps [Esc]</b>
Command completion, e.g. Lambert W function	Enter leading characters <b>[Esc]</b> (or <b>[Command] [Shift] [Space]</b> ), e.g. <b>Lamb [Esc]</b>
Perform context operation on math expression	<b>[Control]</b> -click any math expression
Insert prompt	 on toolbar
Insert text paragraph	 on toolbar
Drag a copy of an expression to a new location	Highlight the expression, hold <b>[Command]</b> , and drag to new location

## 2-D Math Editing Operations, Keyboard Shortcuts, and Operations ([Details](#))

Navigate through expression	<b>[←] [→] [↑] [↓]</b>								
Move cursor to different level in expression, e.g. out of exponent	<b>[→]</b>								
Navigate through placeholders	<b>[Tab]</b>								
Add, remove, rearrange palettes	<b>View</b> → <b>Palettes</b> → <b>Arrange Palettes</b> or <b>[Control]</b> -click palette								
Fraction $\frac{x}{y}$ , superscript $x^n$ , subscript $x_n$	<b>x/y</b> , <b>x^n</b> , <b>x_n</b>								
Prime notation for derivatives, e.g. $y'' + y' = 0$ for $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ ( <a href="#">Details</a> )	<b>y'' + y' = 0</b>								
Square root $\sqrt{x}$ , $n$ th root $\sqrt[n]{x}$	Enter leading characters <b>sqrt [Esc]</b> , <b>nthroot [Esc]</b>								
Symbol above, e.g. $\vec{x}$	<b>x [Command] [Shift] ["]</b> then insert symbol, e.g.  from <b>Arrows</b> palette								
To enter literal characters (^, /, etc.), precede character with \ (backslash)	e.g. <b>foo\^bar</b> produces <b>foo^bar</b>								
Greek letter entry mode (single letter)	<b>[Command] [Shift] [G]</b> letter								
Special characters and symbols: Enter leading characters and <b>[Esc]</b>	<table border="1"> <tbody> <tr> <td><math>\pi, e, i</math></td> <td><b>pi, e, i</b></td> <td><math>\alpha, \lambda</math></td> <td><b>alpha, lambda</b></td> </tr> <tr> <td><math>\infty</math></td> <td><b>infn</b></td> <td><math>\geq, \leq, \neq, \pm</math></td> <td><b>geq, leq, ne, pm</b></td> </tr> </tbody> </table>	$\pi, e, i$	<b>pi, e, i</b>	$\alpha, \lambda$	<b>alpha, lambda</b>	$\infty$	<b>infn</b>	$\geq, \leq, \neq, \pm$	<b>geq, leq, ne, pm</b>
$\pi, e, i$	<b>pi, e, i</b>	$\alpha, \lambda$	<b>alpha, lambda</b>						
$\infty$	<b>infn</b>	$\geq, \leq, \neq, \pm$	<b>geq, leq, ne, pm</b>						

## Plotting and Animation ([Plotting Guide](#))

Plot an existing expression (see <a href="#">plot menu items</a> for more options)	[Control] -click expression → <b>Plots</b> → <b>Plot Builder</b>
Plot new expression (see <a href="#">plot interface</a> for more information)	<b>Tools</b> → <b>Assistants</b> → <b>Plot Builder</b>
Add new expression to existing plot	Highlight and drag expression into plot
Add annotations to plots	[Control] -click plot and select  on toolbar
Animation and parameter plots for functions of several variables	[Control] -click expression → <b>Plots</b> → <b>Plot Builder</b> and select a plot type

### Mathematical Operations

Common manipulations (simplify, factor, expand,...)	[Control] -click expression and select from menu
Solve equations	[Control] -click equation → <b>Solve</b>
Solve numerically (floating-point)	[Control] -click equation → <b>Solve</b> → <b>Numerically Solve</b>
Solve ODE	[Control] -click DE expression → <b>Solve DE Interactively</b>
Integrate, differentiate	[Control] -click expression → select <b>Integrate</b> or <b>Differentiate</b>
Evaluate expression at a point	[Control] -click expression → <b>Evaluate at a Point</b>
Create a matrix or vector	Matrix palette → <b>Choose</b> → <b>Insert</b>
Invert, transpose, solve matrix	[Control] -click matrix → <b>Standard Operations</b> → select <b>Inverse</b> , <b>Transpose</b> , ...
Evaluate as floating-point	[Control] -click expression → <b>Approximate</b>
Various operations and tasks	Use Task Templates: <b>Tools</b> → <b>Tasks</b> → <b>Browse</b>

### Important Maple Syntax ([More](#))

<code>:=</code> Assignment	<code>a := 2; b := 3 + x; c := a + b;</code> produces $5 + x$ for <code>c</code>
<code>=</code> Mathematical equation	<code>solve(2*x + a = 1, x);</code> produces $x = \frac{1-a}{2}$
<code>=</code> Boolean equality	<code>if a = 0 then ...</code>
Suppress display of output	Terminate command with a colon, e.g. <code>1000! :</code>
<code>[ ]</code> List (ordered)	<code>z := [c, b, a]; z[1];</code> produces <code>c</code>
<code>{ }</code> Set (unordered, no duplicates)	<code>{a, b, a, c};</code> produces <code>{a, b, c}</code>
Display help on topic	<code>?topic</code>

### Expressions vs. Functions ([Details](#))

Operations	Expression $x^2 + y^2$	Function (operator) $g(x,y) = x^2 + y^2$
Definition	<code>f := x^2 + y^2;</code>	<code>g := (x,y) -&gt; x^2+y^2;</code>
Evaluate at $x=1, y=2$	<code>eval(f, [x=1,y=2]);</code> produces 5	<code>g(1,2);</code> produces 5
3-D plot for $x$ from 0 to 1, $y$ from 0 to 1	<code>plot3d(f, x=0..1, y=0..1);</code>	<code>plot3d(g(x,y), x=0..1, y=0..1);</code>
Conversion to other form	<code>f2 := unapply(f, x, y);</code> <code>f2(1,2);</code> produces 5	<code>g2 := g(x,1);</code> <code>g2 + z;</code> produces $x^2 + 1 + z$

### Units and Tolerances ([Units Details](#))

Add units to value or expression	Place cursor to right of quantity. Use <b>Units (SI)</b> or <b>Units (FPS)</b> palette or [Control] -click → <b>Units</b> → <b>Affix Unit</b> .
Add arbitrary unit	 from <b>Units (SI)</b> or <b>Units (FPS)</b> palette and enter desired unit.
Simplify units in an expression	[Control] -click expression → <b>Units</b> → <b>Simplify</b>
Convert units to a different system of units	[Control] -click expression → <b>Units</b> → <b>Convert</b>
Enable automatic units simplification	<code>with(Units)(Standard);</code>
Enable tolerance calculations	<code>with(Tolerances);</code>
Tolerance quantity in 2-D Math	<b>9 pm [Esc] 1.1</b> for $9 \pm 1.1$
Tolerance quantity in 1-D Math	<b>9 &amp;+- 1.1;</b> for $9 \pm 1.1$

### Input and Output

Interactive data import assistant	<b>Tools</b> → <b>Assistants</b> → <b>Import Data</b>
Import audio or image file (for details see <a href="#">ImportData</a> )	<b>Tools</b> → <b>Assistants</b> → <b>Import Data</b>
Code generation (C, C#®, Fortran, Java™, JavaScript®, MATLAB®, Perl, Python®, R, Visual Basic®)	[Control] -click expression → <b>Language Conversions</b> . See <a href="#">CodeGeneration</a> for help and details.
Publish document in HTML, LaTeX, or Microsoft® Word-RTF	<b>File</b> → <b>Export As</b> → select <b>HTML</b> , <b>LaTeX</b> , or <b>Rich Text Format</b>
Publish document in PDF	<b>File</b> → <b>Print</b> → select <b>Save as PDF</b> from the drop-down menu

### Select Interactive Tools and Utilities