

Maple 14 Quick Reference Card

UNIX 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.

Document Mode	Worksheet Mode
<ul style="list-style-type: none">Quick problem-solving and free-form, rich content compositionNo prompt (>) displayedMath is entered and displayed in 2-DSolve math problems with right-click menu on input and output	<ul style="list-style-type: none">Traditional Maple problem-solving environmentEnter problems at a prompt (>)Math entered and displayed in 2-D or 1-DPress $\text{Enter} \leftarrow$ to evaluate expressionSolve math problems with right-click menu on math expressions
Document mode lets you create rich content. For example, the following solves for x without any commands: $\frac{x-2}{\alpha} = 1 \xrightarrow{\text{solve for } x} [[x = 2 + \alpha]]$	The command to perform the same operation can be entered in 2-D Math: $> \text{solve}\left(\frac{x-2}{\alpha}=1, x\right)$ $2 + \alpha$
Toggle Math/Text entry mode F5 or on toolbar	Toggle 2-D/1-D Math entry mode 2-D black font, 1-D red font
Evaluate math expression and display result inline $\text{Ctrl} + \text{Enter}$	Evaluate math expression and display result on new line $\text{Enter} \leftarrow$
Evaluate math expression and display result on new line $\text{Enter} \leftarrow$	Continue on next line without executing $\text{Shift} + \text{Enter} \leftarrow$
Switch to Worksheet mode (insert prompt) $\text{D} >$ on toolbar	Switch to Document mode
Show hidden commands View \rightarrow Expand Document Block	Hide commands. Show only results. Format \rightarrow Create Document Block

Common Operations Available in Both Document and Worksheet Modes

Display quick help	for Quick Help. for Quick Reference Card (this guide)
Refer to previous result using equation numbers	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. ϵ	Enter leading characters (or) e.g. ϵ
Command completion, e.g. Lambert W function	Enter leading characters (or) e.g. Lamb
Perform context operation on math expression	Right-click any math expression
Insert prompt	on toolbar
Insert text paragraph	on toolbar
Drag a copy of an expression into a new location	Highlight the expression, hold , and drag to a new location

2-D Math Editing Operations, Keyboard Shortcuts, and Operations

Navigate through expression									
Move cursor to different level in expression, e.g. out of exponent									
Navigate through placeholders									
Add, remove, rearrange palettes	View \rightarrow Palettes \rightarrow Arrange Palettes or right-click palette								
Fraction $\frac{x}{y}$, superscript x^n , subscript x_n	$x/y, x^n, x_n$								
Prime notation for derivatives, e.g. $y'' + y' = 0$ for $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$	$y'' + y' = 0$								
Square root \sqrt{x} , n th root $\sqrt[n]{x}$	Enter leading characters sqrt , nthroot								
Symbol above, e.g. \overline{x}	\overline{x} then insert symbol, e.g. from Arrows palette								
To enter literal characters (_^n , etc.), precede character with \backslash (backslash)	e.g. $\text{foo}\backslash\text{bar}$ produces foo_bar								
Greek letter entry mode (single letter)									
Special characters and symbols: Enter leading characters and	<table border="1"><tr><td>π, e, i</td><td>pi, e, i</td><td>α, λ</td><td>alpha, lambda</td></tr><tr><td>∞</td><td>infin</td><td>\geq, \leq, \neq, \pm</td><td>geq, leq, ne, pm</td></tr></table>	π, e, i	pi, e, i	α, λ	alpha, lambda	∞	infin	\geq, \leq, \neq, \pm	geq, leq, ne, pm
π, e, i	pi, e, i	α, λ	alpha, lambda						
∞	infin	\geq, \leq, \neq, \pm	geq, leq, ne, pm						

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Expressions vs. Functions

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) -> 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); f2(1,2);</code> produces 5	<code>g2 := g(x,1); g2 + z;</code> produces x^2+1+z

Important Maple Syntax

<code>:=</code> Assignment	<code>a:=2; b:=3+x; c:=a+b;</code> produces $5 + x$ for c
<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 c
<code>{}</code> Set (unordered, no duplicates)	<code>{a, b, a, c};</code> produces $\{a,b,c\}$
Display help on topic	<code>?topic</code>

Mathematical Operations

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

Input and Output

Interactive data import assistant	Tools \rightarrow Assistants \rightarrow Import Data
Import audio or image file	Tools \rightarrow Assistants \rightarrow Import Data
Code generation (C, FORTRAN, Java, Visual Basic®, MATLAB®)	Right-click expression \rightarrow Language Conversions. See ?CodeGeneration for help and details.
Publish document in HTML, PDF, LaTeX, or Microsoft® Word-RTF	File \rightarrow Export As \rightarrow select HTML, PDF, LaTeX, or Rich Text Format

Plotting and Animation

Plot an existing expression	- click expression \rightarrow Plots \rightarrow Plot Builder
Plot new expression	Tools \rightarrow Assistants \rightarrow Plot Builder
Add new expression to existing plot	Highlight and drag expression into plot
Add annotations to plots	Click on plot, then on the toolbar
Animation and parameter plots for functions of several variables	Right-click expression \rightarrow Plots \rightarrow Plot Builder and select a plot type

Units and Tolerances

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

Select Interactive Tools and Utilities

Quick introductory tour	Help \rightarrow Take a Tour of Maple
Show available task templates	Tools \rightarrow Tasks \rightarrow Browse
Plot Builder	Right-click expression \rightarrow Plots \rightarrow Plot Builder, or Tools \rightarrow Assistants \rightarrow Plot Builder
ODE Analyzer	Tools \rightarrow Assistants \rightarrow ODE Analyzer
Data Analysis Assistant	Tools \rightarrow Assistants \rightarrow Data Analysis
Unit Conversion utility	Tools \rightarrow Assistants \rightarrow Units Calculator
Back-Solving Assistant	Tools \rightarrow Assistants \rightarrow BackSolve
Apply numeric formatting	Right-click expression \rightarrow Numeric Formatting
Share Maple documents using the MapleCloud™ Document Exchange	MapleCloud palette
Maple Portal	Help \rightarrow Manuals, Resources and more \rightarrow Maple Portal
Manuals	Help \rightarrow Manuals, Resources, and more \rightarrow Manuals
Interactive education tutors for topics in Calculus, Precalculus, and Linear Algebra	Tools \rightarrow Tutors



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