

# **Scientific Calculator v1.3.2**

## **Documentation**

**By Sam Gleske**

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# 1. Introduction

## 1.1. Welcome

Welcome to the Scientific Calculator v1.3.2 Help Documentation. Here you will find extensive knowledge and expertise with the function of this calculator, what different buttons do, examples in computing equations, as well as descriptions of menus and their functions.

I hope this will be of great help to you and that you find many uses for my calculator.

## 1.2. Calculator Info

### What is the Scientific Calculator v1.3.2?

It is an advanced calculator that uses JavaScript (not Java) to compute advanced math functions. Type in almost any equation and my calculator can handle it!

### Why is the version 1.x.x?

That is the number of times the calculator has had major revisions since its original release November, 2005. 2.x.x will be the version when the calculator has had 100 revisions. Each revision usually contains 3 or more changes to the programming, UI, or documentation.

### Other Fun Facts:

- It took me 10 hours to make the initial design of the calculator. So when I mean it was created on November 28th, 2005. I literally mean it was created that day!
- The original calculator had the following menus:
  - *File > Exit*
  - *Edit > Copy*
  - *Edit > Paste*
  - *Conv > Bin > Dec*
  - *Conv > Bin > Hex*
  - *Conv > Dec > Bin*
  - *Conv > Dec > Hex*
  - *Conv > Hex > Bin*
  - *Conv > Hex > Dec*
  - *View > Standard*
  - *View > Scientific* (disabled)
  - *Help > Help* (disabled)
  - *Help > About Calculator*
- The original calculator had most of the current buttons as well.
- The original calculator only supported Internet Explorer.

### What changes have there been?

All code has been entirely rewritten over versions 1.0.x and 1.1.x. It was rewritten to be better optimized, more efficient, and it was even reformatted to a common human readable tabular format across all documents. Even the file structure of the calculator has been changed. More menus have been

added such as an Octal conversion and Temperature conversion in the *Conv* menu.

### **Future Plans?**

Eventually I want the calculator to be able to calculate in hexadecimal, octal, and binary modes. And give the user the option to possibly automatically clean up equation errors.

## **1.3. Compatible Browsers**

Scientific Calculator v1.3.x fully supports the following web browsers on all platforms:

- Firefox
- Internet Explorer 6.0+
- Konqueror 3.4.2
- Mozilla 1.7
- Netscape
- Opera 9+
- Safari 3+

All other browsers work but may not be fully supported with detecting the keystrokes and having shortcut keys.

---

## **Compatibility Tests**

### **Successfully tested browsers**

- Windows 2000/XP/Vista
  - Firefox 1.0.x/1.5.x/2.0.x
  - Internet Explorer 6.x/7.x
  - Mozilla 1.7
  - Netscape 9.x
  - Opera 9.x
  - Safari 3.0
- Linux/UNIX
  - Firefox 1.0.x/1.5.x/2.0.x
  - KDE Konqueror 3.4.2
  - Mozilla web browser
  - Netscape 7.x
  - Opera 9.x
- MAC OSX
  - Firefox 1.5.x
  - Safari 3.0

### **Untested browsers (planned for testing)**

- MAC OSX
  - Internet Explorer 5

## Test results

Scientific Calculator v1.3.2 is compatible with the following web browsers on all platforms:

- Firefox 1.0+
- Internet Explorer 6.0+
- KDE Konqueror 3.4.2+
- Mozilla
- Netscape 7+
- Opera 9+
- Safari 3+

Note: Older versions of those browsers may still work with Scientific Calculator. Though I have not tested older versions so there's no guarantee that it will work.

## Compatibility Alert!

Recently I have discovered that the following Firefox extension(s) do not allow the calculator to be sized correctly:

- [1-ClickWeather 1.1.4](#)

I highly recommend you uninstall these extension(s) because they seem to mess with the CSS engine of Firefox which affects all web pages, not just this calculator.

## 1.4. Keyboard Shortcuts

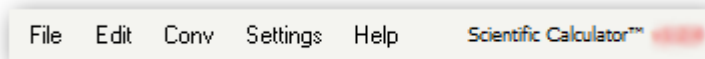
- All the Basic Equation Keys work
- MC press C key
- MR press R key
- MS press S key
- M+ press M key
- pi press P key
- () press () keys
- Backspace press BACKSPACE key
- CE press DELETE key
- = press Enter (Return) key
- EE press E key

When the Calculator Display is selected the keyboard shortcuts are disabled and it acts like a normal text field.

## 2. Menu Help

### 2.1. Overview

**What is the menu?**



**What is a submenu?**

A submenu is a branch within the main headers of the menu. Click on the main header *File*. You will notice other menus extend from it (*Reload* and *Close*); these are called submenus.

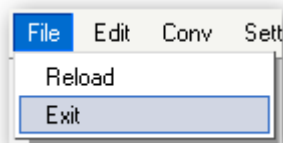
**What are submenu notations?**

A submenu notation is similar to a webpage breadcrumb menu.

For example if you were specified to click *File* and then click *Reload*, then the menu notation would be "select Reload under *File > Reload*".

### 2.2. File Menu

**What is the File Menu?**

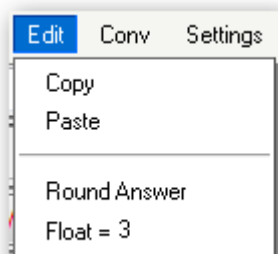


**Functions of the File Menu:**

- Under *File > Reload*: This submenu resets all settings of the calculator
- Under *File > Exit*: This submenu closes the calculator

### 2.3. Edit Menu

**What is the Edit Menu?**



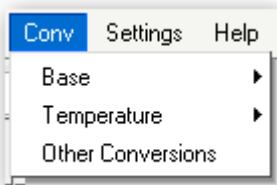
### Functions of the Edit Menu:

- *Edit > Copy* Copies the displayed equation
- *Edit > Paste* Pastes contents of clipboard into the current equation
- *Edit > Round Answer* Rounds the current answer/equation to the decimal places specified
- *Edit > Float* Specifies the number of decimal places to be rounded

Note: *Copy* and *Paste* menus only show up in Internet Explorer where clipboard access by JavaScript is allowed. It won't work in any other browser so therefore it only shows up in IE.

## 2.4. Conv Menu

### What is the Conv Menu?



### What does Conv mean?

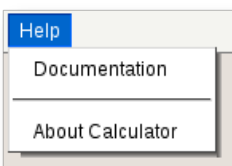
Conv is abbreviated for Convert. Its purpose is to convert between number types

### Functions of the Conv Menu:

- *Conv > Base* Converts the equation between Binary, Decimal, Hexadecimal, and Octal bases.
- *Conv > Temperature* Converts the equation between Celsius, Fahrenheit, Rankine, and Reaumur temperatures.
- *Conv > Other Conversions* is a link to [onlineconversion.com](http://onlineconversion.com) where there is an extensive list of units to convert from.

## 2.5. Help Menu

### What is the Help Menu?



### Functions of the Help Menu:

- *Help > Documentation* Displays the Calculator Help (this entire help guide).
- *Help > About* Displays a quick information dialog about this calculator.

## 3. Button Help

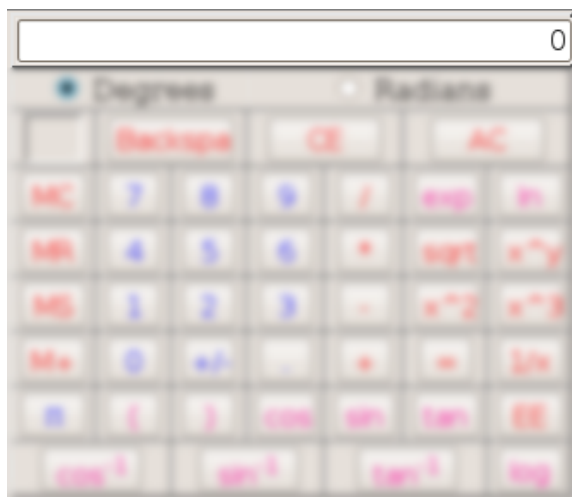
### 3.1. Overview

This section is to teach you how to use the different buttons of the Scientific Calculator. You will learn the names of the function of each button as well as how to use them. The buttons are split into sections:

- Deletion Buttons (Backspace, CE, AC)
- Basic Equation Buttons (0-9, /, \*, +, -, +/-, .., =)
- Memory Buttons (MC, MR, MS, M+)
- Power Functions (sqrt,  $x^y$ ,  $x^2$ ,  $x^3$ )
- Trigonometric Functions (exp, ln, log, cos, sin, tan, acos, asin, atan)
- Miscellaneous (remaining buttons not covered in other sections)

#### Quick note before you proceed:

The display below will be called a few things.

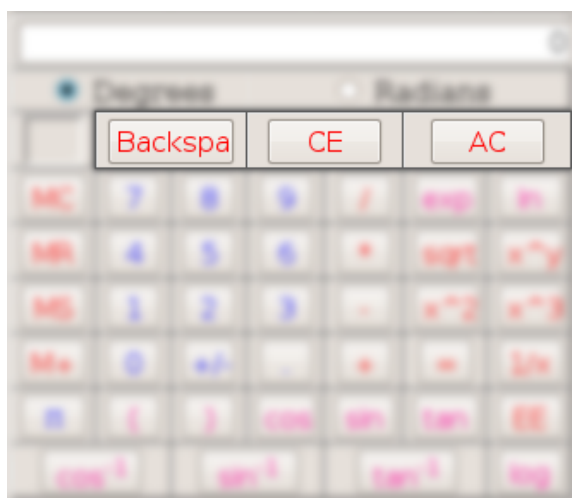


Display, Equation Display, Current Equation, the Equation

### 3.2. Deletion Buttons

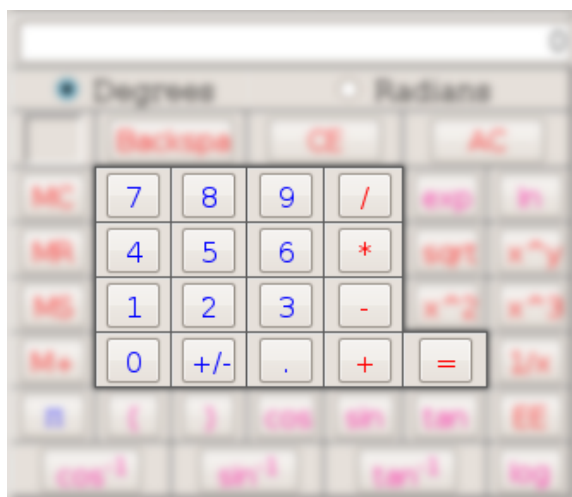
There are several ways to remove variables or entire equations from the display or memory of the Scientific Calculator.





- The next button to the right, "Backspace", deletes a value from the Equation Display from right to left.
- The next button to the right is the CE button or better known as the Clear Equation button. It gets rid of any contents within the Display and sets it back to its default value "0".
- The AC button or All Clear button clears both the memory (by getting rid of the "M" along with the stored data) as well as the Display (sets back to "0")

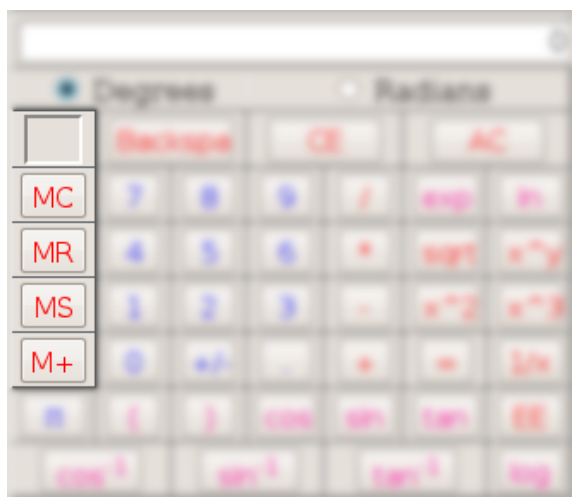
### 3.3. Basic Equations



Above are the basic calculator buttons found on every calculator.

**Rules:** There has to be a symbol in between any two algebraic functions. For example  $(8)(2)=16$  algebraically. But that has to be inputted into the calculator as  $(8)*(2)=16$ .

### 3.4. Memory Buttons

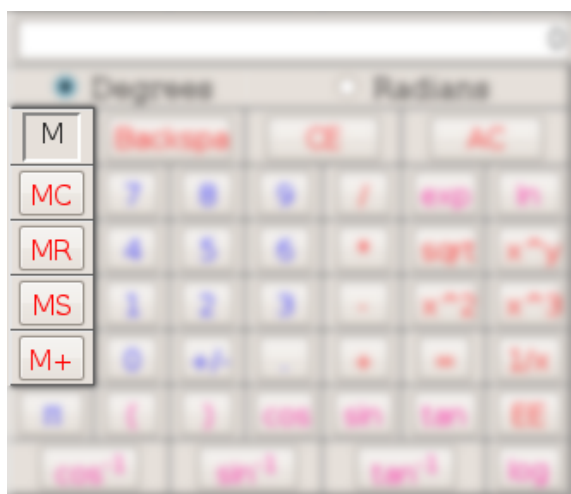


In this help topic you will learn how to use the memory functions of the Scientific Calculator. At the top you should recognize the memory indicator (see Deletion Buttons). Click on the word memory indicator to see its definition. Now before you can use the memory functions you must learn what its buttons mean. Look below for explanations:

- The empty box at the top is known as the memory state. It "indicates" if it has value stored in memory by showing an "M" in its center.
- MC (Memory Clear) Clears the memory and takes the "M" out of the memory indicator
- MR (Memory Recall) Takes the equation out of memory and adds it to the end of the Equation Display \*\*See examples for a better explanation
- MS (Memory Store) Calculates and then stores current Equation into memory to be later recalled. Also a large "M" will appear inside of the memory indicator to show a value has been stored.
- M+ (Memory Plus) Takes the value stored in memory, calculates and takes the currently Displayed equation, and adds them both together while storing the answer once again into memory.

#### Example 1 (Storing in Memory):

1. Type in 45
2. Hit MS
3. Your memory indicator should have an "M" like the one below



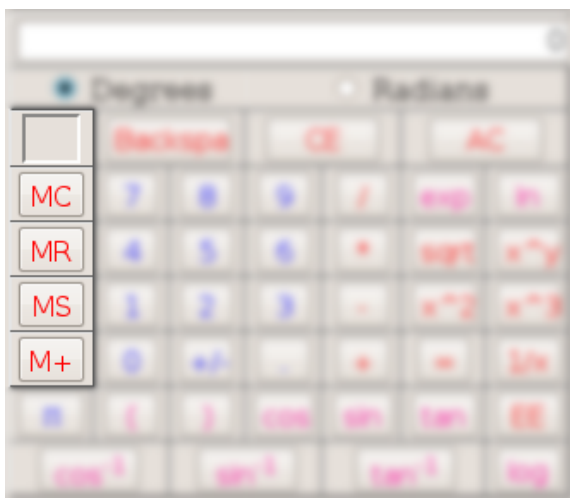
### Example 2 (Recalling Memory):

1. Type in 45
2. Hit MS
3. Now type in + (your Display should look like "45+")
4. Hit MR
5. You should get 45+45
6. Hit Enter (Return) and your answer should be 90

*Note: If you did not type in the + symbol then you would have gotten 4545. So don't forget to put an equation symbol before hitting MR*

### Example 3 (Adding to Memory and then Clearing it):

1. Type in 45
2. Hit MS
3. This time hit M+
4. Now type in + (your Display should look like "45+")
5. Hit MR
6. You should get 45+90
7. Now hit MC to clear the memory and your memory indicator should be empty like the picture below



### 3.5. Power Functions

Now we discuss power functions. Look at the picture below for a list of the power function buttons:



The first power function we shall go over is most likely the hardest to comprehend for a new user at first. It is the  $x^y$  button. Some may get confused as to how this works because when they click it what appears in the Display is " $\wedge$ ". This is actually just an easy way for you to write an equation.

#### Examples of " $x^y$ " functions:

$x^y$  is the same thing as  $X^Y$ .

$2^3=8$  is the same as  $2\wedge 3=8$

Putting it in a more complex equation is no problem either:

$4(2^3+4)=48$  which is like  $4*(2\wedge 3+4)$

*Don't forget the a symbol goes between 2 algebraic functions like  $(8)*(8)$*

*Also all parenthesis have to be closed in order for any function to work*

**Moving on...**

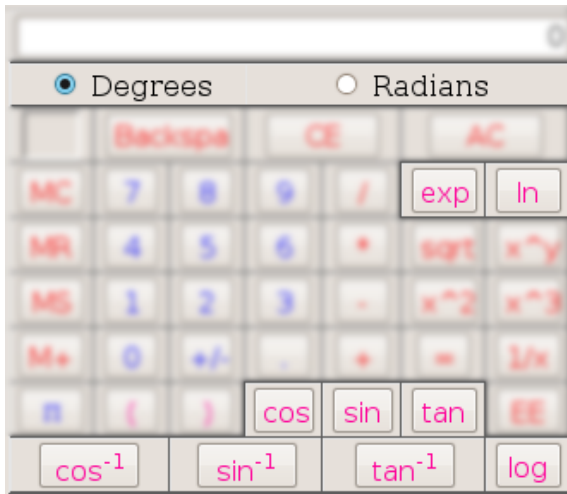
After learning that understanding the rest is no problem.

**sqrt** takes the square route of the current Equation which is basically  $x^{(1/2)}$

**x^2** squares the current Equation

and **x^3** cubes the current Equation

### 3.6. Trigonometric Functions



- At the top you can select a mode for the trig functions to be calculated in, Degrees or Radians. Depending on what you need to calculate is how you decide what mode you need to be in. Most commonly it's Degrees unless you're calculating angular kinematics or simple harmonic motion.
- **exp** (exponential,  $e^x$ ) calculates the current equation and then takes the exponential of it
- **ln** (natural log) calculates the current equation and then takes the natural log of it.
- **log** calculates the current current equation and takes the log of it.
- **cos** inserts 'cos(' into the current equation.
- **sin** inserts 'sin(' into the current equation.
- **tan** inserts 'tan(' into the current equation.
- **cos<sup>-1</sup>** inserts 'acos(' into the current equation. Also known as the inverse cos or arc-cos.
- **sin<sup>-1</sup>** inserts 'asin(' into the current equation. Also known as the inverse sin or arc-sin.
- **tan<sup>-1</sup>** inserts 'atan(' into the current equation. Also known as the inverse tan or arc-tan.

### Common Math rules

**e<sup>x</sup>** and **ln(x)** are inverse of each other meaning **e<sup>ln(x)</sup>=x** and **ln(e<sup>x</sup>)=x**

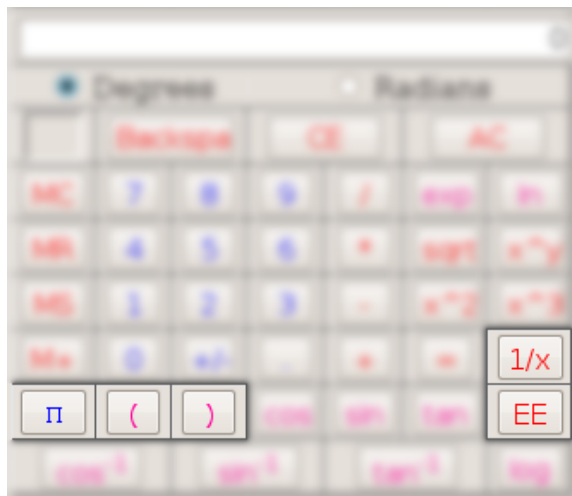
**ln(x)** (natural log) is the integral of  $1/x$  which was proven by Euler.

**log(x)** is the ratio of  $\ln(x)/\ln(10)$ . The inverse of **log(x)** is **10<sup>x</sup>** so **log(10<sup>x</sup>)=x** and **10<sup>log(x)</sup>=x**. By default **log(x)** is **log<sub>10</sub>(x)**

To calculate a different base of log, for example  $\log_3(x)=3^x$ , you would have to calculate  $\ln(x)/\ln(3)=3^x$

### 3.7. Miscellaneous

The rest of the button functions of the Scientific Calculator fall into this category. After you read this you will be scott free and on your way to being a calculator expert!!!



$\pi$  which is known as pi in the equation Display is = 3.141592653589793

It is a Greek constant for finding properties of circles such as the area and circumference.

The ( and ) buttons insert left and right parenthesis into the equation. This is for completing the **pow**( function.

**1/x** flips the equation by dividing it into 1.

**EE** is the same thing as  $\times 10^x$  for example  $1 \times 10^3 = 1e3 = 1000$  (It is NOT an exponential [exp]).

## 4. License Information

### 4.1. Disclaimer

#### Warning!

I do my best to make sure all the calculations and conversions are accurate and correct. But there is always the possibility that they are still inaccurate or incorrect. Here are some points I would like to bring to your attention.

1. **Do not assume** any calculation/conversion this calculator makes is accurate and correct.
2. **Do not use** the Scientific Calculator where loss of life, money, or property could result from inaccurate or incorrect conversions and/or calculations.
3. **Rounding Errors:** Often times, converting/calculating between large and small units causes rounding errors.
  1. *Rounding errors are cause by different:* browser types (even separate versions of the same type), operating systems, versions of JavaScript, and other factors. For example, you will sometimes see 999.9999999 or 1000.0000001 instead of 1000.

#### Example Equation:

$1.001 \times (10^3) = 1000.9999999999999$  instead of 1001

Please keep these key points in mind when using this Scientific Calculator.

A quick tip would be, in the edit menu, to set float=10 and round your answers. This will help reduce the rounding error effect.

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## 5. The Author

### 5.1. Contributors

The following are contributors who helped this calculator along the way:

- name - year contributed
- Kyle Winters - 2005
- Chad Carreras - 2005,2007
- Shriram Raghu - 2008

### 5.2. About the Author

Hello! My name is Sam Gleske. I am 21 years old and do JavaScript programming as a hobby. I am a Computer Engineering student at Drexel University. Other hobbies include community activities such as being involved with Boy Scouts (now as a role model rather than a scout). I also enjoy rebuilding racing motors of motocross bikes (I race and am my own mechanic) and tuning the overall performance of the bike for track conditions. I love to work with my hands on any type of project and am motivated to achieve greatness.

I have a couple of nationally recognized certifications for diagnosing and fixing personal computers as well as an extended knowledge of implemented network structures.

My programming experience includes the following languages: AutoCAD, CSS, C++, C#, DHTML, HTML, Java, JavaScript, Labview, Linux Shell, Maple, Neuron C, NSIS, UPMACS, Windows Batch, XHTML, XML.

### 5.3. Other Developments

By Sam Gleske

Base64 Encrypt/Decrypt Plugin for IE (not released) (completed)

Initial helped develop [Pioneer Linux](#).

FolderView UI (not released yet)

FolderView UI Special Edition for Help Systems (not released yet)

JS Editor (not released).An attempt at a web-based version of Microsoft Word.

[UHARC CMD](#) which can be found on my homepage.

### 5.4. Technologies Used

This section discusses the technologies that were used to create the calculator and this help system.

First of all, the web languages CSS 2.0, HTML 4.01 Transitional, and JavaScript were programmed according to W3C standards and were validated successfully at [validator.w3.org](http://validator.w3.org) and [jigsaw.w3.org/css-validator](http://jigsaw.w3.org/css-validator)

Programs used during development:

- **Aptana**: Replaced Notepad++ as my JavaScript IDE because of autocompletion.
- **GIMP**: Used for advanced graphic editing using layers. Better than Adobe Photoshop in my opinion because it's free. This is how I blurred portions of my sample images and gave them background shadows.
- **Notepad++**: Used for syntax highlighting in HTML, CSS, and JavaScript documents. It also provided a useful function list for navigating JavaScript files.
- **OpenOffice.org**: Used to draft PDF format of documentation using OO Writer.
- **Quanta**: An advanced HTML/JavaScript/CSS IDE used on Linux.
- **Zoom Search Engine**: This is a nice little piece of software that gave my help documentation search functionality. It is free for small websites and is a handy and useful tool for my end users.

## ***5.5. Contact the Author***

Sam Gleske

[sag47@drexel.edu](mailto:sag47@drexel.edu)

<http://www.pages.drexel.edu/~sag47/>

## ***5.6. Resume Request***

If you would like to see my resume then you must request it because I don't post it on-line. You can simply email me (my email is in the contacts section). Enter "Resume Request" as the subject header.