ECLETI
Roberto Panetta

TS
Tension Software

TS Calc 1.8

User Guide

We Make Software - Ecleti.com

TS Calc © 2009-2025 Ecleti - Roberto Panetta all rights reserved

Every effort has been made to ensure that the information in this manual is accurate.
Ecleti is not responsible for printing or clerical errors.
Other company and product names mentioned herein are trademarks of their respective companies.

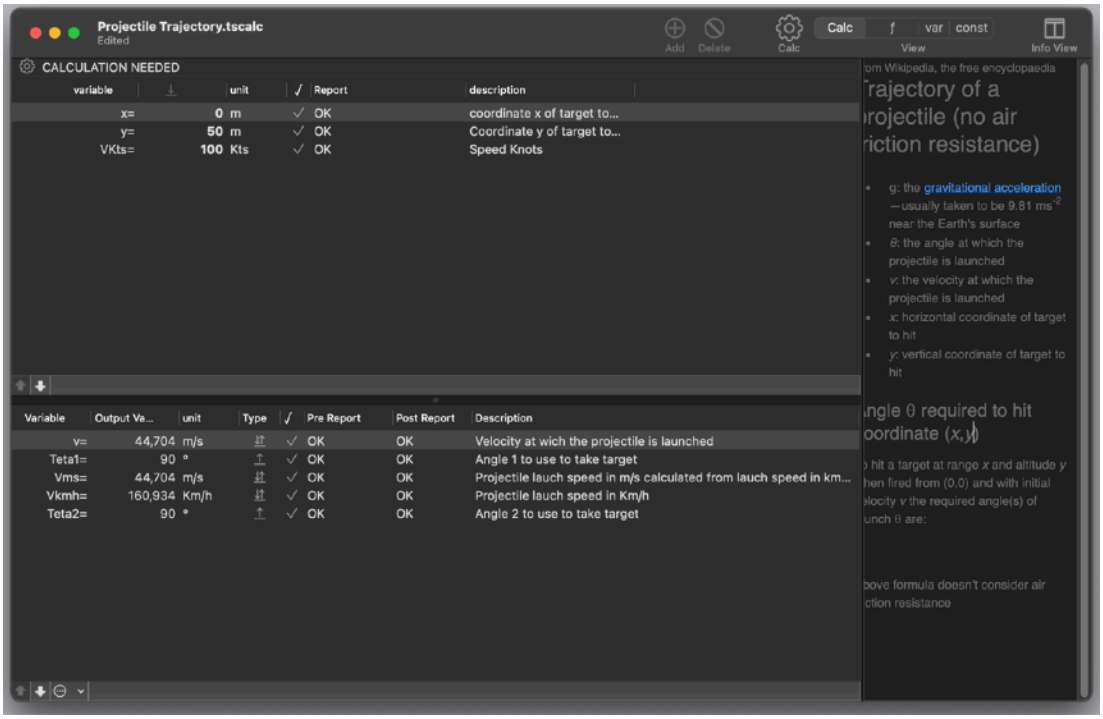
Welcome to TS Calc

The technical tool to manage and solve mathematical equations

TS Calc is a macOS application offering an ideal platform to solve mathematical models applied to technical problems of various type.

TS Calc is a document based application and its documents can be realized and used as calculation models for a specific mathematical technical problems.
One document for each specific problem.

These documents can also be distributed as pre-made solutions for various type of technical problems with all the requested equations inside and all the variables pre-inserted with acceptable range already set.



A TS Calc document contains a series of equations and a list of variables and constants used by the equations. The user can insert different input and see the output generated by the TS Calc document using the equations solving the problem.

TS Calc includes a calculation engine entirely developed and coded internally by Tension Software in C and Objective-C, able to solve equations with any nested level of parenthesis, variables and a large type of mathematical functions at an impressive speed, almost Instantaneously on modern Mac

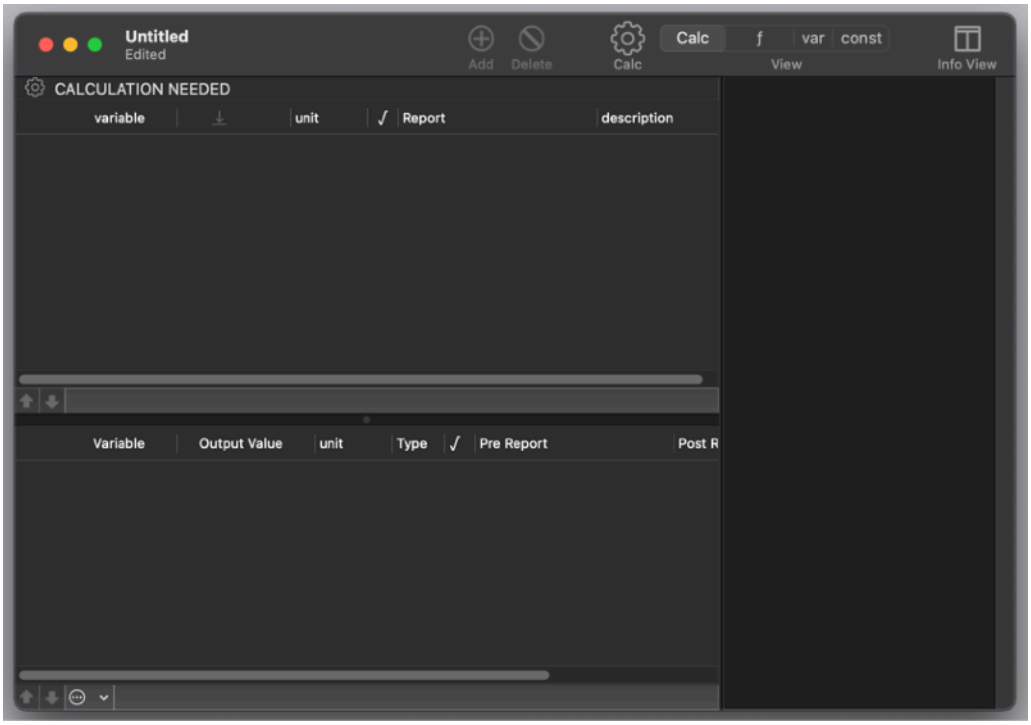
Getting Started with TS Calc

A very simple example

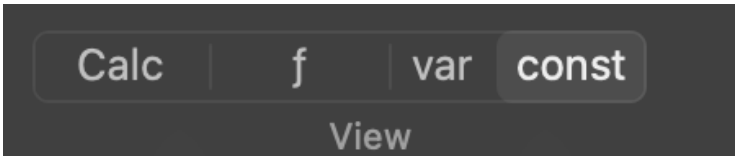
We start with a very simple example.
It can give you a view on how TS Calc works.
After that you will be ready to use TS Calc for complex calculations.

So we start with a calculation that is just to show how to manage things in TS Calc
Suppose we want to calculate how many seconds there are in n days.
We needs to use in this calculation constant data value, how many seconds in 1 hour and in one day. These data are considered constant and inserted in the constant list (they will never change)

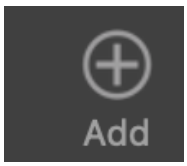
Open TS Calc , create a new document



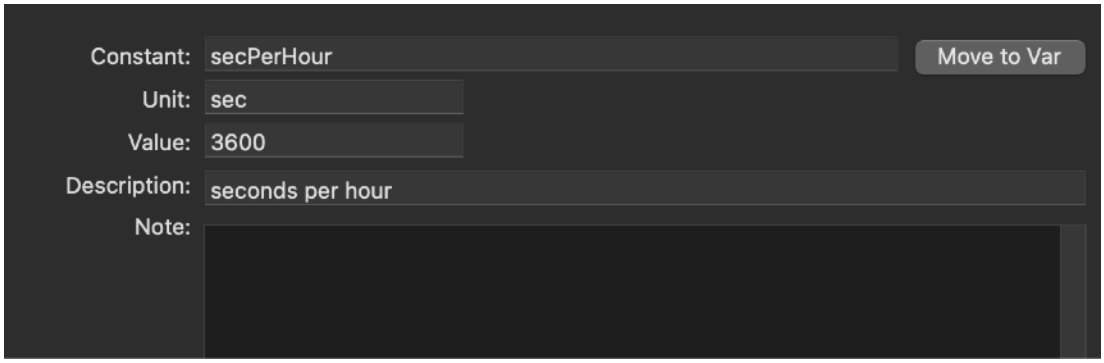
and switch to the constant view



add a constant

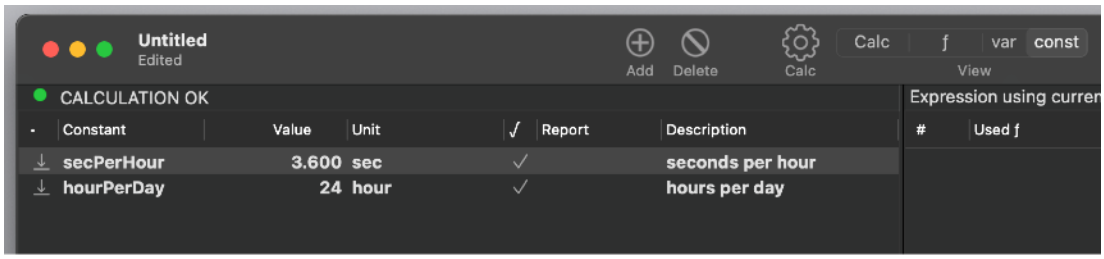


Rename it ‘secPerHour’ and assign a value of 3600



then add another constant
‘hourPerDay’ and assign the value 24

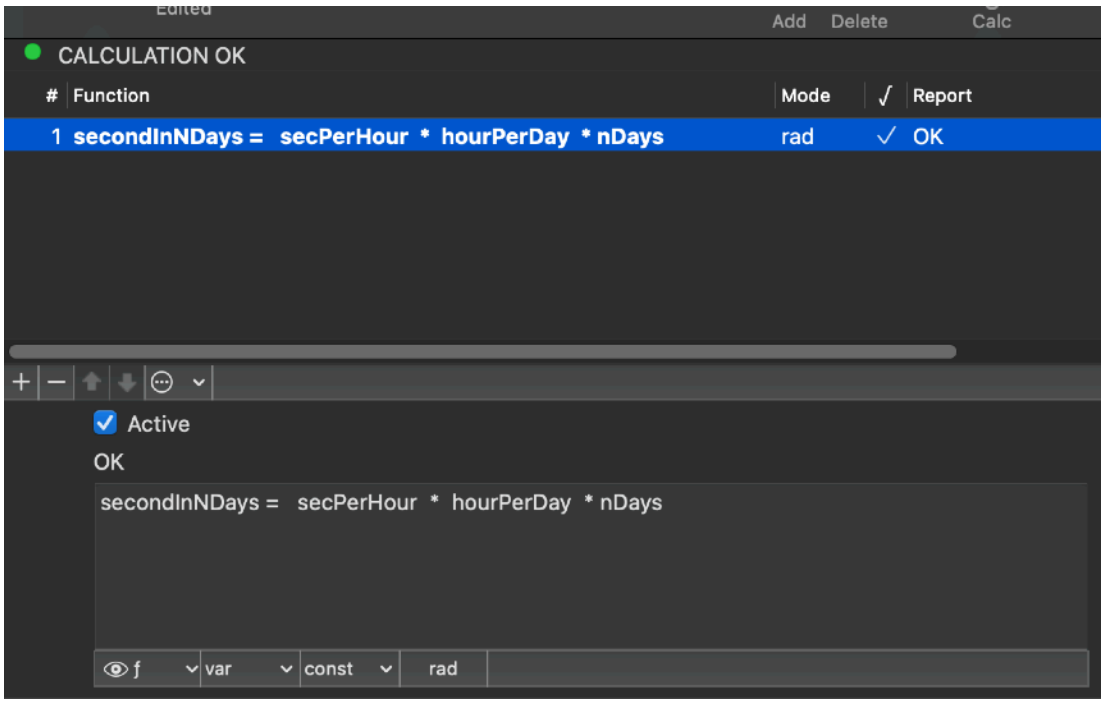
You should end with the rows showing the value entered:



Now we go in the formula view using the tab control in the toolbar

We add a function and modify the default ‘x=y’ text with with:

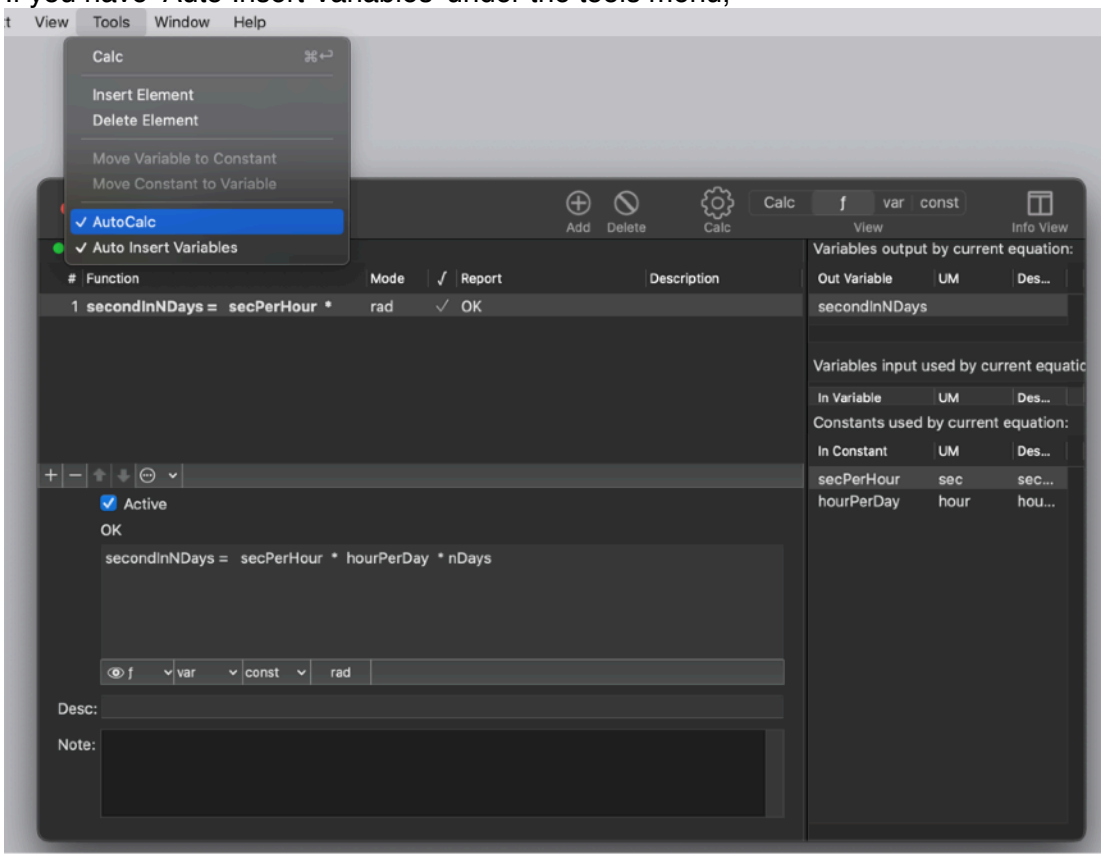
secondInNDays = secPerHour * hourPerDay * nDays



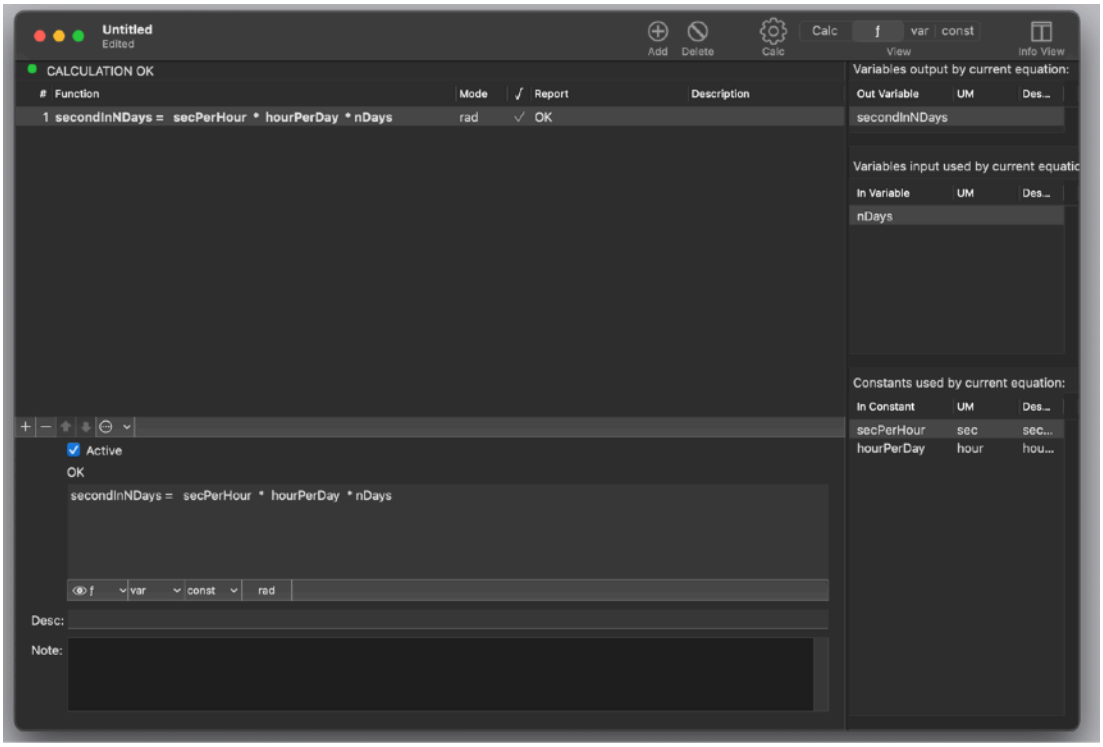
It is self explanatory, to calculate the seconds in a week we calculated the seconds in 1 hour multiplied per hours in one day multiplied the nDays value

Note one thing:
We used two constant value we already entered, plus two variables (secondInNDays and nDays) not yet specified.

If you have ‘Auto Insert Variables’ under the tools menu,

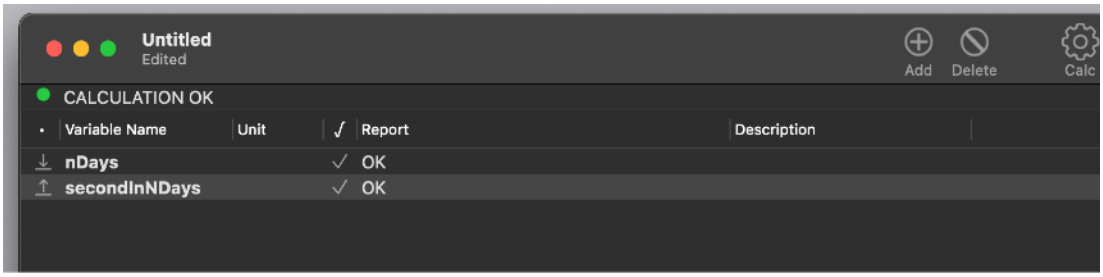


the two new variable will be automatically inserted in the var table when you press enter.



If not you have to manually insert the variable inside the variable table.

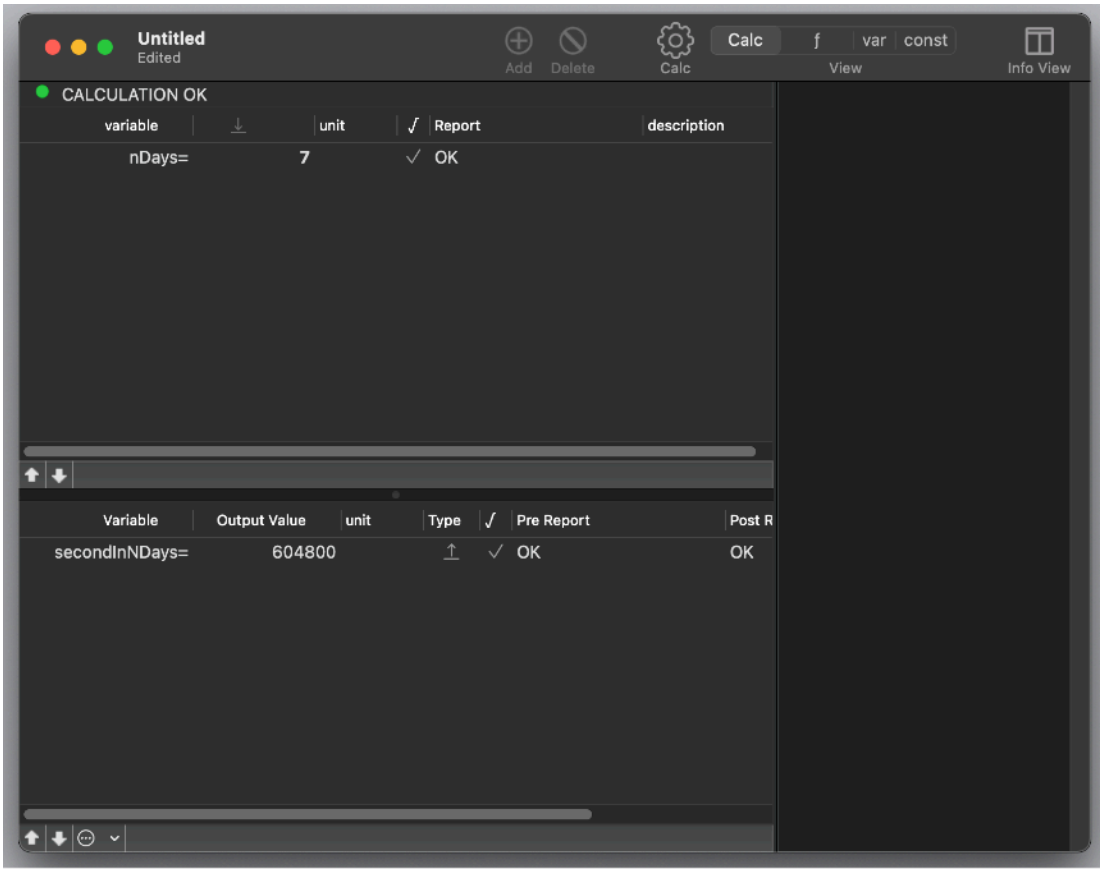
After it we can see in the Variables view both the nDays and the secondsInDays entries:



With ‘Auto insert Variables’ not only TS Calc realised we inserted two new variables not yet defined but it also recognised one is used as input and the other as output. As you can see they have 2 different icons marking them inside the variable table

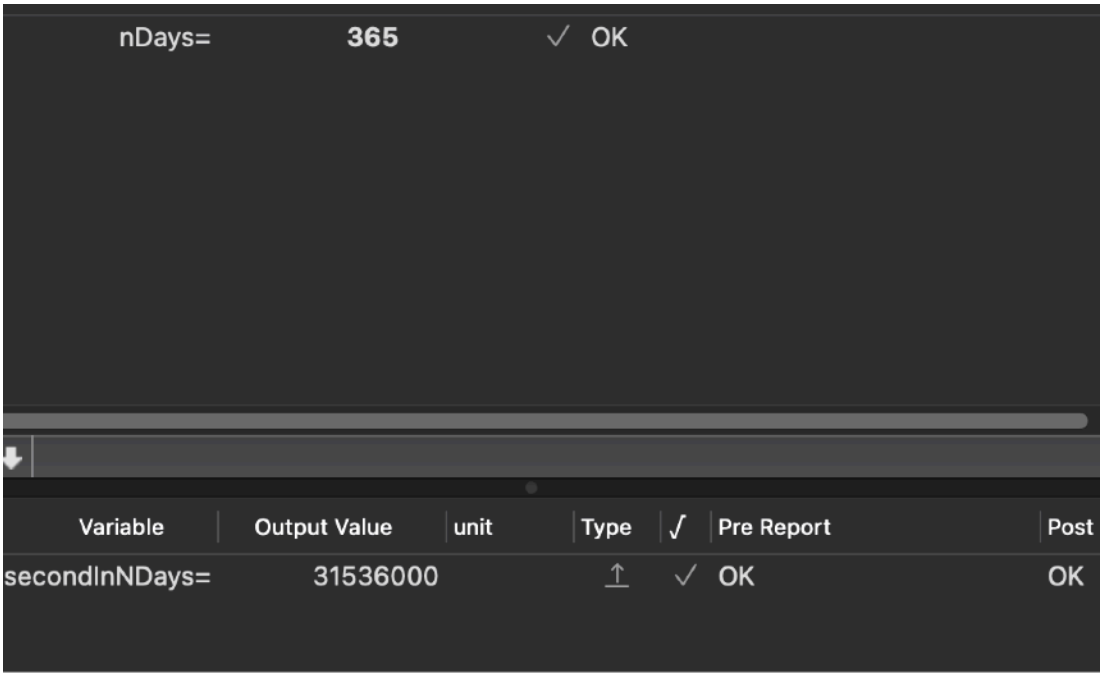
So now we have an equation that TS Calc understand (and solve)

Now go back to the ‘Calc’ tab double click in the variable field in the table and insert 7 in the nDays row in the Value column and press return.



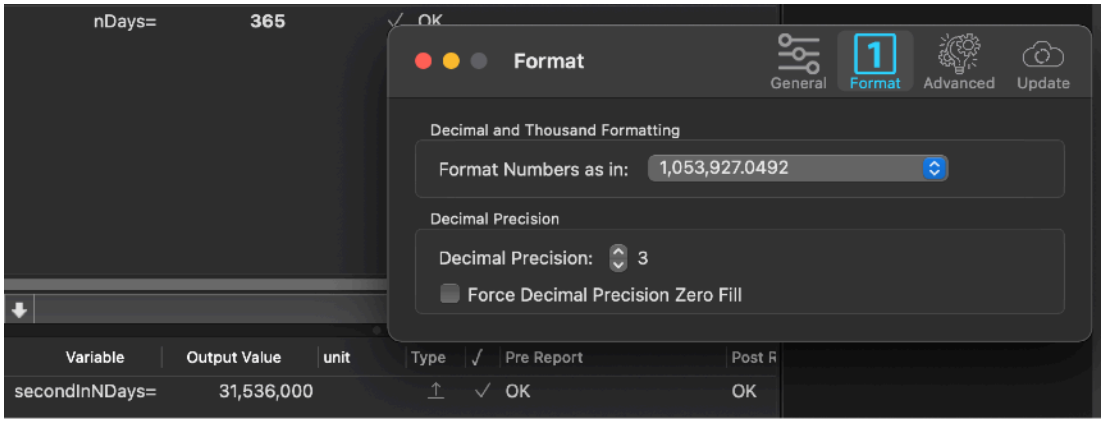
TS Calc immediately execute the calculation and show the result 604800

try with another number of days, as example 365 to know how many seconds in one year:

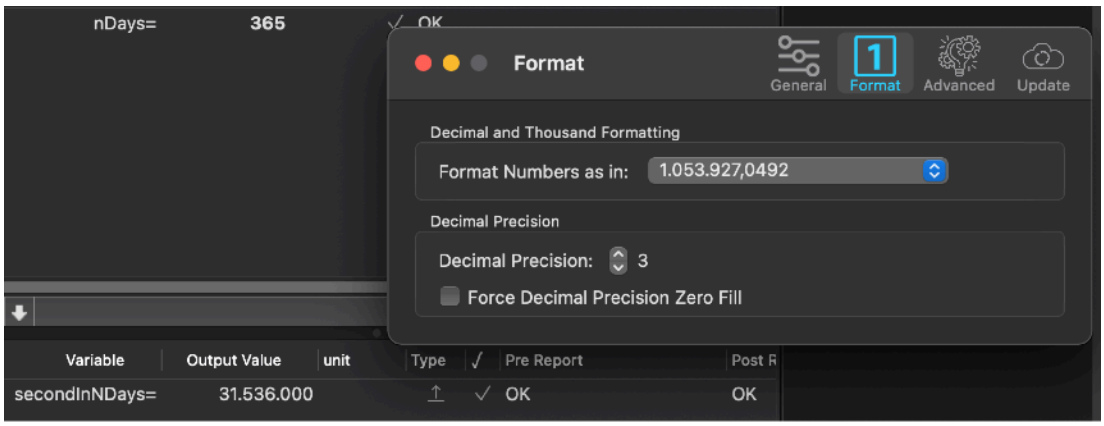


you can change formatting in preferences to have the number displayed according with your country:

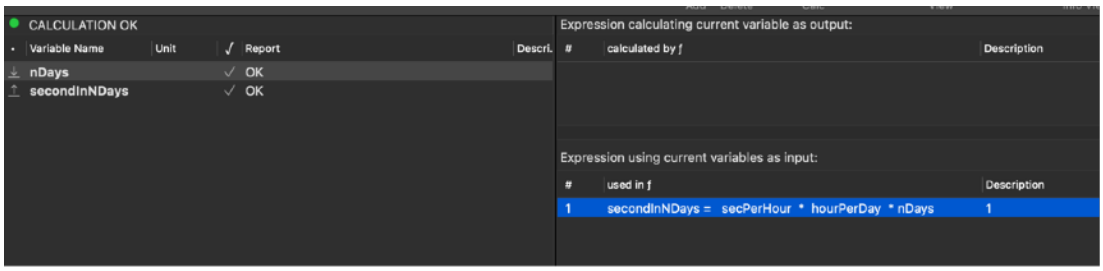
As example USA formatting with comma for thousands separator:



or some european country with dot for thousands separator:

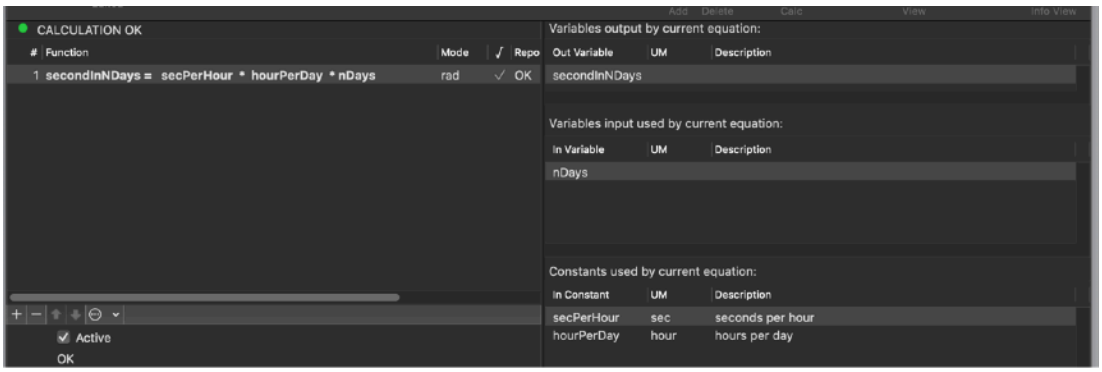


if you select the input variable, in the drawer TS Calc can show you where the variable is used.



This is useful if you have complex model calculation with many variables and equations, things can be a bit confusing in this case.

Is interesting to see what happen selecting the formula in the Equation View:



It can shows for any equation, input variables, output variables and constants used.

The calc view separates Input values and output values in two different panes. This make using a pre made model more easy.

In the ‘Calc’ view the drawer can show additional info entered wit RTF text and pictures, showing an explanation of what the document does and anything other the document creator thinks is useful.

The calculation used was very simple, it was just to understand how TS Calc works. Now you can try your own calculation models, with many and complex calculations, where the output of one equations is used as input in others and so on.

TS Calc will parse all the content of the document trying to always solve things and showing you what is used and where with which results.

Using the ‘Projectile Trajectory’ example

We can now use a more complex pre-made document.
If the Demo Docs are not included with your TS Calc distribution
(As example in the Apple Mac App Store release) you can get the Demo Docs at:
http://www.tensionsoftware.com/download/

WARNING!
If you purchased from the Apple Mac App store, DO NOT download the application from our web site.
Download only the ‘Demo Documents for TS Calc’.

If you substitute your copy purchased via the Mac App Store with the one from our web site, you will end in having the trial version.

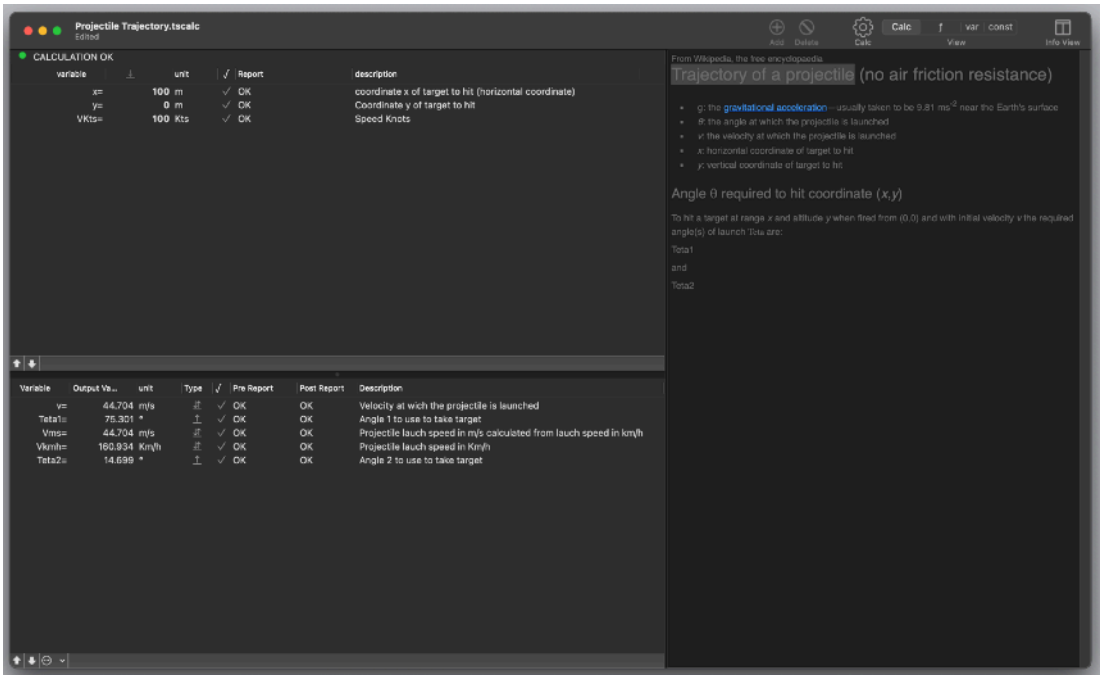
This is valid for all the Apps you purchased from the Mac App Store also from other vendors!

The rule is:
Update the Apps you purchased via the Mac App Store via the Mac App Store only!

In case, with any application, you substituted the application purchased from the store with a trial, deleting the trial, the App Store should let you re-install the full version.

Included with the demo documents you will find the 'Projectile Trajectory' document, we will use it to have a first view of TS Calc.

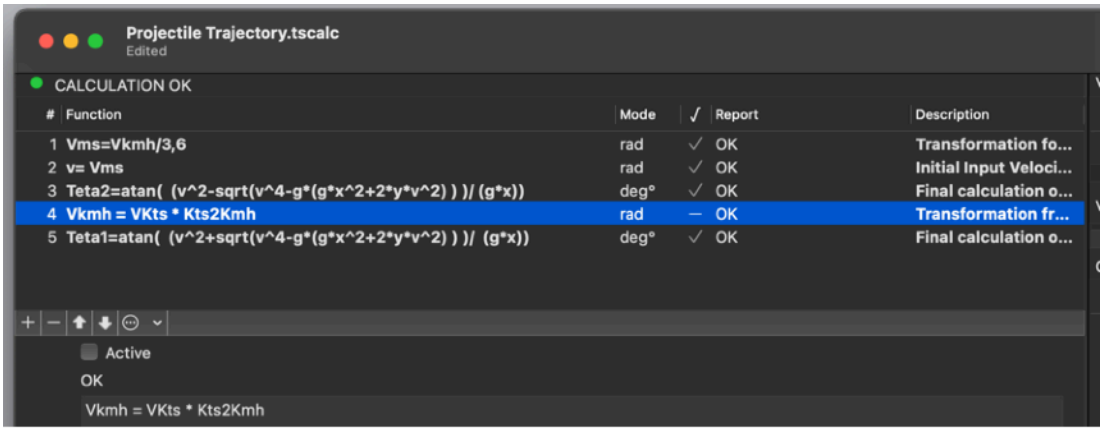
It calculates the ballistic trajectory of a projectile launched from a cannon at speed Vkmh (Velocity in Km per hour) with and inclination angle Teta



The model let you insert the speed of the projectile, exiting from the cannon, and the position of the target to hit.
The position of the target is specified by x and y where x is the horizontal distance from the cannon and y the elevation from the horizontal line passing from the cannon (difference in altitude from cannon to target)
It calculates the two angles from the horizon you can assign to the cannon to hit the target

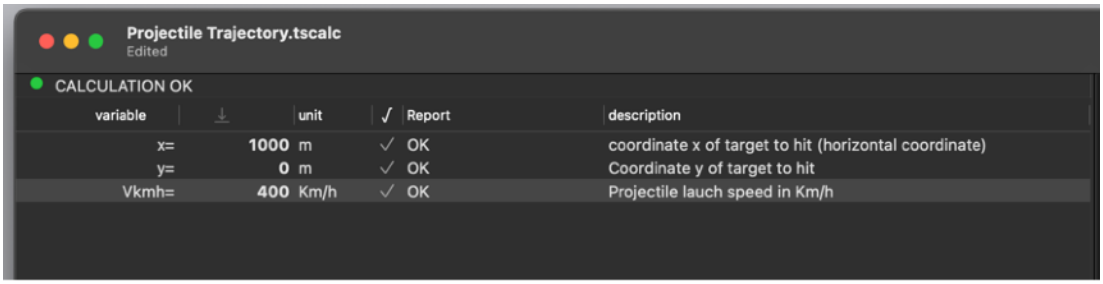
The calculation model consider the launch without air resistance, so it's just a ideal mathematical model, not good if you really want to bomb your neighbours.
To use this formulas in real cases you have to add air resistance elements in the formula.

- Open the document 'Projectile Trajectory' from inside the application or with a double click on it
- Be sure the formula ‘Vkmh = VKts * Kts2Kmh’ It’s not active

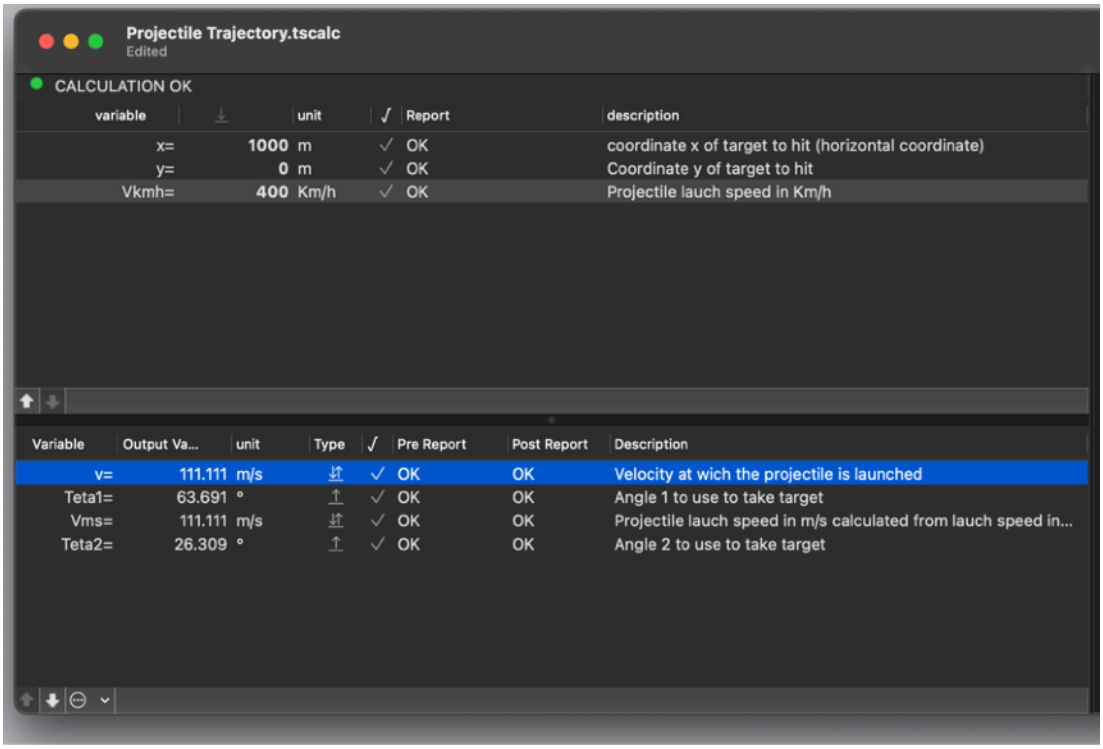


- Insert the velocity Vkmh = 400 Km/h

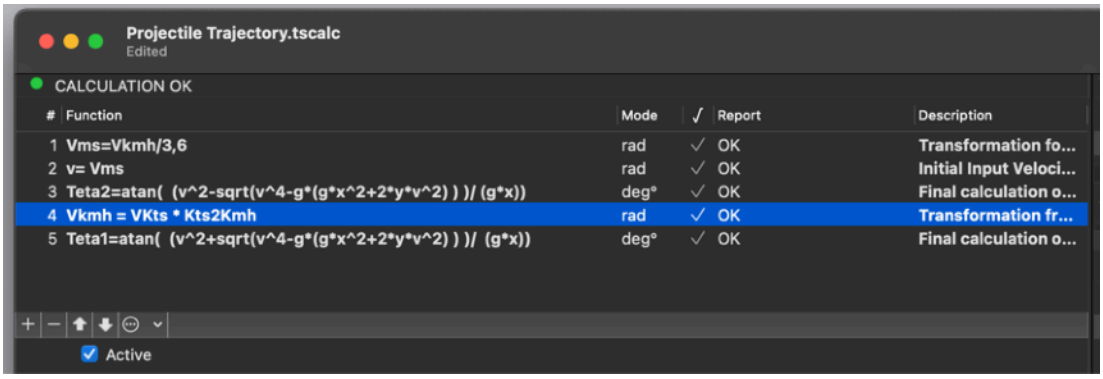
- Insert the distance x of the target in meters, as example 1000 m (around 300 feet) and elevation y equal to 0 (cannon and target are at the same altitude)



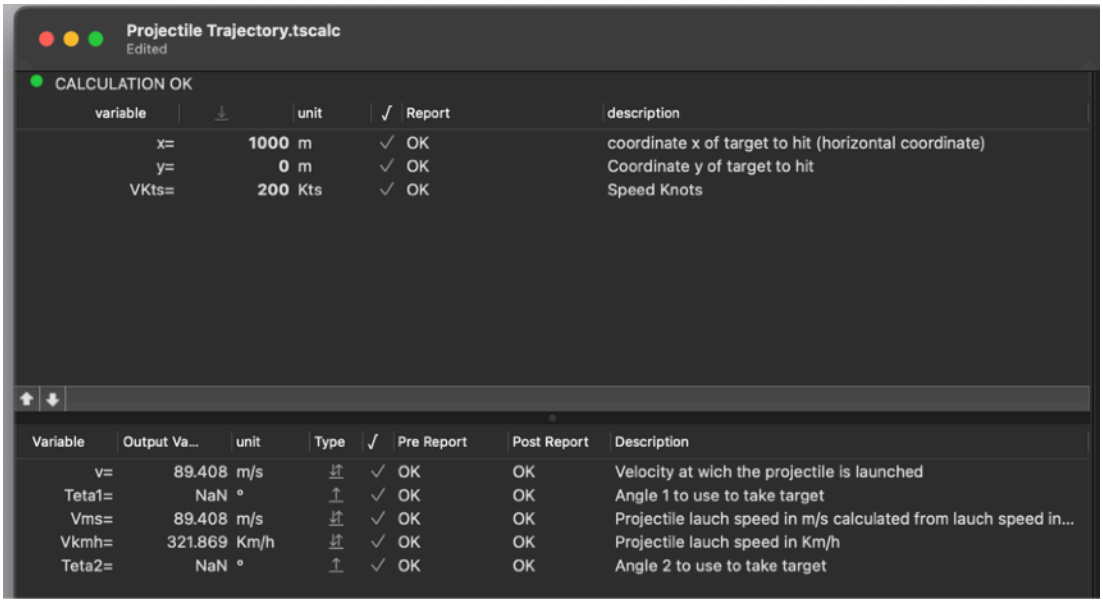
When, under the Tools menu, Autocalc is enabled, if you enter and confirm the last input, TS Calc will show in the output area the results:
v = 111.11 m/s the projectile velocity expressed in a measure unit used for calculation m/s
Teta1= 63.69° one of the possible inclination angle to assign to the cannon to hit the target at the assigned x,y coordinate
Teta2= 26.31° one of the possible inclination angle to assign to the cannon to hit the target at the assigned x,y coordinate



We can now enable the simply function to indicate the distance in feet
In the Function view we need to check the Active check box relative to the function

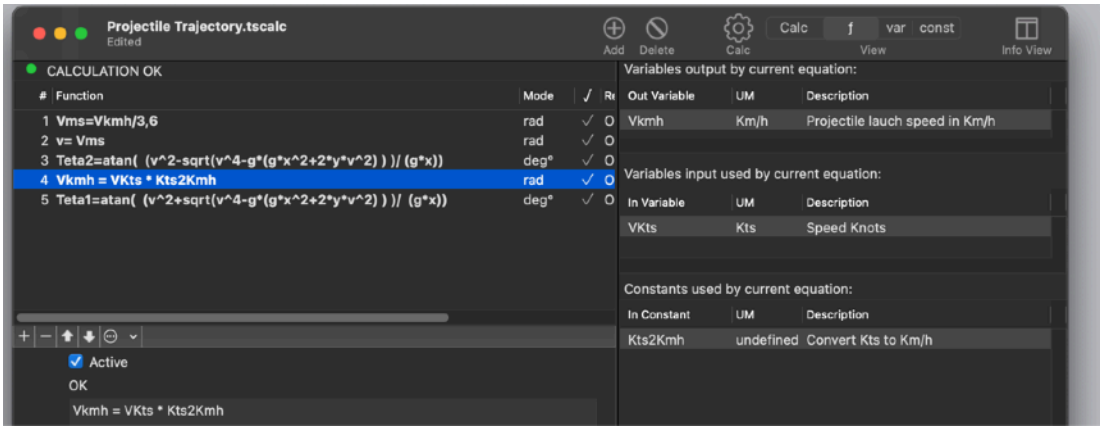


Now values can be calculated using Kts as speed



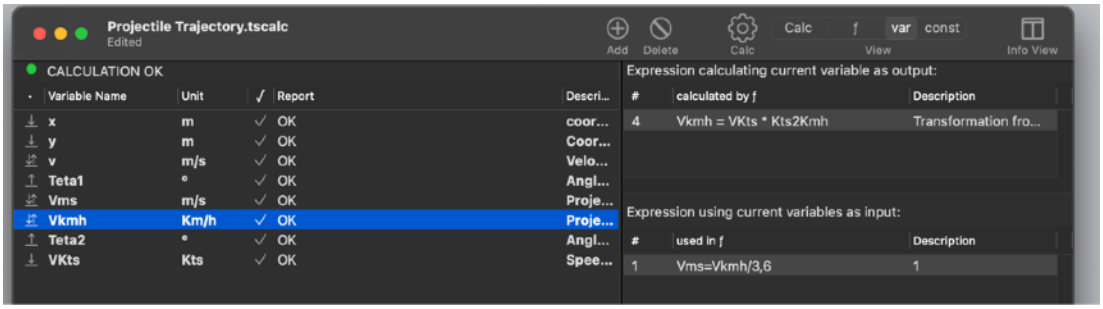
Selecting any equation we can see in the drawer on the side: the output variables, input variables and constant used by the equation

Selecting the equation to convert Kts to Km/h we can see:
- Vkmh indicated as output variable
- Vkts indicated as input variable
- Kts2Kmh indicated as used constant
-

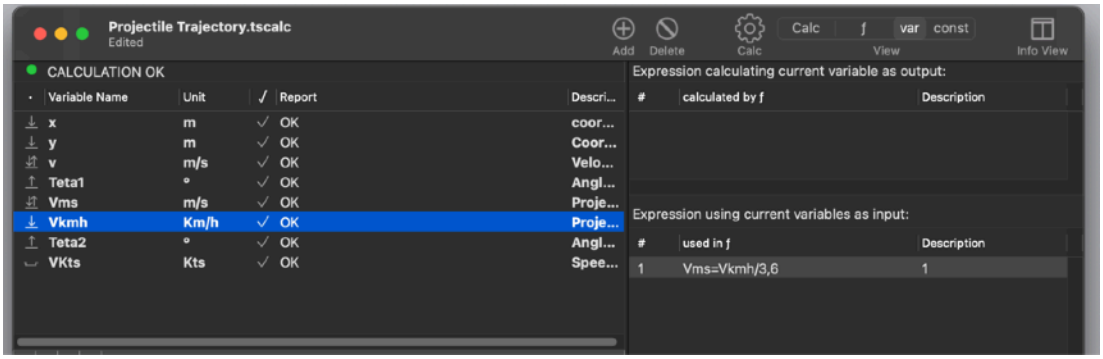


Nowlet see the variable table

There is an interesting change
Before enabling this equation the variable 'Vkmh' was indicated as input variable
Now 'Vkmh' is in the output variable section (it is calculated by the last equation) and
'Vkts' is in the input area

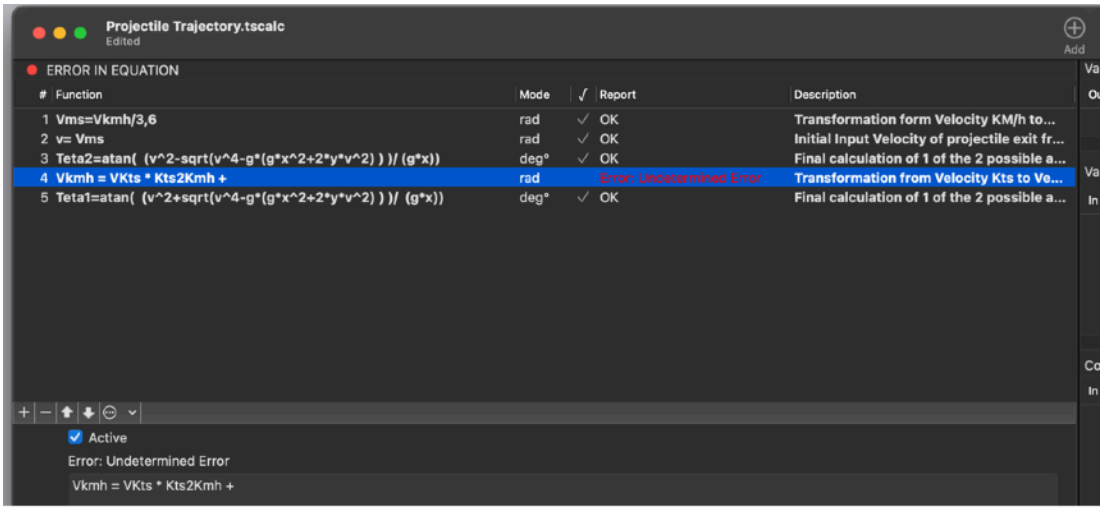


To revert to the previous situation you can go in the equation list and disable the equation Vkmh =Vkts* Kts2Kmh unchecking the 'Active' check box



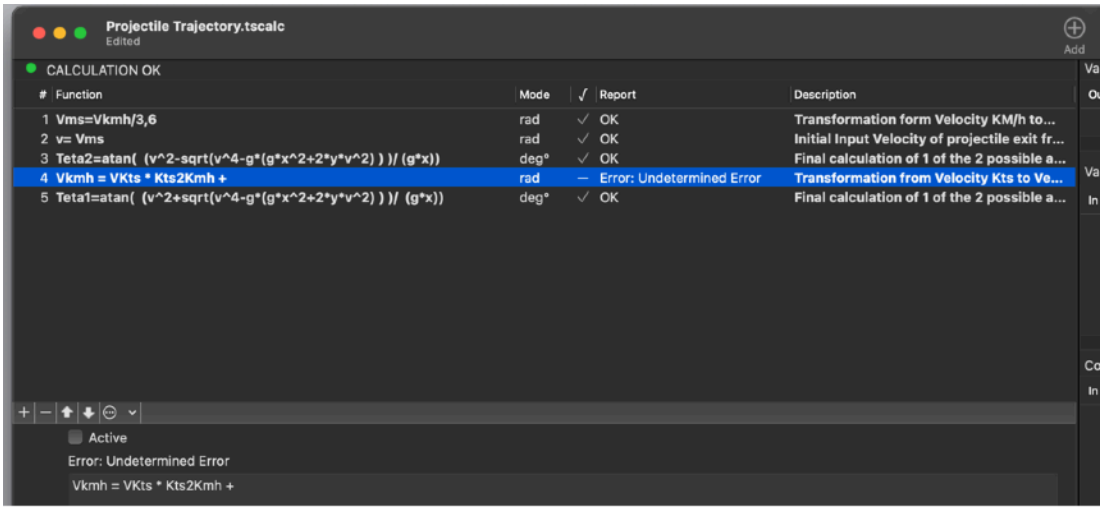
TS Calc assist you creating new function providing you list of variables and constant and available function and informing you of error inside equations, variables or constants

Let see how the error detection works
Try to insert an error in a function
Modify the function
'Vkmh =Vkts* Kts2Kmh'
to:
'Vkmh =Vkts* Kts2Kmh +'
adding a '+' at the end without any final element to add
TS Calc will indicate the global syntax error with ‘ERROR IN EQUATION’ and will indicate it inside the equation row in red



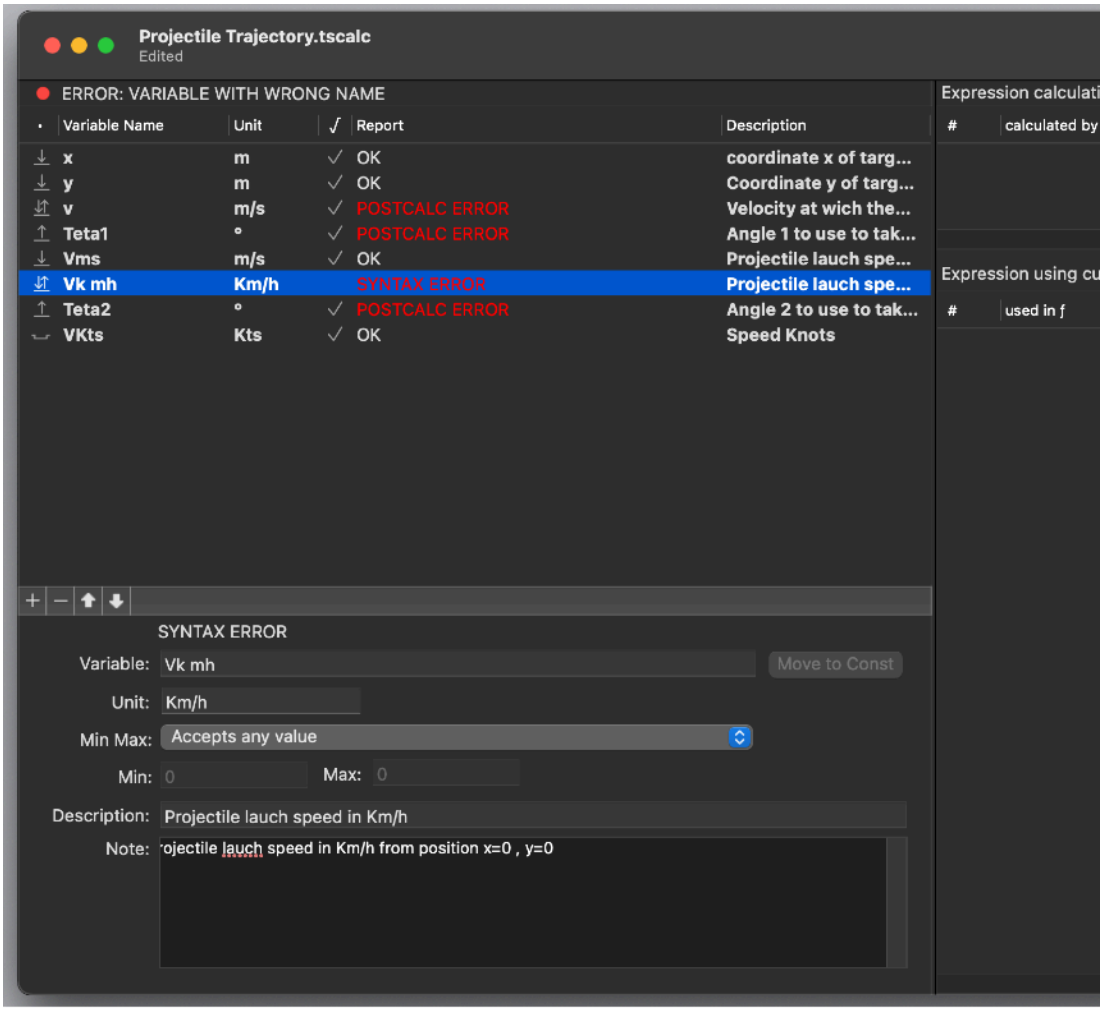
Note that an error is reported inside a function only if this function is enabled

Disabling a function with an error inside it will remove the global error condition because it is not used



The error is still reported inside the row report

Let try now an error inside variable name as example modify the variable name 'Vkmh' to 'Vk mh' with a space inside (space inside a variable name is not admitted) TS Calc will indicate the error in the upper part of the window and will also hiligth in red the variable indicating the error with a red label


Projectile Trajectory.tscalc
Edited
ERROR: VARIABLE WITH WRONG NAME
Variable Name
Unit
Report
Description
x
m
OK
coordinate x of targ...
y
m
OK
Coordinate y of targ...
v
m/s
POSTCALC ERROR
Velocity at wich the...
Teta1
°
POSTCALC ERROR
Angle 1 to use to tak...
Vms
m/s
OK
Projectile lauch spe...
Vk mh
Km/h
SYNTAX ERROR
Projectile lauch spe...
Teta2
°
POSTCALC ERROR
Angle 2 to use to tak...
VKts
Kts
OK
Speed Knots
Expression calculati
#
calculated by
Expression using cu
#
used in f
SYNTAX ERROR
Variable:
Vk mh
Move to Const
Unit:
Km/h
Min Max:
Accepts any value
Min:
0
Max:
0
Description:
Projectile lauch speed in Km/h
Note:
rojectile lauch speed in Km/h from position x=0 , y=0

Reference

TS Calc is an application to mange and calculate mathematical models and solve it

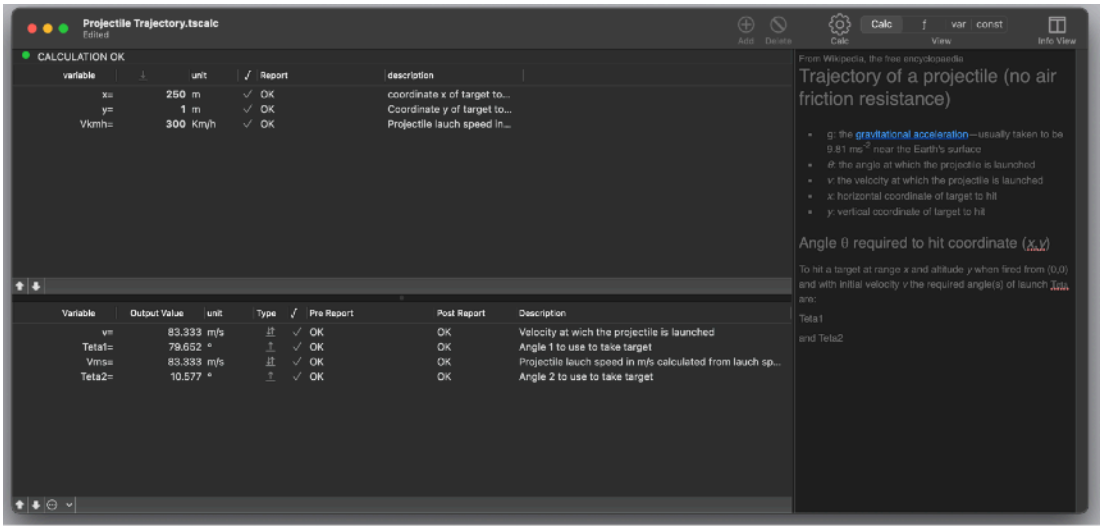
It provides functionalities not available in any other software to accomplish this task in the better way

TS Calc is a standard document based application, it means you can manage an unlimited number of documents, saved on disk, each associated with a separate window with a specific set of equation to solve a specific mathematical problem.

TS Calc Data organisation

A TS Calc document window has 4 different views:
- Calc
- Functions
- Variables
- Constants

Each of this view show in details different elements or views of the problem the document solves.



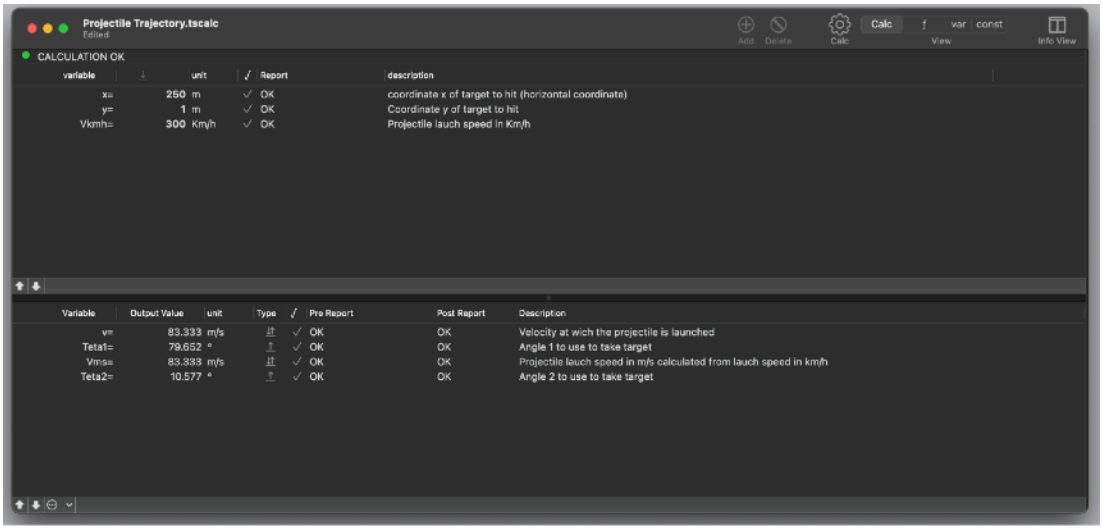
As said a document can be used to solve a specific mathematical problem storing inside the formulas, variables and constant values solving it.
TS Calc allow also to include a description with pictures to explain in details what the document is dedicated to.

The Calc view

Calc (Calc) View shows the input variables and the output variables

Using the Calc View the user can insert the input values and see instantly the output values as it is calculated by the equations inside the document

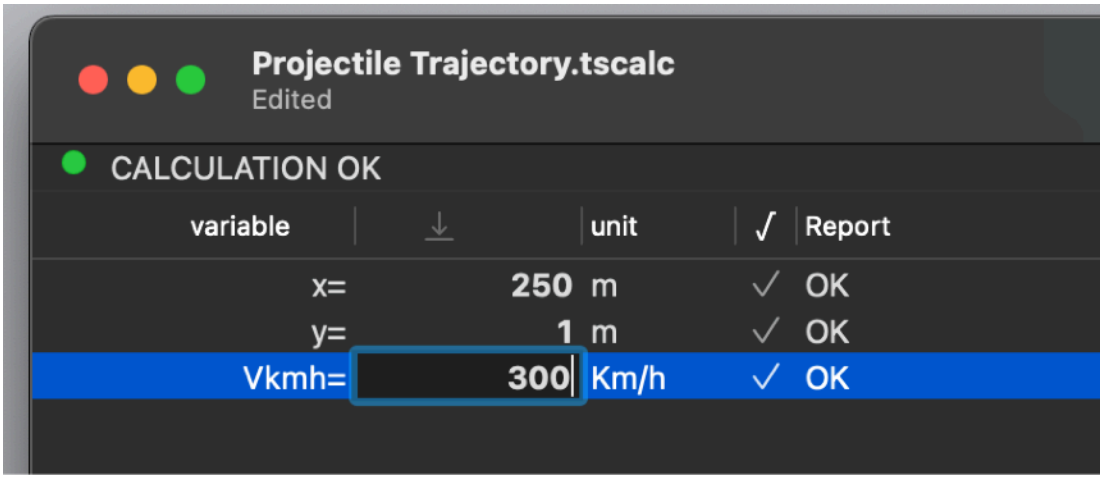
TS Calc, analysing the equations, knows by itself if a variable is an input or output variable



You can instruct TS Calc to inform you if a variable value is outside an acceptable range

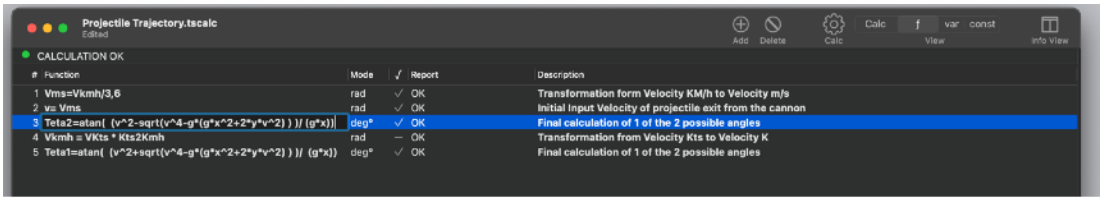
A smart detection system analyse all the data inside the document and inform you about calculation errors

To change the value of an input variable, the user has to double click its value inside the window, the variable value will become editable



The Functions view

Functions (*ƒ*) View shows all the functions inside the document, any enabled function (equation) is calculated and its output considered inside the document calculation, if an equation is deactivated using the checkbox it is not considered as part of the calculation



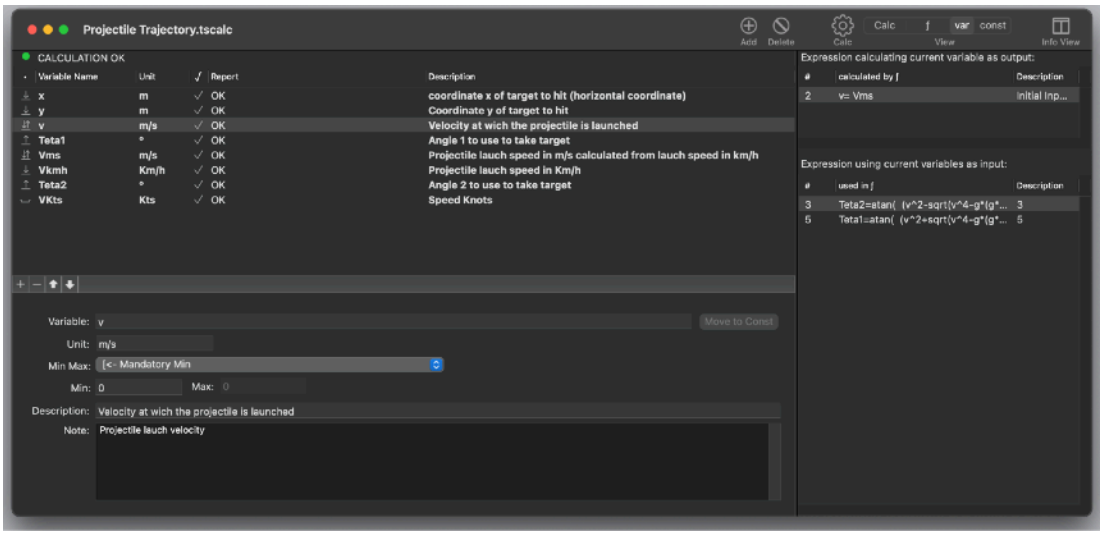
The Variables view

Variables (v) View shows all the variables used inside all the enabled functions in the document.
TS Calc automatically recognise if a variable is an input variable or an output one.

Variables can be added manually or automatically as they are found in equations.

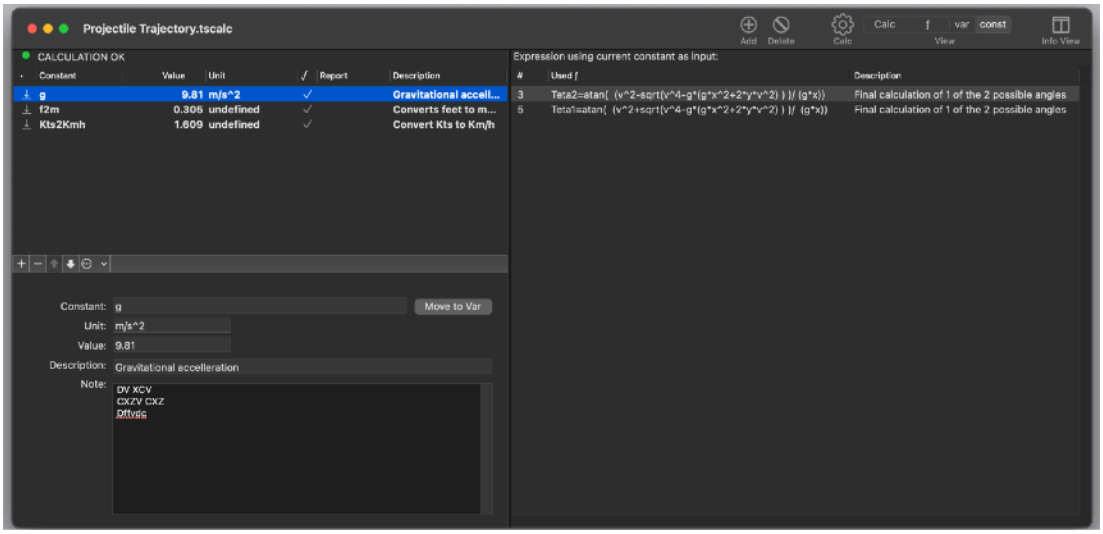
When ‘Auto insert Variables’ is enabled, new variables are inserted in the document as they are found inside any equations.

Variables can be transformed in constant as long as they are used as input value.
To transform a variable in a constant click the apposite button.



The Constants view

Constants (k) show all the constants used inside the equations
The user can manually insert a constant or move a variable in the constants area transforming it in a constant.



When the automatic feature to add variable used inside an equation is used, the user has to manually move a variable to the constant area if it has to be managed as a constant, the application has no way to know it in advance.
A constant can be transformed in a variable using the apposite button.

A constant can be used to receive a value assignment from a function.
If you have a function as:
x= y*2
it means that 'x' has to be intended as a variable.

The Info View

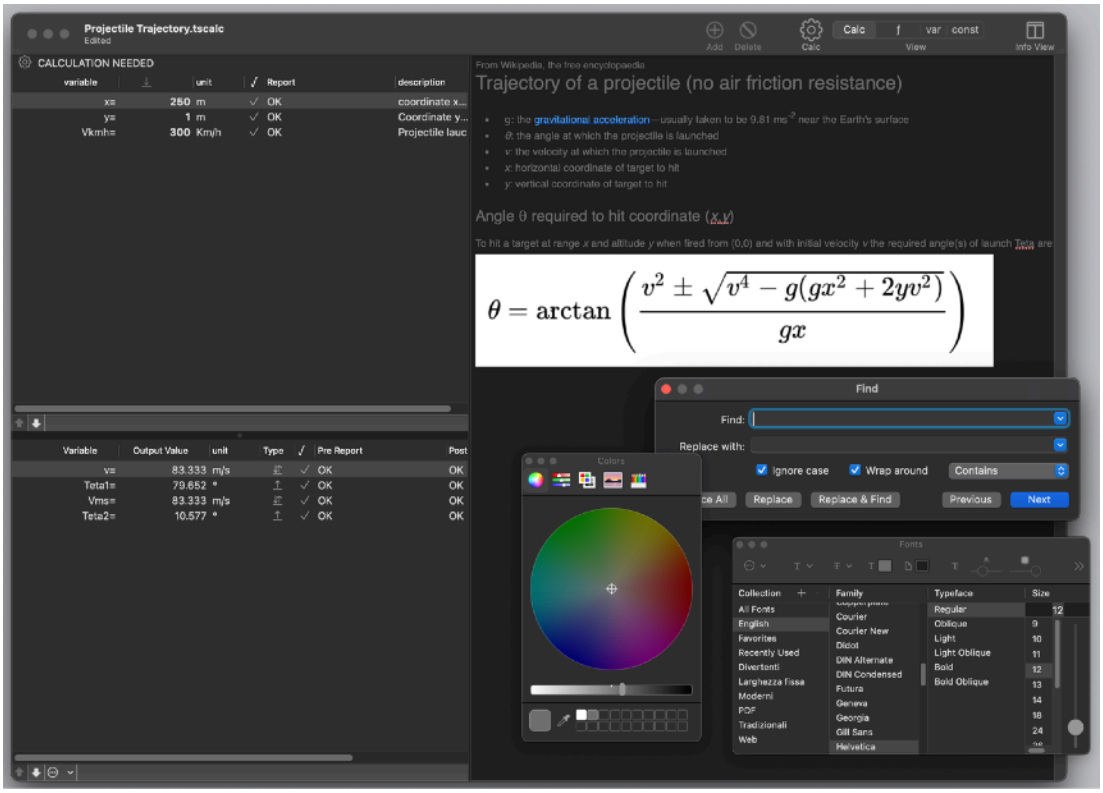
The Info View is a resizable side with additional informations in the right part of the window.

Changing the view in the main window changes the content of the info panel.

The Info panel when in the Calc Main view

When in 'Calc' view, the info panel shows a Rich text area where the user can insert RTF text and pictures, using it as an advanced word processor area.

Its purpose is to describe the document, how to use it, the main purpose of the calculation, which kind of problem it solves and theory used.
It is a reference to the content of the document, useful to anyone that has to use the document.
Even for who create the document, considering that after some time maybe you don't remember all the details of the document you created.



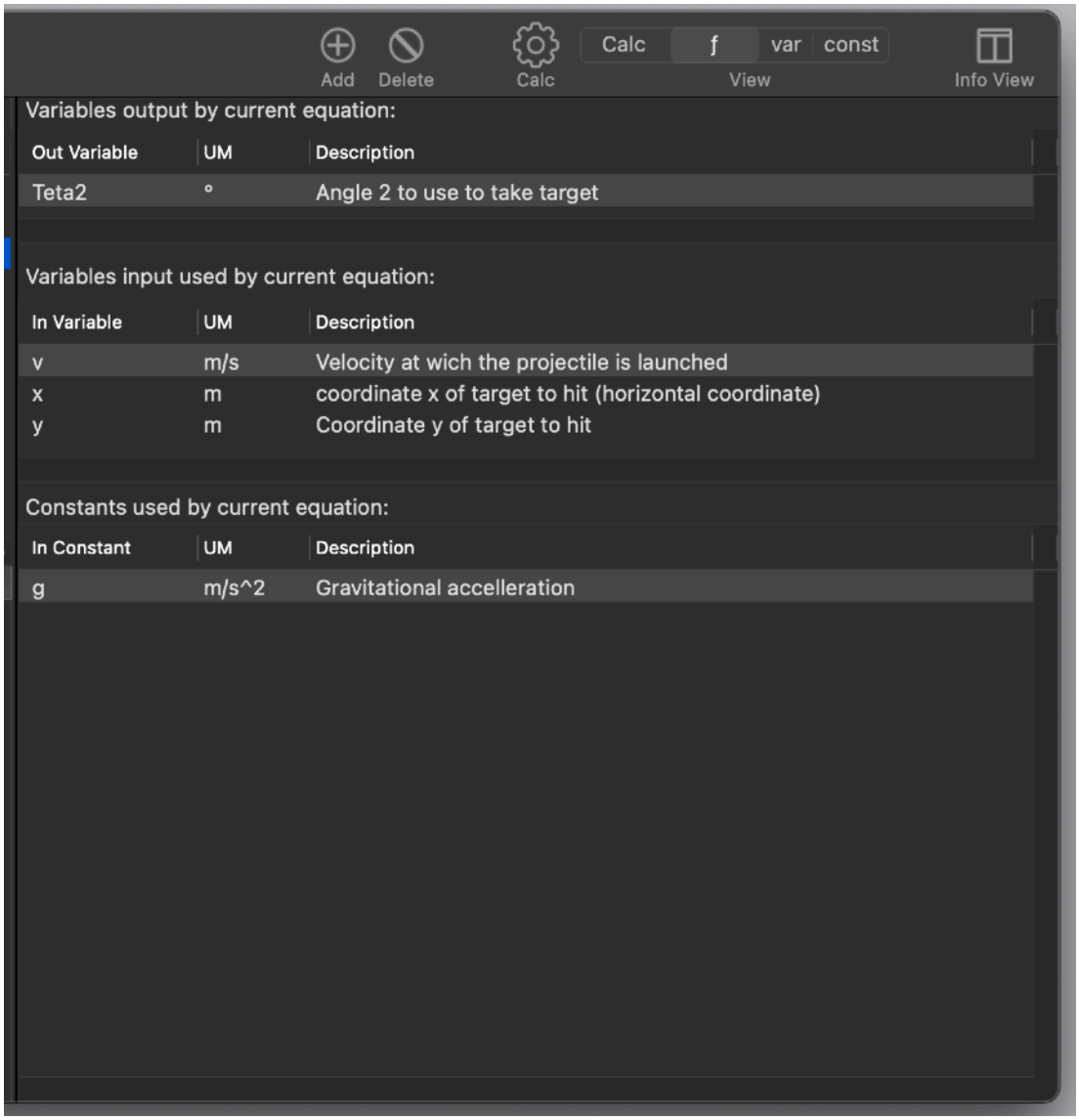
The capability to use formatted text and picture allows to create a very rich and clear explanation

The Info View when in Functions Main view

The info panel, when in functions view, provides 3 tables related to the expression selected in the main window
These 3 tables provide:

- The variable calculated by the selected expression with measure unit and description
- The variables used by the selected expression with measure unit and description
- The constant used by the selected expression with measure unit and description

These tables are filled automatically by the application and updated as the user modify the document content and or change the selection
A double click on any element of each of these tables jumps to the variable or constant specification in the Variables/Constant view



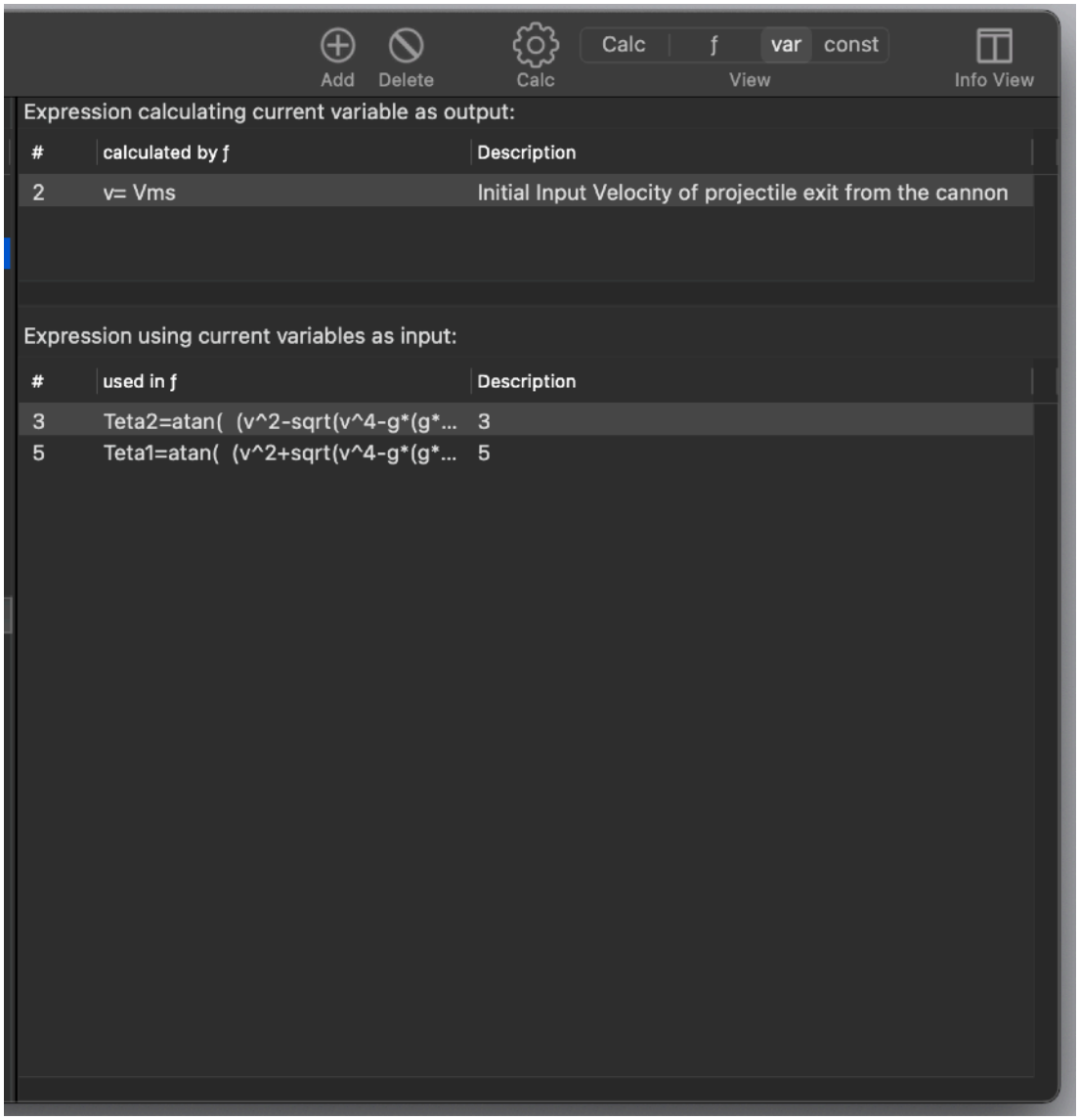
The Info View when in the Variables Main view

The Info View provides 2 tables related to the variable selected in the main window These 2 tables provide:

- The equation calculating the selected variable (if is an output variable)
- The equation using this variable

These tables are filled automatically by the application and updated as the user modify the document content and or change the selection

A double click on any element of each of these tables jumps to the equation specification in the Equation view

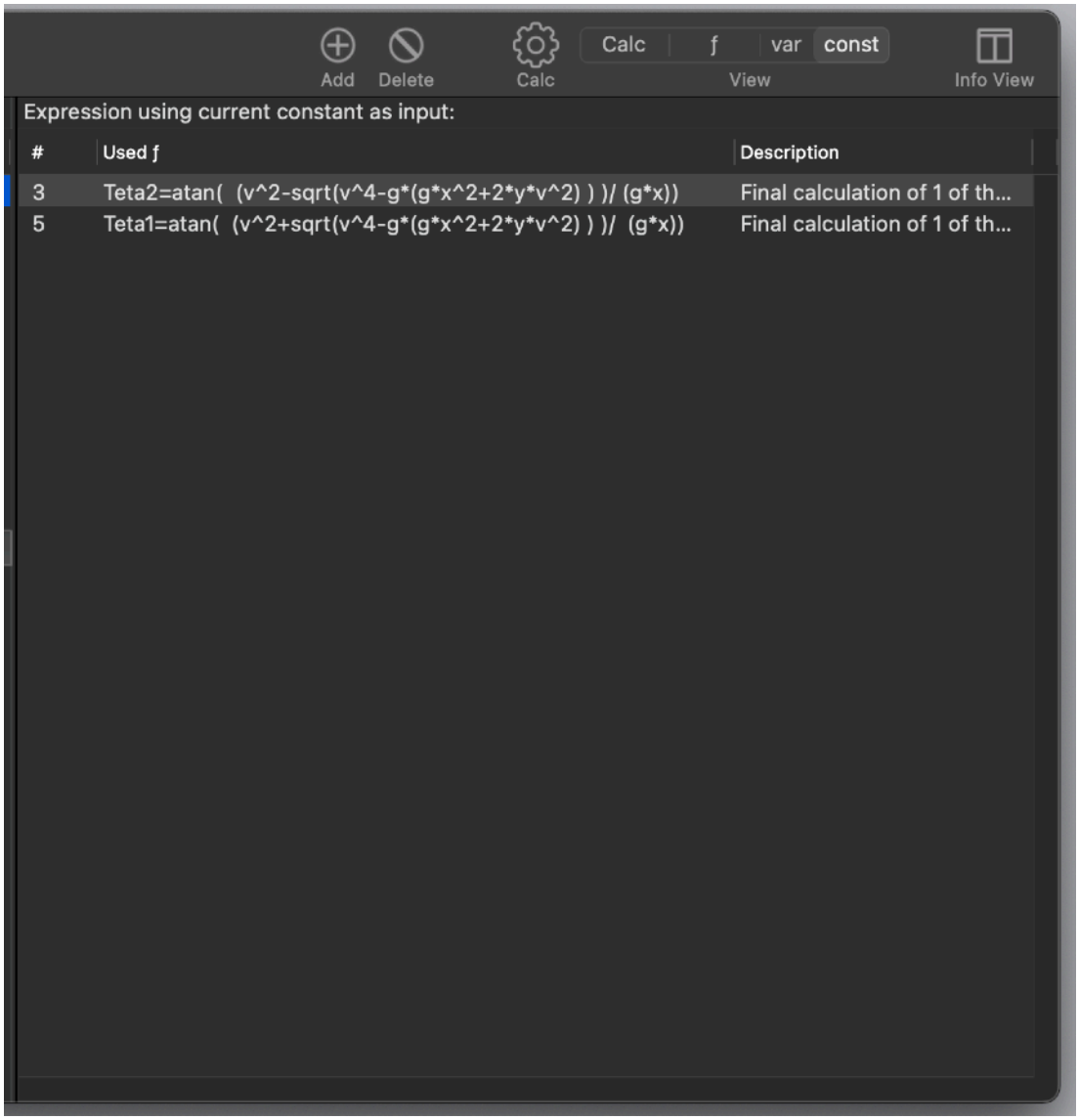


The Info View when in the Constants Main view

The drawer provides 1 table related to the constant selected in the main window
This table provides:

- The equations using this constant

A double click on any element of each of this table jumps to the equation specification in the Equation view

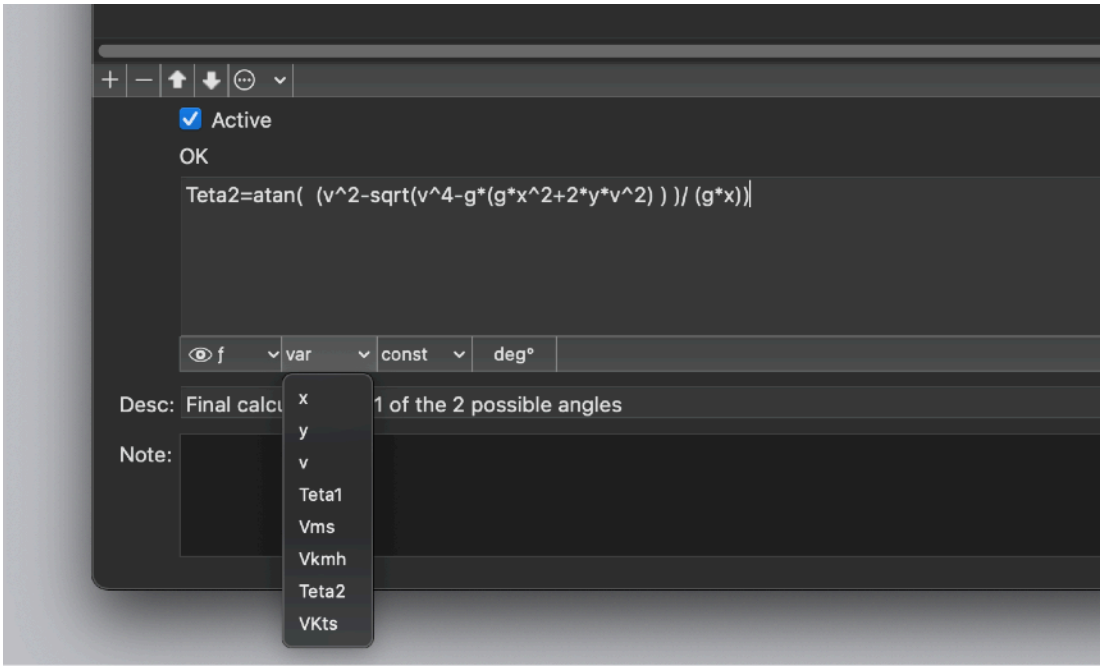


Functions (*ƒ*) in detail

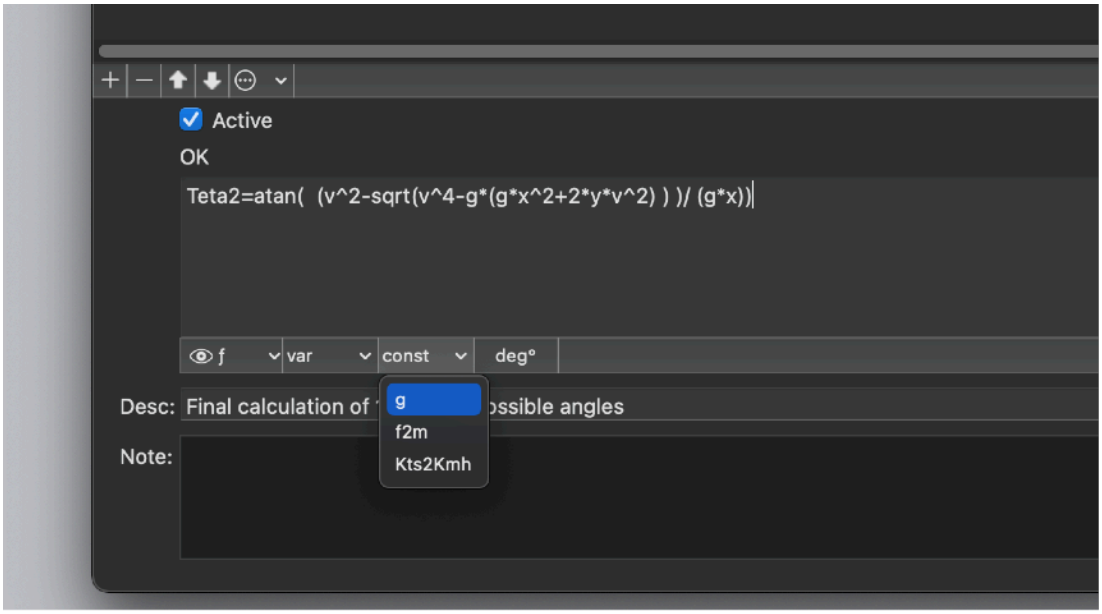
Functions can be created by selecting the '+' button in the Equations view
After an equation is created it can be edited.
To edit a previously created equation simply select it.
You can edit ‘in place’ also inside the table.

- Active: indicate if the equation must be used in calculation, if an equation is not active is just stored in the document but not used at all, also for reference by other variables in the drawer
- RAD/DEG: indicates if calculation must be performed by trigonometric functions using radians or degree
- Body: the mathematical equation to calculate
- Description: description of the equation, it will be displayed also in the drawer when variables and constant view is active, so it is useful to use this field to comment about the equation
- Note: a more extended comment about the equation used

(There are 4 button under the body of the equation, the popup the variables,



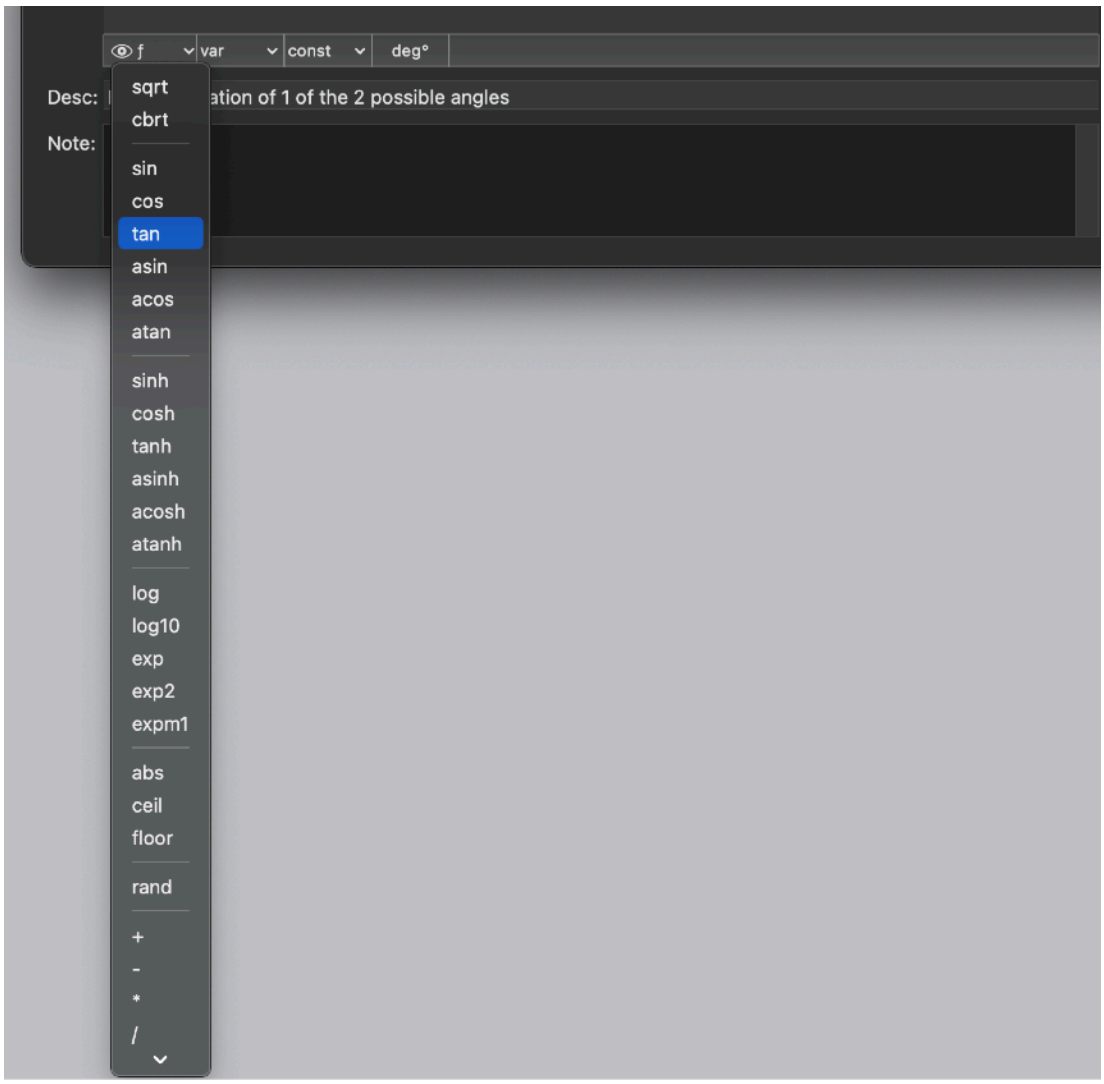
constants and functions available to put inside the functions and a fourth button 'Autoinsert Variables <<' used to recognize new variables, inserted in the body of the function, and to add them in the Variables View)



Functions must be correct from an algebraic syntax point of view with a left variable, an equal sign and a right expression.

In any function ‘internal function’ can be used such as sin() or log()

the only internal function admitted are the one listed in the *ƒ* popup under the function body field:



sqrt() square root
cbrt() cube root

sin() trigonometric sine
cos() trigonometric cosine
tan() trigonometric tangent
asin() trigonometric arcsine, the inverse of the sine function
acos() trigonometric arccosine, the inverse of the cosine function
atan() trigonometric arctangent, the inverse of the tangent function

sinh() hyperbolic sine
cosh() hyperbolic cosine
tanh() hyperbolic tangent
asinh() hyperbolic arcsine, the inverse of the hyperbolic sine
acosh() hyperbolic arccosine, the inverse of the hyperbolic cosine
atanh() hyperbolic arctangent, the inverse of the hyperbolic tangent

log() natural logarithm
log10() base 10 logarithm
exp() returns e^x
exp2() returns 2^x
expm1() returns e^x-1

- abs() absolute value
- ceil() round to ceil integer
- floor() round to floor integer
- rand(x) random value between 0 and x

Plus the operators:

+	addition
-	subtraction
*	multiplication
/	division
^	power
!	factorial

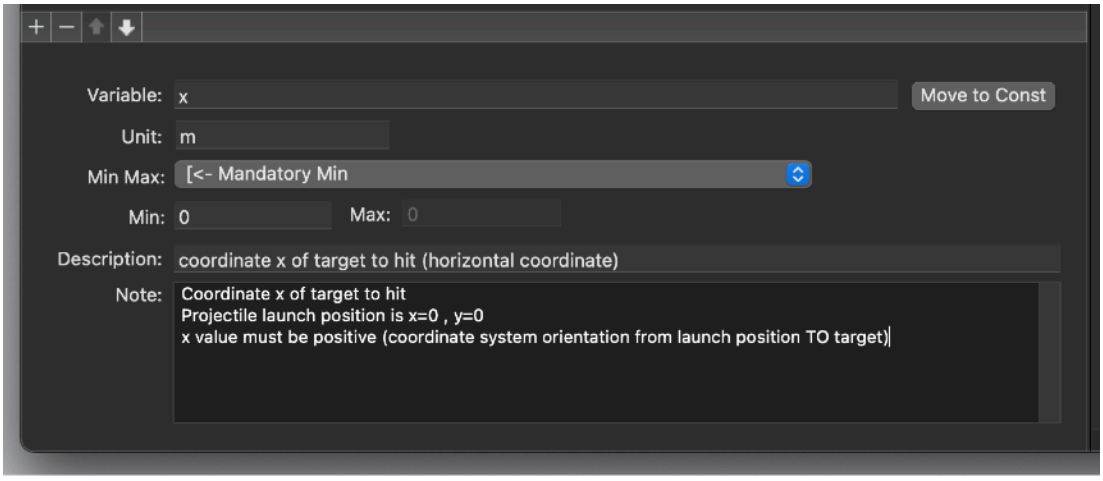
Where inside the parenthesis, as function argument, a numerical value or a variable or a constant value is accepted.

Variables in detail

Variables can be created by selecting the '+' button in the Variables view
After a variable is created it can be edited.

To edit a previously created variable simply select it.
You can edit in place also inside the table.

Variable: the name used by the variable, used in equations to make use of the variable itself.



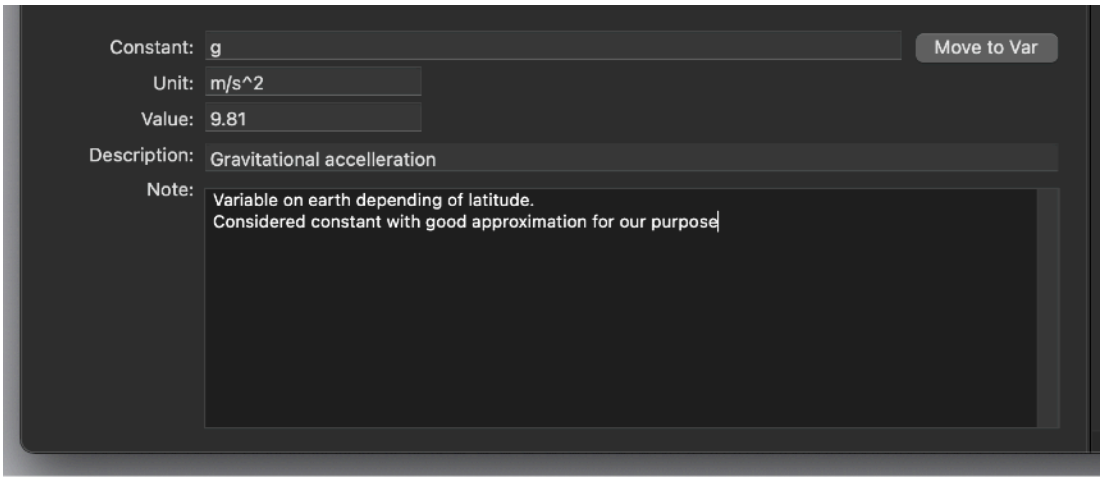
A variable name to be acceptable must be alphanumeric, start with a letter and with no space inside, the only non alphanumeric acceptable char is '_'
Measure Unit: measure unit of the variable
Min Max: Defines range value, mandatory or suggested
Min: Minimum value according with MinMax popup setting
Max: Maximum value according with MinMax popup setting
Description: description of the variable, it will be displayed also in the drawer when equation view is active, so is useful to use this field to comment about the equation
Note.

A more extended comment about the variable

Move to Constant Button: Transform the variable in a constant. It will be moved in the variable list. To be enabled the variable must be of input type. If an equation use the variable as output, it can't be considered a constant, it would be a mathematical nonsense to calculate a value already considered a constant
Variables can be created also from the 'Equations View' simply inserting a new function with inside new variables, if ‘Auto insert Variables’ is enabled all the new variable will be auto-created simply pressing return

Constant in details

Constants can be created by selecting the '+' button in the Constants view
After a constant is created it can be edited.
To edit a previously created constant simply select it.
You can edit in place also inside the table.
Constant: the name used by the constant, used in equations to make use of the variable itself
A constant name to be acceptable must be alphanumeric, start with a letter and with no space inside, the only non alphanumeric acceptable char is '_'
Measure Unit: measure unit of the constant
Value: The constant value, unmodifiable except inside the constant specification in the 'Constant view'



Description: description of the constant, it will be displayed also in the info view when equation view is active, so is useful to use this field to comment about the equation
Note: a more extended comment about the constant

'Move to Variable' Button: Transform the constant in a variable.
It will be moved in the variable list

Precision calculation

TS Calc uses long doubles for all calculations
Mathematical precision is up to 16 decimals in calculations

Import/Export

From panels you can select to import or export names and values.

Import can be executed form files in various encoding and different formats:
- Tab separated values
- Comma separated values
- Char separated values using semicolon

Export can be executed to text files in TSV and CSV or as html tables or using a custom format where the user can specify value separator

Error checking

TS Calc indicates errors in various ways to help the user fix and solve problems
Inserting the equations to solve a technical problem is often a difficult task, specially if there are many equations and many variables to manage.
When in functions view, TS Calc shows for any equation, in the drawer, all the variables and constant used in 3 different tables:
- Out Variable
- In Variables
- In Constant

Double clicking a name for any of this variable or constant in the drawer changes the current view to the Variables View or Constants View details

When in the Variables View for any variable the drawer shows the equations using it (same for the constant)
Double clicking in the drawer on an equation changes the current view back to the Equation View, this facilitate the debugging of your first writing of the equations to rapidly accomplish the task to realise a working math model inside your document.

Additional macOS features

TS Calc adopt and make use of Apple technologies available only in macOS

They are used in the standard Apple way, so nothing new to learn if you already know how to use them.

• Resume – the app will reopen at the point and state the user left it included opened documents and unsaved one

• Auto save – the app saves using the macOS autosave functionality

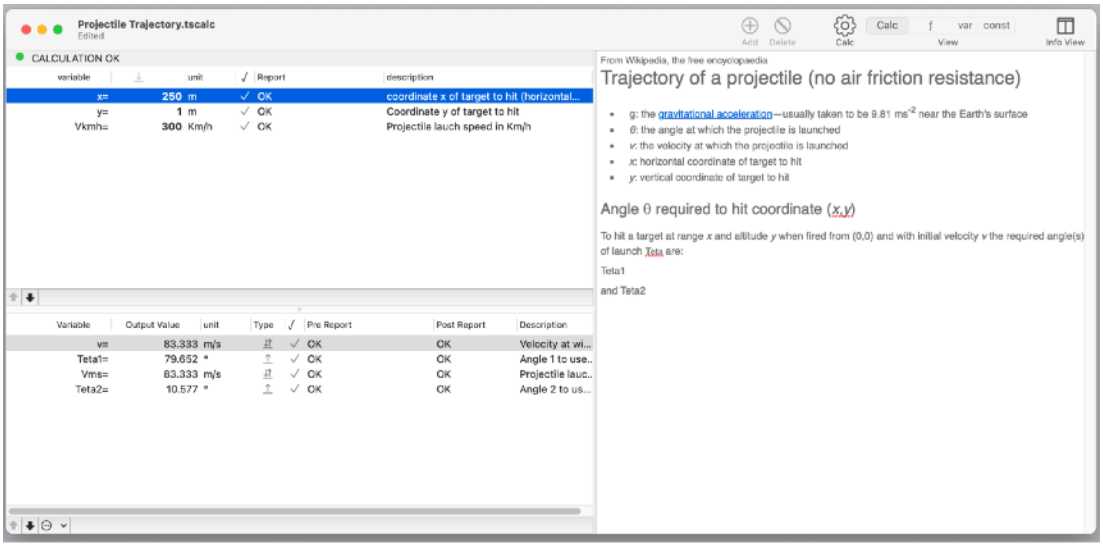
• Versions – the user can look at previous versions of documents and restore to any earlier version (just select Revert to Saved from the menu or the down arrow at the right of the title window, it appears only if you move the cursor over)

To use the Versions you can select ‘revert’ from the file menu or clicking ‘Browse All Versions…’ form the pop arrow in the title window

• Full Screen - the user can switch at any time to full screen using the native macOS Lion full screen mode and commands (use the upper right icon in the window to go full screen and bang the mouse in the upper part of the screen to re-obtain the menu and eventually clicking the standard icon to exit the full screen mode)

Dark Appearance Mode

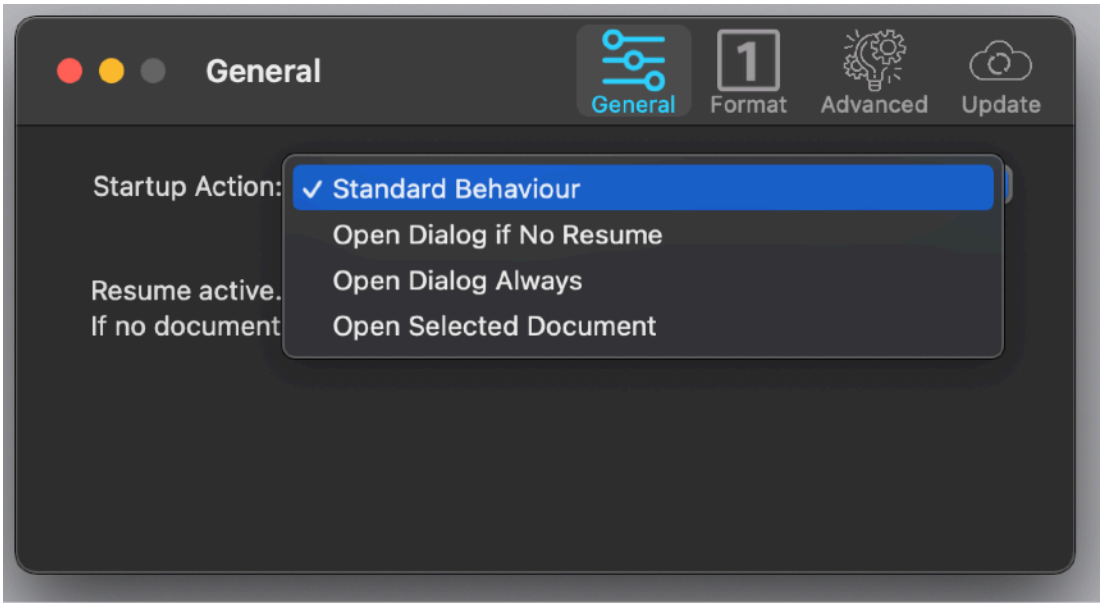
This application is also fully compatible with Light and Dark Appearance Mode.
It can switch at any time from one mode to another



Preferences

General

Specify the action to do at startup

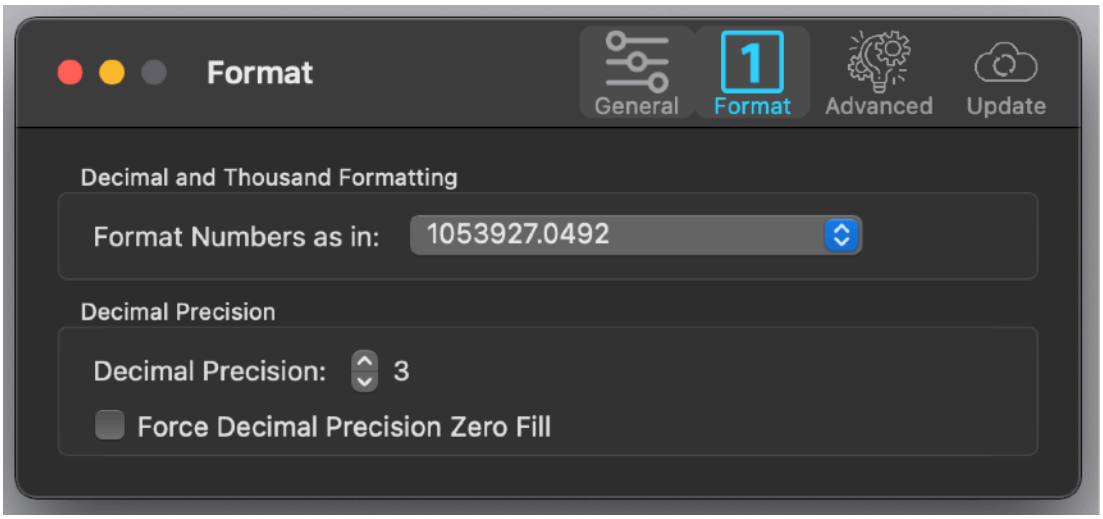


At any successive relaunch TS Calc will execute the option selected.
The additional two buttons at the foot of the edit field let you:

- Show in the finder the selected file
- Test open the selected file as it will be done at the next application launch
- Delete the selected document

Format

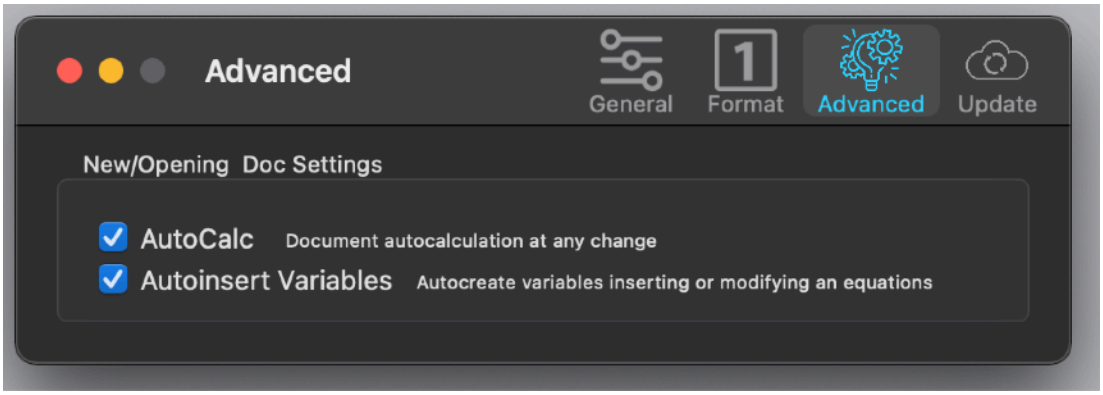
Allows you to select the format for numbers and decimal precision to use:



Advanced

Allows you to select some advanced options:

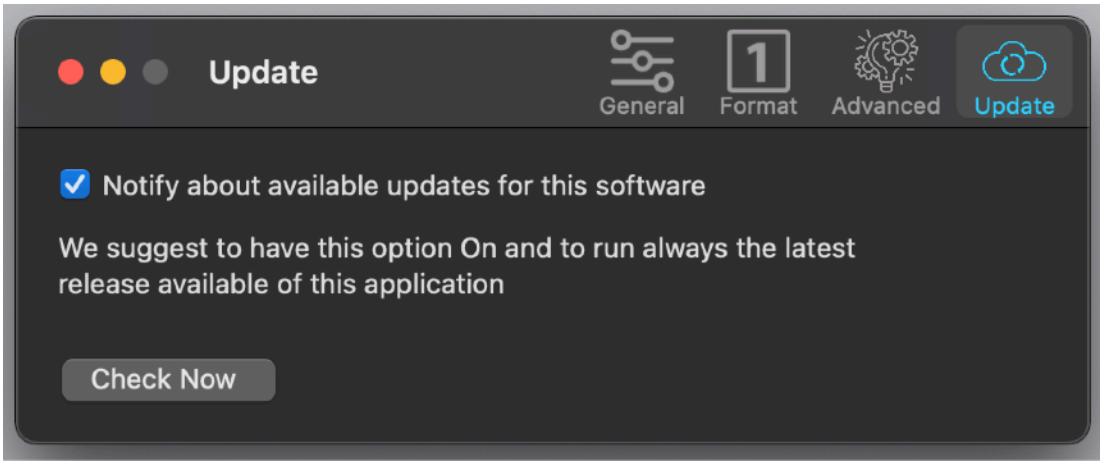
- To auto-calculate the result any time the user changes and input value
- To auto insert variables used inside a formula, in the variable list, if not yet inside the variable list a variable with that exact name



Update

*** Update section is not available in the App Store Release (if you purchased via the App Store, to obtain an update use the App Store Update function)**

TS Calc can inform you if an update is available.
We suggest to have this option always enabled to be informed of new releases
The option it is designed to do not waste bandwidth, so it check for update using a smart algorithm to avoid to check for it too many time inside a period.



If you download the upgrade, you need to install it.
A common error is to download an upgrade and install it maintaining the old application somewhere on the hard disk.
Then using to open the documents sometime the old application and sometime the new one. This cause some problems*. To avoid it simply install your application in the place dedicated to it, the Application folder. When you install an update on the standard Application folder, the system will ask if you want to replace the old one with the new, answering yes will install the new one replacing the old.

*If the application says the document you are trying to open was created with a newer version of the application, probably you have two different release of the application on your

Hard Disk and you are trying to open a document with the older version after having modified the document with the new one. When you receive a similar message open the about box inside the application and see if you are running the last release. In case download it, install it and USE it!

Help

TS Calc provides a standard User Guide under the Help menu.

This software is Universal Binaries and runs native on both PPC Mac and Intel Mac.

If you decide to purchase a license, thank you for your support. When you see on the net how much quality software there is for Mac and how much software is added every day it is because users support small developers buying software.

Support

You can also obtain support using the 'Support Email...' command. An email will be prepared using your email client with the correct address to send to.
Yes, we answer to your emails.

About Tension Software and Ecleti

All the software asset by Tension Software is now under Ecleti
New company name but still the same owner and main developer (Roberto Panetta)
So for the users nothing changes. We provide the same software and the services.
All the user licenses are valid and assistance is provided as before to all our users.