

Maple 10 Quick Reference Card

UNIX version

Document Mode vs. Worksheet Mode

Maple 10 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 composition No prompt (\rightarrow) displayed Math is entered and displayed in 2-D Press $\text{Ctrl} =$ to evaluate expression (inline results) Press $\text{Enter} \leftarrow$ to evaluate expression (results on new line) Solve math problems with right-click menu on input and output Switch to Worksheet mode by inserting prompt 	<ul style="list-style-type: none"> Traditional Maple problem-solving environment Enter problems at a prompt (\rightarrow) Math entered and displayed in 2-D or 1-D Press $\text{Enter} \leftarrow$ to evaluate expression Solve math problems with right-click menu on math expressions Switch to Document mode by creating document block
Document mode lets you create rich content. For example, the following solves for x without any commands: $\frac{x-2}{\alpha} = 1 \rightarrow \{x=2+\alpha\}$	<pre>> solve(x-2=1,x) 2 + alpha > solve((x-2)/alpha=1,x); 2 + alpha</pre>
Toggle Math/Text entry mode: F5 or Text Math Text Math on toolbar	Toggle 2-D/1-D Math entry mode: F5 2-D black font, 1-D red font
Evaluate math expression and display result inline: $\text{Ctrl} =$	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: Shift $\text{Enter} \leftarrow$
Switch to Worksheet mode (insert prompt): $\text{Ctrl} \rightarrow$ on toolbar	Switch to Document mode: Format \rightarrow Create Document Block
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	F1 for Quick Help . $\text{Ctrl} \text{ F2}$ for Quick Reference Card (this guide)
Refer to previous result using equation numbers	$\text{Ctrl} \text{ L}$ then enter equation number in dialog
Recompute calculations within a highlighted selection	! on toolbar
Recompute all calculations in a document	!!! on toolbar
Symbol selection, e.g. ϵ	Enter leading characters $\text{Ctrl} \text{ Shift} \text{ Space}$, e.g. eps $\text{Ctrl} \text{ Shift} \text{ Space}$
Command completion, e.g. Lambert W function	Enter leading characters $\text{Ctrl} \text{ Shift} \text{ Space}$, e.g. Lamb $\text{Ctrl} \text{ Shift} \text{ Space}$
Perform context operation on math expression	Right-click any math expression
Insert prompt	$\text{Ctrl} \rightarrow$ on toolbar
Insert text paragraph	T on toolbar

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

Navigate through expression	\leftarrow \downarrow \rightarrow \uparrow								
Move cursor to different level in expression, e.g. out of exponent	\rightarrow								
Navigate through placeholders	Tab								
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. $y^n + y' = 0$ 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 $\text{Ctrl} \text{ Shift} \text{ Space}$, nthroot $\text{Ctrl} \text{ Shift} \text{ Space}$								
Symbol above, e.g. \vec{x}	x $\text{Ctrl} \text{ Space}$ $\vec{\quad}$ then insert symbol, e.g. \rightarrow from Arrows palette								
To enter literal characters ($_$, $\^$, etc.), precede character with \backslash (backslash)	e.g. foo_bar produces foo_bar								
Greek letter entry mode (single letter)	$\text{Ctrl} \text{ Shift} \text{ G}$								
Special characters and symbols: Enter leading characters and $\text{Ctrl} \text{ Shift} \text{ Space}$	<table border="1"> <tbody> <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> </tbody> </table>	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	$f := x^2 + y^2;$	$g := (x, y) \rightarrow x^2+y^2;$
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	$f2 := \text{unapply}(f,x,y);$ $f2(1,2);$ produces 5	$g2 := g(x,1);$ $g2 + z;$ 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>10001 :</code>
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 Solve Numerically
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, LaTeX, or Microsoft® Word-RTF	File \rightarrow Export As \rightarrow select HTML, LaTeX, or Rich Text Format

Plotting and Animation

Plot an existing expression	Right-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
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	[units] 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	with (Units [Standard]) ;
Enable tolerance calculations	with (Tolerances) ;
Tolerance quantity in 2-D Math	<code>9 pm</code> <input type="text" value="Ctrl"/> <input type="text" value="Shift"/> <input type="text" value="Space"/> <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
Interactive Dictionary of Engineering and Mathematical terms	Help \rightarrow Manuals, Dictionary, and more \rightarrow Dictionary
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 Unit Converter
Manuals (Getting Started Guide, User Manual)	Help \rightarrow Manuals, Dictionary, and more \rightarrow Manuals
Interactive education tutors for topics in Calculus, Precalculus, and Linear Algebra	Tools \rightarrow Tutors



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