The HP GC in Education Newsletter

May 2013
Issue 2

The New HP Prime

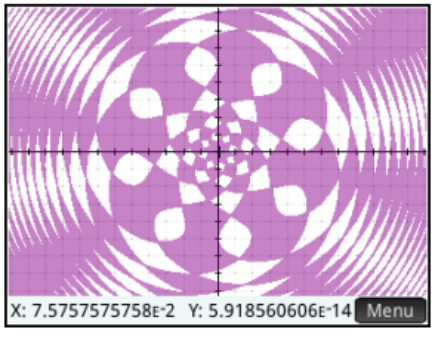
The first European HP Prime training session at Charles University, Prague.

Welcome to Issue 2 of the HP GC in Education Newsletter. The change of name is needed because the world of graphing calculators for education is set to be transformed by the release of the amazing new HP Prime. The response to Prime has been swift, from the teaser YouTube video, to a stunned response at the NCTM conference in Colorado, there is much excitement. In this issue we have a full detailed review of Prime, initial responses and a collection of links to comment and information. Plus of course we won't forget the HP39gII which has kick started interest in HP machines in education again and now stands neatly positioned as Prime's little sister.

The New HP Prime

Imagine a handheld maths machine with a high-resolution multi-touch colour screen. Imagine that you could plug a small dongle into that machine and it would connect wirelessly to the teacher's class computer allowing instant polling, seeing what all connected machines are doing and showing specific student's work to the class, sharing files and settings instantly. Imagine a machine with a spreadsheet, dynamic geometry, a full computer algebra system and high powered programming tools, which is so easily and clearly configurable with its test mode, that it will be allowable for use in exams. HP have just announced themselves to be back on top with the most advanced calculator design yet. Really, this is not a calculator, it is a tablet computer running the most advanced maths software available anywhere. As a bonus it also looks very cool indeed! Gizmodo, a top tech blog says Prime; "appears to be one of the most advanced color touchscreen calculators the scientific world has ever seen." (http://bit.ly/146moqr)

The advanced graphing App is a major advance in Prime. This App will graph pretty much anything, so look at the links on page 3 and download GT Springer's activity set, but just to whet your appetite, here is one of the example graphs from those materials:



$$Sin\left(\left(\sqrt{x^2+y^2}-5\right)^2\right) > Sin\left(8*Tan^{-1}\left(\frac{y}{x}\right)\right)$$

So, read on and keep in touch with ideas activities or questions as we look forward to Prime.

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HP Prime Review

Chris Olley,

King's College London

HP Prime will be launched ready for September and the new school year. Last week I had one in my hands at a launch workshop in Prague led by GT Springer the lead designer. GT has been central to most of the major innovations in graphing calculator design and he has put all of that experience into a genuinely wonderful new device. First impressions matter to schools who want to show the smart new kit they are buying and to students who want something really flash in an era where new tech does indeed look good. It is interesting that there has been a lot of buzz around tech sites like Slashgear and Ubergizmo, which is good, because if the tech savvy think it's worth talking about then bright young teachers and their equally bright students will take a look.

It looks very smart indeed, with a brushed aluminium front and a smooth bright screen. The colour is bright and very sharp with extremely clear detail and you just have to keep reminding yourself that it is a touch screen and that you can drag and move objects and navigate drop down menus. The touch is smooth and very accurate. Younger folk than me will do this instinctively, I'm sure that they will be wondering how it could be done any other way. It is very well made and feels sleek and smooth all round. It is about 300g which feel sufficiently heavy to be solid but easy to hold and it balances really nicely in two hands with your thumbs over the Home screen and the CAS button. You really feel you are holding a classy piece of kit. So, part one of the battle is won, savvy young people will want one and schools will be proud to show off that they bought them. So, what does it do?

The biggest headline is: wireless connectivity. Files can be transferred via the connectivity software. However, if you plug a small USB dongle (which you purchase seperately) into the top of the PRIME, it will immediately be recognised on the computer, notably the teacher's computer in class. Files and settings can then be transferred wirelessly. (Only from PRIME to PC not from PRIME to PRIME). More than that, the PRIME screen can be shown on the teacher's screen. There will be class polling functions allowing the teacher to set a question from her computer and students to offer responses from their PRIMES with the results shown in table and chart form. Just like the polling systems many schools are getting which only do this. That will be just the start of what can be done. The critical point is that this is a plug-and-play system; no set up, which is a critical factor for classroom use.

The software itself initially looks like an up-rated version of the HP39gII, which it is, so you will find all of the Apps in the HP39gII working exactly the same. So, anyone who has used an HP39gII will get started immediately. However, there are three new Apps which make a big difference. There is a mathematical spreadsheet, a dynamic geometry system and the advanced grapher. Together these represent a major advance in providing a space to explore mathematical ideas. These tie together with the big pause for breath moment. The CAS button. There is no CAS/non-CAS option. A mathematical machine must speak algebra and this one does. There are two home screens; a CAS screen which deals with exact objects and the traditional home screen which deals with approximate objects. The Apps can use the last object from each of these screens and the choice is always there; CAS screen or Home screen. This recognition of the fundamental pure/applied, exact/approximate distinctions is central to an underlying philosophy which has the potential to transform the way we think about exploring mathematics. For me, this is the thing that will determine future research into maths education technology.

It is quite clear that this machine has a CAS system, so could you use it in an exam? To be sure the answer will be yes; the machine includes a comprehensive exam mode. A menu system allows a vast range of features to be turned on or off, CAS is one of them, but suppose a particular exam disallowed solver apps, they can be turned off too. The system is password protected and the user is unable to use functions switched off. For school use, the teachers selects the settings they want e.g. turn off the CAS, creates a password and then beams this setting to all of the connected PRIMES, wirelessly. A series of bright LEDs light up in the same sequence while exam mode is engaged. It is immediately clear to the exam secretary that the machine has only those facilities allowed in exams.

I've always been a fan of calculators as a learning tool. I've said elsewhere that tablets are exciting, but you don't work and think in one space, you need different technological tools for different functions and the resilience of the calculator as a form factor is remarkable. It's a highly portable, personal thinking space. I am really excited about PRIME because it has all of the maths you could possibly want with an intuitive touch driven interface and wireless connectivity to support proper classroom dialogue in a package that everyone will want to own.

Support Web Site

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

www.hpgraphingcalc.org

Possibilities for using the HP Prime in the classroom

Linda Earnshaw, Head of Maths,
Magdelen College School,
Oxford, UK

The HP Prime is a powerful calculator with enhanced features that will appeal to students but other features that make it a very useful teaching and learning tool.
The HP Prime has the capability to give the teacher control over a class set of Prime calculators. A teacher can disable applications and functions on the calculators within a class so that pupils' minds are focused on the task in hand within that classroom. Teachers can feed data and instructions to pupils in the class so that all pupils are simultaneously working on the same data and the same task. This gives the opportunity for all pupils to explore maths under controlled conditions and discover patterns or formulae for themselves. For example, at year 7, looking at equations of straight lines and finding the connection with the equation, the gradient and the y-intercept. At A level, looking at graphs of $y = k^x$ and $y = x^a$ and showing that these can be easily distinguished by considering log/log graphs or semi log graphs.
Why use HP Prime calculator and not just use Autograph? Simple. The pupils are individually involved in making the discoveries if they are working on a calculator instead of listening to the teacher with the involvement of the few most vocal and mathematically adept in the class. Learning is then a pupil based activity rather than a passive teacher led lesson. Learning by discovery with understanding (guided by the teacher) is a far better way of progressing in a subject, especially maths.
The HP Prime also has the facility to set quizzes. So, knowing the task that you want to achieve in a lesson, a quick quiz can be set before the lesson starts and at the appropriate moment can be transmitted to the class for immediate response, thus giving immediate feedback on the learning that has been happening.
The calculator has been designed by a teacher with teaching and learning at the heart of the design. It is also user friendly so maths teachers need not be afraid; with some training on the logic behind the navigation around the calculator, it is easily understood.
The HP Prime also has the capability to connect to sensors, the data being fed into the calculator and as the calculator has a spreadsheet application, statistical analysis and graphing capability it has great potential for science departments as well as maths.
This is looking as though it could be a very valuable product when it hits the market. I am hopeful.

Finland, China and HP Look into the Future

Hello from Finland and from the Capstone FUTURE team. Capstone FUTURE is a student project researching and prototyping the future of mathematics education. Our students come from the University of Turku and Fudan University in Shanghai. The project is sponsored by Hewlett-Packard.

We are studying how math is taught in high schools both in Turku and in Shanghai to see the differences and similarities and also the needs and advantages of technology in math education. We are a strongly interdisciplinary team with expertise in computer science, engineering, future studies, East Asian studies, business and finance as well as educational sciences.

In addition to finding the current status and the future needs in educational technology, we also want to think out-of-the-box and try to think one step further to acknowledge the real bottlenecks that are holding the educational technology and its benefits back.

Juha-Matti Santala and the Capstone FUTURE team.

Watch out for news!

Prime Links

The GT Springer Interview at Cemetech: http://bit.ly/11z2dWc

GTs activity set for HP Prime from the Prague training: http://bit.ly/11z3TPi

Calc-Bank Comparison shows Prime is fastest: http://bit.ly/146jqll

Delegates deep in discussion
←

Prague May 2013
European Prime training

GT Springer takes Prime through its paces
→

Using Graphing Calculators During the Revision Season

Kristin Coldwell
KS5 and G&T Leader, Maths
Stanborough School

As the leader of a Key Stage 5 Maths Teacher Network, I invited Chris Olley to one of our meetings before Christmas to give us some instruction in the use of HP graphing calculators. We had some fun playing with quadratics, learning some Italian (something to do with statistics if memory serves) and generally getting to grips with the machine. To follow up this brief encounter, we borrowed a loan set of calculators to take turns with in our own classrooms. Having started the process, I felt responsible for ensuring the organisation and logistics were in place to allow members of staff based in different schools to each get the calculators for a reasonable period of time. And so the box moved gradually around different schools in the Stevenage and Welwyn Hatfield consortia, finding use in Key Stage 3 and 4 classrooms and also supporting modelling in AS Use of Maths and transformations of functions in A2 Maths. I didn't book a spot for myself and thought I'd just wait for a gap. My gap arrived at last after the Easter holiday when other teachers felt it was time to get down to revision. Most of my classes are also in exam years, but I decided that there must be suitable revision activities using the calculators.

My first attempt was with a small group of Year 11 students who are taking the AQA Level 2 Certificate in Further Maths. Graphs play a big part in the specification, so this was the most obvious line to take. A typical exam question might give an equation (linear, quadratic or cubic) and ask students to use algebra and calculus to find significant features and then draw a sketch. Clearly a graphing calculator could check the accuracy of their sketches, but this didn't sound too interesting and in any case, sketches aren't all about accuracy. I decided instead to give this bright group of students a series of unknown functions with some details about the salient features (e.g. roots, intercepts, stationary points) and ask them to find the equation. The calculators could then be used to check their ideas and quickly amend and try again as necessary. The calculators made the activity more engaging for the students and gave them the confidence that they could master it, but they were still doing all the thinking!

My next use of the calculators for revision was with my Year 12 Further Maths group. They have recently learned to manipulate 3 x 3 matrices and I decided to use an activity Chris had shown us involving Pythagorean triples. The idea was to find a matrix which would generate triples in which the two larger numbers were consecutive integers. At each stage, My Year 12s wrote out the matrix equation, worked out what had to be done to find the unknown matrix (by more than one method!) and then started the number-crunching themselves. But at this stage, it seemed like a good idea to let the calculators do the heavy lifting. One student still managed to find the matrix by hand before we had got it on the calculators, but again having the calculators took the painful drudgery out of the equation (so to speak) and allowed students to focus on the thinking behind the calculations.

While I'm sure that graphing calculators are great when you are first starting to explore a topic with a class, I would argue that they're great to spice up revision lessons as well.

Teacher Quote from the HP39gII Loan Scheme:

"The graphical calculators were very helpful for students to:

- explore transformations of graphs
- explore graphs in general
- quickly look at graphs and therefore check any ideas they may have about them
- explore trig and exponential functions and their graphs

I think they're excellent. They put a lot of power and potential for learning maths in the hands of the learner."

SUPPORT WEB SITE:
WWW.HPGRAPHINGCALC.ORG

EDITOR AND CONTENT:
CHRIS OLLEY AT THE MATHS ZONE

T: 020 8318 6380
F: 020 8318 6610
INFO@THEMATHSZONE.CO.UK
WWW.THEMATHSZONE.CO.UK

IN THE UK BUY FROM:
OXFORD EDUCATION
WWW.STUDENTCALCULATORS.CO.UK

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