

# Increasing the Window ClassicView

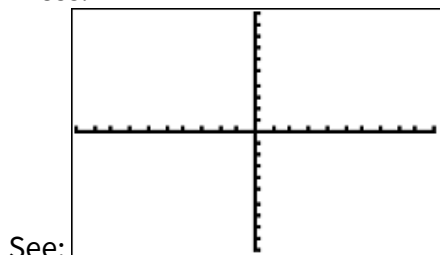
## Objectives:

- Using Zoom Out to increase the window
- Understand some limitations of using the zoom menu
- Increasing the window using Window settings

## Using Zoom Out to increase the window

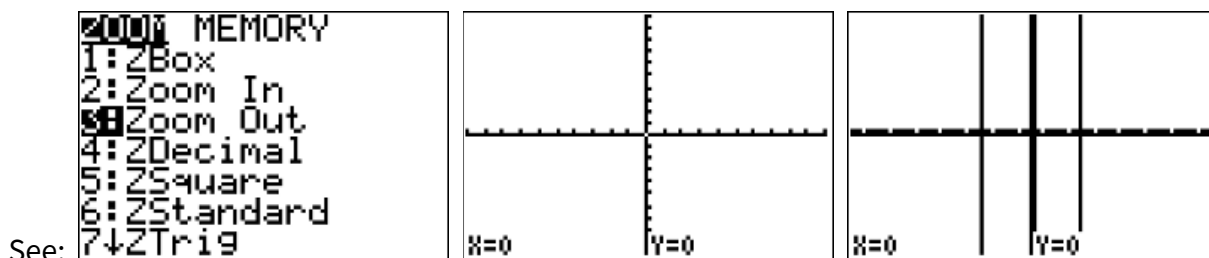
**Example 1:** Graph  $y = x^3 - 121x$  in the standard window, then Zoom Out centered at (0,0).

Press:



121 is big, so perhaps Zoom Out might help. To select Zoom Out, press:

To re-draw the graphing using (0,0) as the center of the new window, just press



## Understand some limitations of using the zoom menu

**CAUTION:** When using Zoom choices 1-4, the calculator waits the user to indicate the new center of the graph before it re-draws.

**IMPORTANT:** The cursor's location when you press ENTER will be the new center of the graph.

**Note:** To use a different center, move the cursor using

**CAUTION:** Using zoom OUT or IN is often confusing, because

- it does not adjust the scales (tick spacing)
- it enlarges (shrinks) both the x-axis and the y-axis by the same amount
- the amount it enlarges (shrinks) has nothing to do with the equation in the Y= menu

**Example 1 (continued):** What window did ZOOM OUT give? There is a blur of ticks on both axes!



To see the new window settings, press:

```
WINDOW
Xmin=-40
Xmax=40
Xscl=1
Ymin=-40
Ymax=40
Yscl=1
↓Xres=1
```

See:

The window increased the same in both x and y directions, from  $[-10,10] \times [-10,10]$  to  $[-40,40] \times [-40,40]$ .

## Increasing the window using Window settings

**PRO TIP:** The Zoom Out result from Example 1 isn't good, but it shows information we can use. There are x-intercepts less than half of 40, meaning 20. So  $Xmin = -20$  and  $Xmax = 20$  might work. The graph goes off the screen top and bottom, so Ymin is too large and Ymax is too small.

**Example 2:** Graph  $y = x^3 - 121x$  in a more appropriate window using WINDOW settings.

**IMPORTANT:** There is not one right answer! Window choice is partly personal taste.

From Example 1, the x-axis might be  $-20 \leq x \leq 20$ , but  $-40 \leq y \leq 40$  is too small.

Use a table to identify the smallest and biggest y-values for the new Ymin and Ymax.

To set up and see a table starting at -20, press:



```
TABLE SETUP
TblStart=-20
ΔTbl=1
Indent: Auto Ask
Depend: Auto Ask
```

See:

then press and many times.

X	Y <sub>1</sub>	X	Y <sub>1</sub>	X	Y <sub>1</sub>	X	Y <sub>1</sub>	X	Y <sub>1</sub>
-20	-5580	-15	-1560	-5	480	5	-480	14	1050
-19	-4560	-14	-1050	-4	420	6	-510	15	1560
-18	-3654	-13	-624	-3	336	7	-504	16	2160
-17	-2856	-12	-276	-2	234	8	-456	17	2856
-16	-2160	-11	0	-1	120	9	-360	18	3654
-15	-1560	-10	210	0	0	10	-210	19	4560
-14	-1050	-9	360	1	-120	11	0	20	5580

See:

Press + for

X=-9

X=1

X=11

X=20

The smallest y-value in all of these screens is -5580 and the largest is 5580.

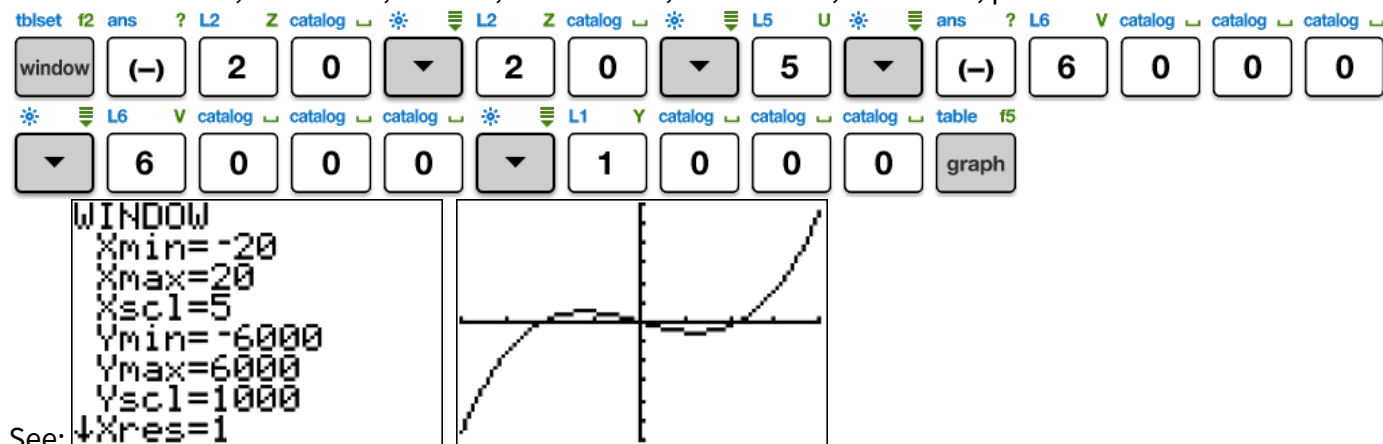
**PRO TIP:** Choose values for Xmin, Xmax, Ymin and Ymax that divide easily to determine Xscl and Yscl.

To use a near multiple of 100, chop to 5500 or round to 5600.

To use a near multiple of 1000, chop to 5000 or round to 6000. These are even easier to divide!

**REMEMBER:** Xmin must be less than Xmax, and Ymin must be less than Ymax. Check the negatives!

To set Xmin = -20, Xmax = 20, Xscl = 5, Ymin=-6000, Ymax=6000, Yscl=1000, press:



See:

**PRO TIP:** When changing window settings, notice whether your calculator automatically erases all of the

old value when you type a new value into the window screen. If it doesn't, press **clear** first.

**PRO TIP:** Either **▼** or **enter** will move down the WINDOW screen.

**CAUTION:** After changing window settings, use **graph**, not **zoom** **6**!

## Try It!

Graph and adjust window as needed

- 1)  $y = \frac{15}{121}x^2 - 15$
- 2)  $y = -x^2 + 15$
- 3)  $y = \sqrt{x+11}$
- 4)  $y = |x-14|$

## Answer Hints

- 1)  $y = \frac{15}{121}x^2 - 15$  is an upward parabola with vertex at (0, -15). Decrease YMIN to -15 or less.
- 2)  $y = -x^2 + 15$  is a downward parabola with vertex at (0, 15). Increase Ymax to 15 or more.
- 3)  $y = \sqrt{x+11}$  is half of a sideways parabola with vertex at (-11,0). Decrease Xmin to -11 or less.
- 4)  $y = |x-14|$  is a V-shape with x-int at (14,0). Increase Xmax to at least 15 or 20.