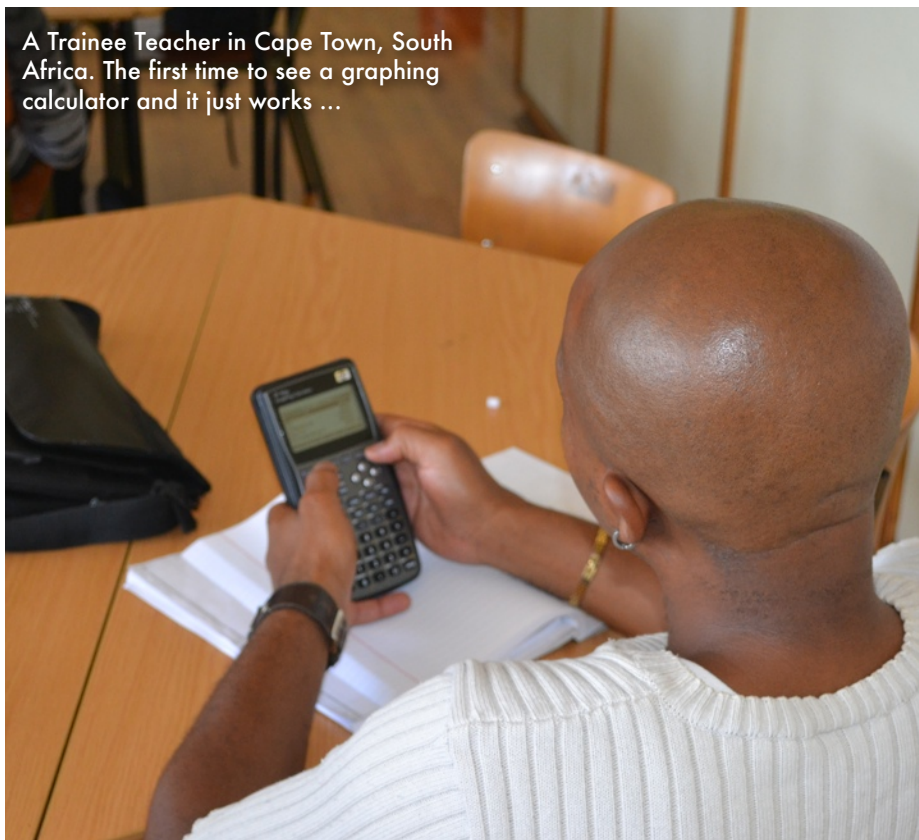


The HP 39gII Newsletter

Issue 1 January 2013

A Trainee Teacher in Cape Town, South Africa. The first time to see a graphing calculator and it just works ...



Welcome to Issue 1 of the HP39gII Newsletter. The aim is to support users of HP graphing calculators in education. This first issue is compiled from Chris Olley's blog articles on the HP39gII. This is just to get things started. Issue 2 will contain case studies and details of users' experiences. Please send us your thoughts to make this a real community.

The New HP39gII

I've now had a good time to work with the new HP39gII graphing calculator. It is exactly what you would want if you have been using HP39/40GS or a TI84 or a Casio FX9750 and you are ready for a really fast processor; tons of memory, a grey scale hi-resolution screen and batteries that last forever.

The HP39/40GS series is a classic graphing calculator with a very smooth operating system built around apps all of which are controlled by the three 'multiple representations' keys: symbolic, plot and table. The HP39gII works in exactly the same way, so you know straight away what to do. On the home screen calculations can be shown in textbook display with quotients and indices shown correctly. Divisions are shown fraction form where needed and an approx key comes up which converts to a decimal approximation. The graphing screen is superb; clear smooth lines, clear dark axes and subtle grey grid lines.

Pressing the + or - keys zooms in and out. Everything happens really fast.

A major new feature is the App notes. Teachers will want the activities set up for students use, so they can set up an app (e.g. creating an initial set of functions to explore) then create a notes page describing the activity and telling students what to do. On the app, just choose to save, give it a name for the activity and then you have a new app set up as you want with full activity instructions to share out amongst the students. This is superfast handheld activity authoring. Naturally teachers will use the free emulator to create the pages using a computer keyboard and then drag and drop onto the first calculator for sharing in class.

One of the critical features of a graphing calculator is accessibility and reliability. The teacher wants to trust that they can pick up the box of machines before the lessons and they will all work. The HP39gII still runs on standard AAA batteries, but there has been a major redesign in the power management. The batteries work in serial which means that it can even run on a single battery. It is reported that 6 months later they are still going strong.

As an intriguing bonus, ICT teachers may be pleased to hear that the calculator can be programmed using a language akin to C++, which has been extensively developed and documented (because the Chinese market saw this as a priority). The development work is being done on the emulator for fast typing, but you now have a handheld programme test environment which works straight out of the box (just like the BBC micro that Eric Schmidt says gave us the lead in games software that government (rightly) thinks we can recover.

Follow this link to see a video of the screen and the device and how fast it can graph very complicated functions: <http://www.youtube.com/watch?>

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Graphing Calculator group
Work in Cape Town



Graphing Calculator Workshops

Chris Olley, King's College London

Last spring I completed a round of workshops for teachers and for PGCE and GTP students on handheld technology. I've always thought that ICT provides opportunities for teachers to invent interesting activities that give students deep insights into how maths works. It was good to explore this thinking with groups of teachers in training.

I start with the neat teacherly trick of playing 'guess the function'. Here the participants see a calculator giving values of $f(x)$ for their values of x , letting them choose, to get a feeling for the variation. I only show them a graph when they have already formed a reasonable view, then watching as they focus on the details. The first thing is to realise that experienced teachers and well qualified trainees struggle to see a quadratic just from a small table of values. Most of the students will only ever have experienced a traditional drill and practice pedagogy. So, a quadratic is only ever encountered as a set of already known values they were given to plot. But they see that it is good to get a different perspective and a good feeling for variation and they see this. So, playing the game on the handheld with their partners strengthens the insights and makes them more flexible.

It turns out that lots of schools are buying sets of iPads; demonstration that there is plenty of money around.

But the maths software available for iPads isn't a patch on any graphing calculator and the storage, security and battery issues for anything you have to recharge means they will be no more reliable than laptops. A set of 15 HP39gIIs stored in a bag in the maths office with a few spare batteries and you just pick them up on your way in to class. If it can be that easy then is it the teacher who prevents the use of technology? Maybe. But with a device which costs about the same as two textbooks and will always work, the teacher can be more confident that the benefits of the technology will outweigh the perils and they will be prepared to give it a try.

Then we get back to seeing the resources we have as sites to conjure up really clever ways in to mathematical ideas. That's what makes our job fun. Look at bag of dice, counters, centicubes and we should always be saying, OK what could I do with those that encapsulates a mathematical idea. A graphing calculator is just the same, it's something we can use to give students deeper insights. It is in fact a calculator, but also it's a pedagogic device. A clever piece of kit for clever teachers to do what is most creative about our jobs. Something that supports kids doing clever thinking.

I've written up the core activities from these sessions as activity sheets and made them available on the hpgraphingcalc.org web site. So, please try them out and let me know how you get on.

My Top Getting Started Activities with Graphing Calculators

1. What does the 'b' do?

Everyone knows what the a and b do in a linear function, they also know what the a and c do in a quadratic function. But, what does the 'b' do? A graphing calc gets you in so quickly, and generates the data to get to the hard maths.

2. Guess the function

In school we learn to get good at constructing a graph from a table of values and to remember the shape of graphs knowing the function. What if we don't know the function? Can we 'see' it from the table of values? Which values tie it down?

3. Women teachers are fitter than men

A good statistical investigation requires a good experiment, generating good data, using a good model. How do we model fitness? I use resting heart beat, but now in 5 out of 6 PGCE groups the women turn out to be much fitter than men comparing medians and IQR with a box plot. So, the men are very keen to critique the model...and that makes for credible validation and good statistics.

4. iFactor and primes

You can do this on a scientific calculator, but the GC shows much more data. Just use iFactor to generate a prime decomposition. Ask students how it does this. With ordinary kids, one hour later and they tell you how to do it without the calculator and tell you what a prime and a rectangular number is as well. Simple!

Support Web Site

We have launched a UK web site to support users of HP calculators, notably the new HP39gII. You can download teacher and student books of activities, the FREE teacher emulator as well as the the updater software. Visit regularly as new activities and materials are being added all the time.

www.hpgraphingcalc.org

Applied Maths

So, why do we teach students maths in school? How tempting it is, to say "because it's useful". Well, I defy anyone to respond to this post by finding a single example taken from a school maths text book, in which something happens that (a) could be described as useful and (b) happens in the manner that it might do if someone were actually doing it. Even the examples specifically formulated to test functional skills, which is expressly designed to engage students in genuine applications of mathematics, are laughable in their credibility. The fundamental problem is that the real world does not behave in the nice neat clean way that mathematics exercise problems do and we are stuck in a situation in which assessable school maths can brook no argument. The real world has messy tests of validity and continual critique. Jean Lave in 'Cognition in Practice' tracked shoppers in the supermarket and found (a) no relationship between success in school maths and the methods used or the complexity of arithmetic deployed to make shopping calculations and (b) that a successful outcome was always found but regularly for reasons outside of the calculation (notably that you don't buy the large soap powder even though has a lowered cost per unit, simply because your shelves aren't tall enough for the box).

We worked on a project for the Bowland trust in which we looked at the cooling of pizzas, engaging participants in the role of consultants to a new pizza business needing to know how long the pizza would remain saleable for delivery. The real aim is to allow students to develop a mathematical model, validate it, then critique it. I heat a pizza and allow it to cool for ten minutes, getting participants to do two things (i) estimate the temperature in each successive minute and (ii) say with increasing accuracy, and an increasingly specific calculation, the basis on which they are estimating. The participants (who this week were the experienced teacher mentors for

our King's College London PGCE school partnership) generate a model which says the temperature is the starting temperature (about 90°C) minus about 2°C per minute, i.e. $T=90-2x$ where x is the elapsed time in minutes. We then test this function by fitting it to the data (which we have generated on a graphing package using a data logging temperature probe as the pizza cooled). The graph fits perfectly and I mean really perfectly. So much so, that everyone is very happy to accept the linear model and calculate the time taken for the pizza to reach 48°C which I have previously tested is the lowest acceptable temperature. Only when we look to see what this model will predict for the temperature after two hours does anyone see the problem. Left on a table for two hours, a pizza does not freeze all by itself! So, we see the model is good in the short term, but cannot account for the medium term behaviour.

The key point is that if we want to develop skills in applications of mathematics we have to recognise that maths can not be applied by wrapping a story around an exercise question. All applications require modelling. This requires developing skills in validation and critique (amongst other things). We have developed a narrative that expressly foregrounds these issues, providing the possibility of movement in the student's thinking. We say this tentatively because many other factors are involved. However, functional skills exams are not designed to engage learners in credible problems and therefore they cannot possibly achieve this.

Equipment: You can use HP StreamSmart data streamer equipment with HP39gII/40gs and HP50 calculators and emulators. I use Chicago Town mini deep dish pizzas, because you can put the probe between the cheese and the tomato, so it stays hot better! (Truth be told recently I've done it with water in an insulated mug, which also works very well).



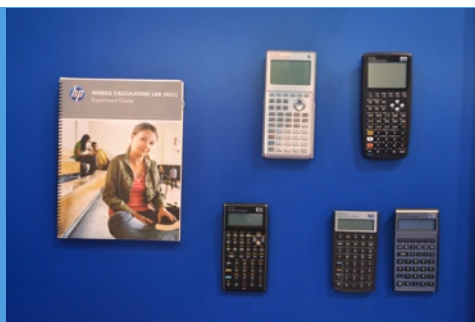
Chris Olley at the Education Show 2012 with HP StreamSmart data streaming equipment, from top to bottom:

1. Emulator and interface
2. Big Trak with Distance Sensor constructing distance/time graphs
3. Microphone
4. Accelerometer attached to the end of a ruler showing a diminishing sine curve



LEFT: HP Graphing Calculators in Dar-Es-Salaam, Tanzania

RIGHT: HP Scientific, Financial and Graphing Calculators in Birmingham, England.



Hints and Tips for Using an HP39gII

Add Programs to Your HP39gII

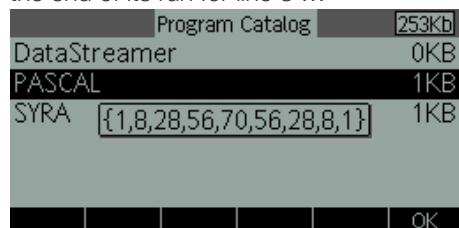
There is now a big library of teacher created add on programmes for your HP39gII. They have been created through a French web site called CALC-BANK. As far as I can tell they are all written for the HP39gII, so browse through the sections. Many show output only in the French language is an issue with many of them, but the Pascal's Triangle and the Periodic Table are good useable examples.

What you do is download and unzip the file and then drag it into the folder containing the your HP39gII emulator's files. You should find it at:

C:\Users\YourComputerName\AppData\Roaming\HP39gII

Next time you launch the emulator you will find the new program. Run it by pressing Shift then 1 (for Prgm), choose the programme you want to run and then F6 to run.

This is the Pascal's Triangle program at the end of its run for line 8 ...



Key Details on the HP39gII

Updating

One of the really clever features of the HP39gII is that you can easily update the

operating system. To do this you download the updater software, connect your calculator to your computer and in about 20 seconds, it's done. Go to the hpggraphingcalc site and download the updater zip folder. make sure to keep it all together in the folder and look at the read me file. Follow the instructions and you're done. There will be regular updates. The latest is version 1.3 which contains the StreamSmart data streaming app. We are hoping for a computer algebra systems and dynamic geometry and various other new content, so it will be well worth making this a habit.

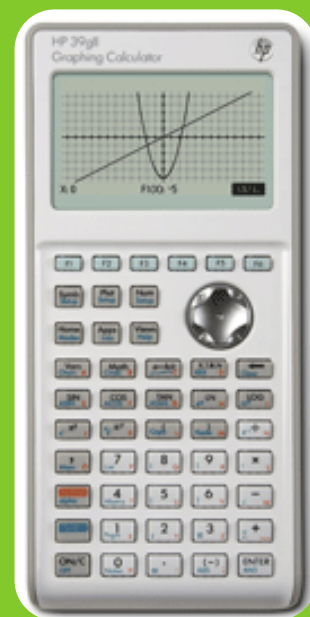
Examinations

The HP39gII can be used in all exams where a calculator is allowed at GCSE and A Level. However, exam secretaries are sometimes worried that students will have put their own content on the machine and need a quick check that the calculator is exam ready. To do this you need to reset the machine:

- Turn the calculator off.
- Hold down F1 and F6.
- Turn the calculator on still holding F1 and F6.
- Release everything when you see the HP logo.
- You then get a clear visual confirmation that everything has been cleared.

The emulator has very clever features for configuring your best screen composition. On the 'skins' menu there are four choices for showing the calculator looking like a calculator. My favourite for a 4:3 projector is 'Large'. However if you press the maximise button (the middle one of the group of three in the top right hand corner of the window), you get the calculator screen maximised with the buttons placed to the right. This is set up differently for each of the skins. My favourite here for showing the calculator screen as big as possible is the 'medium' skin maximised.

The HP39gII



SUPPORT WEB SITE:
WWW.HPGRAPHINGCALC.ORG

ARTICLES AND CONTENT:
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