

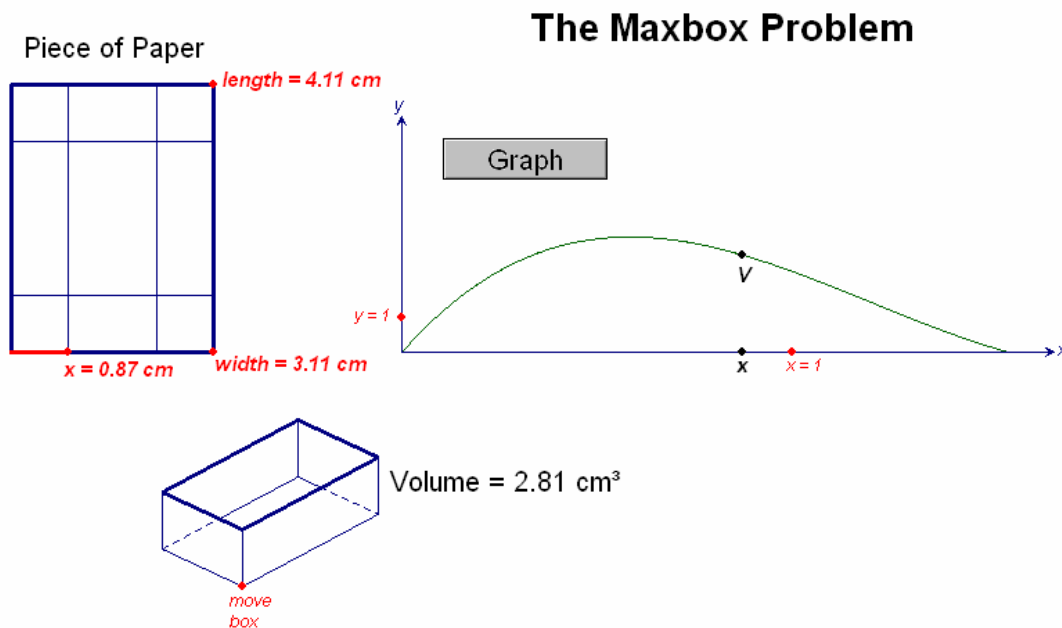
Association of Teachers of Mathematics

Review from: www.atm.org.uk/reviews/

Cabri 2+ - a review

This review was written partially while attending CabriWorld 2004 conference in Rome from 9th-12th September 2004.

There are three questions that this review might help the reader to answer. The first of these is “should my school use interactive geometry software, such as Cabri or Geometer’s Sketchpad?”. The answer to this question is an unqualified “yes!”. One look at the exemplar material in the KS3 strategy will make clear the numerous ways in which this software can be used in shape and space in KS3/4. The software can also be used in any part of the mathematics curriculum in which visual images can enhance learning. One can create, for example, pictures of decimal numbers, or link dynamic models and graphs, as shown below.



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For further discussion, see Mackrell and Johnston-Wilder (2004). I would also suggest looking at the three teacher reviews given at www.chartwellyorke.com/cabrireviews.html, which together give a very positive evaluation of the use of Cabri 2+ in the classroom.

Interactive geometry can also be used both in primary and post-16 mathematics teaching. See for example the new Sketchpad for Young Learners materials available on the Key

Curriculum Press website. ATM is developing Cabri materials for use in primary schools which will hopefully be available by Easter 2005. I will illustrate some of the potential for post-16 mathematics below in discussing some of the new features of Cabri 2+.

The second question is “which of the available interactive geometry softwares should I use?”. This question is more difficult to answer. Part of the answer is to use the superb Cinderella files which are online at Bryan Dye’s website. These are an invaluable, and free, resource for learning about specific aspects of geometry. However, for a more flexible and broader range of use, a school should really have a site licence for either Cabri or Geometer’s Sketchpad (Cinderella currently lacks features, such as the ability to create custom tools/macros or to perform calculations, which make it less useful than the other two in an ordinary classroom). So, Cabri or Sketchpad? This is a difficult question. My “native language” as it were is Cabri, and I really disliked Sketchpad when I first encountered it (similar sentiments have been expressed about Cabri by those who have first encountered Sketchpad!). However, the more I’ve got to grips with GSP, the more I’ve recognized the possibilities inherent in it. I now occasionally make mistakes with Cabri because I’m thinking in Sketchpad!

In an ideal world, students ought to have access to both: these softwares, developed independently, present subtly different views on geometry and mathematics and the interaction between the two can be very rich. Some of my best ideas have come from trying to get GSP to behave like Cabri, or vice-versa.

However, this is anything but the ideal world. The time needed to come to grips with either can be substantial, particularly for teachers or students who do not have a strong grounding in geometry (although preconstructed files, such as ATM’s Active Geometry, can facilitate immediately meaningful mathematical activity with GSP or Cabri with little teacher experience or expertise). Hence a choice needs to be made. This is not the space for a detailed comparison of Cabri and Sketchpad (although it is difficult to discuss the new features of Cabri 2+ without comparison to GSP4) and hence I can only recommend that teachers try out both (trial versions are available for download) – and find out what support is available locally. If most schools in your area use Cabri, it may make sense to go for Cabri, and vice versa.

So, on to the third question: “if we already have Cabri 2, is it worth upgrading to Cabri 2+?”. The remainder of this review will focus on the new features in Cabri 2+ in an attempt to answer this question. I would again refer readers to the reviews cited above for more general reviews of the use of Cabri 2+ in the classroom.

I first heard about Cabri 2+ at CabriWorld 2001 – fitting that I should write a review at CabriWorld 2004! In 2001, Cabri 2+ was seen as a bug-fix, with a few extra features. The exciting Cabri ventures were Cabri 3D and Cabri Junior for the TI-83. One of the extra features promised was the intersection of loci, however, so I waited for Cabri 2+ with some eagerness.

And waited. And waited.

The release date of “later in 2001” stretched to “early in 2003” as the few extra features multiplied in number.

My first encounter with 2+ was a let-down. On my trusty 300Mhz PC, dragged objects jerked slowly rather than moved smoothly. It wasn't much better on a 700Mhz. Only when I moved to a 1.2 Ghz machine did objects begin to move smoothly again – and even so, I hit a speed limit when constructing anything complex such as a 3D graph.

There was a surge of complaint on the Cabri Forum, and I decided to put off writing this review until the problem had been sorted, as I couldn't honestly have recommended Cabri 2+ at all at that point.

There has been one update since the initial release, and I was told at the conference that the problem had been sorted, but I'm not entirely convinced. However, machines have got faster...

Impressions of some of the new features:

The Good:

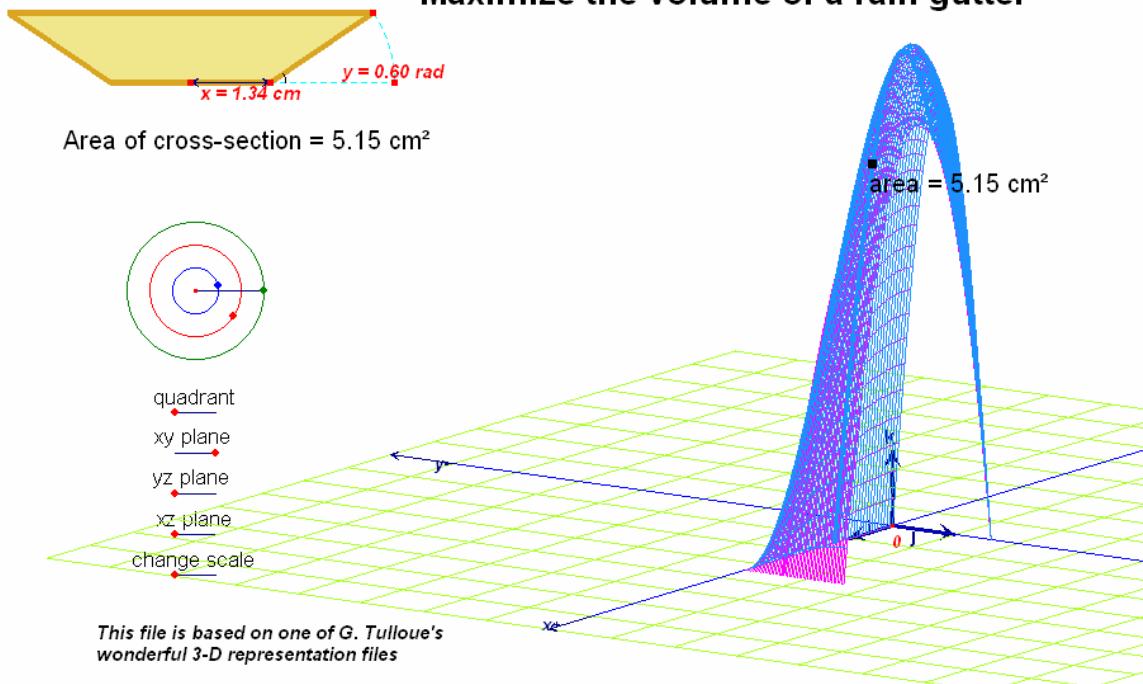
One very useful feature is that Cabri 2+ is an enhancement of Cabri 2, rather than a major change. The transition from Cabri 1 to Cabri 2 required relearning how the software worked: not so for the transition to 2+. An experienced Cabri 2 user will have no problem using Cabri 2+.

Expressions. This is a very powerful feature. Type any algebraic expression onto the screen. Now apply this expression, either choosing numbers to substitute for the variables, or choosing axes to draw the graph. The expression may now be edited – and the corresponding number or graph changes. It was possible to draw graphs with Cabri 2, but was not particularly straightforward. It is now reasonably easy – perhaps not as easy as with GSP4, but, importantly, Cabri 2+ graphs keep the student more in touch with what the graph is actually representing.

Locus of a locus. Cabri got here first. This is awesome. Now not only are ordinary graphs easy, but 3D graphs are possible, as shown below:

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Maximize the volume of a rain gutter



These graphs do not compete with Autograph 3 graphs – but have the advantage that in their creation students need to have a strong understanding of a graph as a locus and must engage in productive mathematical thinking. Unlike Autograph 3, such graphs can also be linked with objects in the way that the maxbox model was linked with its graph above. The graph above shows a model of the cross-section of a rain gutter. The total length of base + sides is fixed, but the base length and the side angle can be varied. The resultant area has been plotted against base length and angle.

Parametric colour at long last! (GSP got here first) This is a major new development in mathematical representation: objects can be filled or coloured using three numbers for red, green and blue – and these numbers can depend on whatever you like. A formula? Distance from another object? Random numbers? I have yet to see any Cabri files that make use of this feature for more than cosmetics (such as a kaleidoscope that changes colour), but GSP files utilizing this feature for mathematical representation are beginning to appear and it is an exciting area of development.

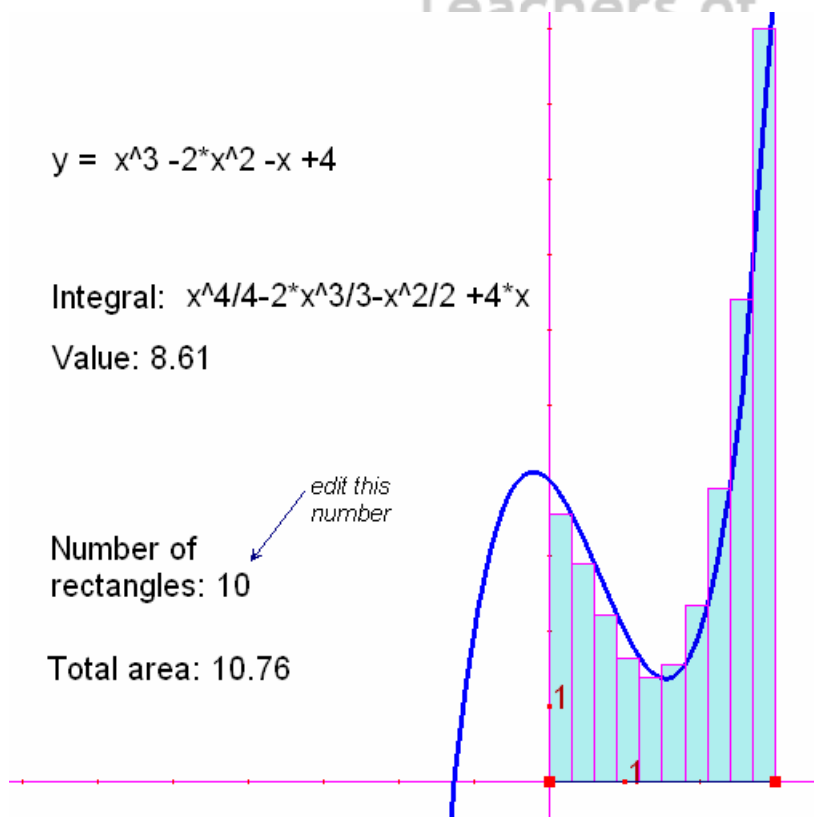
Ability to attach dynamic numbers to a point. This is not specifically mentioned in the documentation. I have been attaching numbers to points for awhile with Cabri 2, but it has been a very complicated procedure involving editing the Cabri file as a text file. The GSP attachment was far easier. It's now very straightforward (and easier than GSP): find the coordinates of a point in some nonsense coordinate system, and edit these coordinates, including whatever text and/or numbers you want and deleting the nonsense coordinates. Cabri 2 crashed for all but very simple files if you attempted this: Cabri 2+ is far more robust and seems happy.

Figure description. This was a feature of Cabri 1, but disappeared with the introduction of Cabri 2, and I very much welcome its re-emergence. It's very powerful: select the menu item and a description appears, with one line per object. Selecting an object in the file highlights it in the description and vice versa. It's also now possible to determine the antecedents of individual objects (a feature GSP has had for awhile).

Recording a session This is an excellent feature for keeping track of what students have done during a session: each time a change is made a separate file is saved automatically.

Background graphics and graphics attached to objects. (GSP got there first) This is excellent. See Adrian Oldknow's article in MicroMath, summer 2003, or his website (<http://www.adrianoldknow.org.uk/Page3.htm>) for a description of the way in which such images can be used in modeling.

Intersections involving loci This feature, unique to Cabri 2+, is great for solving certain geometry problems – and of course can be used for e.g. the intersection of graphs. I'm disappointed by the lack of accuracy, however. For example, in creating the graph below which illustrates the Riemann sum, intersections of the vertical lines with the curve simply did not give an accurate enough result to show convergence to the integral value as the width of the rectangles decreased: I ended up needing to plot each function value, as I would have done with Cabri 2.



format, which, in files such as the Active Geometry files where text has been carefully frozen, make the files much less easy to use. Cabri 2+ files cannot be opened in Cabri 2, however, which will increasingly become an issue for those who have yet to upgrade.

The documentation! I like the absence of text when using Cabri: I do geometry spatially and don't like words intruding unnecessarily (a constant irritation when using GSP) – but I do like to have some text to tell me what's possible! This is in stark contrast with GSP, which comes with extensive documentation and introductory activities. I think the authors of Cabri have not realized that for the geometry-impooverished UK, this software simply does not have the proclaimed “low learning curve and ease of use”. The Help menu continues to only give one line descriptions of how to use tools. And having misplaced my (very thin) user manual, I have been unable to find any online documentation specifically for Cabri 2+ as opposed to Cabri 2 (for which online documentation can be found at Chartwell-Yorke's website). Jack Jackson's photocopiable worksheets Using Cabri 2 in Key Stage 3, also available from Chartwell-Yorke seem to go a long way toward making Cabri 2+ more accessible to students, however.

And the (B)ugly

BUGS!

MORE BUGS!

YET MORE BUGS!

This was really noticeable at the conference: in many sessions, Cabri 2+ simply died and had to be restarted. Those who had preconstructed files were able to open again and continue – but those who were demonstrating a construction were in trouble. The crashes seemed unexpected: clearly all speakers had thoroughly tested whatever they were presenting beforehand and had not anticipated problems.

On the other hand, the reviews cited above have not found bugs to be a problem in ordinary classroom use: one review in fact states specifically that no bugs have been experienced.

In contrast, GSP has crashed once when I have been using it – and this turned out to be a problem with my operating system. (GSP does have an issue with hide/show that I would dearly like to see sorted – but at least this issue does not cause crashes and wipe out work!)

There are also some very irritating consistent bugs: I have given up creating nice icons for macros simply because halfway through messing around with the graphics the whole thing tends to get wiped and replaced with something else. Fine if my macros are just meant for myself – but very irritating if I want to create macros with meaningful icons for students to use.

So, save at frequent intervals, particularly if you are doing anything complicated!

In conclusion, I'm enjoying using Cabri 2+ and would be reluctant to return to just Cabri 2, or just GSP4. Cabri has always been an enormously powerful tool for learning and doing mathematics and the new features of Cabri 2+ enable some very exciting mathematics indeed. Teachers need to be aware, however, that there are issues with bugs and with minimal documentation that will need to be faced before this software is able to be used to its full potential in enhancing student learning of mathematics.

Kate Mackrell

Reference:

Mackrell, K & Johnston-Wilder, P. (2004) "Thinking Geometrically: Dynamic Imagery"
In S. Johnston-Wilder and D. Pimm (Eds) *Teaching Secondary Mathematics with ICT*,
Milton Keynes: Open University Press.

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