

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

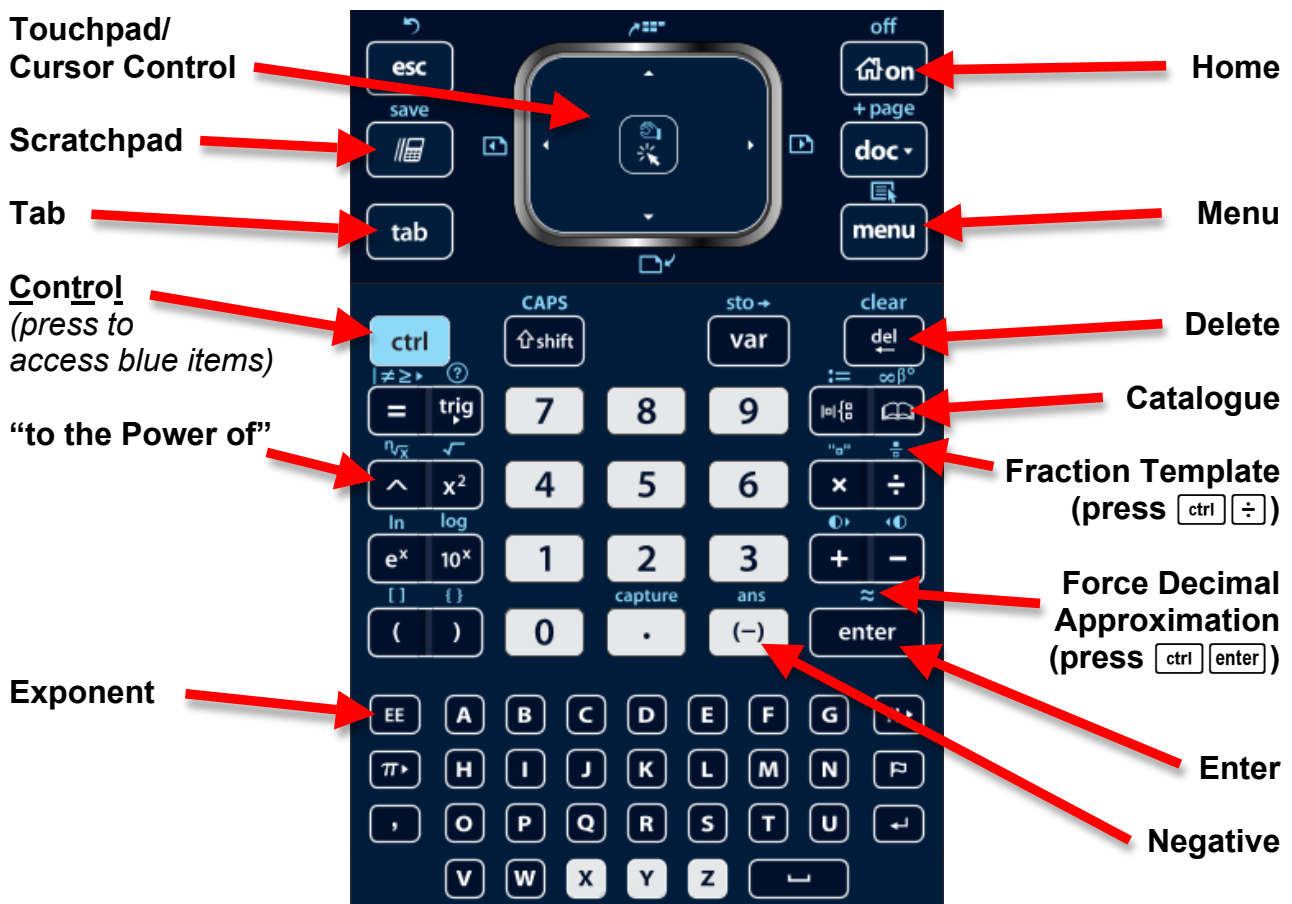
Texas Instruments TI-Nspire Handheld (Touchpad with Operating System 3.2)

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 Numeracy or Maths concepts.

Page


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

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



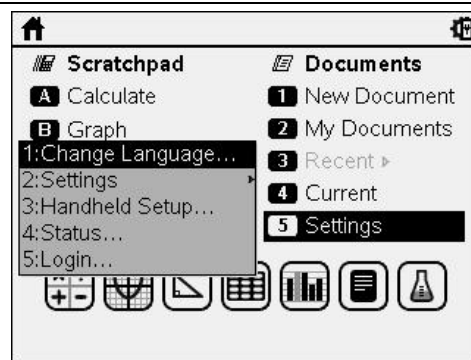
Page 2 - The General Settings Menu

The General Settings Menu controls how the Nspire displays answers to calculations.

Go to the Home screen by pressing  on.

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

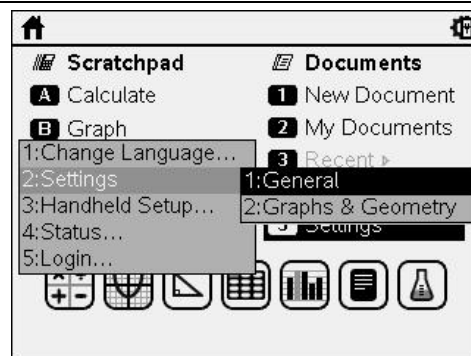
This will open a new pop-up menu, as shown ⇨



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

This will open another pop-up menu, as shown ⇨


Press **1** to select **General**

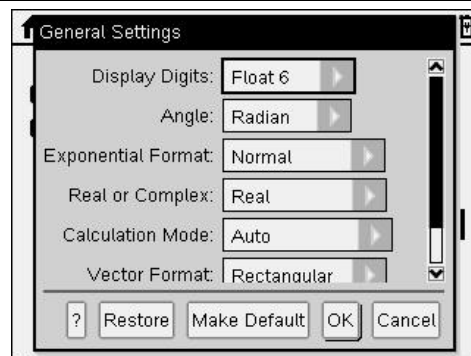


You will now see the **General Settings** menu.

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 General 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 General 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'.

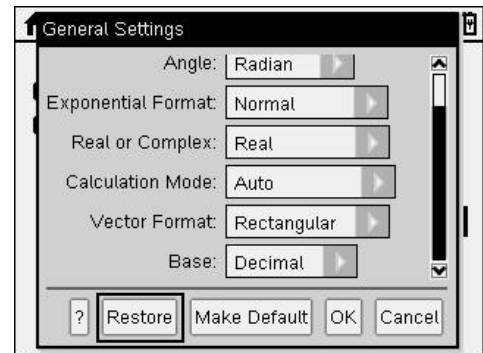
Go to the Home screen by pressing  on


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

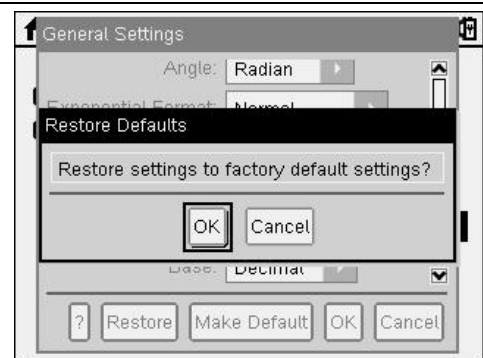
Press **2** to select **Settings**

Press **1** to select **General**

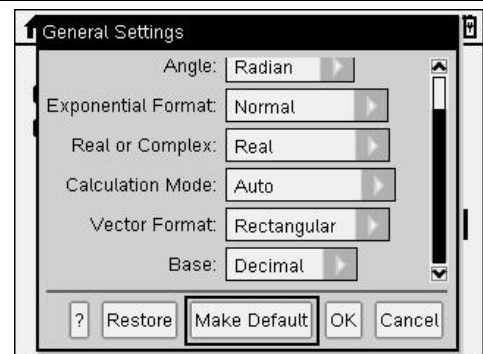
Select 




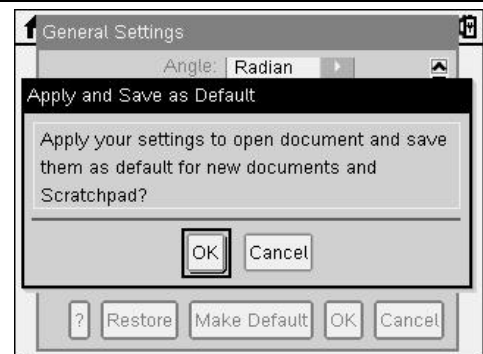
Select  to restore the settings.



Select 



Select  to apply the restored settings.



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

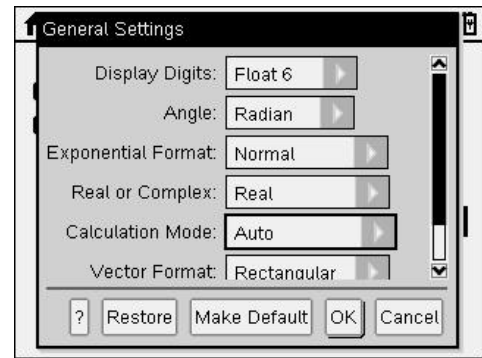
Restore Factory Default Settings by first going to the Home screen by pressing .

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

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

Press **1** to select **General**

Select  and then  to Restore factory default settings.



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

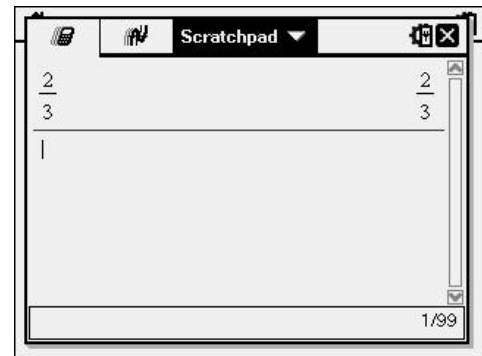
This means that the Nspire will try and give answers exactly, without writing them as decimals.

Select  and then .

Access the Scratchpad Calculator by pressing .

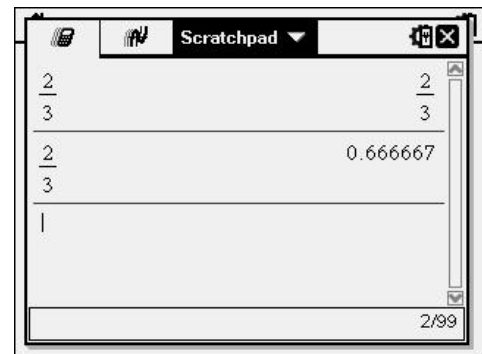
When you type **2**  **3** and then press **enter**, the display should look like that shown \Rightarrow

Notice that the answer is displayed as an exact fraction.



Press **ctrl** then **enter**.

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

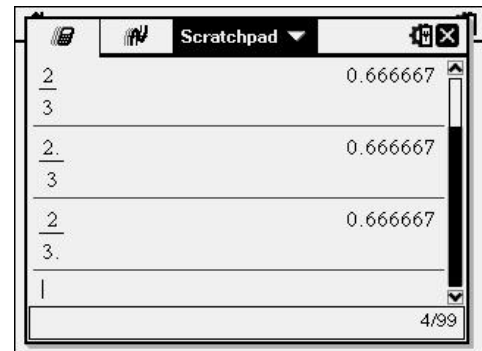


You can force the Nspire to give a decimal answer straight away by simply **including a decimal point** somewhere in your calculation - even at the end of a number will do.

For example, you could


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

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



Page 5 - Using the Nspire in Normal Calculation Mode

We are taking 'Normal Calculation Mode' to mean here that the 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 **Settings**

Press **1** to select **General**

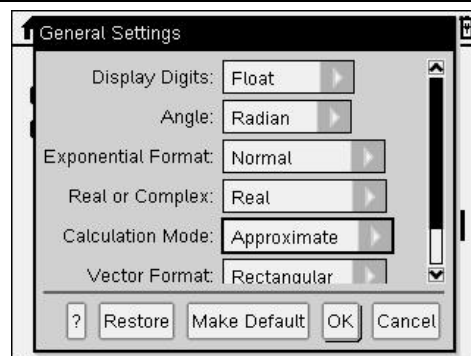
Select  and then  to Restore factory default settings.

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.

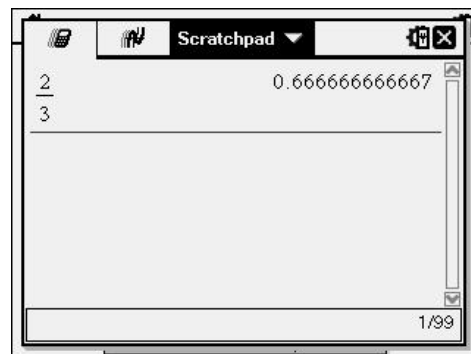


Access the Scratchpad Calculator by pressing .

When you type **2** \div **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 Nspire actually knows the answer to 14 decimal places, and it uses these extra known digits to round the answer correctly.



Page 6 - Using the 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 **Settings**

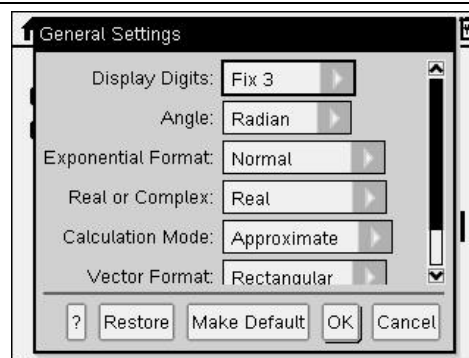
Press **1** to select **General**

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**

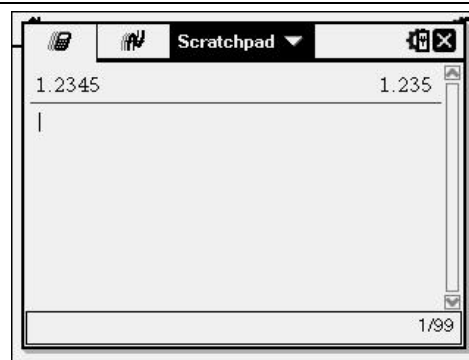
Select  and then .




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 Nspire in Scientific Notation Mode

Go to the Home screen by pressing  on.

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

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

Press **1** to select **General**

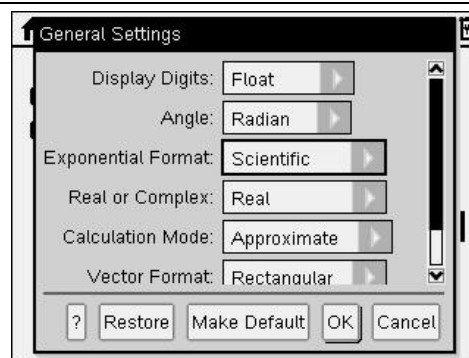
Select  and then  to Restore factory default settings.

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

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

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

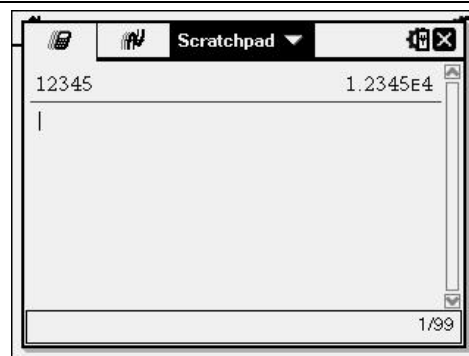
Select  and then .




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 ⇨

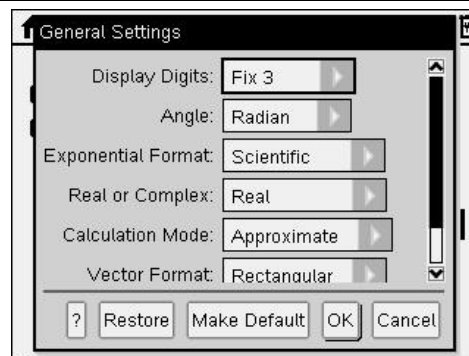
Notice that the number has not been rounded, as the **FLOAT** setting was chosen.



If you wanted Scientific Notation to 3 decimal places, press  **5** **2** **1**

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

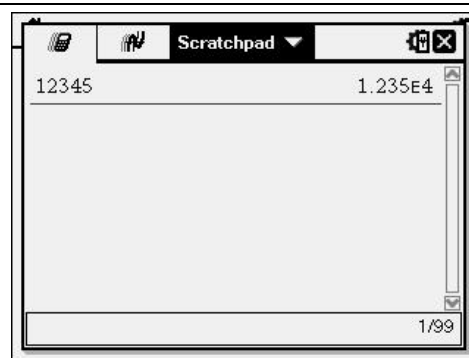
Select  and then .



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 ⇨

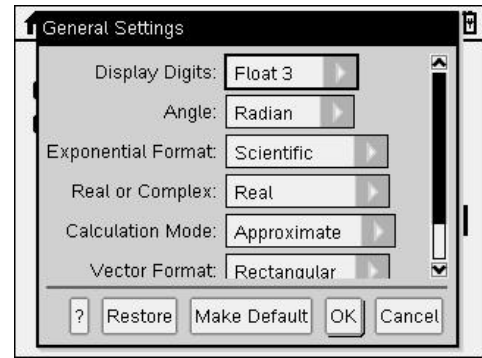
Notice that the displayed result has been rounded to 3 decimal places.



If you wanted Scientific Notation to 3 significant figures places, press \uparrow on **5** **2** **1**

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

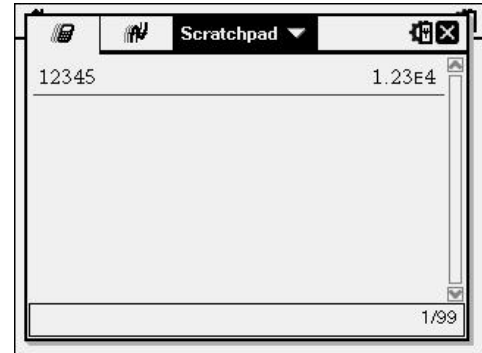
Select **Make Default** and then **OK**.



Access the Scratchpad Calculator by pressing [Scratchpad] .

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

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] $\text{[}\div\text{]}$ [5] [.] [6] [7] [EE] [(-)] [8]

and then press [enter] .

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



... pressing [enter] becomes...

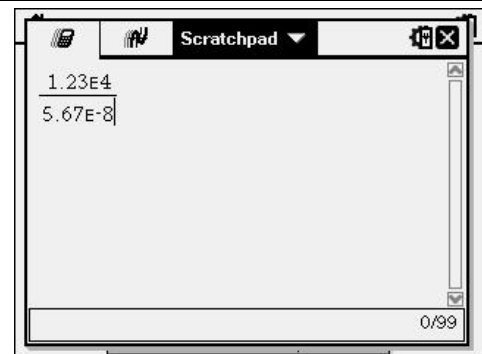


Alternatively, you could enter the calculation using the fraction template. Type:

[ctrl] $\text{[}\div\text{]}$ [1] [.] [2] [3] [EE] [4] [tab] [5] [.] [6] [7] [EE] [(-)] [8]

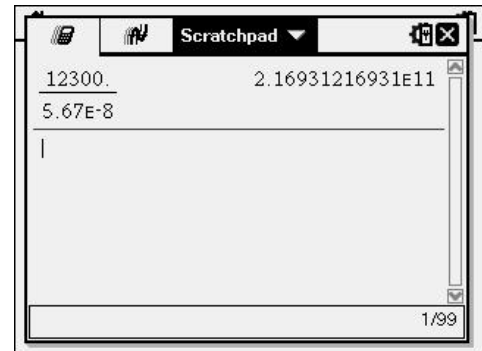
to give a screen like that shown \Rightarrow


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 \Rightarrow



Go to the Home screen by pressing  on

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

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

Press **1** to select **General**

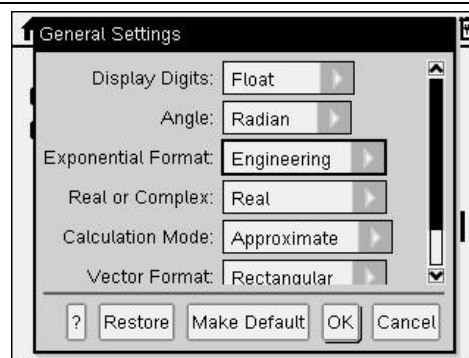
Select  and then  to Restore factory default settings.

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

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

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

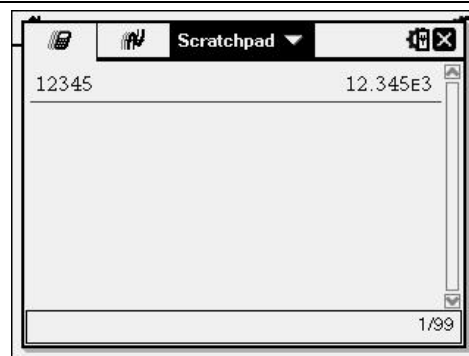
Select  and then .




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.



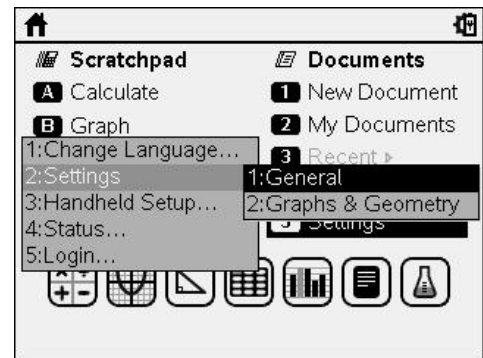
Page 10 - Using the Nspire in Degree Mode for Calculations

Go to the Home screen by pressing  on.

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

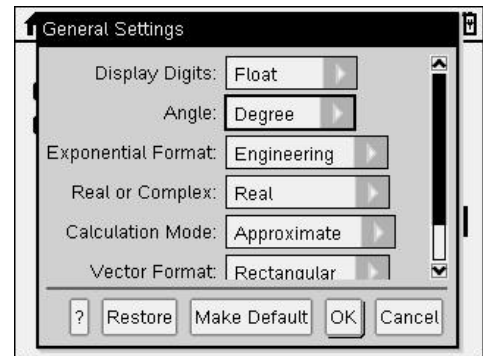
Press **2** to select **Settings**

Press **1** to select **General**




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

Select  and then .



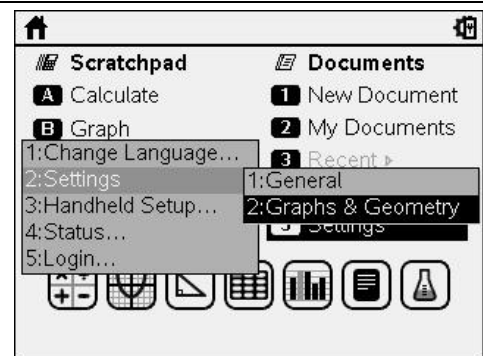
Page 10 - Using the Nspire in Degree Mode for Drawing Graphs

Go to the Home screen by pressing  on.

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

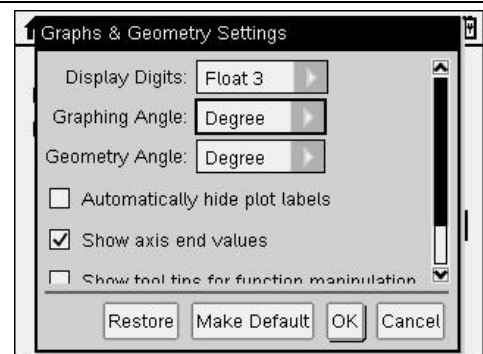
Press **2** to select **Settings**

Press **2** to select **Graphs & Geometry**



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

Select  and then .



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**

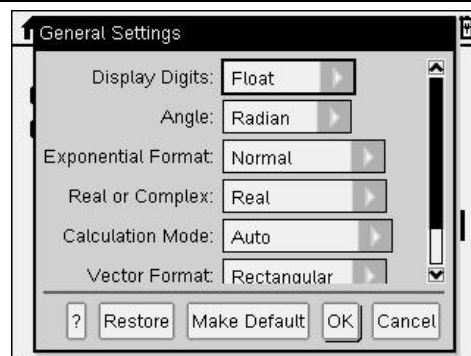
Press **2** to select **Settings**

Press **1** to select **General**

Select and then to Restore factory default settings.

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

Select and then .



Access the Scratchpad Calculator by pressing .

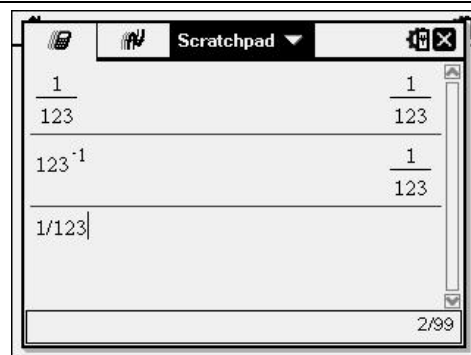
To calculate the reciprocal of 123

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...

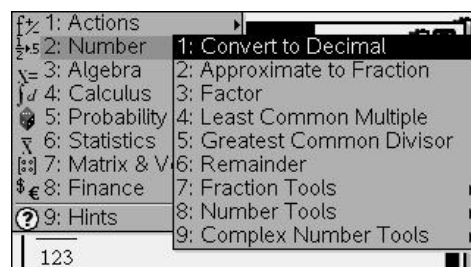
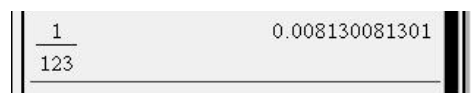
EITHER press then

This selects \approx and displays a decimal approximation.

OR Press

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

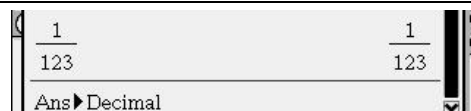
Press **1** to select **Convert to Decimal**



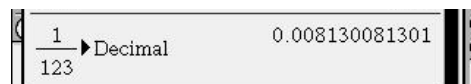
This should give a screen as shown \Rightarrow

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.

First, restore factory default settings by pressing  on

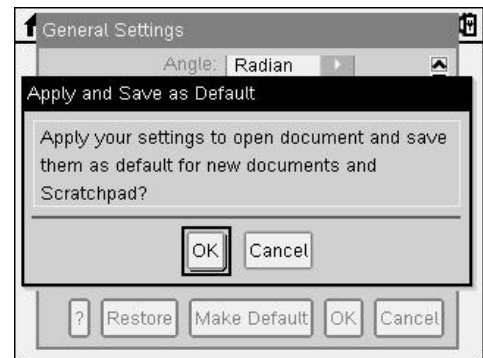
Press **5** to select **Settings**


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

Press **1** to select **General**


Select  and  to restore the settings.

Select  and then .




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

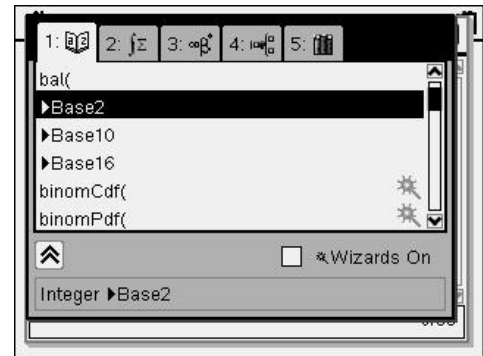
Type in **1****2****3**


Press  to access the catalogue, as shown \Rightarrow

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

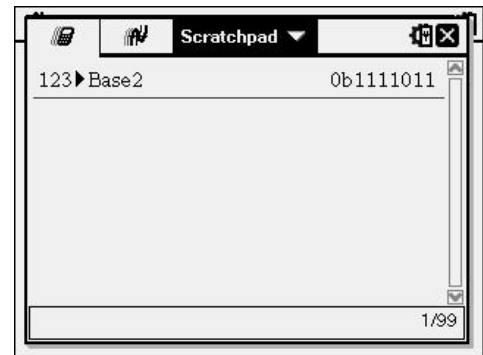
Move down the list to highlight **►Base2**

Select **►Base2** by pressing .




Press  again to complete the conversion.

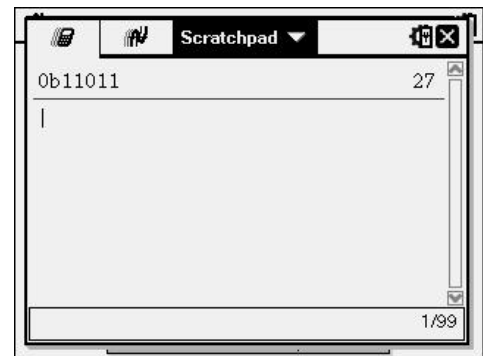
Notice the binary number is prefixed by **0b**
[the number zero and the letter b]




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 Nspire work exclusively in Binary, go to the Home screen by pressing .

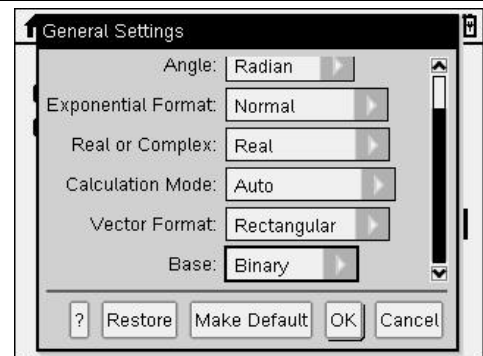
Press **5** to select **Settings**

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

Press **1** to select **General**

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

Select  and then .

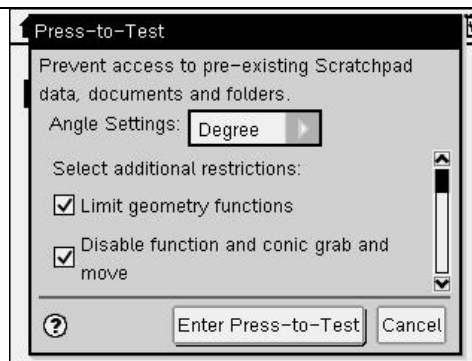


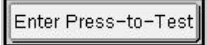
'Press to Test' mode temporarily disables all current documents and denies access to programming libraries.

Switch the Nspire handheld **off**.

Hold down the  key and **then** press 

This will give the screen shown on the right ⇨

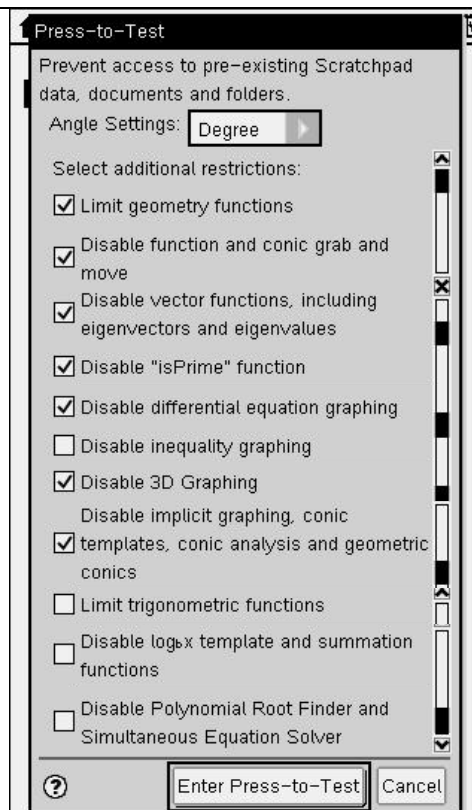



Don't select  **yet** – you need to configure the correct restrictions first.....

You will **deselect** only **four options**, as these are all **allowed**:

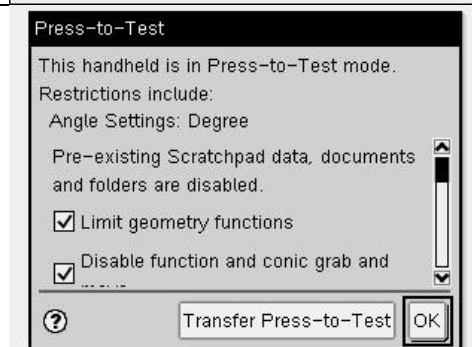
- 'Disable inequality graphing'
- 'Limit trigonometric functions'
- 'Disable $\log_b x$ template and summation functions'
- 'Disable Polynomial Root Finder and Simultaneous Equation Solver'


Leave the remaining **seven items selected**.



Click on .
This will cause your Nspire to re-boot.

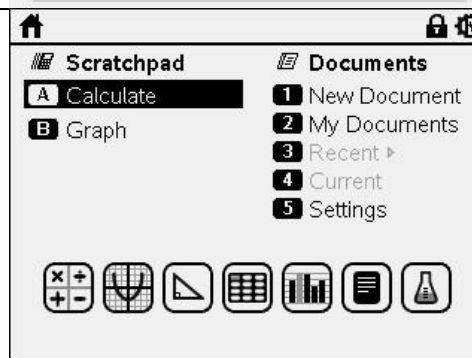
After a short time, it will display the screen shown on the right ⇨



Click on .
This will give the screen shown on the right ⇨

Notice the small padlock icon in the top right hand corner.
Also the **yellow** LED at the top of the handheld will be flashing with **two short pulses**.

You are now ready to use your Nspire in an exam.

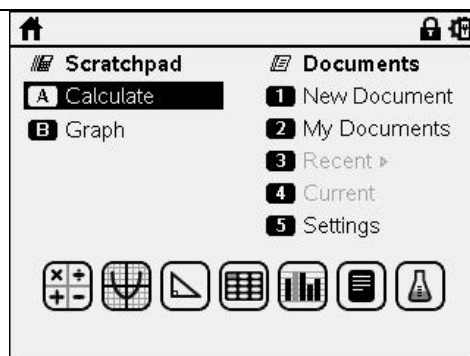


Page 14 - Removing the Nspire from Press-to-Test mode

The **only** way to exit Press-to-Test mode is by physically connecting your Nspire to another device. You will need a USB cable and another Nspire Handheld.

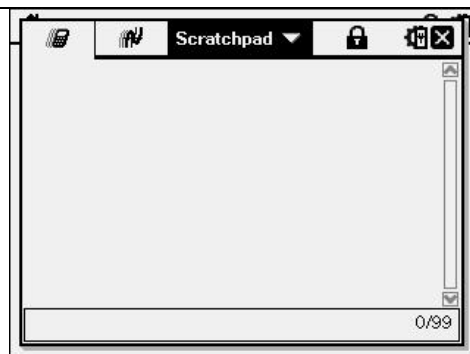
Connect your Nspire to another Nspire handheld using a USB cable.

Switch **both** Nspires **ON**.



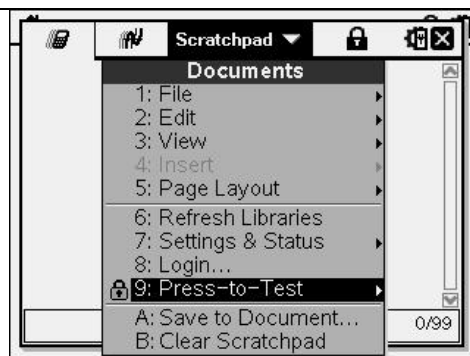
Open the Scratchpad on your Nspire.

This will give the screen shown on the right ⇒



Press **doc** to open the Documents menu.

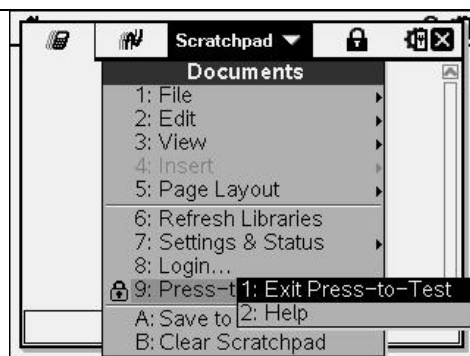
This will give the screen shown on the right ⇒



Select **9: Press-to-Test** and then select **1: Exit Press-to-Test**.

This will cause your Nspire to re-boot.
After a short time, it will display the normal Home screen.

You have now Exited Press-to-Test mode.



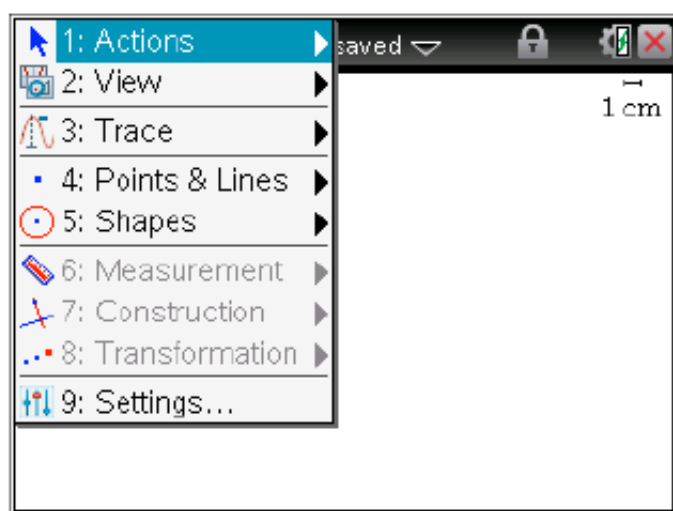
Further Information on Press-to-Test Restrictions

The following information is from the official TI-Nspire User Guide, and it will clarify what functionality of the Nspire is not available to you when in Press-to-Test mode.

Restricting Geometry Functions

When you choose to limit geometry functions, all options on the Measurement, Construction and Transformation menus are disabled.

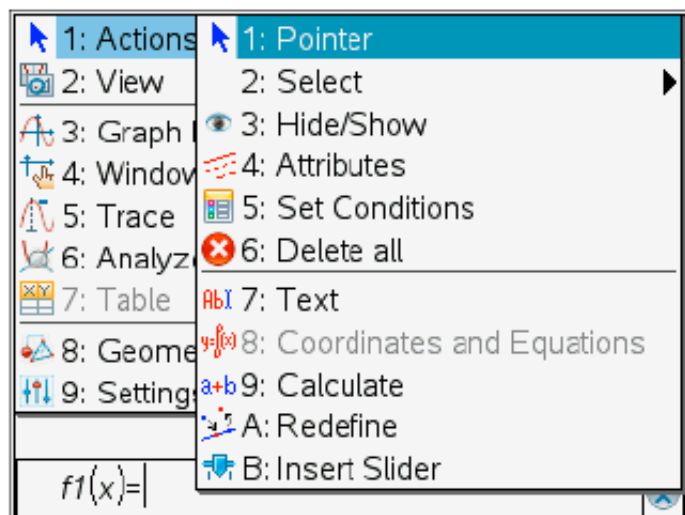
Note: Press ▼ and ▲ to scroll through the menu items on the application menu.



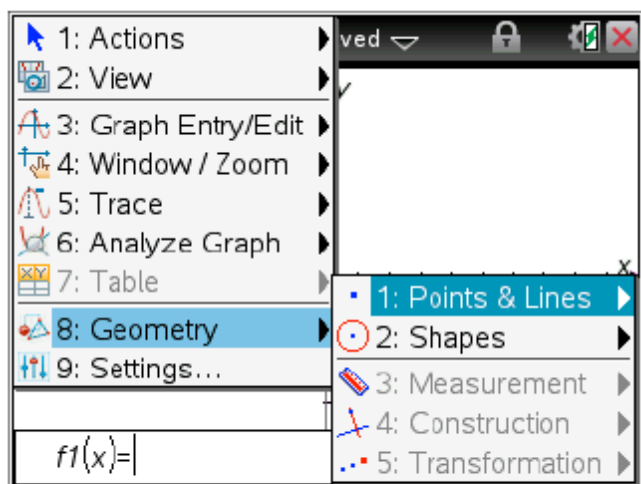
Options on these menus are disabled in Press-to-Test mode.

Restricting Graphs Functions

On the Graphs menu, the following options are disabled:



Actions:
> Coordinates and Equations



Geometry:
 > Measurement
 > Construction
 > Transformation

Disabling Function and Conic Grab and Move

- You cannot move any function or conic in Graphs, Geometry or Scratchpad. For example, if you graphed $y=x^3$, you can select the function but you cannot move it in any way.
- Disabling function and conic grab and move does not apply to lines and functions in Data & Statistics.
- Disabling function grab and move does not restrict sliders in the Graphs & Geometry applications.
- You can still grab the coordinate plane and move it around.

Disabling Vector Functions

When vector functions are disabled, students are unable to calculate the following functions:







- Unit vector [unitV()]
- Cross product [crossP()]
- Dot product [dotP()]
- Eigenvector [eigVc()]
- Eigenvalue [eigVI()]

Disabling the “isPrime” Function

The **isPrime(** function is used to determine if a number is a prime number (a whole number greater than two that is only evenly divisible by itself and one). Disabling this function prevents students from selecting the **isPrime(** command in the Catalogue and from selecting **Test > IsPrime** in Maths Operators. When a student manually enters the **isPrime(** function, submitting the expression results in an error message.


Disabling Differential Equation Graphing

The Differential Equation graph type is disabled in the Graphs & Geometry applications. Users are unable to manually type and graph a differential equation. Options for graphing differential equations are disabled in the following menus.

Location/Application	Path
Graphs and Scratchpad	<ul style="list-style-type: none">•  > Graph Entry/Edit > Diff Eq•   > Graph Entry/Edit > Differential Equation
Geometry (within an Analytic window)	<ul style="list-style-type: none">•  > Graph Entry/Edit > Diff Eq•   > Graph Entry/Edit > Differential Equation





Disabling 3D Graphing

When disabled, options for using 3D graphing are disabled in the following menu.

Location/Application	Path
Graphs and Scratchpad	 > View > 3D Graphing

Disabling Implicit Graphing, Conic Templates, Conic Analysis and Geometric Conics

When disabled, students are not able to graph equations in terms of $x = ay + c$ or $ax + by = c$. Conic templates are not available, and students are unable to analyse conics or graph the geometric conic of an ellipse, parabola, hyperbola or conic by five points.

Location/Application	Path
Graphs and Scratchpad	 > Graph Entry/Edit > Equation
Graphs and Scratchpad	 > Analyse Graph > Analyse Conics
Graphs and Scratchpad	 > Geometry > Shapes Ellipse, parabola, hyperbola and conic by five points are disabled.
Geometry	 > Shapes Ellipse, parabola, hyperbola and conic by five points are disabled.