Autograph – a new resource for all seasons

Douglas Butler describes how Autograph has come of age with a new pedagogically driven user interface for KS 3-5: a useful addition to the existing canon of dynamic softwares Geogebra and Desmos.

Autograph began its life on the BBC computer in the 1990s. It has since aimed to set new standards for the most effective pedagogical use of dynamic mathematical objects in 2 and 3 dimensions.

In its latest incarnation, Autograph is free to download, thanks to the generosity of La Salle Education and Complete Maths. From the New Year it will run on the web on all platforms - likewise Geogebra and Desmos, so why Autograph?

Everyone must agree it is unlikely that one software will 'do it all', and the first and most important consideration is the user interface. Many teachers are cautious about using technology in their classrooms, and Autograph has concentrated on making its use as easy and as powerful as possible.

Autograph is a fully fledged object-based dynamic geometry system in 2D and 3D: all its mathematical objects are created from the top-level objects: point, line, data, vector and shape. A strict hierarchy is observed so that the dynamic dependency of an object on another is clear.

Probably the most significant new feature in Autograph is that each object has a set of 'attributes' that can be used in calculations or the creation of more objects.

Equations are added in simple one-line form in 2D and 3D, ranging from straight lines, parametric, polar, implicit and piecewise equations, to 2nd order differential equations.

The ability to plot 3D implicit expressions in 'x', 'y' and 'z' is particularly impressive, and Autograph led the way in successfully demonstrating all the vectors, lines and planes topics in 3D.

Letter-constants can be used anywhere, and can either be controlled by Autograph's versatile constant and animation controller, or by physical movement. For example, if a constant has been tied to the 'x' coordinate of a point on a graph, dragging the point along the curve can set its value, which can then be used elsewhere.

Importantly, the entire program can be run at 'Advanced' level, or at the 'Standard' level when there is no mention of radians or calculus or complex numbers.

Data handling has always been a significant feature of Autograph, with data created internally or seamlessly imported from a spreadsheet. Bivariate and single-variable data can be handled, including the tricky concepts involved in interpreting the histogram.
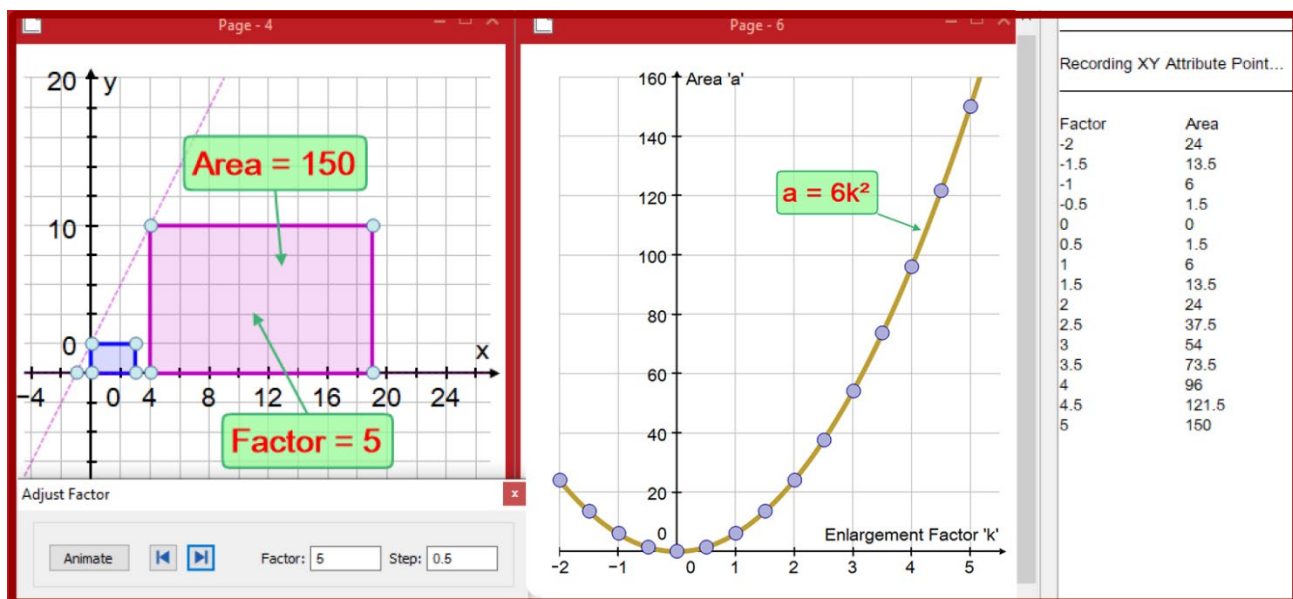

A new feature of Autograph is the ability to define a new 'XY' point using attributes of other objects. Here its coordinates are: the enlargement factor, 'k' and the enlarged area, 'a'. As 'k' is animated the values are recorded and plotted to confirm a quadratic relationship (the host shape has area 6).
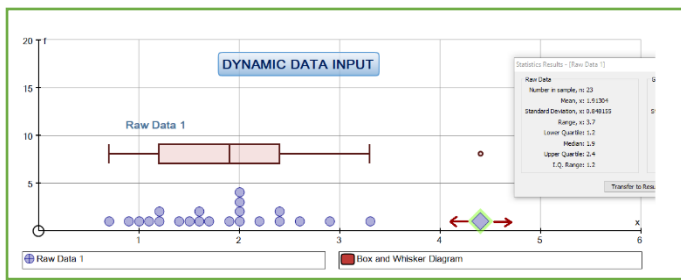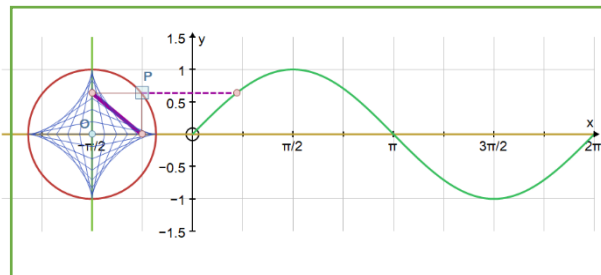
Single variable: points can be dropped in and moved about to help understand the box plot and its outliers.
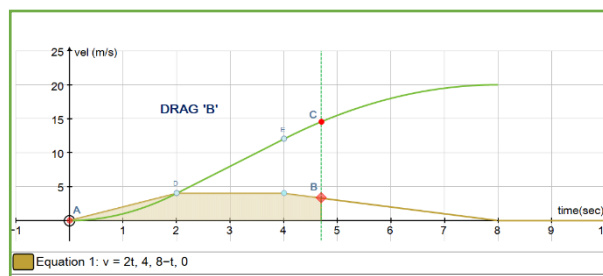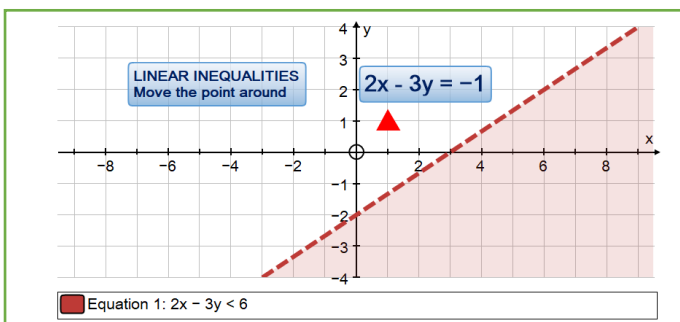

Velocity-Time graph entered as a piece-wise graph. The distance travelled is generated from the area to time 't'.
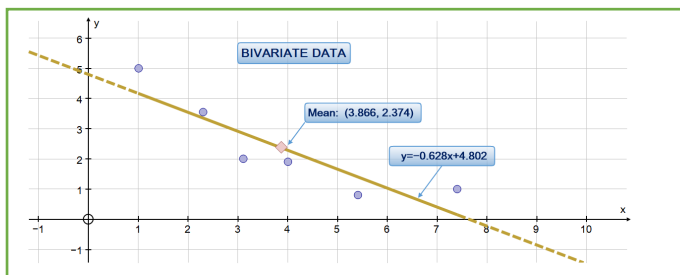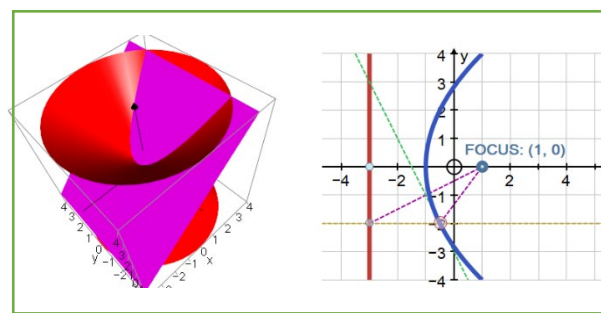

Just 6 points added which can be moved about to help understand the mean, best fit line and correlation.
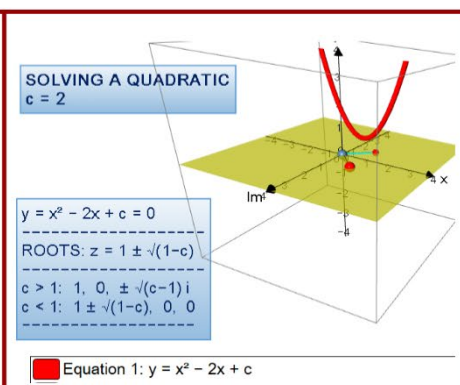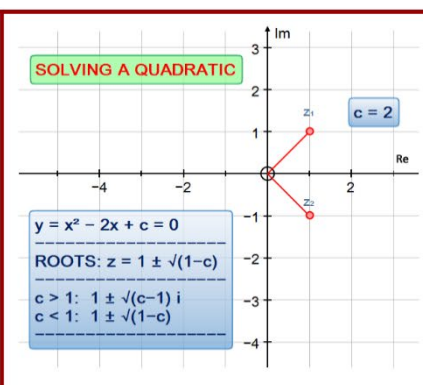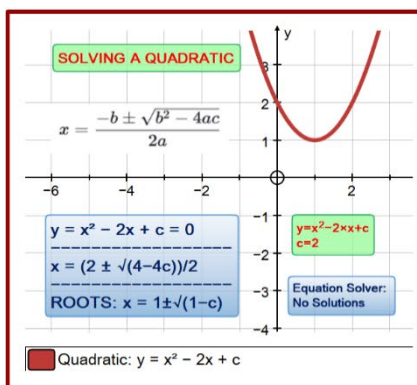

The very visible link between the sine graph and the unit circle, together with a locus of a chord of length 1.

Exploring an inequality: using the calculator to evaluate $2x-3y$ for a moveable point: more than 6 on the right!

A cone and a plane illustrating the conic sections, together with the construction of a parabola.

I have always wanted a 3D Argand Diagram and here it is! Three views of the roots of $x^2 - 2x + c = 0$ when 'c' = 2: (a) in the x-y plane 'no solutions!', (b) in the 2D Argand diagram with 'z' entered as $1 \pm \sqrt{(1-c)}$ and (c) in 3D with the 'z'-axis being imaginary. Naturally this all comes to life as you vary 'c' dynamically.

Douglas Butler's resources are on www.tsm-resources.com

Autograph can be downloaded with access to online tutorials: https://completemaths.com

Videos of the 8 tasks in this article are available from: www.tsm-resources.com/pubs/atm