

# Science, Technology, Engineering & Maths (STEM) Calculator Guide

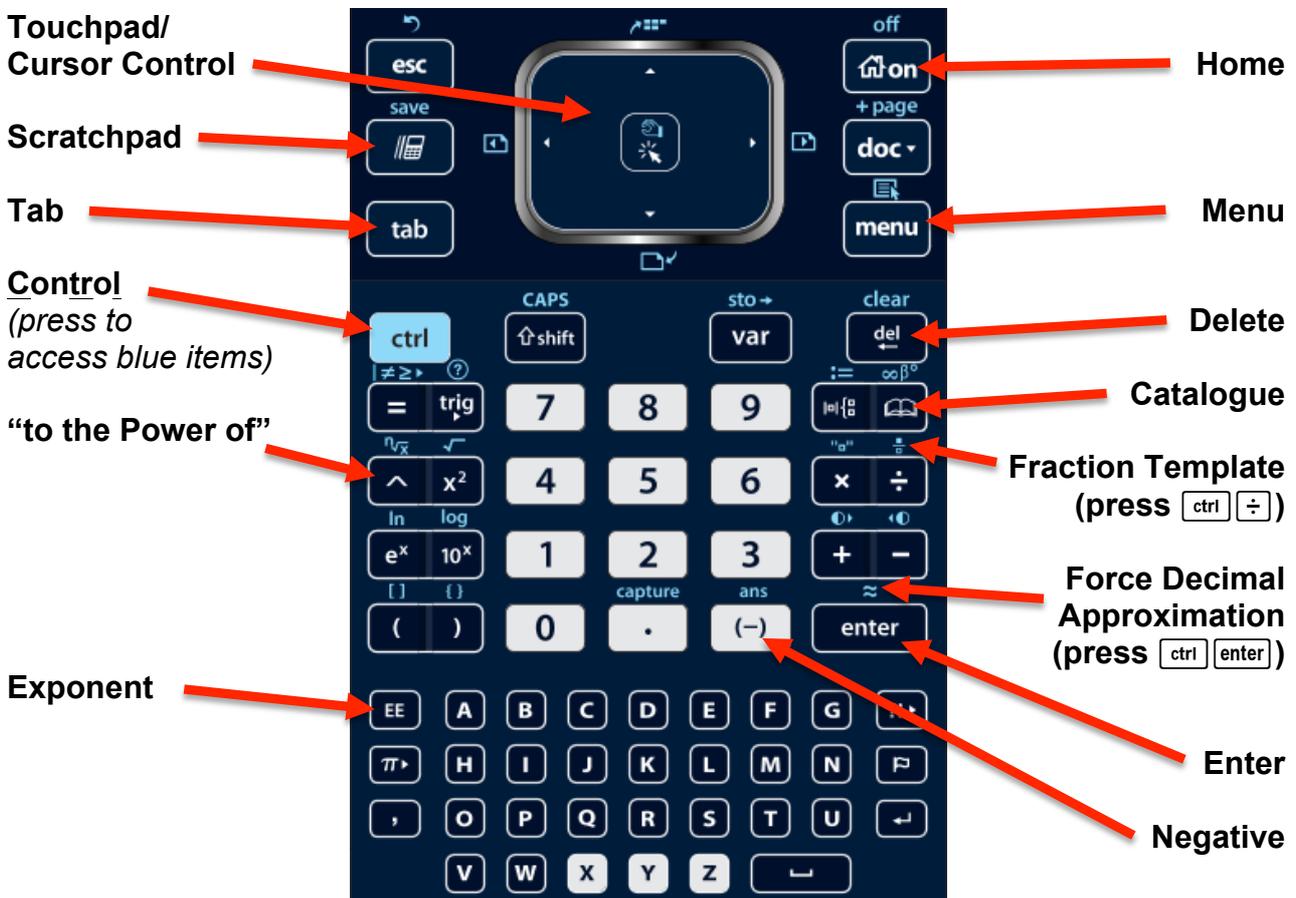
## Texas Instruments TI-Nspire CX Handheld (Operating System 4.4)

This short guide is designed to instruct you on how to set up your handheld to perform calculations that you will typically do in Science, Technology, Engineering and Maths. This guide will not attempt to explain the underlying Numerical or Mathematical concepts.

Page

1	Layout of the keypad, highlighting keys used in this guide
2	The Document Settings Menu
3	Restoring the General Settings to Factory Default Settings
4	Using the TI-Nspire for Calculations with Factory Default Settings
5	Using the TI-Nspire in Normal Calculation Mode
6	Using the TI-Nspire in Fixed Decimal Place Mode
7 & 8	Using the TI-Nspire in Scientific Notation Mode
9	Using the TI-Nspire in Engineering mode
10	Using the TI-Nspire in Degree Mode for Calculations
10	Using the TI-Nspire in Degree Mode for Drawing Graphs
11	Calculating Reciprocals
12	Converting numbers between Decimal and Binary

**Page 1 - Layout of the keypad, highlighting keys used in this guide.**



## Page 2 - The Document Settings Menu

The Document Settings Menu controls how the TI-Nspire displays answers to calculations.

Go to the Home screen by pressing .

Press **5** to select **Settings**

*This will open a new pop-up menu, as shown ⇨*

Press **2** to select **Document Settings**

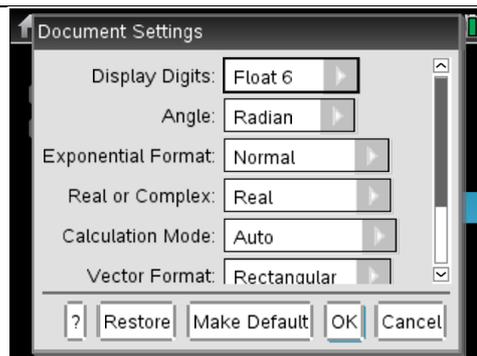


You will now see the **Document Settings** menu.

You can **either** press **tab**, **or** you can use the Touchpad, to move to different options.

You can press **▶** to open up a drop-down menu, and then use **▲** and **▼** to move through the settings.

You can **either** press **enter**, **or** you can click on the centre of the touchpad , to make your setting choice.



**This guide will demonstrate how several of these menu settings can be used to control how answers to calculations are displayed.**

You can also access the Document Settings menu from within any Document or Scratchpad, without having to go back to the Home screen.

Simply use the touchpad to move the cursor arrow over the **cog/battery** icon in the top right corner.

Then click on the centre of the touchpad to select the icon, which will then open up the first pop-up menu.

## Page 3 - Restoring the Document Settings to Factory Default Settings

It is often helpful to reset the general settings to avoid unexpected behaviour when starting a new calculation task.

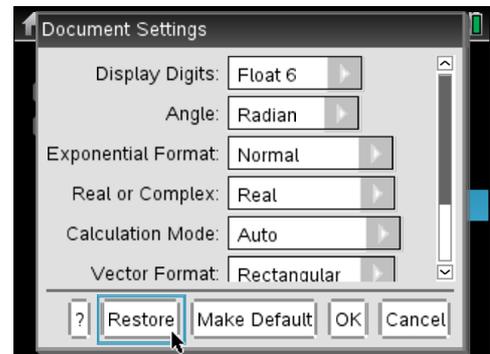
This resetting action is called 'Restoring settings to factory default settings'.

Go to the Home screen by pressing  on

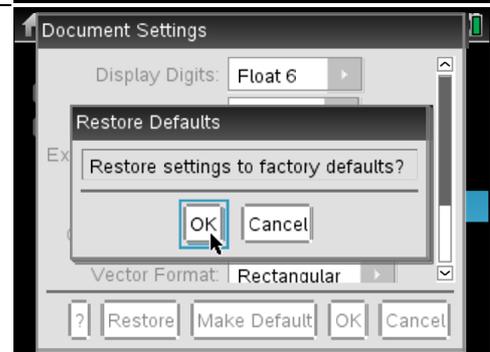
Press **5** to select **Settings**

Press **2** to select **Document Settings**

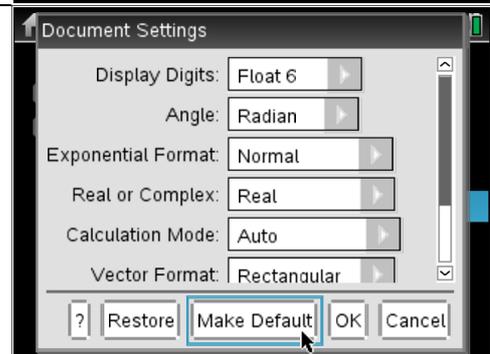
Select 



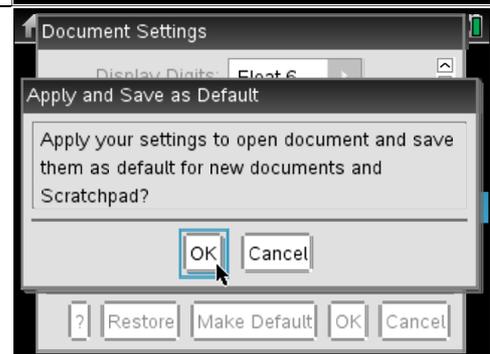
Select  to restore the settings.



Select 



Select  to apply the restored settings.



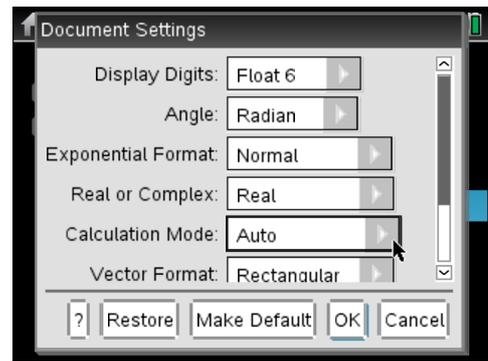
## Page 4 - Using the TI-Nspire for Calculations with Factory Default Settings

Restore Factory Default Settings by first going to the Home screen by pressing .

Press  to select **Settings**

Press  to select **Document Settings**

Select  and then  to Restore factory default settings.



Notice that **Calculation Mode** is set to **Auto**

This means that the TI-Nspire will try and give answers exactly, without writing them as decimals.

Select  and then .

Access the Scratchpad Calculator by pressing .

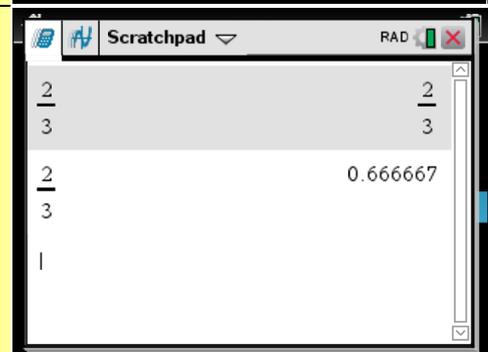
When you type    and then press , the display should look like that shown  $\Rightarrow$

Notice that the answer is displayed as an exact fraction.



Press  then .

This selects  $\approx$  and displays the last calculation's answer as a decimal approximation.

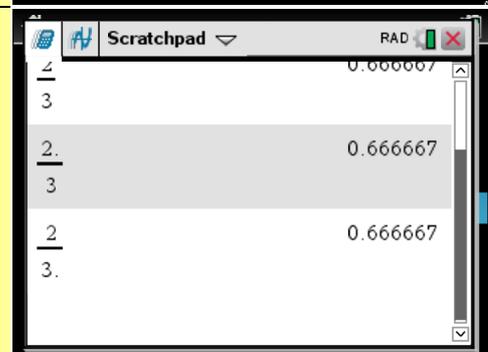


You can force the TI-Nspire to give a decimal answer straight away by simply including a decimal point somewhere in your calculation - even at the end of a number will do.

For example, you could

**EITHER** type in     which will display  $\frac{2.}{3}$

**OR** type in     which will display  $\frac{2}{3.}$



## Page 5 - Using the TI-Nspire in Normal Calculation Mode

*We are taking 'Normal Calculation Mode' to mean here that the TI-Nspire will give answers to all calculations as decimal approximations, rather than exact values.*

Go to the Home screen by pressing .

Press **5** to select **Settings**

Press **2** to select **Document Settings**

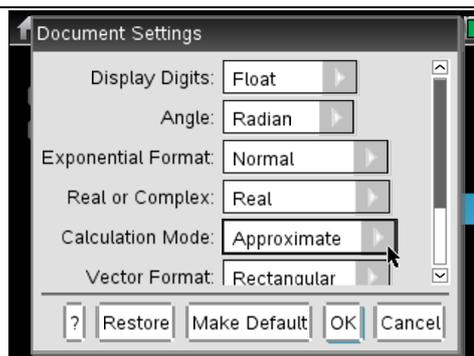
Select  and then  to Restore factory default settings.

For **Display Digits** select **Float**

For **Calculation Mode** select **Approximate**

Select  and then .

These settings will display all answers as decimals, with up to 12 decimal places on show.

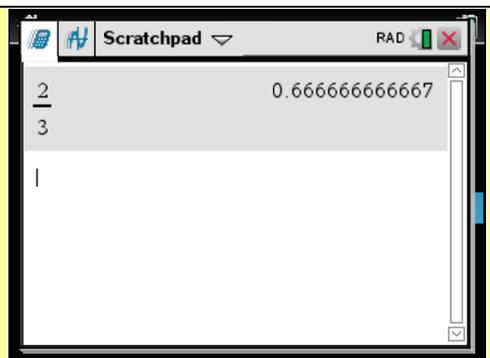


*Access the Scratchpad Calculator by pressing .*

*When you type **2**  **3** and then press **enter**, the display should look like that shown  $\Rightarrow$*

*Notice that the displayed answer has been rounded to 12 decimal places.*

*The TI-Nspire actually knows the answer to 14 digit accuracy, and it uses these extra known digits to round the answer correctly.*



## Page 6 - Using the TI-Nspire in Fixed Decimal Place Mode

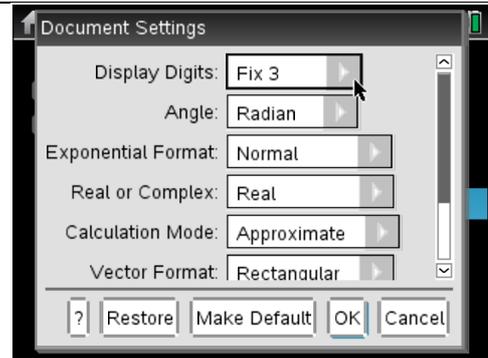
*In this example, we will select 3 decimal places.*

Go to the Home screen by pressing .

Press **5** to select **Settings**

Press **2** to select **Document Settings**

Select  and then  to Restore factory default settings.



For **Display Digits** select **Fix 3** (*scroll down the list to below all the Float settings*)

For **Calculation Mode** select **Approximate**

Select  and then .

*Access the Scratchpad Calculator by pressing .*

*When you type **1****.****2****3****4****5** and then press **enter**, the display should look like that shown ⇨*

*Notice that the number has been rounded to 3 decimal places.*



## Page 7 & 8 - Using the TI-Nspire in Scientific Notation Mode

Go to the Home screen by pressing **on**.

Press **5** to select **Settings**

Press **2** to select **Document Settings**

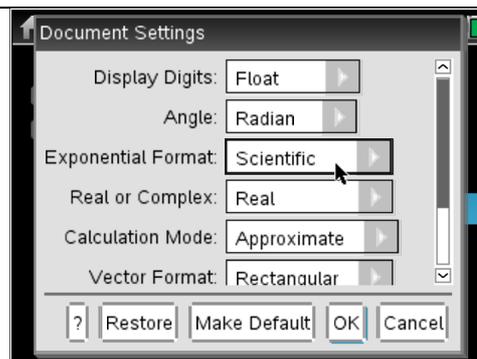
Select and then to Restore factory default settings.

For **Display Digits** select **Float**

For **Exponential Format** select **Scientific**

For **Calculation Mode** select **Approximate**

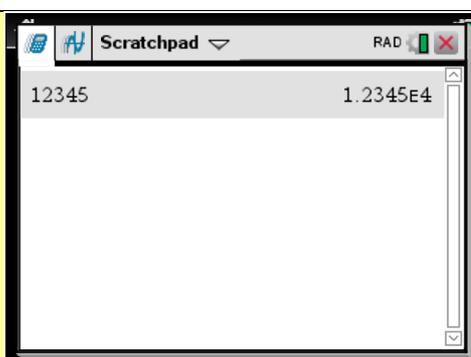
Select and then .



Access the Scratchpad Calculator by pressing .

When you type **1 2 3 4 5** and then press **enter**, the display should look like that shown ⇨

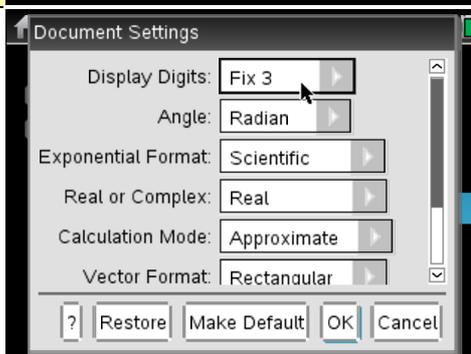
Notice that the number has not been rounded, as the **Float** setting was chosen.



If you wanted Scientific Notation to 3 decimal places, press **5** **2**

For **Display Digits** select **Fix 3**

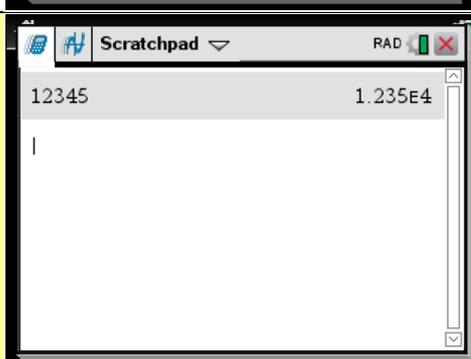
Select and then .



Access the Scratchpad Calculator by pressing .

When you type **1 2 3 4 5** and then press **enter**, the display should look like that shown ⇨

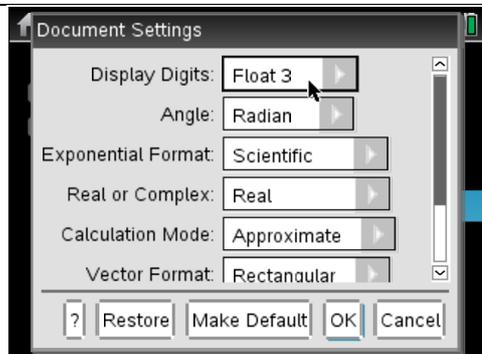
Notice that the displayed result has been rounded to 3 decimal places.



If you wanted Scientific Notation to 3 significant figures places, press **on** **5** **2**

For **Display Digits** select **Float 3**

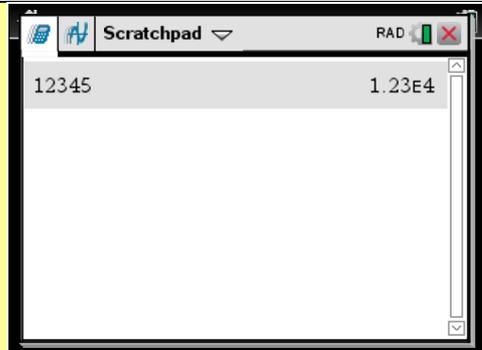
Select **Make Default** and then **OK**.



Access the Scratchpad Calculator by pressing **on**.

When you type **1** **2** **3** **4** **5** and then press **enter**, the display should look like that shown ⇒

Notice that the displayed result has been rounded to 3 significant figures.



If you wanted to do the calculation

$$(1.23 \times 10^4) \div (5.67 \times 10^{-8})$$

You would type:

**1** **.** **2** **3** **EE** **4** **÷** **5** **.** **6** **7** **EE** **(←)** **8**

and then press **enter**.

Note that pressing **EE** **4** means the same as  $\times 10^4$



... pressing **enter** becomes....

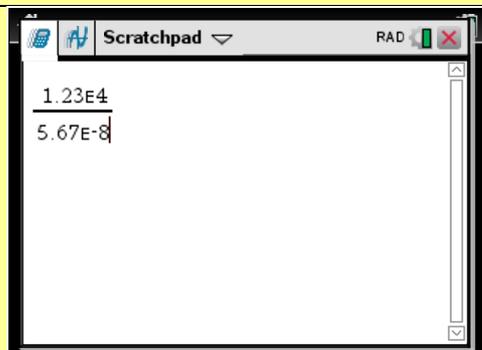


Alternatively, you could enter the calculation using the fraction template. Type:

**ctrl** **÷** **1** **.** **2** **3** **EE** **4** **tab** **5** **.** **6** **7** **EE** **(←)** **8**

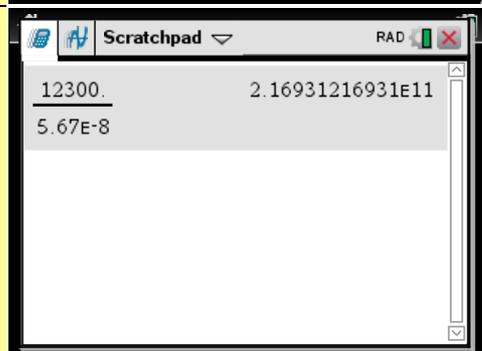
to give a screen like that shown ⇒

and then press **enter**.



The above results are displayed with 3 significant figures (Float 3) in Scientific mode.

The same result in just Float mode would look like ⇒



## Page 9 - Using the TI-Nspire in Engineering mode

Go to the Home screen by pressing  on.

Press **5** to select **Settings**

Press **2** to select **Document Settings**

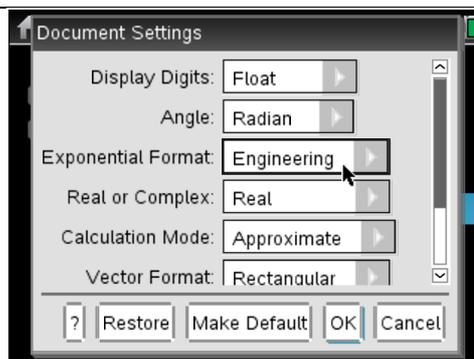
Select  and then  to Restore factory default settings.

For **Display Digits** select **Float**

For **Exponential Format** select **Engineering**

For **Calculation Mode** select **Approximate**

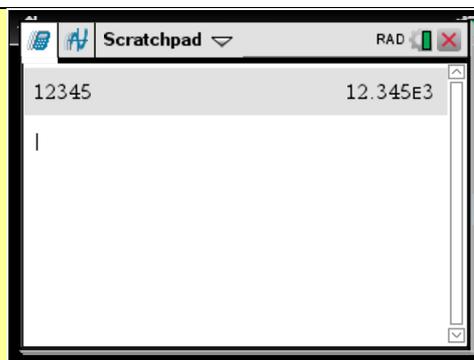
Select  and then .



*Access the Scratchpad Calculator by pressing .*

*When you type **1 2 3 4 5** and then press **enter**, the display should look like that shown ⇨*

*Notice that the number has not been rounded, as the **Float** setting was chosen.*



## Page 10 - Using the TI-Nspire in Degree Mode for Calculations

Go to the Home screen by pressing .

Press  to select **Settings**

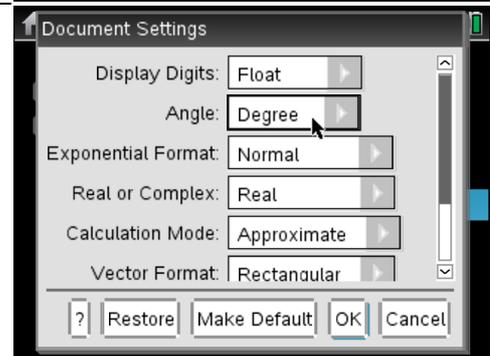
Press  to select **Document Settings**



You are now viewing **Document Settings**

For **Angle** select **Degree**

Select  and then .



## Page 10 - Using the TI-Nspire in Degree Mode for Drawing Graphs

Go to the Home screen by pressing .

Press  to select the Scratchpad **Graph**

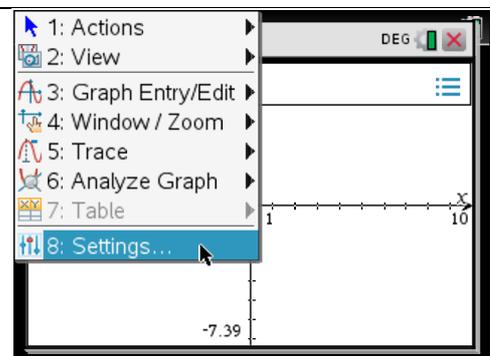
Press  to select **8: Settings**

--- OR ---

Press  to select **New Document**

Press  to **Add Graphs**

Press  to select **8: Settings**

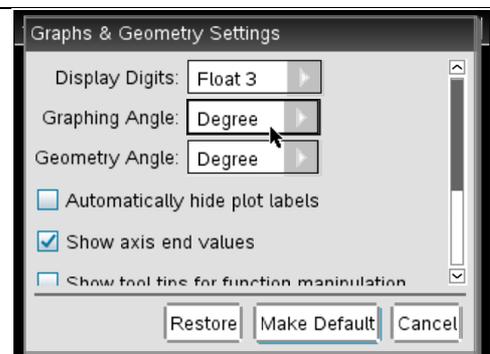


You are now viewing **Graphs & Geometry Settings**

For **Graphing Angle** select **Degree**

Select  and then .

The **important** thing to note here is that you use the  button to change the **Graphing Angle** settings, but to change the **Calculation Angle** settings, you use the  or the home screen to access the **Document Settings** screen.



## Page 11 - Calculating Reciprocals

The 'reciprocal of a number' is a fraction formed by putting the number in the denominator of a fraction.

Go to the Home screen by pressing .

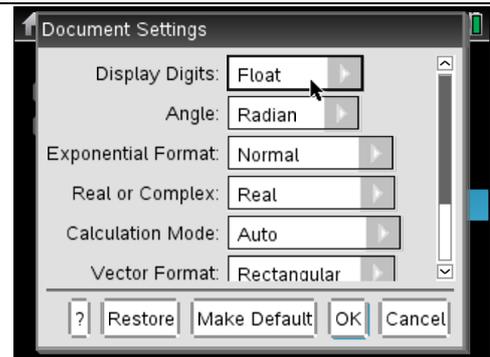
Press **5** to select **Settings**

Press **2** to select **Document Settings**

Select and then to Restore factory default settings.

For **Display Digits** select **Float**

Select and then .



Access the Scratchpad Calculator by pressing .

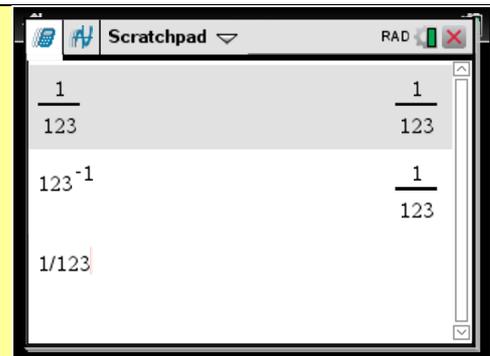
To calculate the reciprocal of 123

**EITHER** type in **1** **1** **2** **3** to display  $\frac{1}{123}$

**OR** type in **1** **2** **3** **1** to display  $123^{-1}$

**OR** type in **1** **1** **2** **3** to display 1/123

.....and then press .



You can convert the answer from a fraction to a decimal, by doing the following...

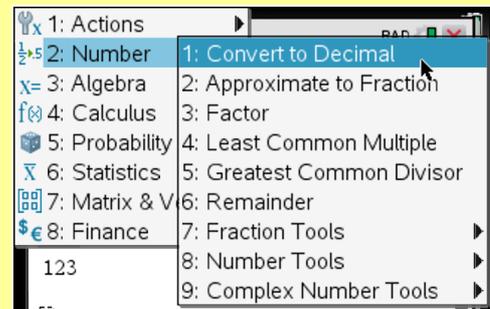
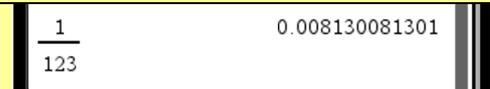
**EITHER** press then

This selects  $\approx$  and displays a decimal approximation.

**OR** Press

Press **2** to select **Number**

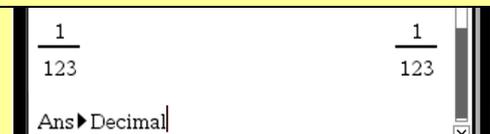
Press **1** to select **Convert to Decimal**



*This should give a screen as shown* ⇨

Press to convert the fraction to its decimal.

Notice that the number has not been rounded, as the **Float** setting is currently chosen.



... pressing becomes....



## Page 12 - Converting numbers between Decimal and Binary.

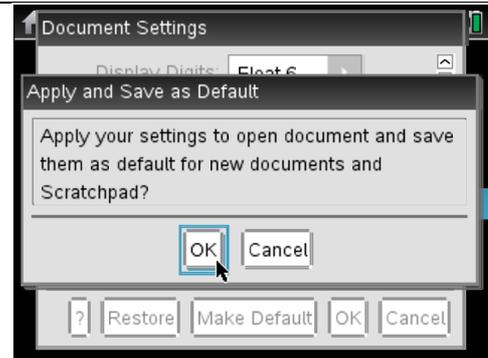
Go to the Home screen by pressing **on**.

Press **5** to select **Settings**

Press **2** to select **Document Settings**

Select and to restore the settings.

Select and then .



To convert the decimal number 123 to binary, first access the Scratchpad Calculator by pressing .

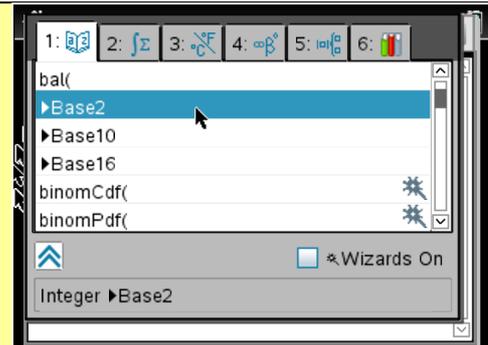
Type in **1 2 3**

Press to access the catalogue, as shown  $\Rightarrow$

Press **B** to quickly locate the commands that start with the letter **B**.

Move down the list to highlight **►Base2**

Select **►Base2** by pressing .



Press again to complete the conversion.

Notice the binary number is prefixed by **0b**  
*[the number **zero** and the letter **b**]*



To convert the binary number 11011 to decimal, type:

**0 B 1 1 0 1 1**

As the handheld is already in decimal mode, it will display the decimal equivalent to binary 11011.



If you want to have the TI-Nspire work exclusively in Binary, go to the Home screen by pressing **on**.

Press **5** to select **Settings**

Press **2** to select **Document Settings**

Scroll down, and for **Base** select **Binary**

Select and then .

