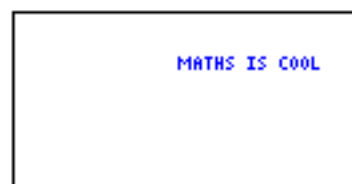
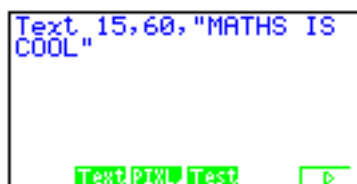


An application of Location in the Plane

A unique learning experience – Student Learning Booklet



*A product of the Noel Baker Centre for School Mathematics
WIP (Work in progress)
LUMAT-NSW (2004) is the initiative of the
Noel Baker Centre for School Mathematics and CASIO AUSTRALIA.*



Copyright Information.

The materials within, in their present form, can be used free of charge for the purpose of facilitating the learning of children in such a way that no monetary profit is made.

The materials within can be reprinted free of charge if being used for the purpose of facilitating the learning of children in such a way that no monetary profit is made.

The materials or ideas cannot be reproduced in any other publications without the express permission of the authors.

Pre-requisite knowledge.

This is a support booklet for the booklet called “Interacting with those families”.

Index

Section

Page

1. How does the calculator find and display (2,3)?

Introduction

All electronic devices with graphic display screens need to be programmed to locate positions on a plane.

Even though there are an infinite number of points on a plane (think about it) there are not an infinite number of points on a graphics calculator screen where a point can be displayed.

On the Casio *CFX-9850GB PLUS* there is only 8001 points that can be displayed as a dot. The screen contains 8001 pixels – small objects that can either be turned on or off. When on they emit light and look like a tiny dot, blue, green or red on the Casio, when off – you see the blank screen.

The people who make the calculator have to be able to do things like turn the pixels on and off. It is by doing this they *make* the opening screen of the calculator and *make* those neat screen buttons at the base of the screen – seen below.

Look at these screens on your calculator – determine which are on and which are off and which are what colour.



How do they do this?

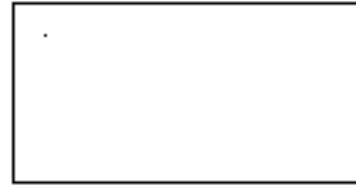
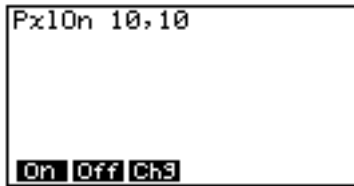
They write what is called a *program*. A program is just a series of lines of code that the calculator understands. We will start with just one line of code. You can write code in either the RUN mode or the PRGM (program) mode of your calculator.

Enter RUN mode. Use SHIFT, then SKTCH(F4) and press the continuation key (F6) twice and then use PIXL(F3) to reveal the screen opposite.



Use ON(F1) and then enter 10,10 (the , key is center right on the key board) and then press EXE.

Note that if you get Syn ERROR when you press EXE it means the calculator does not understand the code. Press the right arrow key and the calculator will tell you where the error is by placing the cursor at the position of the error.



You can now see how large one pixel is. It is blue in colour; this is the default colour. Press AC/ON.

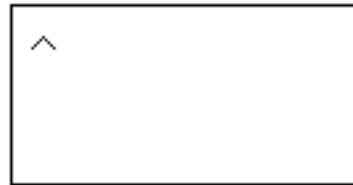
To change the colour: use OPTN and then press the continuation key (F6) and then COLR(F1). This will give two options Orng or Grn. Look at how I have used it below. Note that I have entered more than one command by separating the command lines with a colon (:). This can be found by using PRGM (SHIFT then VARS) and then pressing the continuation key (F6).



Look closely at the result. How do those co-ordinate pairs seem to be working?

To save retyping all this code, press AC/ON and then press the up arrow key – the text returns, then press the right arrow key and cursor appears at the start of the line. You can over-type the code or add to it. To add to it use INS (SHIFT then DEL).

I have edited my code to be as seen below as is the result.



Note that the green line still remains. To get rid of it you needed to tell the calculator to clear the screen. This command is found in the SKTCH (SHIFT then F4). It the Cls (F1) command. Select it and press enter and all previous pixels on will be off.



CP Exercise 1D

(Write your answers to these questions in your 'Problem Book')

Question 1

Experiment with turning pixels on and off and then write down how the co-ordinate system of the screen on this calculator works.

Question 2

In RUN mode, clear the screen and then use SKTCH(SHIFT then F4) and find the command F.L i n e.

Enter the code line F . L i n e 2 0 , 2 0 , 6 0 , 1 2 0

What happens? Why?

The F.L i n e cammand

Unfortunately the F.L i n e command works a little differently. It draws a line between two points you choose. It saves a great deal of turning on and off of pixels. It has the syntax:

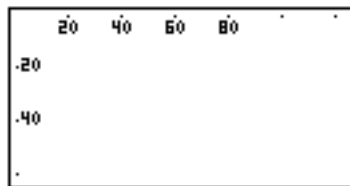
F . L i n e <x co-ord1> , <y co-od1> , <x co-ord2> , <y co-ord2>

But, it is working on Cartesian Plane co-ordinates – eek! Now this could be painful. How can we use the Text command and the F.Line command together?

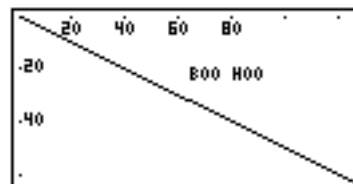
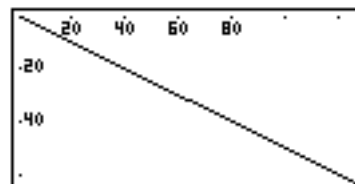
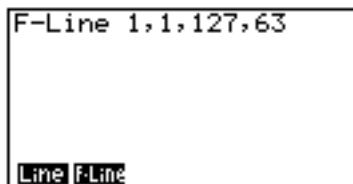
We need the calculator to think the line/column location system is the same as the Cartesian Plane system. We can do this by setting the View Window as follows. Note that the scale does not matter as we are going to have the axes turned off for now.



Hence the Cartesian Plane on the screen is divided as follows:



So the following can be done. If I want to draw a line from the top left corner to the bottom right corner I can do the following:



Note that I have not cleared the screen in between these sections.

Writing a program – keeping the code!

The problem with doing what we have done is the code we write is eventually lost.

We can, however, write a simple program.

Enter the PRGM mode of the calculator. Select NEW(F3) and enter a name for your program and press EXE. I used the name OPENSCH. This is going to be a program that acts as an opening screen to a program I am going to write.



Now I can simply put lines of code into this program. I will press EXE between each line of code rather than putting the : as we did before. You can put the : if you wish but it is cleaner and easier to see what you are doing if you press EXE. Each line of code is then a separate entity.

I have entered the following code, note the little ↵ at the end of each line that results from pressing EXE. The ViewWindow and AxesOff come from SHIFT V.WIN and SHIFT SETUP respectively. You find the Circle command and work out what the arguments refer too.

```

Cls↵
ViewWindow 1,127,1,63,1,1↵
AxesOff↵
F-Line 5,5,123,5↵
F-Line 123,5,123,59↵
F-Line 123,59,5,59↵
F-Line 5,59,5,5↵
Orange F-Line 6,6,122,6↵
Orange F-Line 122,6,122,58↵
Orange F-Line 122,58,6,58↵
Orange F-Line 6,58,6,6↵
Orange F-Line 7,7,121,7↵
Orange F-Line 121,7,121,57↵
Orange F-Line 121,57,7,57↵
Orange F-Line 7,57,7,7↵
Circle 64,32,20↵
Text 30,38,"PRIME FACTORS"↵
Text 50,34,"by A. Harradine"↵

```

To execute (or run) your program press `EXIT` and then `EXE (F1)`.

Remember that if you get `Syn ERROR` when you press `EXE` it means the calculator does not understand the code. Press the right arrow key and the calculator will tell you where the error is by placing the cursor at the position of the error.

The result is:



or in colour



Other commands and making life easier – the manual and the FA-123.

The manual that came with your calculator tells you about many more commands than we have used here. See page 453 to 455 for a summary.

Other documents to help are available on the WWW, try www.casioed.net.au as a starting point.

Also, if you wish to write long programs you will want to copy code. Also the calculator technique of entering the code is tedious. A program called the *Program Link FA 123* is available for the computer so you can program on the computer and then transfer the code to the calculator. It is available free on the internet at many sites – try:

www.casioed.net.au

This site also contains a document that tells you how to use this program.

You will need a cable to transfer the code. Ask your teacher for one or you can purchase them at shops or on the net.