

Using technology to help with Ritangle

Finding approximate solutions to equations using a graphing calculator

The equations below are all solved using algebraic methods you will be familiar with.

$$3x + 2 = 11$$

$$\Leftrightarrow 3x = 9$$

$$\Leftrightarrow x = 3$$

$$x^2 + x - 6 = 0$$

$$\Leftrightarrow (x+3)(x-2) = 0$$

$$\Rightarrow x = -3 \text{ or } x = 2$$

$$6x^3 + 17x^2 - 26x + 8 = 0$$

$$\Leftrightarrow (x+4)(3x-2)(2x-1) = 0$$

$$\Rightarrow x = \frac{1}{2} \text{ or } x = \frac{2}{3} \text{ or } x = -4$$

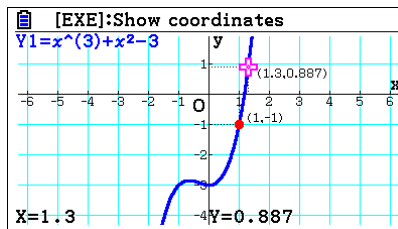
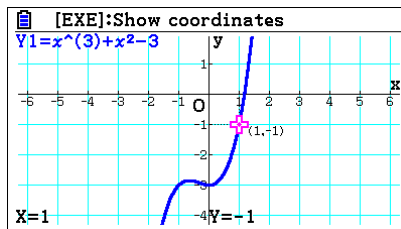
Sometimes it's not possible to do this. For example this cubic equation

$$x^3 + x^2 - 3 = 0$$

cannot be solved using factorisation as for the quadratic and the cubic equations at the top of the page.

The equation $x^3 + x^2 - 3 = 0$ must have at least one real root since the left-hand side is a cubic.

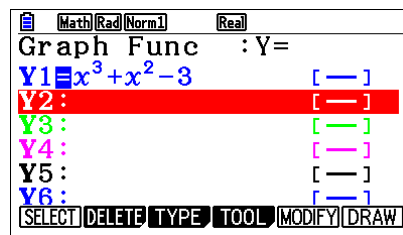
You can see from the graph below that there is a real root between $x = 1$ and $x = 1.3$



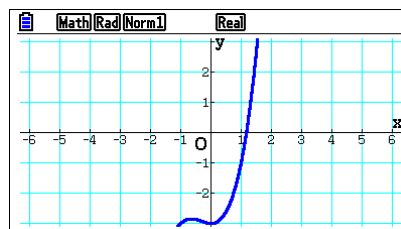
Technology can provide a good approximation to the value of this root. You could use some of the built-in functionality of a graphing calculator such as the Casio fx-CG50.

Plotting the curve on the Casio fx-CG50

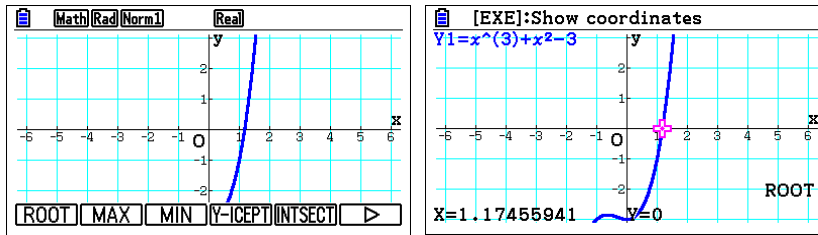
Choose GRAPH from the main menu and enter the equation.



Choose DRAW (F6).

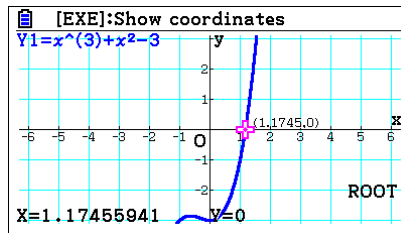


You can solve the root by pressing G-Solv (SHIFT-F5) and then choosing ROOT (F1).



The coordinates of the root appear at the bottom of the screen. The solution to the equation $x^3 + x^2 - 3 = 0$ is $x = 1.7455941$

You can then paste the coordinates on the graph by pressing EXE.



The full value of the root is still shown at the bottom of the screen.

You can also explore iterative methods such as Newton-Raphson. Check the [Casio resource centre](#) for videos on solving equations.