# Guess the Function

Maths: Variation, functions.
Age: 11 and up

This activity gives a problem solving context to engage with variation. I do this in two phases. Firstly from the front to a group without calculators using the emulator, then pair work using the calculators. It is interesting to see which values of x the audience chooses to identify the graph. I only give guidance after a good deal of trying, so, for example many teacher groups fail to examine the extremes with large $\pm x$. It is particularly important that no-one shouts out what they think the function is. Only towards the end do I alow participants to suggest a value of x and $f(x)$ just to show others that someone now has it. Only when I am confident that the vast majority have found the function would I press SYMB and reveal the function. This generates an interesting discussion about the form of the function that was used.

It is particularly interesting to note that teacher groups tend to be no better than ordinary school groups at doing this, and much worse than A level maths groups. It is good for teachers to see how they lock themselves into procedural thinking!

Reset the Function App: Press Apps, F6 (Reset), F6 (Yes), F6 (Start).

Enter a function, and press ENTER.
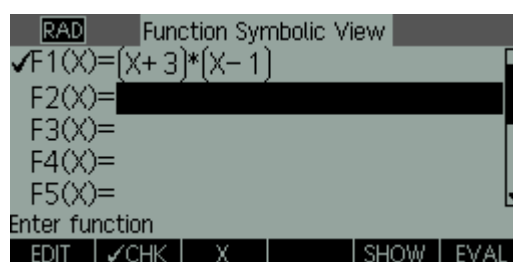
Now click SHIFT and PLOT to enter the plot setup. Click the PAGE down softkey (F4), select AXES and click the CHK softkey to deselect the axes.
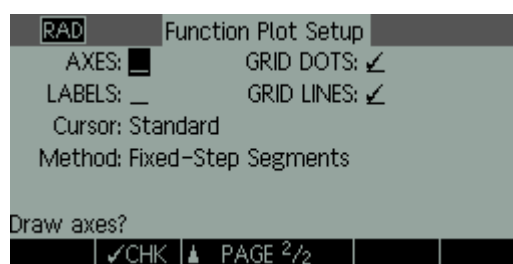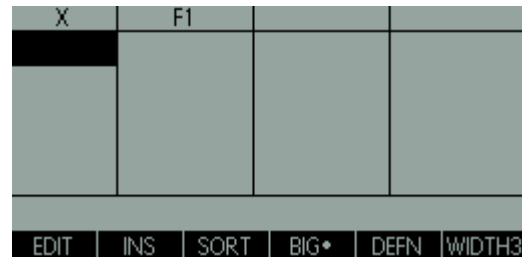
Click PLOT to make sure you can see the graph properly (you may need to use MENU then ZOOM to set it up, but quicker to choose a function whose graph you can see!)
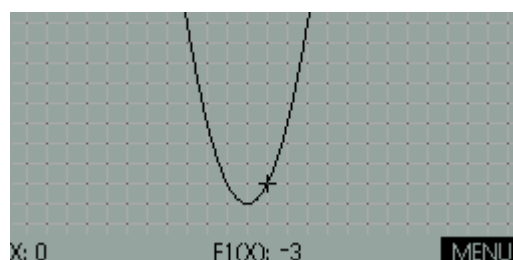
Now click SHIFT NUM to enter the number setup, select NUMTYPE, click the CHOOS softkey (F2), select BUILD YOUR OWN and click OK.
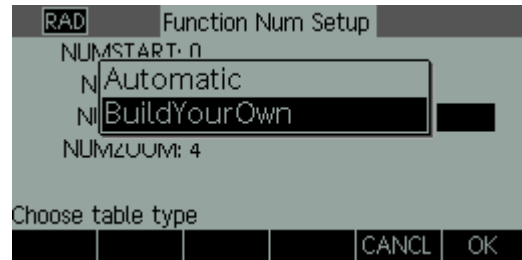
Now click NUM and you are ready to start.

Ask participants to give a value for x and guess the value for F1. Make sure no-one actually guesses the function or that will close down everyone else's thinking. When you have a few values, ask if we could improve the table and they will say (because they always do!) "put them in order", so click the SORT softkey (F3). Only when there is enough data and some are struggling, ask if another view would be useful and they'll say "show us a graph". So click PLOT, but only very briefly, click NUM again after a couple of seconds. They only need the shape after all. When most participants are able to give a value for x and its corresponding value of F1, ask them what form they think you put the function in. (Entering the quadratic as $(x + 3)(x - 1)$ is unusual, but very helpful!). Finally, the function can be revealed.

Now, because they have a handheld, pairs can make up their own function and try it out on their neighbour. It is important to set rules as to how complicated the function can be at least to start with and progressive increases are good. So, decide on the rules according to the knowledge of your students. I have done this activity with mixed ability year 8 students, A Level students and maths advisors.

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December 2012