

Solving Equations Using x-Intercept Method -1 ClassicView

Objectives:

- Make one side of the equation equal to zero
- Use the Zero calculation to find solution

Review: Make one side of the equation equal to zero

To use the x-intercept or zero method (instead of the intersection method), the equation must equal 0.

Example 1: Re-write $4x - 6 = 8x - 18$ so the right side equals 0.

Subtract $8x$ from both sides: $4x - 8x - 6 = -18$

Add 18 to both sides: $4x - 8x - 6 + 18 = 0$

This gives $LHS - RHS = 0$, where LHS means “left-hand side” and RHS means “right hand side”.

The point where a graph crosses the x-axis has y-coordinate 0 and is called an **x-intercept** or **zero**.

Use the Zero calculation to find solution

Example 2: Use the x-intercept of difference method to find the solution of $4x - 6 = 8x - 18$.

Step 1: Subtract one side to get an equation equal to zero: $LHS - RHS = 0$

See Example 1: $4x - 8x - 6 + 18 = 0$

Step 2: Graph $y_1 = LHS - RHS$

IMPORTANT: This method uses only one graph. Clear (or turn off) all other functions in the Y= menu.

Press:

See:

Step 3: Adjust the window to see the x-intercept in the GC window, if necessary.

IMPORTANT: If the x-intercept is not visible in the GC window, the calculator won't find it. Adjust the window if necessary.

The x-intercept is visible on or near (3,0), no adjustment needed.

Step 4: Start the Zero calculation, in the CALC menu.

Press:

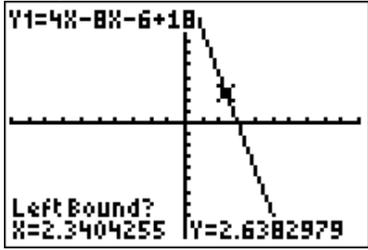
See:

entry solve

Step 5: "Left bound?" Press  or  until the cursor is left of the x-intercept, then press . A small triangle appears on the screen, marking the left bound.

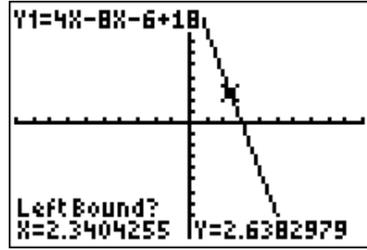
PRO TIP: If the cursor is not visible, look at the bottom of the screen; the coordinates are displayed.

The screen says the cursor is at (0,12), off the top of the screen. Press  several times until the cursor

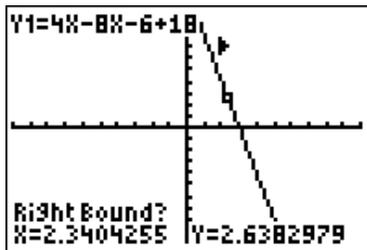


entry solve





is visible: then press .

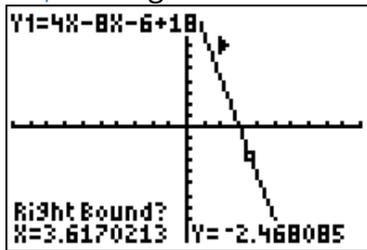


Move cursor to the left of x-intercept, and press ENTER to select "Left bound?"

Notice: A small triangle, pointing to the right, appears above the cursor.

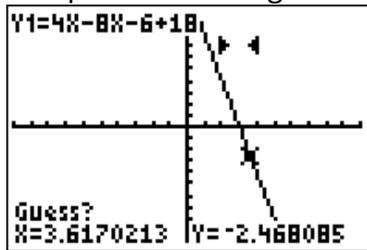
entry solve

Step 6: "Right bound?" Press  until the cursor passes to the right of the x-intercept. Press .



entry solve





Then press . Another small triangle appears on the screen, marking the right bound.

The x-intercept must be between these two triangles, or the GC's calculation will fail.

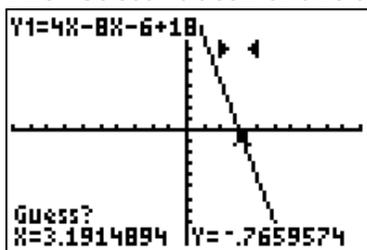
entry solve



Step 7: Lastly, "Guess?". Press .

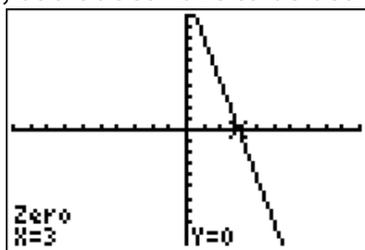
Move the cursor near x-intercept and press ENTER to select this "Guess".

The "Guess" doesn't have to be very close, but it does have to be between the two triangles.



entry solve





Press . Answer: $x=3$

CAUTION: “Zero” is fussier than Intersect – don’t press ENTER three times or you’ll get this error:

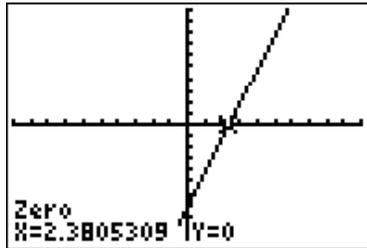
```
ERR:BOUND
[2]Quit
```

Try It!

Solve each equation graphically using the x-intercept method. Round to the nearest hundredth if needed.

- 1) $2x - \pi = 4 - x$
- 2) $(3x - 20) - (x + 14) = -2(x - 6) - (1 - x)$
- 3) $(7x + 13) - (5x - 29) = -6(x + 10) - (x + 6)$

Solutions

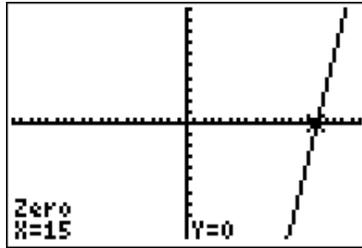


1) $2x + x - \pi - 4 = 0$ Answer: 2.38

2) $y_1 = (3x - 20) - (x + 14) + 2(x - 6) + (1 - x)$ Don't know where the graph is; increase Xmax and decrease

```
WINDOW
Xmin=-20
Xmax=20
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1
```

Xmin.



```
WINDOW
Xmin=-20
Xmax=20
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1
```

3) $y_1 = (7x + 13) - (5x - 29) + 6(x + 10) + (x + 6)$

