

Solving a Quadratic Equation by Graphing

Tutorial Overview

In this tutorial, you will learn how to graphically solve a quadratic equation with the TI-Nspire™ CX. Follow the steps below to solve problems, like the example below from the [2023 STAAR Algebra 1 Released Test](#) (item 41):

Function k is defined as $k(x) = x^2 + 32x + 248$. What are the solutions to $k(x) = 0$?

Ⓐ $x = -16 + 2\sqrt{2}$ and $x = -16 - 2\sqrt{2}$

Ⓑ $x = 16 + 2\sqrt{2}$ and $x = 16 - 2\sqrt{2}$

Ⓒ $x = -32 + 4\sqrt{2}$ and $x = -32 - 4\sqrt{2}$

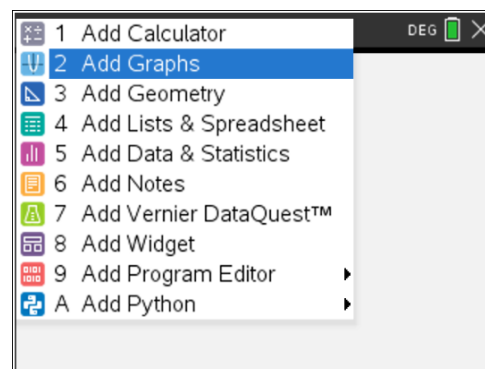
Ⓓ $x = 32 + 4\sqrt{2}$ and $x = 32 - 4\sqrt{2}$

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Solving a Quadratic Equation using Graph Trace


Step 1: Create a Graphs application page.

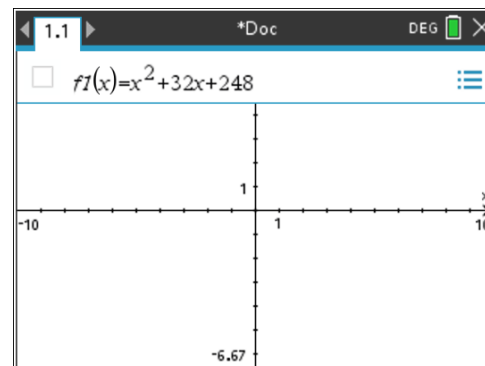
Press , select **1 New Document**, and **2 Add Graphs**.



Step 2: Enter the quadratic equation.

The quadratic equation must be equal to zero to determine the solution(s) using Graph Trace. The example problem asks for the solutions when $k(x) = 0$. This means the equation we will solve is: $0 = x^2 + 32x + 248$.

Enter $x^2 + 32x + 248$ after $f1(x)=$ and press  to view the graph.



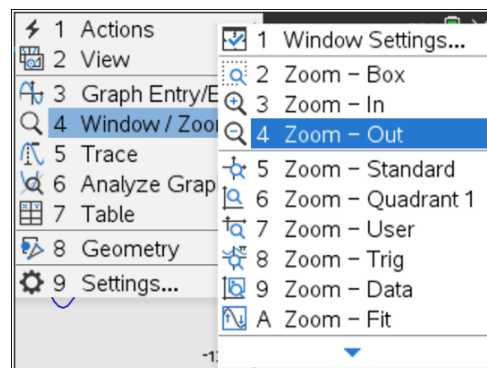
Solving a Quadratic Equation by Graphing



Solving a System of Equations using the Intersection Tool

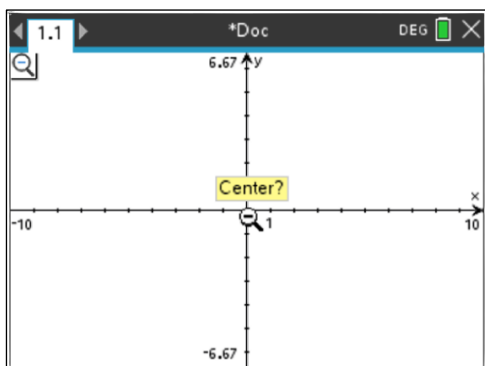
Step 3: Adjust the viewing window to see the x -intercept(s).

The x -intercepts are the solutions when the equation equals zero. If you do not see where the parabola of the quadratic equation intersects the x -axis, you will need to adjust the viewing window.

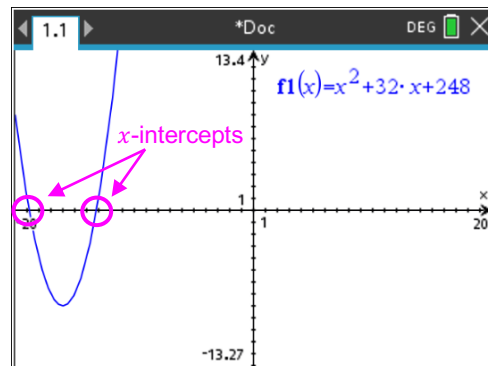
Press **[menu]**, **4 Window / Zoom**, and **4 Zoom – Out**.



Using the touchpad, mark the center by moving the cursor tool, , to the origin and press the center of the touchpad, , or **[enter]**.



If you do not see the x -intercepts, keep zooming out by pressing **[enter]**. Press **[esc]** when you have reached a good viewing window to see the x -intercepts.

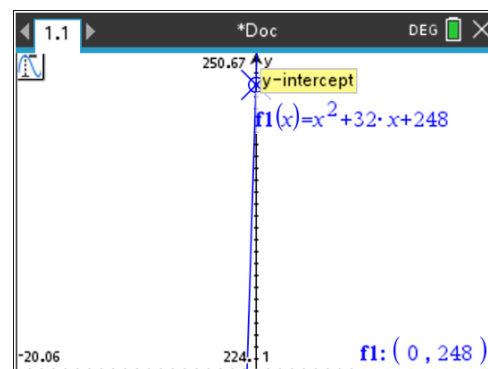
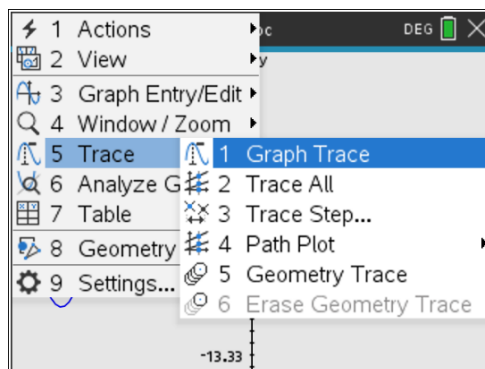


Step 4: Use Graph Trace to determine zeros.

An x -intercept is known as a zero of a function because they have ordered pairs with a y -value of zero. We can use the Graph Trace tool to locate the zeros of the graph.

Press **[menu]**, **5 Trace**, and **1 Graph Trace**.

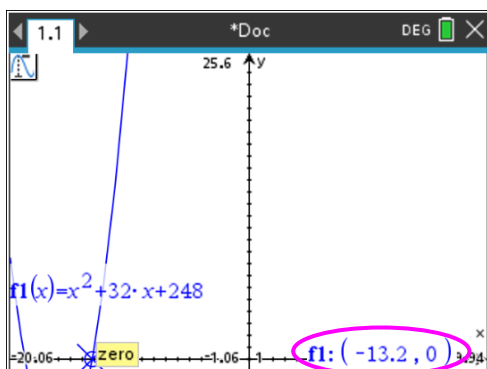
The Graph Trace tool will start at the y -intercept. Press the **◀** left arrow on the touchpad to move the cursor to the x -intercept.



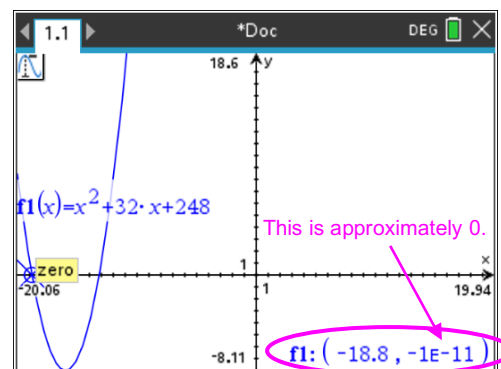
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Solving a System of Equations using the Intersection Tool

Stop when you see the word **zero** appear.
The first x -intercept is located at $(-13.2, 0)$.



Keep pressing \blacktriangleleft to see the second x -intercept.
It is located at $(-18.8, 0)$.



Step 5: Determine the correct answer to the question.

The x -values we are looking for in the answer choices are $x = -13.2$ and $x = -18.8$. We can eliminate answer choices that we know have positive values.

Function k is defined as $k(x) = x^2 + 32x + 248$. What are the solutions to $k(x) = 0$?

A $x = -16 + 2\sqrt{2}$ and $x = -16 - 2\sqrt{2}$

B $x = 16 + 2\sqrt{2}$ and $x = 16 - 2\sqrt{2}$
positive

C $x = -32 + 4\sqrt{2}$ and $x = -32 - 4\sqrt{2}$

D $x = 32 + 4\sqrt{2}$ and $x = 32 - 4\sqrt{2}$
positive

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The remaining answer choices in the problem are not in decimal notation. We can use a calculator page to convert the choices to decimals.

Press $\boxed{\text{ctrl}}$, $\boxed{\text{doc}}$, $\boxed{1}$ **Add Calculator**.

Type in the values from answer choices A and C.

Answer choice A is correct because the x -values -13.2 and -18.8 .

