Graphics Calculator Resources for Years 9 and 10

Activity	*Parabolic Aerobics*
Year Group	9
Level	1, 2
Strand	Algebra
Sub-Strand	Coordinate Geometry
Author	Based on *Parabola Guessing Game*, an activity from *Activities Integrating the TI-83+ into Algebra* by Vicki Fortson Shirley. Modified by Peter McIntyre (p.mcintyre@adfa.edu.au).
Calculators	Casio CFX-9850 family
Description	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.

Parabolic Aerobics

Warm-ups

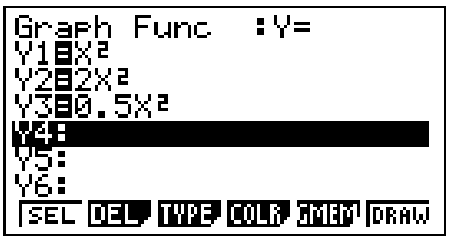
Press [MENU] [5] or use the cursor and [EXE] to select GRAPH mode.

Set a View Window for plotting the graphs by pressing [SHIFT] [F3] (V-Window) and then [F1] for INIT.

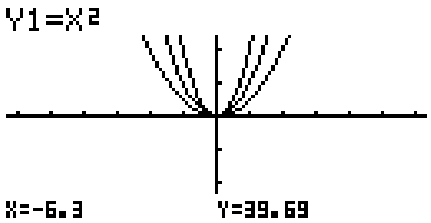
Press [EXIT] to return to the Graph Func screen.

1. Stretches and reflections

Set $Y1=X^2$, $Y2=2X^2$ and $Y3=0.5X^2$. X is produced with the [X,θ,T] key.



Press [F6] (DRAW) and then [F1] (TRACE). Use the arrow keys to see which graph is which.



Let A stand for the number multiplying X^2. You have just plotted graphs for A=1, A=2 and A=0.5.

Use your graphs to decide what happens when you multiply X^2 by different positive numbers. Test your ideas with some other values of A, that is by graphing $Y=AX^2$ for different values of A. Press [F6] to go back to the Graph Func screen. Write down your conclusions in the space below.

What if A is a negative number? Again, test your ideas by plotting suitable graphs. Write down your conclusions in the space below.

2. Shifts or translations

Set $Y1=X^2$, $Y2=(X-2)^2$ and $Y3=(X+3)^2$. What happens when you vary the number B in the family of graphs $Y=(X-B)^2$? Test your ideas by trying some more values of B. Write down your conclusions in the space below.

Set $Y1=X^2$, $Y2=X^2+1$ and $Y3=X^2-2$. What happens when you vary the number C in the family of graphs $Y=X^2+C$? Test your ideas by trying some more values of C. Write down your conclusions in the space below.

3. Summary

In the space below, summarise the effects of changing the numbers A, B and C in the family of graphs $Y=A(X-B)^2+C$.

What parabola is that?

Press [MENU]. With the cursor and [EXE], select the PRGM icon. Run the PARABOLA program by moving the cursor to PARABOLA and pressing [F1] (EXE).

This program plots the graph of a mystery parabola $Y=A(X-B)^2+C$ as a solid line, where A, B and C are generated randomly.

Just to make it a bit easier, A, B and C can take only a restricted number of values.

A: ± 0.5, ± 1 or ± 2.

B, C: 0, ± 1 or ± 2.

Press [EXE] to generate the first mystery parabola. The program also plots the basic parabola $Y=X^2$ as a green line to use for comparison.

Your job is to decide what values of A, B and C the calculator has chosen. When you have decided, press [EXE] and input your values. The calculator will then plot the mystery parabola again as a blue line and the parabola with your values of A, B and C as an orange line. *Did you get the right values?*

Press [EXE] again to see the calculator values, and [EXE] once more for the NEXT... menu.

Here you can generate another mystery parabola by pressing [1] followed by [EXE] or quit by pressing [2] followed by [AC/ON]. When you quit, you will see your final score.

The PARABOLA program is available for download at *www.ma.adfa.edu.au* under *High School and College Activities.*