THE MATHEMATICAL
ASSOCIATION OF VICTORIA

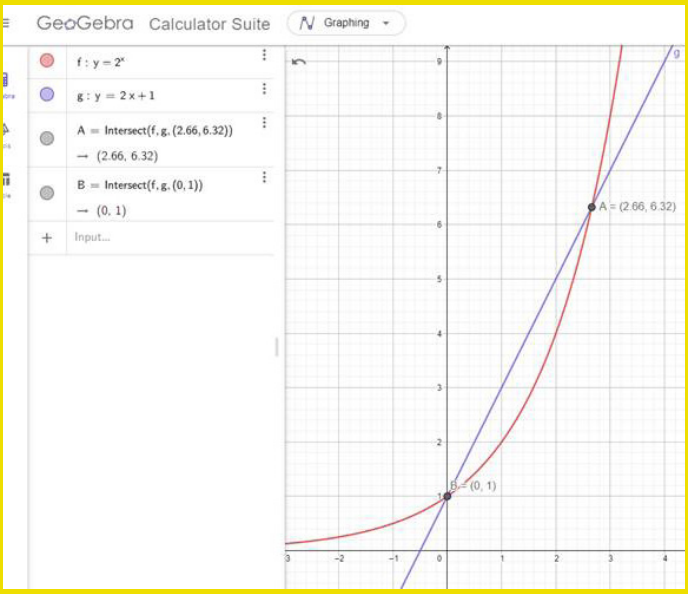
MATHS TREATS

BY LUCIANA
THE POSSUM

MATHEMATICS AND GRAPHING SOFTWARE

Graphing calculators originated in the 1980s, and graphing software became widely available after the spread of modern computers. The data or formulas are entered into an input panel, typically to the left of a Cartesian plane.

MATHEMATICS EXPLORATIONS



Graphing software can be used to plot points and shapes, graph relations and functions, and solve simultaneous equations. Their use can be an efficient way to plot multiple graphs, explore geometrical ideas, and test conjectures.

ACTIVITY

Use graphing software to plot points, create lines and segments, and construct polygons (e.g., triangles, quadrilaterals, pentagons, hexagons). Measure the interior and exterior angles in the polygon. Can you see the relationship between the number of sides and the sum of the interior angles? Does it matter if the polygon is not regular? Use graphing software to explore and predict the shape of $y = x^n$, where $n = 1, 2, 3, 4, \ldots$ What happens when n is negative? What if n is a fraction? How would you change the equation to translate the graph vertically or horizontally? What other mathematical explorations could be assisted with graphing software?

REAL-WORLD CONTEXTS

Graphing software can be used for mathematical modelling of real-world problems. If an equation can be built to model a real object or data trend, then the impact of changing the values of key variables can be explored.

ACTIVITY

Import some images into a graphing software package. Try different relations (equations) to model the elements of the picture. Do you need to specify the domain and range of some of the equations? The red line in the photograph is $y = -15(x - 2.4)^4 - 0.39$ $\{1.92 \leq x \leq 2.88\}$. A likely reasoning process: Reflected parabola → turning point → a quartic is better → find the 'stretch' (dilation) → domain (or range). Import a chart of historical or current trend data and try to model the trend with an equation. Some examples you might like to consider are purchasing power of one Australian dollar, annual rainfall, annual or daily temperature. What period of time should you consider?

REFERENCES AND FURTHER READING

Search Wikipedia for Cartesian coordinate system, Plot (graphics), graphing calculator.

The graphing calculator story www.pacifict.com/Story/

A brief tour of dynamic geometry software www.math.bas.bg/bantchev/misc/dgs.pdf

www.geogebra.org

www.desmos.com/calculator

Images: Leadbeater possum - Steve Kuiter, others from Pixabay.