CASIO

Getting Started with the fx-CG50

Your calculator can complete a huge variety of operations.

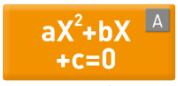
This guide will help you to get started with
Graphs, Calculations, **Statistics** and **Equations**.
It is especially aimed at A-level Mathematics.

Choosing your mode

From the main menu you can select various options which will take you to screens where you can

- **perform calculations**
- **work with statistics**
- **plot graphs**
- **solve equations**

and much more. The most useful menus to start learning the calculator for Maths are

	Use this mode for arithmetic calculations, function calculations, binary, octal, decimal, and hexadecimal calculations, matrix and vector calculations.
	Use this mode to perform single-variable and paired-variable statistical calculations, to perform tests, to analyse data and to draw statistical graphs.
	Use this mode to store graph functions, plot and analyse the functions.
	Use this mode to solve linear equations with two to six unknowns, and polynomials from 2nd to 6th degree.

Some important keys NOT found on your scientific calculator

Many of the general features are very similar to your scientific calculator. So for most things, just try looking for the key you would usually use.

EXE One basic difference is that the "=" key is replaced with an "EXE" key. This stands for "execute", and is what you press to actually **complete** most actions on the calculator.

MENU Allows you to change between screens. For example to go from plotting a graph to solving an equation or just completing a calculation, you would go via the main menu.

EXIT This is like your "back" button. If you want to go back to where you were previously, this will take you there.

OPTN Allows you to access a whole range of different options. If you can't find something, this is often a good place to start looking!

Always keep an eye on the bottom of the screen as there will often be a list of things that you can do there. You can choose these options by pressing one of keys F1 to F6, which lines up below the choice you want to make.

Some advice

We strongly recommend that you reset the calculator before learning about it. Please see page 12 for more information.

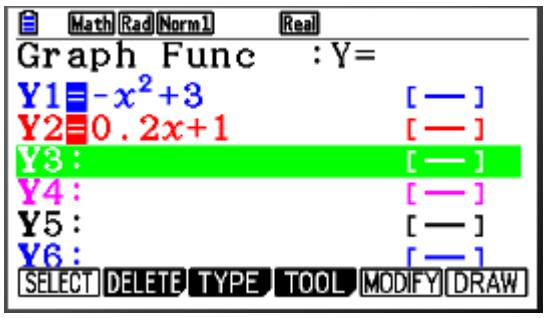
You can't break the calculator! At least, not by using it. If you get stuck, try a different menu or the OPTN key.

There's plenty of support from Casio – please see the back page.

Graphs [Option 5]

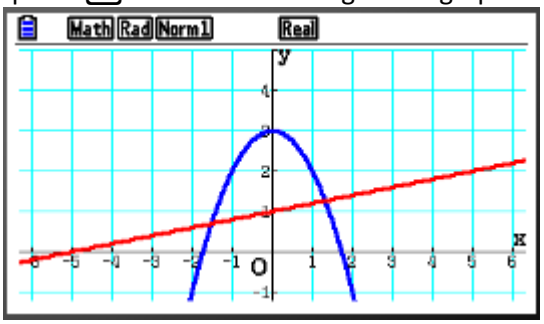
Plotting graphs – basics

Type the equations of the graphs that you would like to plot…



***Hint**: you can change between **types** of graphs by pressing [F3] on this screen, and this will allow you to plot parametric curves if you need to.*

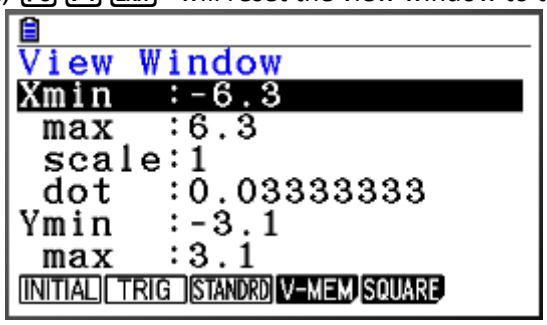
…then press [F6] to see the drawing of the graphs



View window

If the scale on your graph is just far too big or small for you to see what you need, then you can change the view window manually.

- **V-Window** – press [SHIFT] [F3] and this will take you to a screen where you can change what you can see your graph. You can alter the range of x and y values that you can see on the screen, the scale, and the grid. From the graph screen, [F3] [F1] [EXIT] will reset the view window to the original settings.



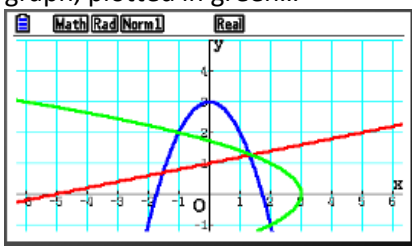
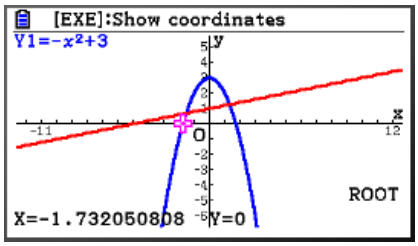
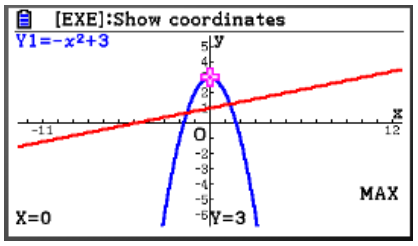
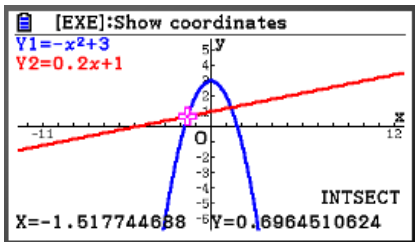
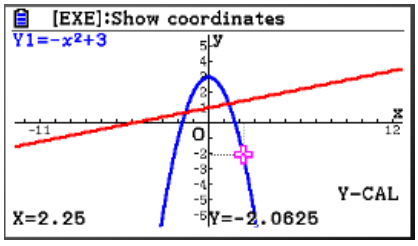
If the grid isn't showing, then you will need to adjust either or both of the following

- the scale is too fine (too many marks on the axis) or too coarse (no marks show on the axis)
- the grid is not set to LINE ([SHIFT] [MENU] (SETUP) and scroll to GRID).

You can also move around your graph. You can try

- **Zoom** – press [+] or [−] when you are looking at your graph, and this will zoom in or out, based on the scale settings ([SHIFT] [F2] (ZOOM),then [F2]). [SHIFT] [F2] [F5] will "auto" zoom so will often give a sensible scale.
- **Move** – press ◀ or ▶ when you are looking at your graph, and this will move the view left or right.
- **Pan** – if you need to move a long way it is quicker to use pan. Press [OPTN] [F2] to get into the pan mode. Then use the four-way arrow button to scroll to where you want to pan from. Press [EXE] to select that position, scroll again to move the graph around, and when you have the position you want, press [EXE] again and then [EXIT] to get out of pan mode.
- **Trace** –you can move along a graph by pressing [SHIFT] [F1]. Move along a graph by using the cursor ◀ ▶. Move between graphs using the cursor ▲ ▼. Move to a specific coordinate by entering an x-value.

Once you have the plot of your graph(s) there are a number of useful features that you can take advantage of …

Feature	Useful for…	Steps / key presses	Screen
Inverse	If you need to sketch an inverse function, or find the range or domain of the inverse function. ***Hint***: Check the domain is valid for the inverse, and that the inverse is not one-many or many-many.	Press SHIFT F4 to get the SKETCH function, then choose F4 again for INVERSE. If you have more than one graph plotted, choose the one you want by using the ▲ ▼ keys, then EXE	Here is the inverse of the blue graph, plotted in green… 
ROOT	Checking the roots/solutions of an equation.	Press SHIFT F5 to get the G-SOLVE function, and then choose F1 for ROOT. Select which curve you want the roots of, then use ◀ and ▶ to switch between roots if there are more than one.	
MAX MIN	Checking the coordinates of maximum and minimum points of a curve.	Press SHIFT F5 to get the G-SOLVE function, and then choose F2 for MAX or F3 for MIN. Select which curve you want the max or min of, then use ◀ and ▶ to switch between stationary points if there is more than one.	
INTSECT	Checking the coordinates of points of intersection between two curves.	Press SHIFT F5 to get the G-SOLVE function, and then choose F5 for INTERSECT. Use ◀ and ▶ to switch between points of intersection if there is more than one, and press EXE if you want to see the coordinate point labelled on the graph.	
Y-CAL X-CAL	Checking the corresponding y or x value when finding coordinates of points that are on the curve.	Press SHIFT F5 to get the G-SOLVE function, and then choose F6 to go to the next page. Then choose F1 for Y-CAL and choose F2 for X-CAL. Select which curve you want a value from, then type in the value you want.	 This was to find the y-value when x was equal to 2.25

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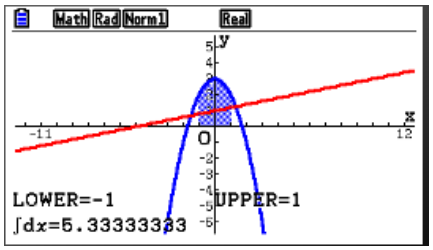
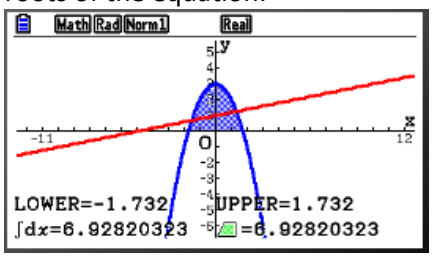
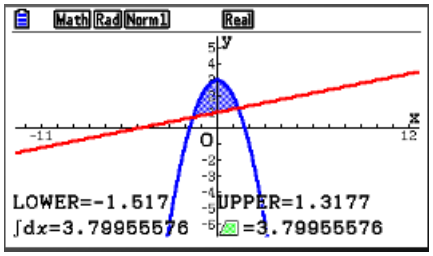
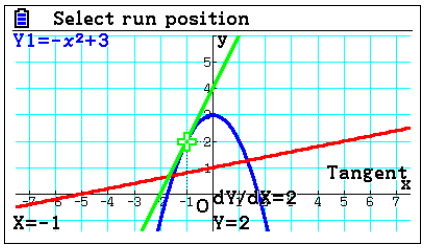
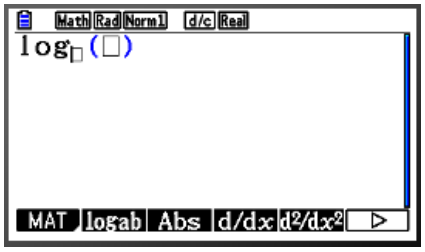
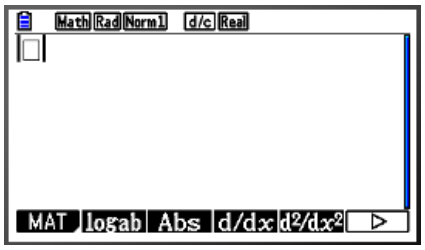
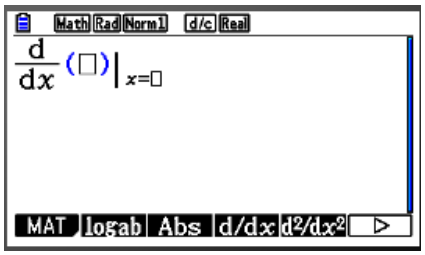
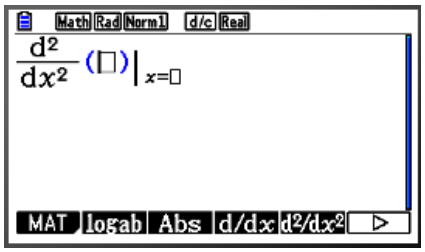
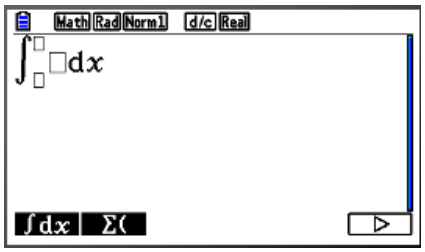
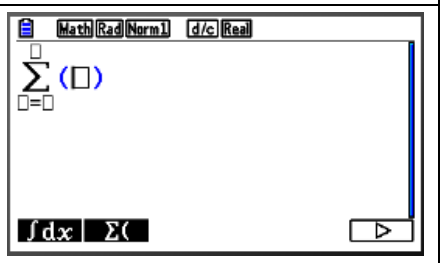
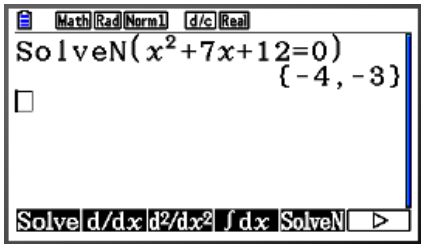
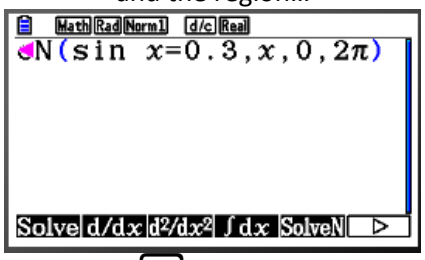
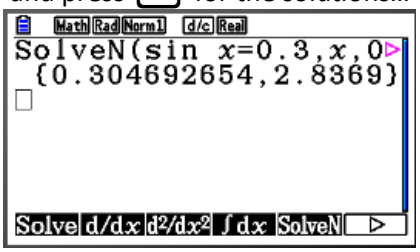
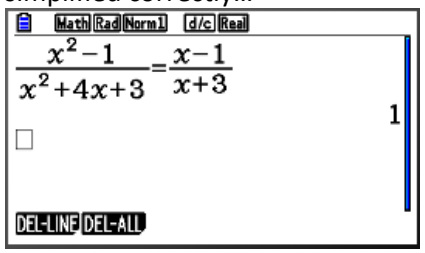
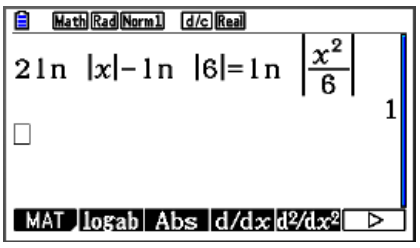
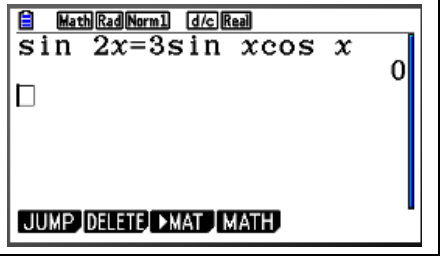
Feature	Useful for…	Steps / key presses	Screen
∫dx	Checking the area under a curve, or the area between a curve and a line	Press SHIFT F5 to get the G-SOLVE function, and then choose F6 to go to the next page. Then choose F3 for the integral. Within this you can choose • ∫dx which gives the area under a curve between any limits that you choose yourself • ROOT which gives the area under the curve between the roots of the function • INTSECT which gives the area between a line and a curve	Area under a curve between two limits:  Area under a curve between two roots of the equation:  Area between a line and a curve: 
Tangent	Draw a tangent to a curve. ***Hint***: to show the value of the derivative (the gradient), use SETUP (SHIFT w) and scroll to DERIVATIVE, then choose ON.	Press SHIFT F4 to enter the SKETCH function, and then choose F2. Use the scroll cursor ◀ ▶ to move the tangent, or enter a x-value for a specific coordinate. ***Hint***: Press EXE to see the equation of the tangent.	

Run-Matrix (Calculations) [Option 1]

Changing the mode for calculations

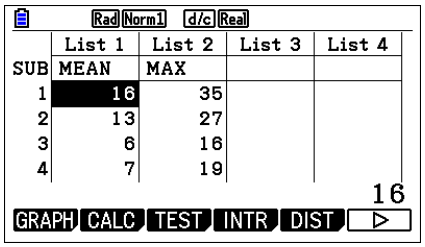
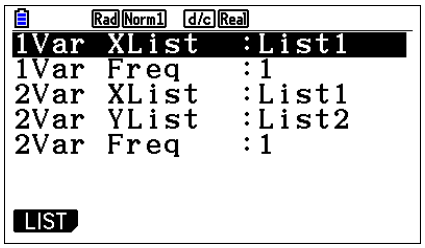
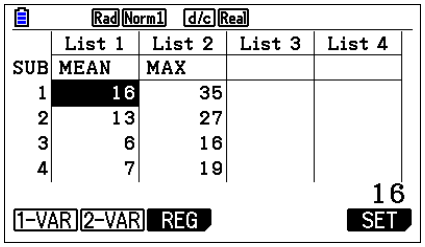
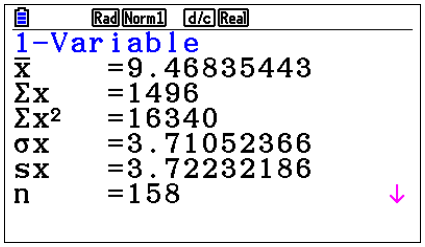
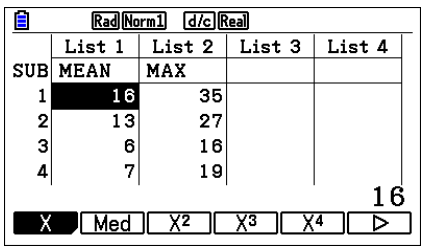
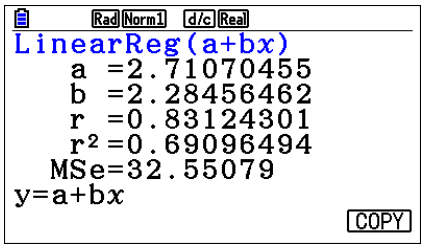
Once you have reset your calculator most things will be automatically set up how you need them.
If you are doing a calculation and you do need to change between **degrees** and **radians** mode, for example, you can do this by pressing SHIFT MENU which takes you to the SETUP screen. Scroll down to find the ANGLE option and you can choose degrees or radians here.

Feature	Useful for…	Steps / key presses	Screen
logab	Typing in logarithms which are not base 10.	Go to the MATH menu by pressing F4, and then press F2	
Abs	Typing in modulus functions.	Go to the MATH menu by pressing F4, and then press F3	
d/dx	Checking answers if you have to find "the value of $\frac{dy}{dx}$ when x =…"	Go to the MATH menu by pressing F4, and then press F4 again	
d²/dx²	Checking answers if you have to find "the value of $\frac{d^2y}{dx^2}$ when x =…"	Go to the MATH menu by pressing F4, and then press F5	
∫dx	Checking answers for definite integration (with limits).	Go to the MATH menu by pressing F4, and then press F6 to go to the next page of options, the select the integral function by pressing F1	
Σ(	Checking answers if you are working out the sum to n terms of a series.	Go to the MATH menu by pressing F4, and then press F6 to go to the next page of options, the select the "sum" function by pressing F2	
SolveN	Checking solutions to quadratics, cubics, trig	Press OPTN F4 to get into the CALC menu. From here press	Solving a quadratic example

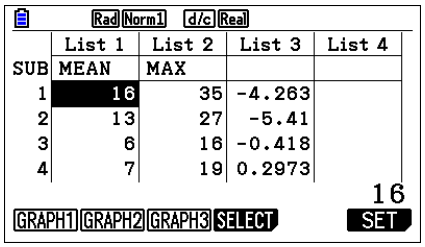
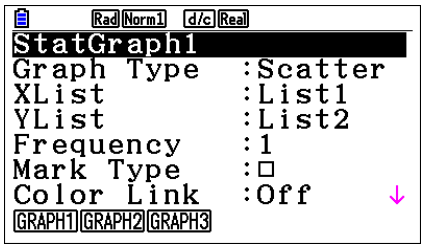
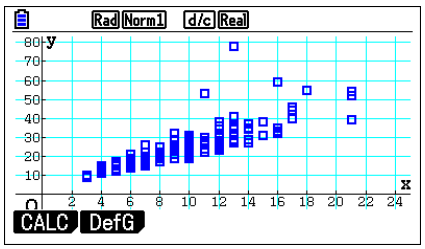
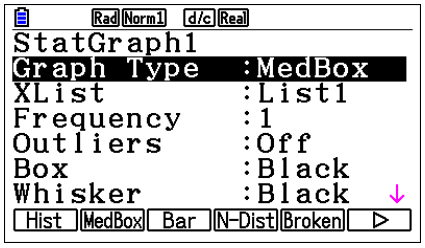
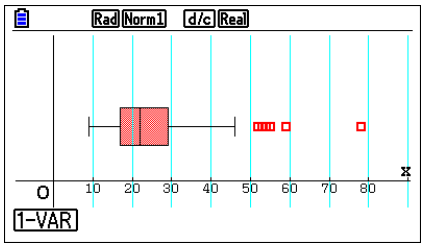
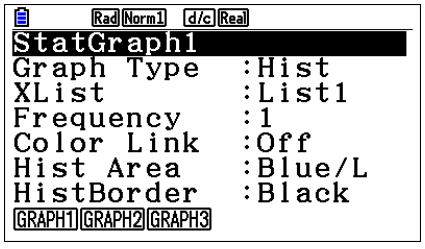
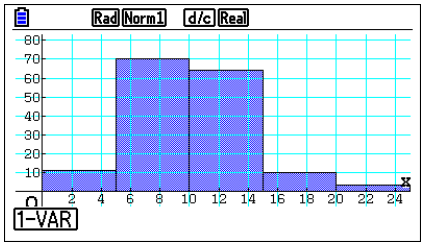
Feature	Useful for…	Steps / key presses	Screen
	equations, exponential and logarithmic equations, modulus equations, etc. ***Hint:*** *if you want an* ***exact value*** *when solving a quadratic or cubic, you will be much better using the "****Polynomial****" function in the "****Equation****" menu, as this will give you your solutions in both decimal and surd form.*	[F5] to get into SolveN mode. From here you can type in the equation you want to solve, using [SHIFT] [•] to get an = symbol when you need it. For trig equations you can specify your interval. After typing your equation, type [,] [X,θ,T] [,] minimum value [,] maximum value [)] before pressing [EXE] to get your solutions. Make sure you are in the correct mode (radians or degrees).	 Solving a trig equation example: "Solve $\sin x = 0.3, 0 \le x \le 2\pi$" Type in the equation to be solved and the region…  and press [EXE] for the solutions… 
True/False	Checking work on algebraic fractions (simplifying, adding, writing as partial fractions, changing improper to mixed). Checking that you have simplified a logarithmic or exponential equation correctly. Checking that you have simplified using trig identities correctly, or just checking that you memorised a trig identity correctly.	Type what you **started with** on the LHS, an "=" in the middle (by typing [SHIFT] [•] to get the "=" remember!) and what you **finished with** on the RHS. When you press [EXE] the calculator will give a value of… 1 if what you typed is TRUE 0 if what you typed is FALSE.	Confirming that these are simplified correctly…  
	Hint: *BEFORE USING THIS, make sure that you define x as an appropriate value. For example, if x is set to equal 0, it will tell you that* $2x = 3x$ *is TRUE (clearly not true for all real values of x)!* *Make sure you choose an appropriate value for x for the identity or equation that you are checking. To do this, type the value you want to use for x, then press* [→] [X,θ,T] [EXE]. *This will assign that value to x.*		Confirming that this identity is NOT correct… 

Statistics [Option 2]

Data are stored in lists. From these, you can calculate statistics such as mean and standard deviation.

Feature	Useful for…	Steps / key presses	Screen
List 1	Typing in the data. Enter the data line by line, pressing EXE after each item. ***Hint***: you can type a label for the data in the cell below the List number.	Enter the data line by line, pressing EXE after each item.	
SET	Telling the calculator which list(s) to use for calculations. For 1-variable statistics set 1-Var lists. For 2-variable statistics (regression), set 2-Var lists.	Press F2 to enter CALC mode, then F6 and scroll to the 1-Var or 2-Var lists. XLIST is the list of values. Press LIST to change the List number. YLIST is the 2nd list of values for 2-variable data. FREQ is the frequency of each data item. This is either 1 or a list of frequencies. Press LIST to specify frequencies in a list.	
1-VAR	Calculating statistics of a single variable, for example mean or standard deviation. ***Hint***: BEFORE USING THIS make sure that you have told the calculator which list to use (see SET)	Press F2 to enter CALC mode, then F1 ***Hint***: use ▼ to scroll down for more statistics such as quartiles	 
REG	Calculate regression statistics (equation of the regression line and the correlation coefficient)	Press CALC to enter the statistics calculation menu, then F3 (REG). This will give you a choice of regression types. Choose F1 (X) for linear regression and then F2 (a+bx) for the equation type.	 

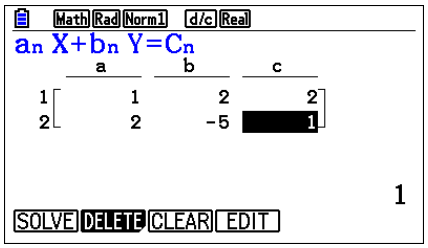
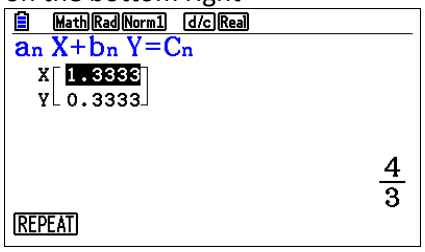
You can draw graphs from the lists of data using GRAPH (F1)

Feature	Useful for…	Steps / key presses	Screen
SET	Telling the calculator what type of graph and which list(s) to use. The settings depend on the type of graph – see examples below. ***Hint***: you can set 3 graphs	From the statistics menu press F1 (GRAPH) then F6 (SET). Choose which graph number you wish to set (F1, F2, F3). Press EXIT to return to the graph screen.	
Scatter	Draw a SCATTER GRAPH. Use SET above and the following setttings: GRAPH TYPE: Scatter (F1) XLIST: List number with your 1st set of values YLIST: List number with your 2nd set of values FREQUENCY: 1 or List of frequencies The other settings allow you to set colours and mark type.	From the graph screen press the key for your graph in SET You can draw the regression line (line of best fit). From the graph plot, press F1 F2 F2 F6 for a linear regression.	 
MedBox	Draw a BOX PLOT Use SET above and the following setttings: Graph Type: MedBox (F6 F2) XList: List number with your values Frequency: 1 or List of frequencies Outliers: Off (default) or On The other settings allow you to set colours.	From the graph screen press the key for your graph created in SET. ***Hint***: You can find the values of each quartile by pressing SHIFT F1 (TRACE) and using the cursor ◀ ▶	 
Hist	Draw a HISTOGRAM. Use SET above and the following setttings: GRAPH TYPE: Hist (F6 F1) XLIST: List number with your values FREQUENCY: 1 or List of frequencies The other settings allow you to set colours.	From the graph screen press the key for your graph created in SET. Enter the START value (the lowest value for the graph to start) and the WIDTH of each interval. Then press EXE	 

Equations [Option A]

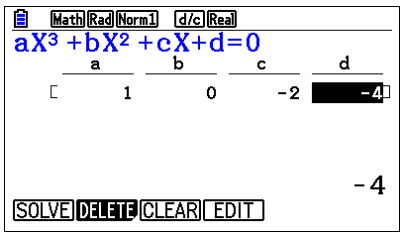
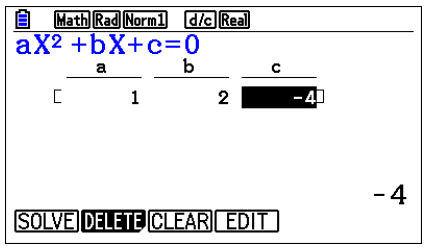
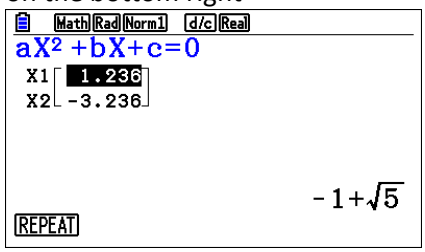
Simultaneous linear equations

The equation has to be entered in the form $ax+by=c$ (2 unknowns) or $ax+by+cz=d$ (3 unknowns), and similarly for more unknowns. Don't forget to rearrange your equation if it is not in this form.

Feature	Useful for…	Steps / key presses	Screen
SOLVE	Find the solutions of the equations. ***Hint***: If the lines (2 unknowns) or planes (3 unknowns) are parallel, the calculator will show 'No Solution'. If the lines or planes are coincident (lie on each other) it will show 'Infinite Solutions').	From the EQUATION menu, press F1 to choose the SIMUL menu, then choose the number of unknowns. Press F1	 Notice that the exact value is given on the bottom right 

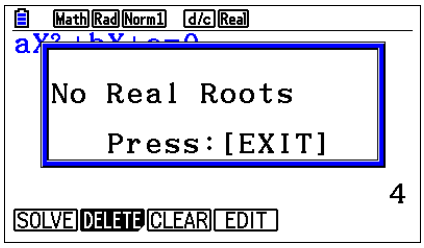
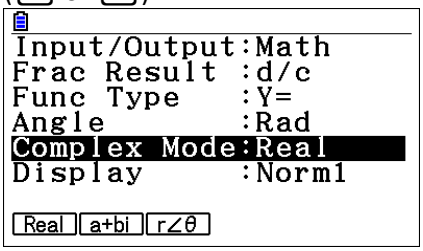
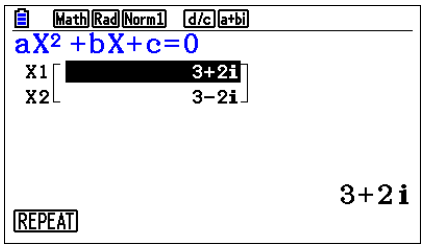
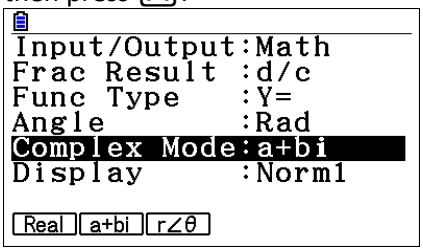
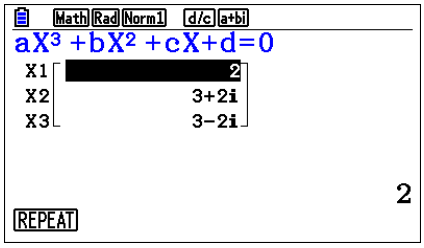
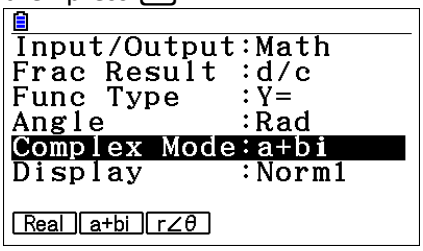
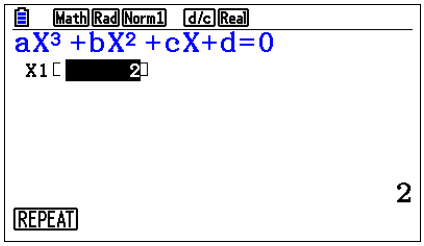
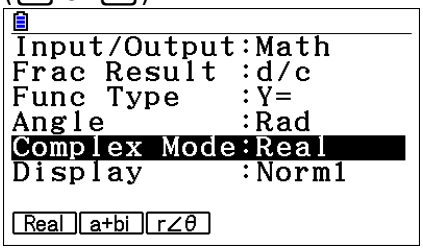
Polynomial equations

The equations must be in the form $ax^2+bx+c=0$ for quadratics and $ax^3+bx^2+cx+d=0$ for cubics. Remember to rearrange your equation if necessary.

Feature	Useful for…	Steps / key presses	Screen
SOLVE	Find the solutions of the equations. ***Hint 1***: If the equation does not have one of the terms, enter 0 for the coefficient e.g. for $x^3-2x-4=0$ enter  ***Hint 2:*** If the display shows 'No Real Solutions' or a solution such $3+2\mathbf{i}$, see below.	From the EQUATION menu press F2 to choose the POLY menu then the degree (e.g. 2 for quadratics, 3 for cubics). Enter the coefficients of your equations. Press F1	 Notice that the exact value is given on the bottom right 

CASIO

If the quadratic equation has no real solutions, or a cubic has only 1 real solution, then the calculator will show the result depending on how it is set up.

Type	Screen	Explanation	How to change
Quadratic		The graph lies entirely above the *x*-axis.	To show complex roots, press [EXIT]. Enter SETUP by pressing [SHIFT] [MENU] and scroll to Complex Mode, then choose the appropriate notation ([F2] or [F3]). 
Quadratic		The graph lies entirely above the *x*-axis. Complex roots are shown.	To show real roots only, press [EXIT]. Enter SETUP by pressing [SHIFT] [MENU]. Scroll to Complex Mode, then press [F1]. 
Cubic		The function has complex roots.	To show real roots only, press [EXIT]. Enter SETUP by pressing [SHIFT] [MENU]. Scroll to Complex Mode, then press [F1]. 
Cubic		The graph only crosses the *x*-axis once.	To show complex roots, press [EXIT]. Enter SETUP by pressing [SHIFT] [MENU] and scroll to Complex Mode, then choose the appropriate notation ([F2] or [F3]). 

Resetting the calculator

From the main menu, choose System (Option G) 

Choose RESET (F5), then MAIN (F2). You will be asked to confirm. Press F1.

Return to the main menu.

Taking it further

This guide has introduced you to some of the common uses of the fx-CG50 in Maths A-level. There are many other things you can do.

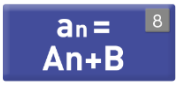
Follow the on-screen menus to explore. Some menus have more options indicated by

- a black background (for example GRAPH)
- an arrow ▷

More menus can usually be found by pressing the OPTN key.

You can access stored values of variables from statistics, graphs and probability distributions by pressing the VARS key.

The calculator can undertake a huge variety of maths. Now you have tried the basic functions, take a look at these

	Use this mode to calculate probabilities from many distributions, and graph the normal distribution.
	Use this mode to store functions, to generate a table of values, and to draw graphs.
	Use this mode to store recursion formulas, to generate a table of values, and to draw graphs.
	Use this mode to draw graphs of conic sections.
	Use this mode to plot and analyse 3-dimensional graphs.

You can explore much more sophisticated maths and ways of using the calculator in the manual.

Casio have many videos, lesson resources and skills sheets. Take a look at our dedicated education website https://education.casio.co.uk/

Casio gratefully thanks Kim Ogden for substantial contributions to this guide. We hope that you enjoy using the calculator.