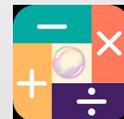


Welcome to this session on using technology to enhance your mathematics learning.

During the session you will be looking at a program which enables you to draw graphs, an app which solves equations, trying logic puzzles and arithmetic games via apps and finally taking a quick look at the Casio 991fx Classwizz calculator.

- Casio Calculator
fx – 991EX ClassWizz
- Desmos Graphing Tool (or app)
- *Photomath*
- *Calculitos*
- *Perplex*



Click on icons for links

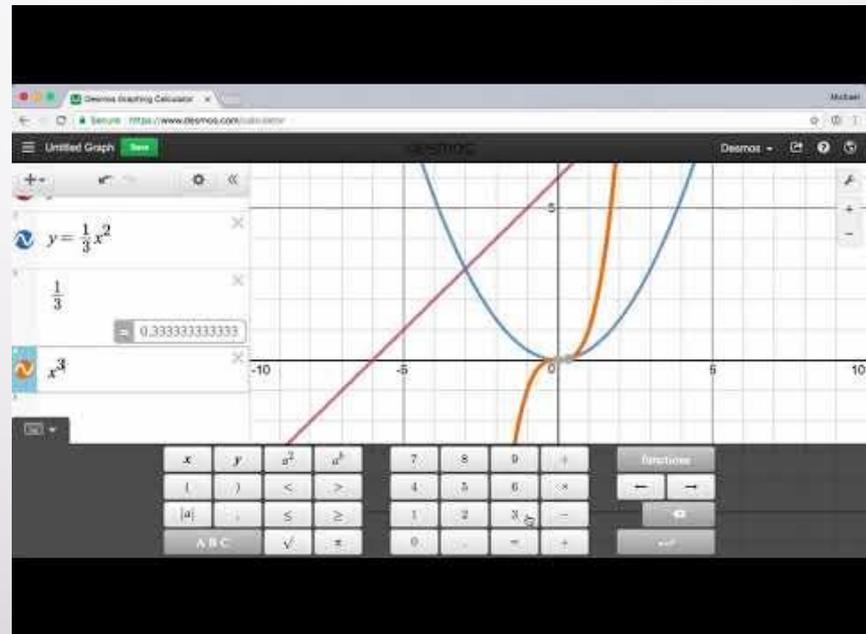
Desmos Graphing Tool



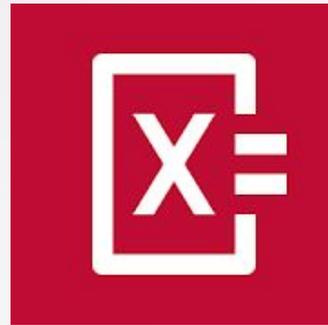
Watch the short introduction video then click on the link to have a go yourself.

<https://www.desmos.com/calculator>

(or click on icon to download the app)



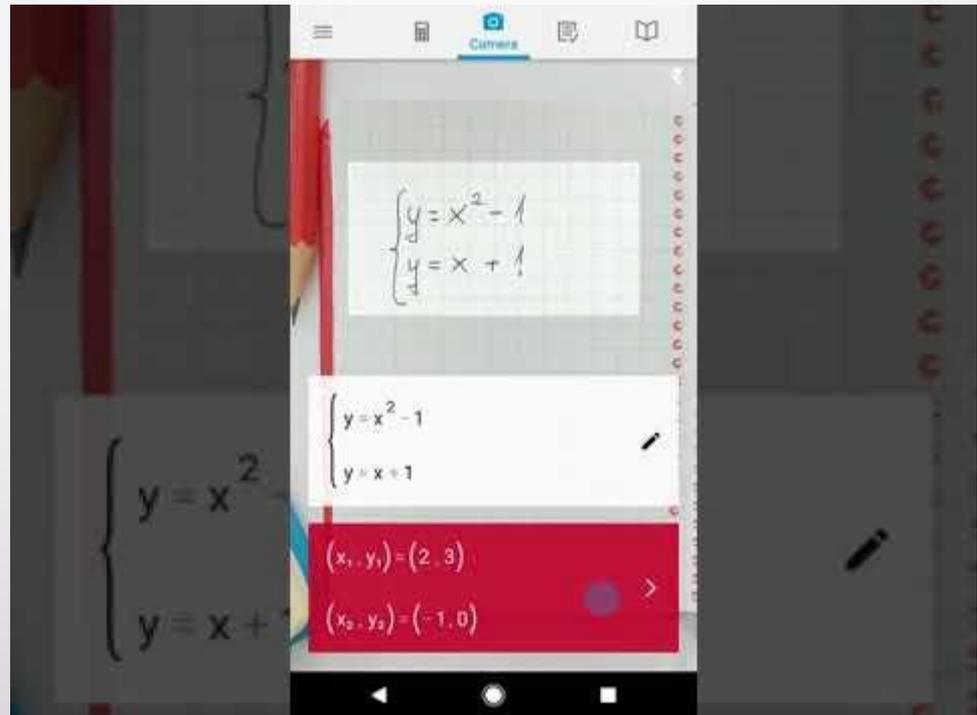
Photomaths



Watch the short
introduction video.

Download the app and
solve equations by
taking a photos of them.

Give it a go.

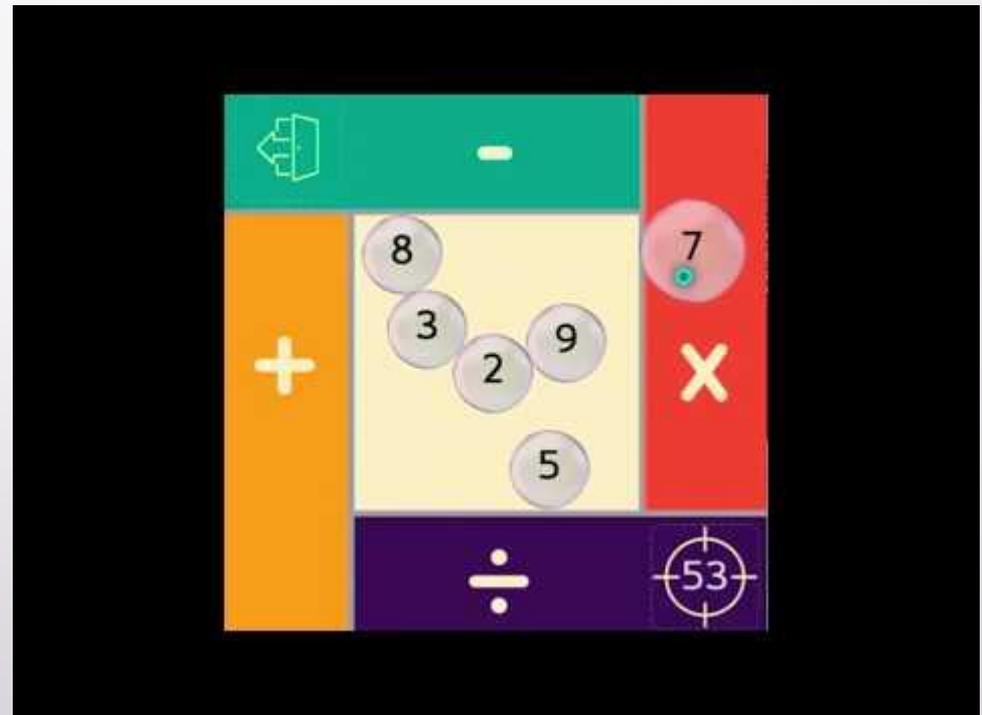


Calculitos



If you are a fan of
countdown, you will love
this number game.

Watch the short introduction
video, download the app and
see how addictive it is.



Perplex

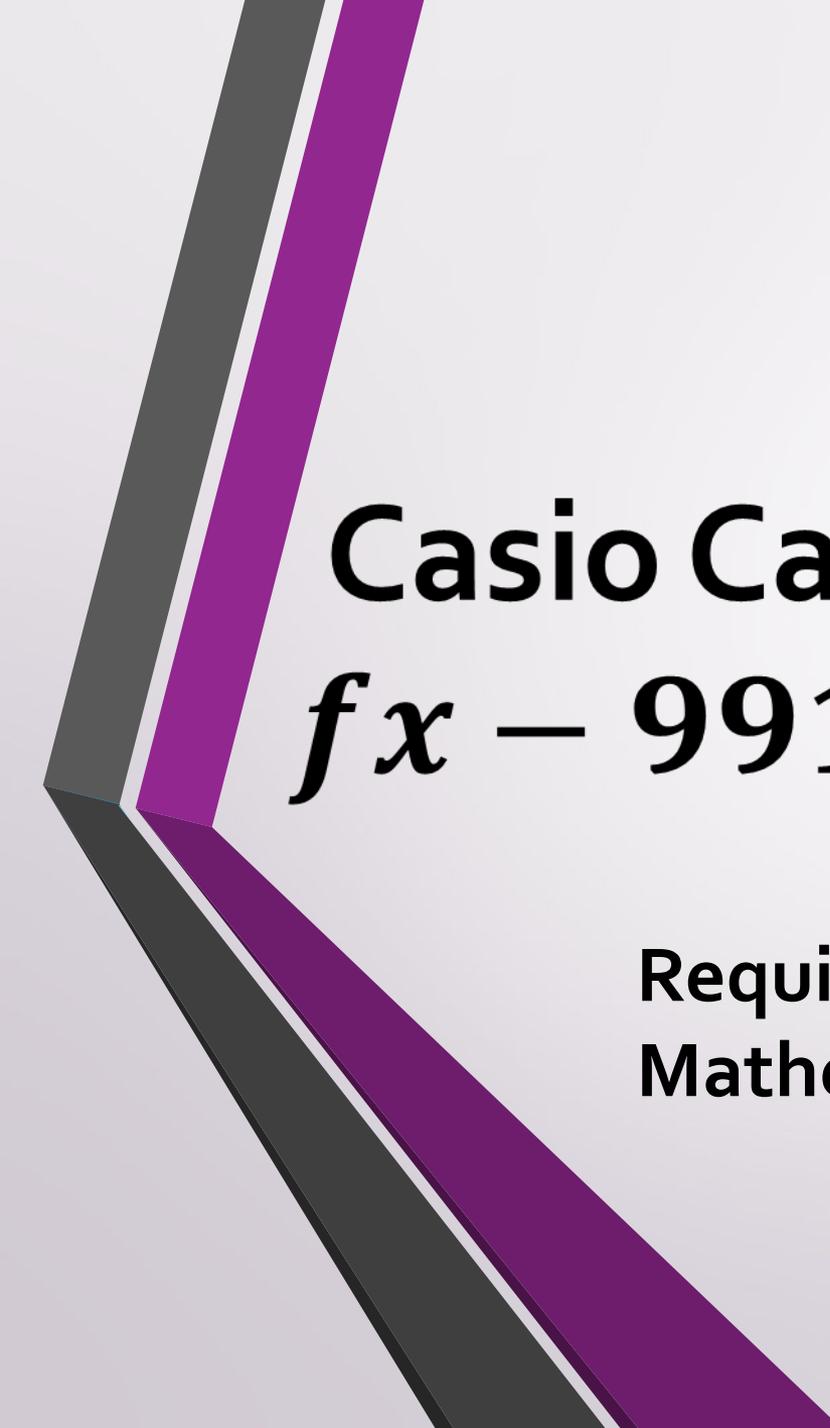


Test your knowledge and puzzle-solving ability with incredibly immersive interactive puzzles from The Open University and UKMT, the United Kingdom Mathematics Trust.

Download the app and test your skills.



No video to watch



Casio Calculator

fx – 991EX ClassWizz

Requirement for the A Level
Mathematics Course



We are aware many of you won't have this yet, so here are a couple of features it can do.

Click the menu button

Mode Menu

Click Mode 9 Table then Mode A Equation to find out more.



1: Calculate

Normal calculation.



2: Complex

Make calculations with complex numbers, including conversion between Cartesian and mod-arg form.



3: Base-N

Convert a number to a different base (e.g. decimal to binary) and make calculations (e.g. +, ×) in different bases.



4: Matrix

Multiply matrices, raise to a power, transpose or find the inverse or determinant.



5: Vector

Find the dot or cross product of two vectors, or find the angle between two vectors.



6: Statistics

Make calculations from a variable or frequency table, including mean, standard deviation, PMCC and regression lines.



7: Distribution

Get values from Binomial, Poisson and Normal tables, including inverse-Z tables.



8: Spreadsheet

Like Excel, allows you to input data and make calculations (e.g. Mean) based on cell ranges.



9: Table

Get a table of values for a given function, e.g. the values of y in $y = x^2 - 2x$ as x varies between -4 and 4.



A: Equation/Func

Solve linear simultaneous equations and polynomial equations (i.e. quadratics, cubics, quartics).



B: Inequality

Solve quadratic inequalities (as well as cubic and quartic inequalities).



C: Ratio

Find a missing value in two equivalent ratios.

MODE 9: Table

< Return

A function is simply a 'number machine' which takes an input (e.g. x) and outputs a value according to some expression, e.g. $f(x) = x^2 + \frac{1}{2}$ is a function which squares the input then adds $\frac{1}{2}$.

On a graph, we often make the y value the output of the function, so might write $y = x^2 + \frac{1}{2}$

In some exam questions you're asked to calculate a table of values for a given function:

$$f(x) = x^2 + \frac{1}{2}$$

x	-1	-0.5	0	0.5
f(x)	1.5	0.75	0.5	0.75

Once in table mode, your calculator display should look like this:

f(X)=	0	Math
-------	---	------

Now input some expression in terms of X . You can use the new x key (top-right) or [ALPHA] → [X] to insert X into your expression.

$$f(x) = x^2 + \frac{1}{2}$$

You can also optionally input a second function $g(x)$. Just press = to skip this.

Table Range
Start: -1
End : 1
Step : 0.5

Enter the starting x value (e.g. -1 on the left table), the ending x value. The step size is what the x values goes up by each time in your table. Press = after each number.

	x	f(x)
1	-1	1.5
2	-0.5	0.75
3	0	0.5
4	0.5	0.75

Use the arrow keys to navigate your table.

MODE A: Equation/Func

While the 'SOLVE' button could allow you to solve a quadratic equation, it would only give a single solution and not give an exact answer. The Equation mode however overcomes these problems. It can also find roots when they are complex numbers (involving $i = \sqrt{-1}$).

(Note however it still can't express roots of cubics or quartics exactly)

Step 1: Select equation vs simultaneous equation solver.

A *polynomial* is an expression of the form $a + bx + cx^2 + \dots$ where the a, b, c, \dots are constants, for example, $1 + 2x$ or $3 - x + x^2 + 2x^3$.

The *degree* of a polynomial is the highest power, so the degree of a cubic equation, e.g. $x^3 - 2x + 1 = 0$, is 3. So for quadratic equations, use 2.

Simultaneous equations are where you have multiple equations with multiple variables, e.g. x and y .

"Solve $x^3 - x^2 + 3x - 4 = 0$ "

Choose polynomial mode, degree 3.

Enter 1, -1, 3, -4, pressing = after each number. Use down arrows to scroll through solutions.

"Solve the simultaneous equations:

$$2x - y = 4$$

$$3x + 2y = 5$$

Choose simultaneous equations, 2 "unknowns" (as we have x and y).

Enter 2, -1, 4, 3, 2, 5, pressing = after each number. Use down arrows to scroll through solutions.

Improvements over old Casio models: Solves quartic equations and simultaneous equations with 3 unknowns. The input of coefficients is now clearer as the full (simultaneous) equation(s) are shown before solving.



There are many other features on
the calculator we will use
throughout the course

*Remember you will need to purchase this calculator,
it is available from most good retailers or the college
shop when you start college.*

We hope you enjoy the activities.