

Graphics Calculator Activities on the Web

at

www.unsw.adfa.edu.au/pems/news/high_school/hsc_activities.html

All the materials on this web site may be copied for use by teachers and students for non-commercial educational purposes only.

1. Graphics-calculator activities for Years 9 and 10

Written as part of the CQTP Program. For TI-83/83 Plus, Casio CFX-9850GB Plus and Sharp EL-9650/9900, unless otherwise stated.

- **A Classic Problem — The Hare & Tortoise**

The graphs of the distances covered versus time in this classic race are used to answer various questions about the race, such as who won and by how much. A fun exercise in putting questions into maths and solving equations graphically.

Year 10, Level 1; Algebra; Sketching Other Graphs, Simultaneous Equations.

- **Alien Attack**

Uses one of Newton's equations of motion to explore properties of quadratic equations both numerically and graphically.

Years 9 and 10, Levels 1 and 2; Algebra; Coordinate Geometry.

- **Compound Interest**

An introduction to compound-interest calculations on a graphics calculator using formulas, tables and graphs.

Year 9, Levels 1 and 2; Number; Consumer Arithmetic.

- **Coordinate Geometry Art**

A simple picture consisting of straight-line segments is 'coded' using the coordinates of its vertices. These are used 'transmit' the picture to someone else. A graphics calculator is used to 'decode' and check the 'transmitted' picture.

Year 9, Levels 1 and 2; Algebra; Coordinate Geometry.

- **Graphing Straight Lines**

Uses the calculator graphics to explore the $y = mx + b$ form of a straight line.

Years 9 and 10, Levels 1 and 2; Algebra; Coordinate Geometry.

- **Let's Be Rational**

Understanding the local and global behaviour of rational functions.

Year 10, Level 1; Algebra; Sketching Other Graphs, Polynomials.

- **Parabolic Aerobics**

The first activity investigates the effect of changing the numbers A, B and C on the graphs of the family of parabolas $Y=A(X-B)^2+C$. In the second activity, you have to guess the numbers A, B and C for the graph of a mystery parabola generated by the PARABOLA program. The calculator checks your answers and keeps score.

Year 9, Levels 1 and 2; Algebra; Coordinate Geometry.

- **Probably Finding π**

An experimental-probability method for finding π .

Year 10, Levels 1 and 2; Chance and Data; Probability.

- **Reaction Times and Statistics** (TI and Casio)

Programs are used to measure reaction times in various scenarios. The data are displayed as box-and-whisker plots for subsequent analysis.

Years 8–10, Levels 1 and 2; Chance and Data; Statistics.

- **Simultaneous Equations**

Solving simple simultaneous linear equations numerically (with a table), graphically and algebraically.

Year 9, Levels 1 and 2; Algebra; Solve Simultaneous Linear Equations.

- **Sketching Quadratics — Intercept Method**

Uses the calculator graphics to determine the intercepts and vertex of a parabola. Students should be able to factorise monic quadratics.

Years 9 and 10, Levels 1 and 2; Algebra; Coordinate Geometry.

- **Speeding — A Study in Linear Functions**

Students learn and apply basic knowledge of linear functions to problems involving speeding tickets.

Year 9, Levels 1 and 2; Algebra; Coordinate Geometry — Straight Lines.

- **Starburst**

A study of straight lines: slope and intercept.

Year 9, Levels 1 and 2; Algebra; Coordinate Geometry — Straight Lines.

- **Statistics from Birthdays**

Class data on day and month of birth are used to provide an introduction to data presentation on a graphics calculator.

Year 9, Levels 1 and 2; Chance and Data; Statistics.

- **Tangrams and Straight Lines**

Students make a picture using tangram pieces, place the resulting picture on graph paper and use their knowledge of xy coordinates and straight-line equations to redraw the picture on a graphics calculator.

Years 9 and 10, Levels 1, 2 and 3; Algebra; Coordinate Geometry — Straight Lines.

- **Temperature Conversions**

An applications of linear functions to conversion between degrees Celsius and degrees Fahrenheit.

Year 9, Levels 1, 2 and 3; Algebra; Coordinate Geometry — Straight Lines.

- **The Best Shape for a Can**

Minimising the surface area of a cylinder (can) for a fixed volume. Numerical and graphical techniques, rather than Calculus, are used to find the minimum. Aspects of mathematical modelling are introduced.

Year 10, Level 1; Algebra/Measurement; Sketching Other Graphs/Volume.

- **Walk the Walk** (TI only)

A study of functions, lines and slope using a motion detector.

Year 9, Levels 1, 2 and 3; Algebra; Coordinate Geometry.

- **What's My Line**

Investigates the connection between a table of values, the line on a number plane and the equation of the line.

Years 9 and 10, Levels 1 and 2; Algebra; Coordinate Geometry — Straight Lines.

- **Which Fuel?**

An application of linear functions to choosing whether to use petrol or LPG in your car.

Years 9 and 10, Level 1; Algebra; Coordinate Geometry — Straight Lines.

2. Using graphics calculators for . . .

A variety of topics — explanations, key strokes, applications/problems with answers and associated calculator programs.

Again, available for all three brands unless stated otherwise.

- **Using the Graphics Calculator** — an introduction to the basic operations; Years 8–12.
- **Coordinate Geometry** — basic commands and a variety of problems; Years 9, 10.
- **Population Modelling** — a variety of problems from simple exponential growth to Leslie matrices and difference equations; Years 7–12.
- **Sequences and Series** — basic commands and a variety of problems; Years 10–12.
- **Calculus** — basic commands and a variety of problems; Years 11, 12.
- **Matrices** — basic commands and a variety of problems; Years 11, 12.
- **Complex Numbers** — basic commands and problems; Years 11, 12.
- **Programming** — suitable for teachers and keen students.
- **The Graphics Screen and Accuracy** — information to help you understand the graphical and numerical limitations of a graphics calculator.

Also available: a wide range of calculator programs and program information for TI-83/83+ calculators. Suitable for Years 11, 12 and first-year university.

Contact for more help

Peter McIntyre

School of Physical, Environmental
and Mathematical Sciences

UNSW@ADFA

Canberra ACT 2600

Email: p.mcintyre@adfa.edu.au

Phone: (02) 6268 8896

FAX: (02) 6268 8786