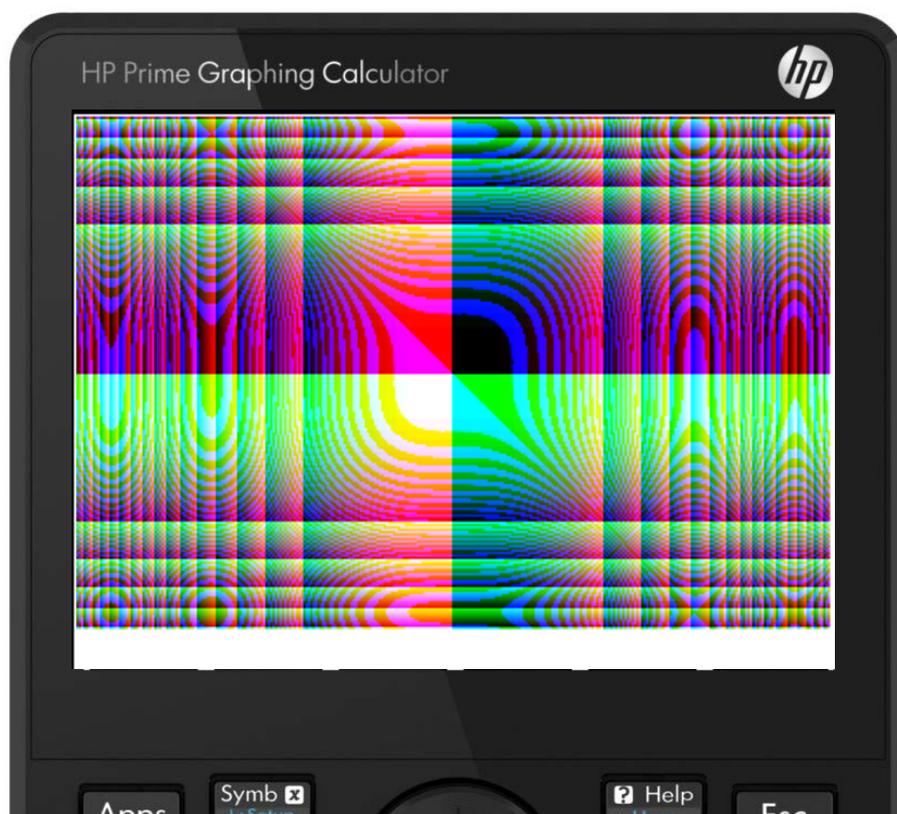


The HP GC in Education Newsletter

Issue 4 Oct. 2013



Welcome to Issue 4 of the HP GC in Education Newsletter. We hope you are marveling at the amazing power of HP Prime and are trying to work out how this image has been created. Well, I'll be honest, I have cut a screen shot into a high resolution picture of the HP Prime to make it look nice, but the screen shot is real. G.T. Springer, lead designer of the HP Prime has been busy working out new ways to show off its power. Check the page 3 for full details and how you can easily recreate this image on your Prime. Also in this issue a new classroom activity and more news and views. But the big news is the arrival of the connectivity kit, this is set to revolutionise the way teachers and students can discuss mathematical ideas in classrooms. Full discussion and details in this issue.

HP Prime News and Views

The big news, of course is that HP Prime is now available so you can go out and buy one. That means that user reviews are available and the wonderful HP calculator community is beginning to discuss the machine and its potential and to prepare new and modify existing materials to suit the HP Prime. Notably the programming community is taking note of how powerful Prime's processor is. On the US Amazon site a user review is headed "Programs run

blazing fast on prime" saying of a key benchmark "...the prime delivers the answer in less than a second (in contrast a RPL program on the HP50G takes 72 seconds). The enthusiast and programming community are very much engaged with HP Prime. Bruce Horrocks at the HPCC has written a full edition of their DataFile magazine devoted to HP Prime (see: www.hpcc.org). At www.hpcalc.org you will find a good selection of additional apps, including a rudimentary 3D grapher and an Asteroids game. These require the connectivity kit which is part of the HP Prime package. This allows easy up and

down loading of files, data and programmes. However, for teachers this is the interface between student handhels and the teacher computer. Polling, quizzes and messaging allow two way communication and screen views show students' thinking. This will all be wireless by the start of 2014. Exciting times indeed. Read on for full details.

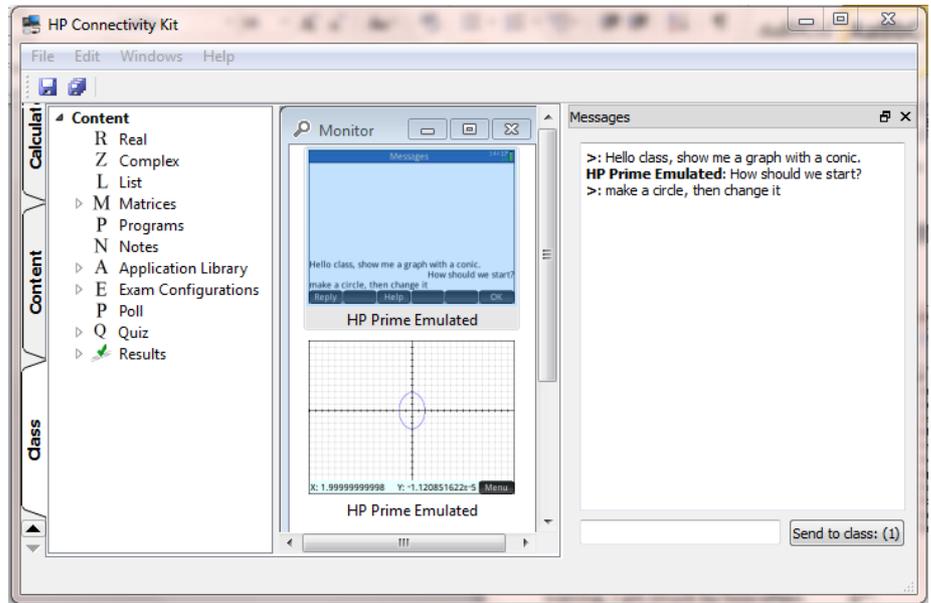
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Dialogic Teaching with the HP Prime Connectivity Kit

Advanced Pedagogy with the HP Prime (Chris Olley)

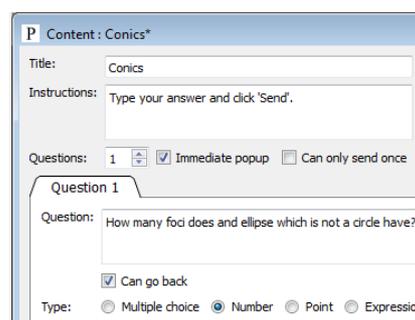
In my classroom, I want to engage my students in mathematical conversations. I want to listen to their responses, take full account of them and react and respond accordingly. In my work in teacher training, I am struck by how often I watch a beginning teacher engage with their class and a student says something deep and insightful. Capturing that moment requires skill and knowledge, but it also requires an activity setting in which there is the opportunity to think deeply. Really good mathematical software provides the means to construct the dynamic and open activities that allow for deep thinking. The difficulty is for the teacher to be aware of what students are doing and thinking while it is happening. HP Prime has a full suite of mathematical software to make the activities possible. Now with the HP Prime Connectivity Kit, the teacher can see the screen of all connected student machines updating regularly. The teacher is on the lookout for what Martin Gardiner referred to as Aha! moments. Those key breakthrough points of mathematical insight. Now there is a choice, open a one-to-one discussion asking the student to describe or explain their thinking or maybe the whole class could benefit from seeing the student's screen and hearing their thoughts. To achieve this effect with other technologies has proved hard because of the enormous hardware and set up overheads. With the Connectivity Kit, you install software on the PC, connect HP Prime to the PC and that's it. The handheld is registered in the class and an updating screen shot appears. As of now, this works



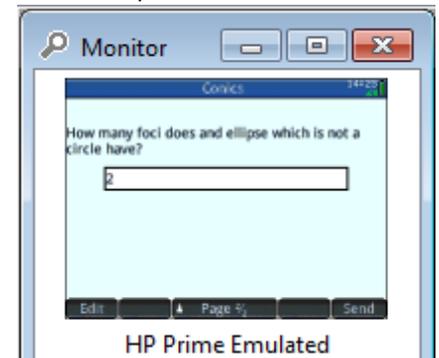
through USB cable connection. By the start of 2014, with the addition of a low cost dongle to plug in to the top of the HP prime, and a corresponding adapter for the PC (much like those used in wireless mouse and keyboard sets), the whole system will be fully wireless, with absolutely no set up.

I'm running two versions of the emulator so you can see my class of two students! We have a content pane which allows for the creation and sharing of content. We have the monitor pane showing the handheld screenshots and we have a pane to show messages between teacher and students, either individually or collectively.

I can send a task to the class and monitor the responses. No names are shown, so students are comfortable for their work to be on view. Students can send a reply or ask a question and I can respond personally to them. Now use a 'Poll' to get feedback:



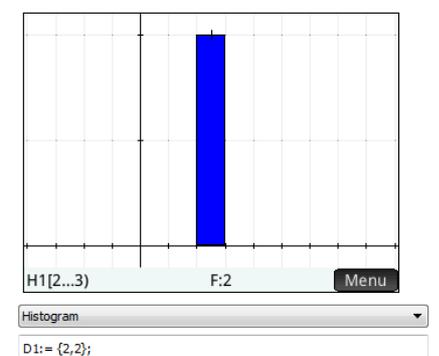
You can see that the handhelds all receive the question and can send back a response:



All of the responses are collected:

Content : Conics	
Question 1	
How many foci does and ellipse which is not a circle have?	
	1
HP Prime Emulated	2
HP Prime Emulated	2

... and can be analysed:

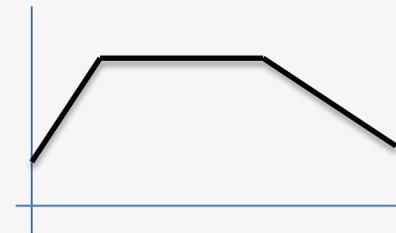


Please send ideas for more activities. The essential feature is *no set up time*, we just get talking mathematically.

Lower Secondary/Junior High/Key Stage 3

Using a Graphing Calculator as early as possible.

A new version of the Maths Activities Pack, optimised for the HP Prime will be available very soon on the hpgraphingcalc.org web site, so please download a copy and try out some activities with students in the first stage of their secondary/high school education. I always like telling the story of the time I worked with year 6 pupils (10 years old) using data streaming technology (An HP StreamSmart 410 with a distance probe connected to the StreamSmart App on HP prime does the job very nicely). Students walk along a line away from and towards the sensor which graphically shows their distance away from it, against time. Their aim is to match with a distance time graph they have been shown, like the classic:



To begin with pupils say things like; "walk up", "go steeper", "down the hill", "along the top", ... but after just a few pupils have had a turn, the vocabulary has changed to "faster", "slower", "start closer", "stand still". The shift from a focus on the geometry of the graph, to what it is that the graph is showing and to vocabulary which is fundamentally mathematical can be achieved by very young pupils.

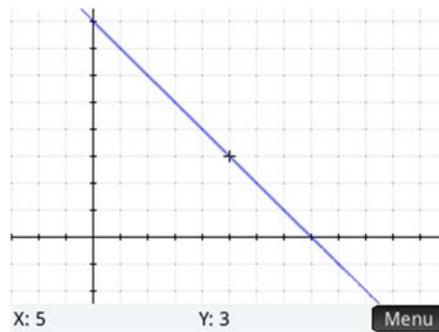
The Maths Activities Pack is designed to offer a range of activities across a selection of maths topic areas for students at the start of secondary school. If, like the distance/time example, you have activities that work in Primary Schools as well, please share!

Now, I want to share an excellent idea from one of my new intake of trainee teachers, that make simple but clever use of the Advanced Graphing App.

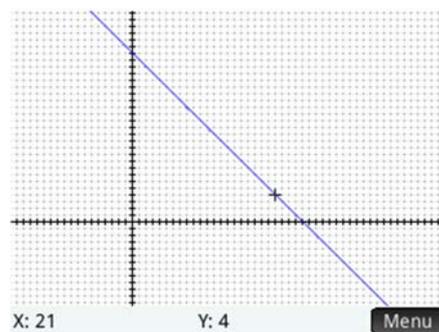
1. Launch the Advanced Graphing App. (Reset/OK/Start to avoid old entries remaining).
2. Enter $x+y=5$ for V1
3. Press Plot.
4. Share any coordinates that lie on the line.

Pupils generally show (0,5) and (5,0)

5. Now share some between those.
6. Now share some outside points. (Use + or - to zoom in or out and find some with larger numbers).
7. Repeat for $x+y=8$



8. Tell me some points that lie on $x+y=11$ (draw it and check using 'Trace').
9. Which line do these two points lie on: (21, 4); (-11, 14)? (draw it and check with 'trace').



10. Start again with $2x+3y=5$...

The activity very neatly keeps pupils' focus on the relationship between x and y expressed in a form that is less common as a starting point for linear graphs. Here, the negative gradient is quite natural and intriguingly, moving on to graphs such as $x-y=10$ are equivalent to the more common starting point.

Programming the HP Prime

A Program from GT Springer

Use the connectivity kit to create a new program on your Prime. Make sure your Prime is connected (USB or wireless). We suggest you call it DrawPattern.

This will create BEGIN and END statements in the program editor. Copy and paste this code in between:

```
LOCAL xincr,yincr,color;
STARTAPP("Function");
RECT();
xincr := (Xmax - Xmin)/318;
yincr := (Ymax - Ymin)/218;
FOR X FROM Xmin TO Xmax STEP
xincr DO
FOR Y FROM Ymin TO Ymax STEP
yincr DO
color := RGB(X^3 MOD 255,Y^3 MOD
255,TAN(0.1*(X^3+Y^3)) MOD 255);
PIXON(X,Y,color);
END;
END;
WAIT;
```

Click the save icon and you will find the program already in your Prime. So click Shift Program and highlight DrawPattern and click Run. Now of course you have to work out how it works!

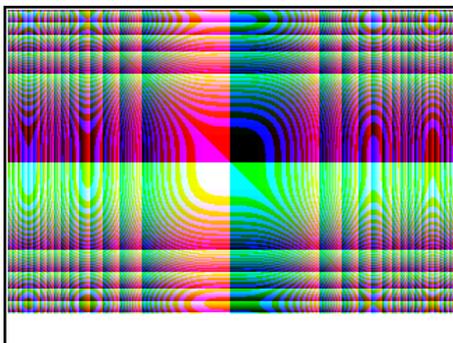
HP Prime on US TV!

See Laura Harich show off HP Prime on the US TV show Designing Spaces. http://www.designingspaces.tv/show_segment.php?id=133

Support Web Site

Visit our UK web site to support users of HP calculators, notably the HP Prime and the 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



The Astonishing Screen Shot created with GT's Programme on page 3



Astroroids for HP Prime by Mickaël Nicotera available at <http://mic.nic.free.fr> →



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 3×3 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.



SUPPORT WEB SITE:
WWW.HPGRAPHINGCALC.ORG

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