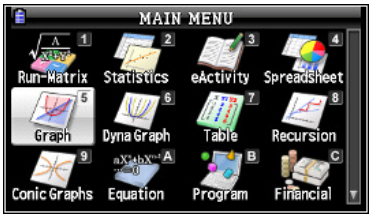
Trigonometric Graphs

This resource sheet is designed for use with the Casio fx-CG20. However it can be used with the Casio fx-9860GII or the Casio fx-9750GII although there may be some differences in the key sequences needed and in the screen displays.

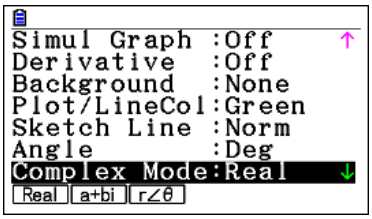
Aim

This activity will show you how to graph trigonometric functions on the calculator. It will also explore the use of dynamic graphing. There are also some activities for students to explore how these functions can be used to investigate some of the properties of trigonometric functions.

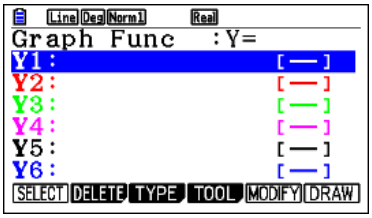
Set your calculator to GRAPH mode. Press [MENU] [5]



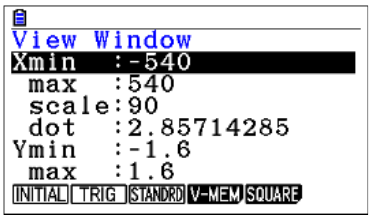
Set the calculator to degrees by going to **SET UP**. You will find this by pressing [SHIFT] [MENU]. Scroll down to get to 'Angle' and press [F1] to set the calculator to degrees. Press [EXE] to get back to the Graph Function screen.



Delete any existing functions [DEL] [F1].



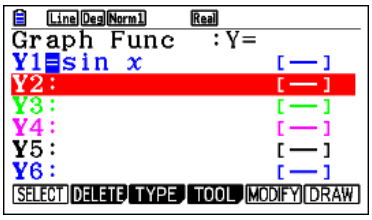
Set the range of axes by using the viewing window (which is labelled V-Window). Press [SHIFT] [F3]. To start with use the built in **TRIG** setting by selecting [F2] Press [EXIT] to return to the funstion table screen.



You can now enter a function for Y1. Use the [X,θ,T] key to enter the variable, x and remember to press [EXE] to store your function when you are happy with it.

Try entering Y1= sin x

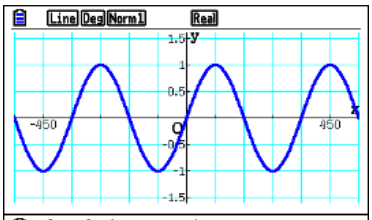
To view the graph press [F6] which you can use to toggle between the graph and the function table screens. You may need to use the [SHIFT] key.

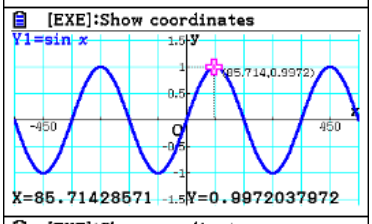


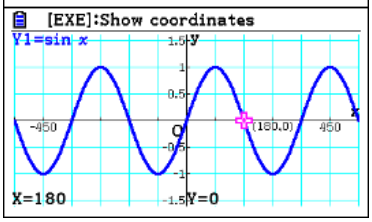
Trigonometric Graphs

Use the 'trace' function SHIFT F1 to find:

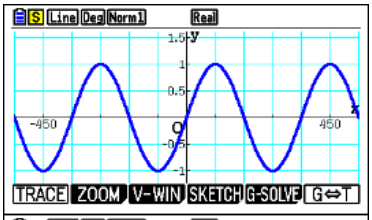
- Angles where sin x = 0
- Angles where sin x is a maximum
- Angles where sin x is a minimum
- Maximum value of sin x



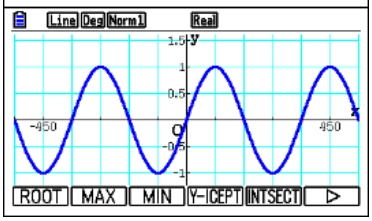


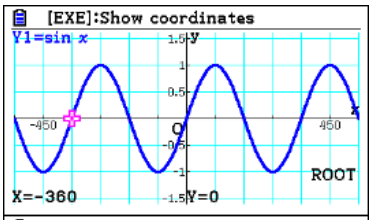


The 'trace' function is not very accurate. You could, of course, use 'zoom' and then trace on a larger scale graph, but the accuracy still depends on pixel size. To get a more accurate reading you could use 'G-Solve'.
With the graph displayed, press SHIFT F5 to get G-Solv.

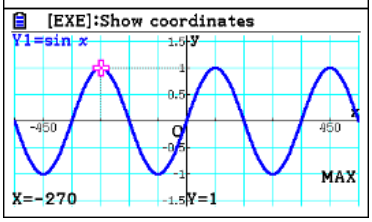


The mini menu bar now gives a selection of possible values to explore. To find the roots, press F1 and then use the cursor to explore the range of values.





G-Solv can also be used to find maxima and minima, y intercepts, whilst the ISCT option allows you to find the point where two graphs intersect.



Press SHIFT F5 to get back to the G-Solv mini menu and then F6 to get to options to find x or y values at particular points or areas under the graph.

Trigonometric Graphs

CASIO

You should now feel confident using the graphing facility on the calculator for trigonometric functions. Here are some investigations that will encourage your students to explore some of the features of trigonometric functions using the graphics calculator.

Some investigations:

Investigation 1
Investigate the following families of graphs

- y = a sin x
- y = sin bx
- y = sin x + c

Try different values of a, b and c and see what happens to the graph.
What is the difference between y = 2sin x and sin 2x ?
If I want to increase the amplitude of y = sin x by a factor of 3.5 what do I need to do?
What is the equation that will produces a function that is like y = sin x except that one cycle takes 720° instead of 360°

Investigation 2
Investigate y = sin(x + d).
Try different values of d.
What about y = sin(x – d)?
Write down three different functions that are identical to y = cos x

Investigation 3
Plot the following

- $y = \frac{\sin x}{\cos x}$
- $y = (\sin x)^2 + (\cos x)^2$
- y = 2 sinx cosx

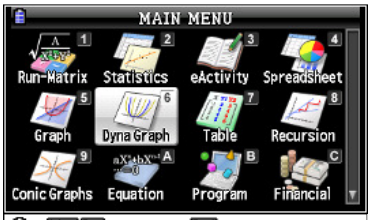
You should recognise the resulting graphs. Check your answers by plotting them to make sure they really are identical to the graphs of the functions above. Make a note of the results because these are all important results that are useful when solving trigonometric equations.

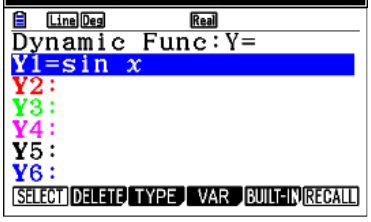
Trigonometric Graphs

Dynamic Graphing

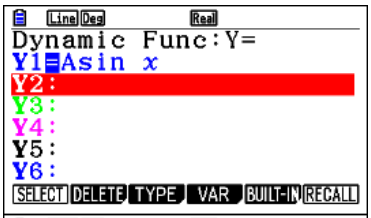
These could be investigated by using the 'Dynamic' facility on the calculator.

For example, to explore y=asinx:
On the main menu choose DYNA (option 6)



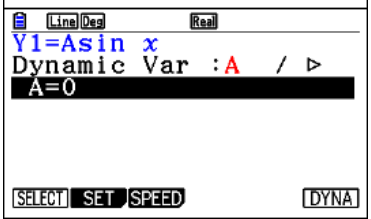


Edit the equation by highlighting it and pressing the right cursor key ▶ Change it to Y1 = Asinx in the Dynamic Function table (You will need to use [ALPHA] [X,θ,T] to display the 'A')



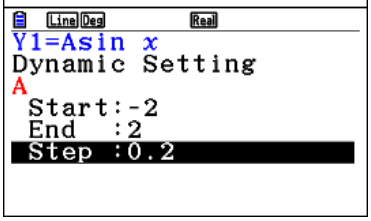
Press [EXE] [EXE]

Choose SET [F2] to set the parameters



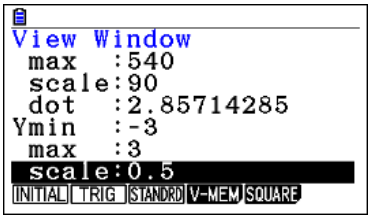
The next screen shows the settings for the dynamic variable A

Try setting the start value at -2, the end value at 2 and the step at 0.2. This will start the cycle at -2sinx, and move through -1.8sinx, -1.6sinx….and so on.

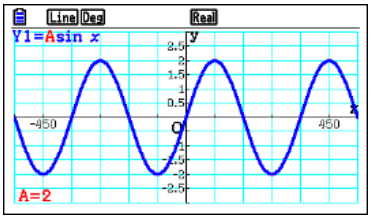


You will need to change the viewing window settings as well

Set the viewing window to TRIG [F2] but then change Ymin to -3 and Ymax to +3



Press [EXE] and then DYNA [F6] to display the graph.



[SHIFT] [AC/ON] will stop the display at any time