

NAME: \_\_\_\_\_

Algebra One  
Calculator Tutorials  
TI 84 Plus

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Part Two  
Unit 6 to Unit 10

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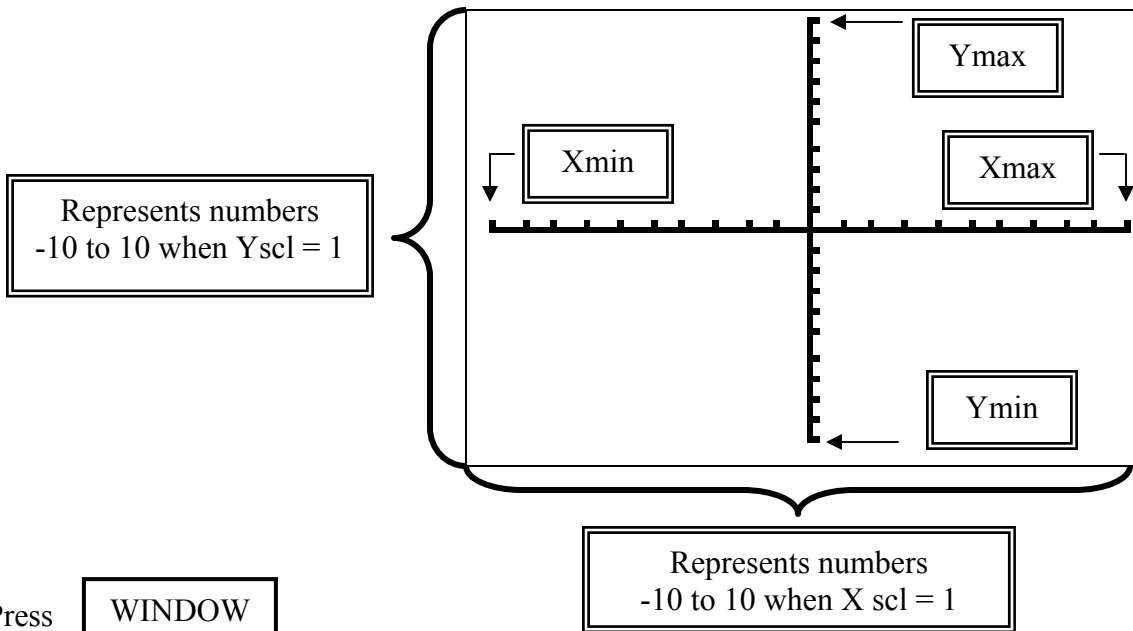
# Introduction to Graphing: Graphing Window

Press ZOOM

```

ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
    
```

Press 6 to select ZStandard to display the standard viewing window shown below.



Press WINDOW

```

WINDOW
Xmin=-10 —Minimum X value displayed on graph
Xmax=10 —
Xscl=1 ——— Tells calculator what to count by for x values
Ymin=-10 —Minimum Y value displayed on graph
Ymax=10 ——— Maximum Y value displayed on graph
Yscl=1 ——— Tells calculator what to count by for y values
Xres=1
    
```

## Trace Feature Activity

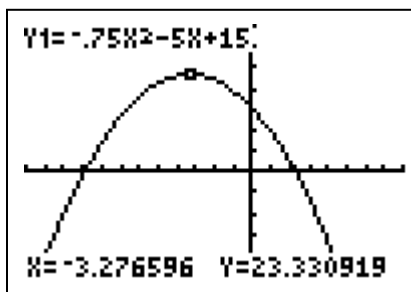
1. Press **Y=**. Enter the function  $f(x) = -0.75x^2 - 5x + 15$ .

2. Set viewing window to match the screen below. Press **WINDOW**

```
WINDOW
Xmin=-12
Xmax=8
Xscl=1
Ymin=-25
Ymax=35
Yscl=5
Xres=1
```

3. Press **GRAPH** to view the parabola.

4. Press **TRACE**



5. Use the arrow keys to move the cursor along the graph to answer the following questions. Round answers to the nearest tenth.

- What is the x value when the y value is approximately 19?
- What is the y value when the x value is -2?
- What is the x value when the y value is approximately 0?
- What is the y value when the x value is -7.11?
- What is the x value when the y value is approximately -13?
- What is the y value when the x value is -10.51?
- What is the highest point on the graph?

# Zoom Menu Features

## Zbox – Zoom Box

**Problem:**  $y = x^3 + x^2$

Press: 

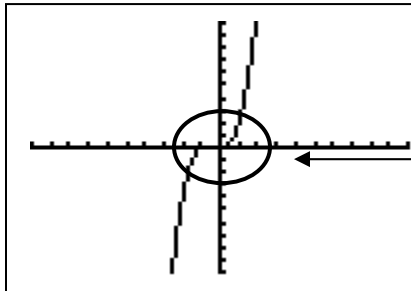
y=	x	^	3	+	x
^	2				

```
Plot1 Plot2 Plot3
\Y1=X^3+X^2
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Press 

GRAPH
-------

(Graph is shown in the Standard Viewing Window using ZStandard)



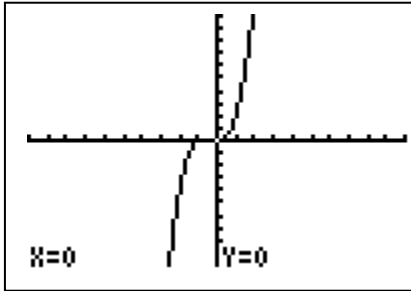
The graph appears to be straight; however, let's take a closer look.

Press 

ZOOM
------

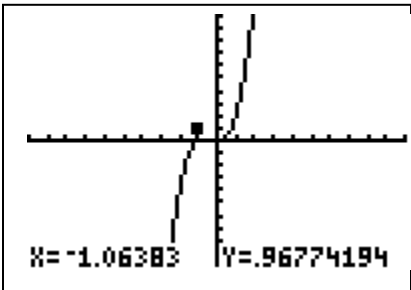
```
MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
```

Press  to select Zbox

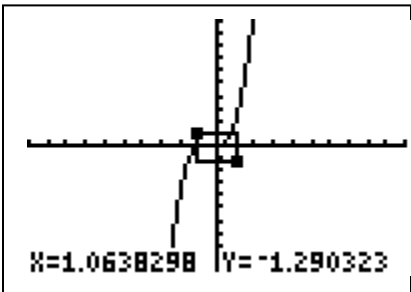


Zbox draws a box to define a viewing window.

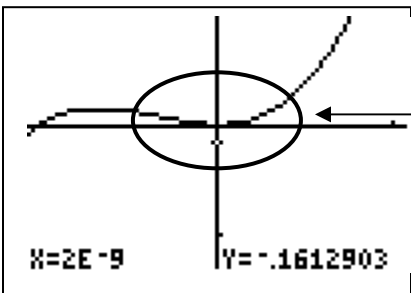
Move cursor approximately to (-1, 1) and Press



Move cursor approximately to (1, -1)



Press

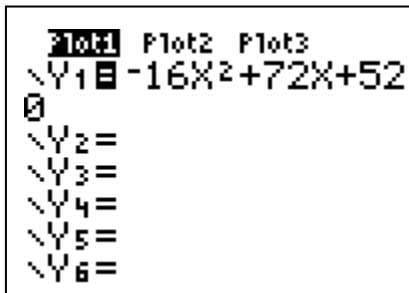


The graph actually curves.

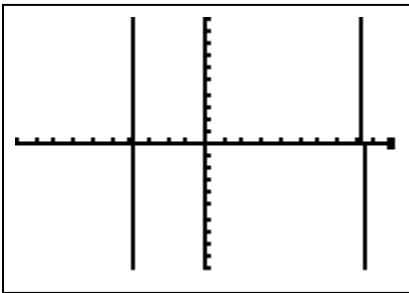
## Zoom Menu Features ZFit-Zoom Fit

Problem: Graph  $y = -16x^2 + 72x + 520$

Press

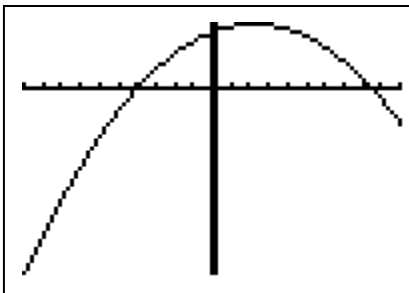


Press



Press

(You can also scroll down to  $\text{0:ZoomFit}$  using the arrow keys, then press )



The graph now shows the maximum y value.

# Zoom Menu Features

## Zoom In

**Problem:**  $y = 40x^2 - 1$

Press y = 4 0 X, T, θ, n x ^  
2 - 1

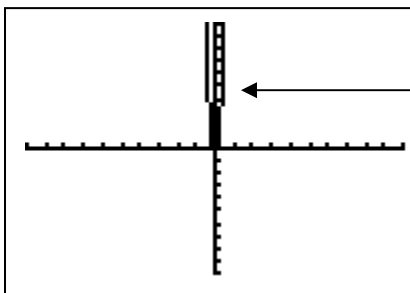
Press Zoom 6:ZStandard

```

Plot1 Plot2 Plot3
\Y1=40X^2-1
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
    
```

Press GRAPH

(Graph is shown in the Standard Viewing Window using ZStandard)



It is difficult to determine the shape of this graph.

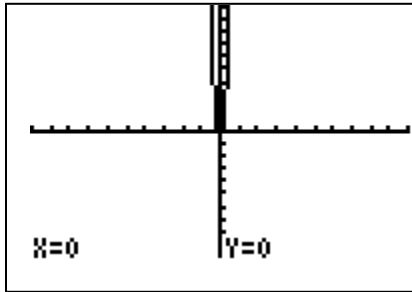
Press ZOOM

```

MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
    
```



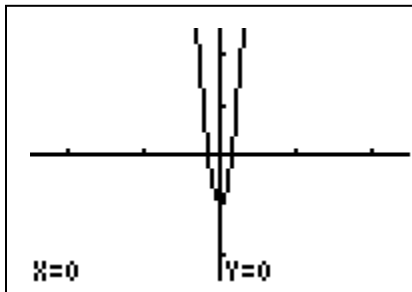
Press  to select Zoom In



Zoom In magnifies the graph around the cursor.

Press

(You may move the cursor anywhere in the graph to Zoom In and take a closer look.)



After using Zoom In, the shape of the graph is much clearer.

## Zoom Menu Features

### Zoom Out

**Problem:** Solve the system. 
$$\begin{cases} y = 2x + 12 \\ y = 5x - 18 \end{cases}$$

Enter first equation in  $Y_1$ :

Press

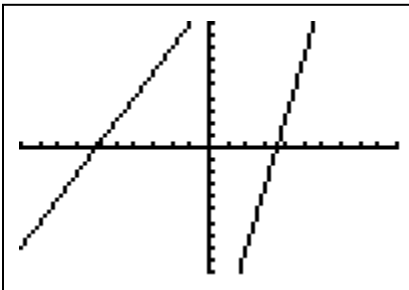
Enter second equation in  $Y_2$ :

Press

```
Plot1 Plot2 Plot3
\Y1=2X+12
\Y2=5X-18
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Press

(Graph is shown in the Standard Viewing Window using ZStandard)



It is difficult to determine at what point the graphs intersect.

Press

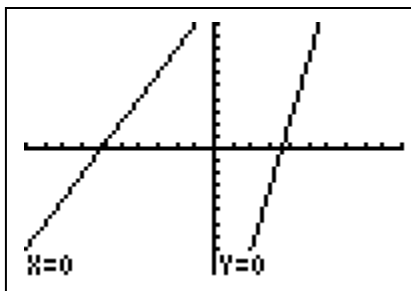
ZOOM

```
MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZSquare
6:ZStandard
7↓ZTrig
```

Press

3

to select Zoom Out

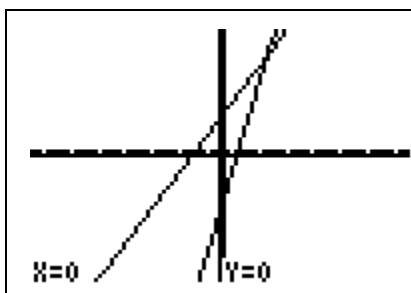


Zoom Out views more of the graph around the cursor.

Press

ENTER

(You may move the cursor anywhere in the graph to Zoom Out.)



After using Zoom Out, an intersection point is visible on the screen.

# Graphing a Linear Equation

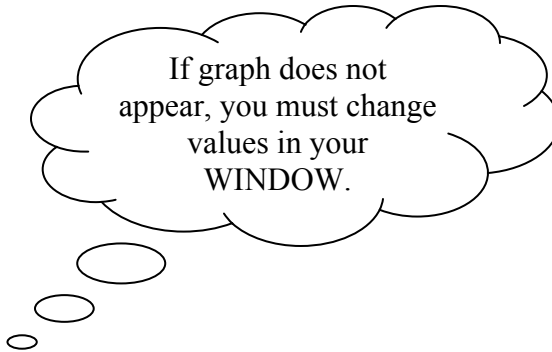
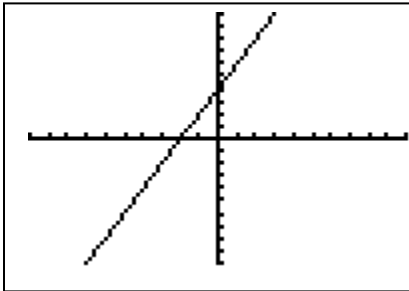
**Problem:** Graph.  $y = 2x + 4$

The equation MUST be in "y =" form!!!

Press

```
Plot1 Plot2 Plot3
\Y1=2X+4
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Press



**Practice:** Graph

1.)  $y = -x + 3$

2.)  $y = \frac{2}{3}x - 2$

3.)  $x - 3y = -18$

**Challenge:** Graph  $y = 210 + \frac{1}{5}x$

Hint: Adjust window

## Find X Intercept Using A Graph

**Problem:** Find the x-intercept of  $y = 2x - 5$

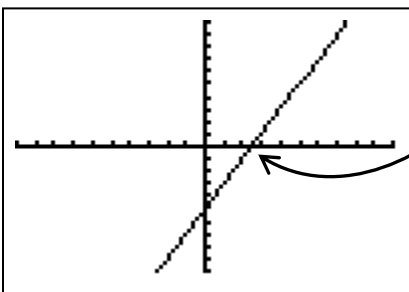
The equation MUST be in "y =" form!!!!

Press

Enter the part of the equation after the = sign.

```
Plot1 Plot2 Plot3
\Y1=2X-5
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Press

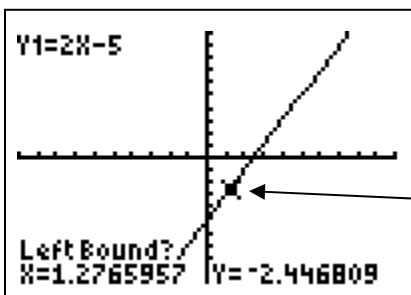


Make sure you can see the x-intercept in the window!

Press

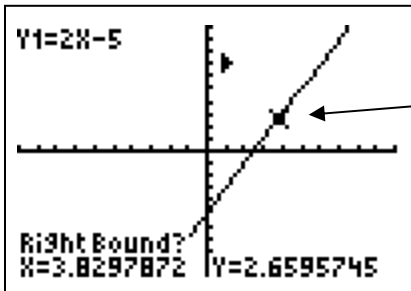
```
1: value
2: zero
3: minimum
4: maximum
5: intersect
6: dy/dx
7: ∫f(x)dx
```

Press  to select zero



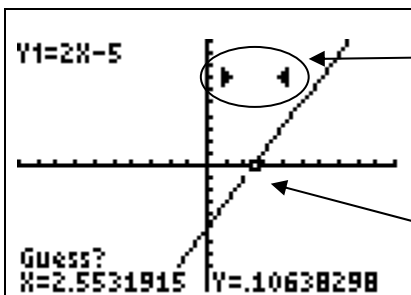
Position cursor BEFORE the x-intercept

Press



Position cursor AFTER the x-intercept

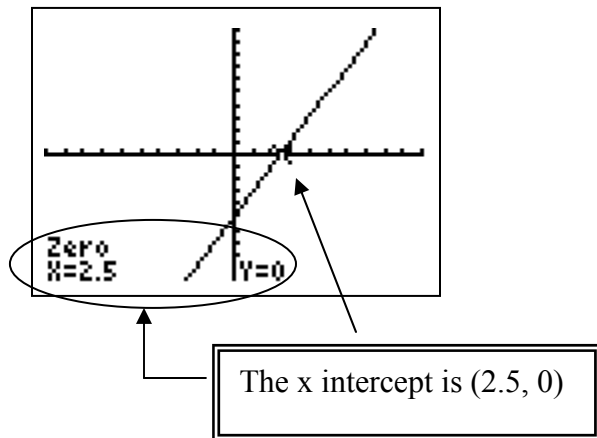
Press



Note: The calculator will look for an answer between these arrows

Position cursor ON the x-intercept

Press **ENTER**



**Practice:** Find the x-intercept for each graph.

1.)  $f(x) = 3x + 8$

2.)  $y = \frac{1}{2}x - 5$

3.)  $f(x) = -x + 3$

**Challenge:**  $f(x) = 3\sqrt{(x+8)} - 5$

## Find Y Intercept Using A Graph

**Problem:** Find the y-intercept of  $y = 2x - 5$

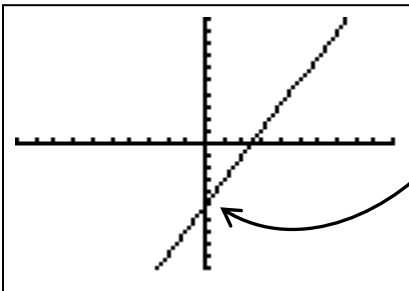
The equation MUST be in "y =" form!!!!

Press

Enter the part of the equation after the = sign.

```
Plot1 Plot2 Plot3
\Y1=2X-5
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

Press



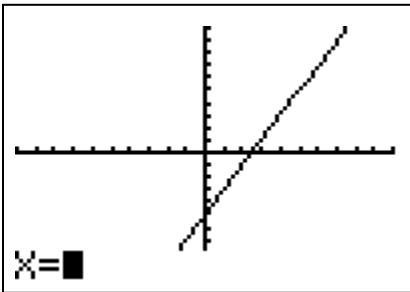
Make sure you can see the y-intercept in the window!

Press

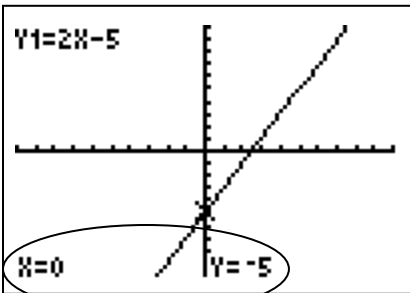
```
CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```



Press **ENTER** to select value



Press **0** **ENTER**



The y intercept is (0, -5)

**Practice:** Find the y-intercept for each graph. Round to the nearest tenth if necessary.

1.)  $f(x) = -x + 3$

2.)  $y = \frac{1}{2}x - 5$

3.)  $f(x) = -3x + \frac{2}{3}$

**Challenge:**  $f(x) = 3\sqrt{(x+8)} - 4$

## Find X and Y Intercepts Using A Table

**Problem:** Find the x-intercept and y-intercept of  $y = -\frac{x}{2} - 4$

The equation MUST be in y = form.

Press y = (-) X, T,  $\theta$ , n  $\div$  2 -

4

```

Plot1 Plot2 Plot3
\Y1= -X/2-4
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
    
```

Press 2ND GRAPH to select TABLE

X	Y1	
-8	-3.5	
-7.5	-3	
-7	-2.5	
-6.5	-2	
-6	-1.5	
-5.5	-1	
-5	-.5	

X=1

To find x-intercept:

In the Y<sub>1</sub> column, move the cursor up or down until your Y<sub>1</sub> value reaches 0.

X	Y1	
-8	0	
-7.5	-.25	
-7	-.5	
-6.5	-.75	
-6	-1	
-5.5	-1.25	
-5	-1.5	

Y1=0

When you y value is 0, you found your x-intercept. The x-intercept is 8.

To find y-intercept:

In the X column, move the cursor up or down until your X value reaches 0.

X	Y1
0	-4
0.5	-3.5
1	-3
1.5	-2.5
2	-2
2.5	-1.5
3	-1
3.5	
4	

X=0

When your x value is 0, you found your y-intercept. The y-intercept is -4.

**Practice:** Find the x and y intercepts.

1.)  $y = 3x - 9$

2.)  $y = x - 2$

3.)  $y = \frac{2}{3}x$

**Challenge:** Find the x and y intercept of  $y = 5x - 2.5$ .

Hint: Adjust TBLSET

## Linear Regression (Finding Line of Best Fit)

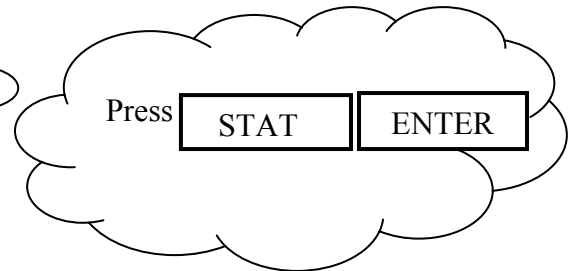
**Problem:** Find the equation of a line containing the following points in the table.

x	f(x)
1	5
2	6
3	7
4	8

Enter the values in the x column in L1.  
Enter the values in the f(x) column in L2.

L1	L2	L3	Z
1	5		
2	6		
3	7		
4	8		
---	---		

L2(5) =



Press **2ND** **MODE** to return to the main screen

Press **STAT**

<b>2ND</b> <b>CALC</b> TESTS
<b>1</b> Edit...
<b>2</b> SortA(
<b>3</b> SortD(
<b>4</b> ClrList
<b>5</b> SetUpEditor

Press **→** to select CALC

EDIT <b>TESTS</b>
<b>1</b> 1-Var Stats
<b>2</b> 2-Var Stats
<b>3</b> Med-Med
<b>4</b> LinReg(ax+b)
<b>5</b> QuadReg
<b>6</b> CubicReg
<b>7</b> ↓ QuartReg

Press  to select LinReg(ax+b)

```
LinReg(ax+b)
```

Press

```
LinReg(ax+b) L1,  
L2
```

Press

```
LinReg  
y=ax+b  
a=1  
b=4
```

**Practice:** Find the equation of a line containing the following points in the table.

1.)

x	f(x)
4	10
6	11.5
8	13
10	14.5

2.)

x	f(x)
-3	-2
-1	-8
1	-14
3	-20

3.)

x	f(x)
0	15
1	8
2	1
3	-6

# Solving a System of Equations Using a Table

**Problem:** Solve the system by using a table.  $\begin{cases} y = 3x - 3 \\ y = 2x - 1 \end{cases}$

The equation MUST be in "y =" form!!!

Enter first equation in Y<sub>1</sub>:

Press y = 3 X, T, θ, n - 3

Enter second equation in Y<sub>2</sub>:

Press y = 2 X, T, θ, n - 1

Press 2ND WINDOW

```
TABLE SETUP
TblStart=0
ΔTbl=1
Indent: Auto Ask
Depend: Auto Ask
```

Set TBLSET to 0  
Set ΔTBL to 1

Press 2ND GRAPH

X	Y <sub>1</sub>	Y <sub>2</sub>
0	-3	-1
1	0	1
2	3	2
3	6	3
4	9	4
5	12	5
6	15	6

X=0

Look for the place where the y values are same for both equations. The x value and y value from that row is the solution. The solution is (2, 3).

**Practice:**

1.)  $\begin{cases} y = x - 7 \\ y = -\frac{3}{2}x + 3 \end{cases}$

2.)  $\begin{cases} y = 2x + 3 \\ y = -\frac{3}{2}x - 4 \end{cases}$

3.)  $\begin{cases} y = -2x + 6 \\ y = -\frac{3}{4}x + 6 \end{cases}$

## Solving a System of Equations Using a Graph

**Problem:** Solve the system by using a table.  $\begin{cases} y = 3x - 3 \\ y = 2x - 1 \end{cases}$

The equation MUST be in "y =" form!!!

Enter first equation in  $Y_1$ :

Press

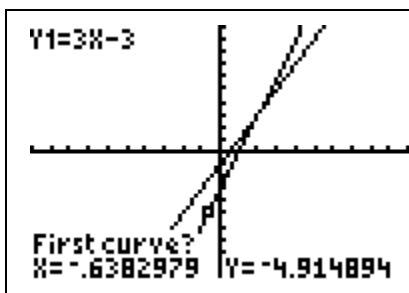
Enter second equation in  $Y_2$ :

Press

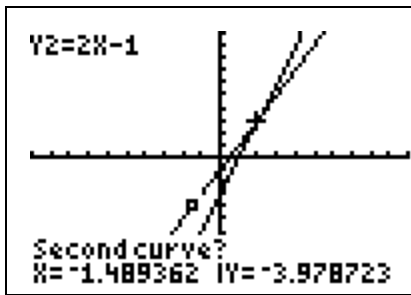
Press

```
W:LCU:HTA
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx
```

Press   to select intersect.

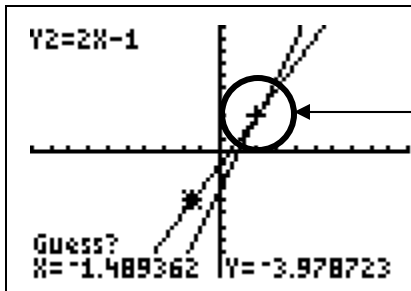


Press



Press

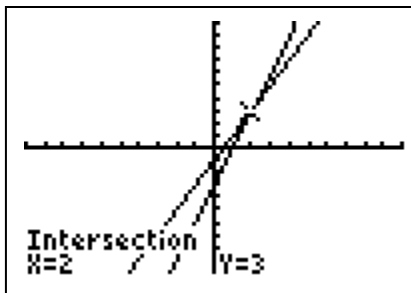
ENTER



Move cursor to the approximate point of intersection.

Press

ENTER



The solution is (2, 3)

**Practice:**

1.) 
$$\begin{cases} y = -\frac{5}{4}x - 4 \\ y = \frac{1}{4}x + 2 \end{cases}$$

2.) 
$$\begin{cases} y = -x + 2 \\ y = -5x - 2 \end{cases}$$

3.) 
$$\begin{cases} y = 7x - 4 \\ y = -x + 4 \end{cases}$$

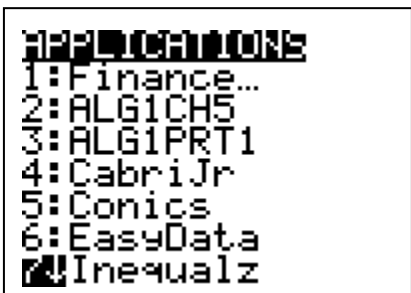


# Graphing Linear Inequalities

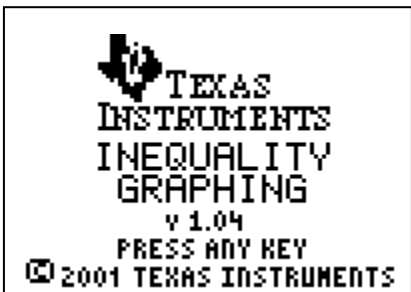
**Problem:** Graph  $f(x) \leq -x + 3$

The inequality MUST be solved for y!!!!

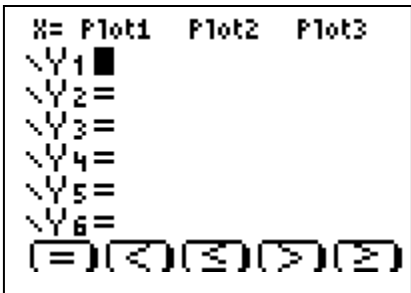
Press APPS 8 to select Inequalz



You will see the following screen:



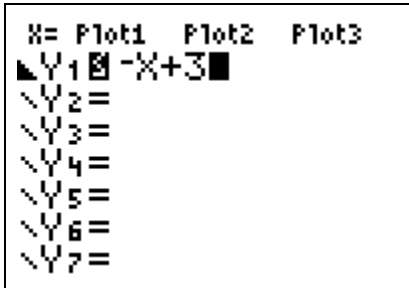
Press any key to continue.



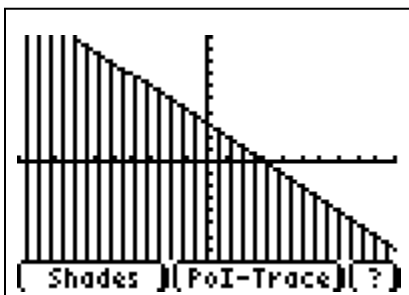
Your cursor should be on the equals sign.

Press **ALPHA** **ZOOM** to select  $\leq$

Press **→** and enter the rest of the inequality



Press **GRAPH**



**Practice:** Graph.

1.)  $f(x) \geq -2x - 5$

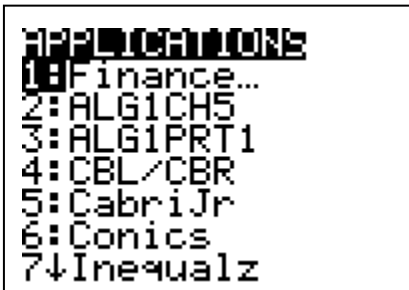
2.)  $y < \frac{1}{2}x - 7$

3.)  $y > \frac{1}{2}x - 7$

# Solving Systems of Linear Inequalities by Graphing

Problem: 
$$\begin{cases} y \leq 3x - 3 \\ y > 0.5x - 1 \end{cases}$$

Press

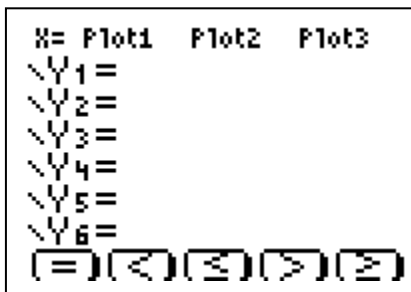


Press

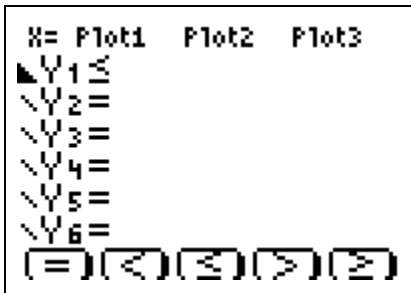


Press any key

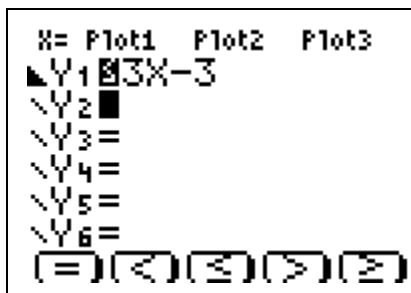
Press



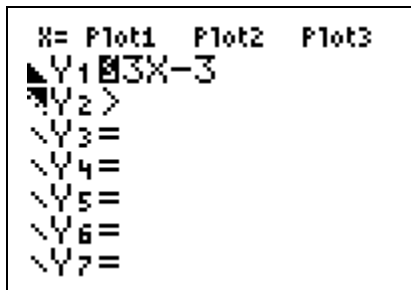
With the cursor on the first equals sign, press **ALPHA** **ZOOM** to choose **[<]**



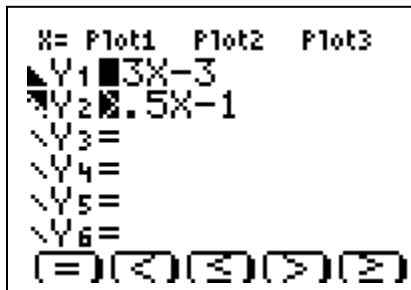
Enter the first inequality:



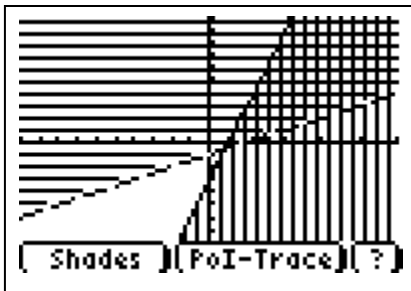
With the cursor on the first equals sign, press **ALPHA** **TRACE** to choose **[>]**



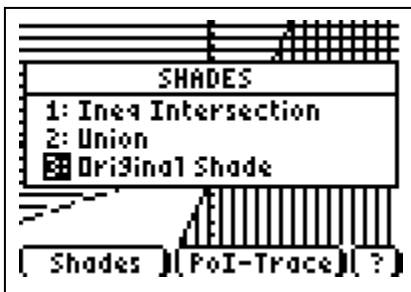
Enter the second inequality:



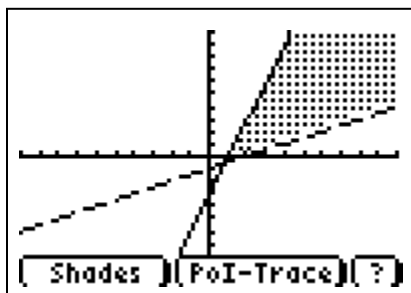
Press **GRAPH**



Press **ALPHA** **Y=** to choose **Shades**



Press **1** to select Ineq Intersection.



Any dot in the shaded region is a solution to the system.

Practice:

Sketch the solution set for each system.

1.) 
$$\begin{cases} y \geq x + 1 \\ y > 5x - 1 \end{cases}$$

2.) 
$$\begin{cases} y \leq x - 2 \\ y < -0.2x + 4 \end{cases}$$

3.) 
$$\begin{cases} y \leq -4x + 8 \\ y \geq 2x + 3 \end{cases}$$

## Writing a Number in Scientific Notation

**Problem:** Write 56,900,000 in scientific notation

Press

MODE



A screenshot of a calculator's mode selection screen. The modes listed are: NORMAL, SCI, ENG, FLOAT, RADIAN, DEGREE, FUNC, PAR, POL, SEQ, CONNECTED, DOT, SEQUENTIAL, SIMUL, REAL, FULL, and SET CLOCK. The 'SCI' mode is highlighted with a black box and a white circle around it. An arrow points from a text box to this circle.

Highlight SCI and Press ENTER

Press

2ND

MODE

Type 56,900,000 . Press

ENTER

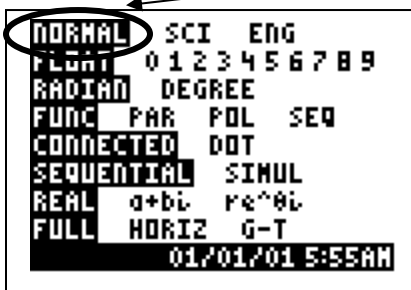
56900000

5.69E7

Write the answer in scientific notation.

The solution is  $5.69 \times 10^7$ .

Reminder: When finished, reset MODE to NORMAL



A screenshot of a calculator's mode selection screen, identical to the one above. The 'NORMAL' mode is highlighted with a black box and a white circle around it. An arrow points from a text box to this circle.

Highlight NORMAL and Press ENTER

**Practice:** Write each number in scientific notation.

1.) 34,000

2.) 0.000017

3.) 67,894,000

## Multiplying Numbers in Scientific Notation

**Problem:** Write in scientific notation.  $(8 \times 10^4)(3 \times 10^2)$

Change mode from NORMAL to SCI using mode key

Press

(	8	×	1	0	^
4	)	(	3	×	1
0	^	2	)	ENTER	

$(8 \times 10^4)(3 \times 10^2)$   
 $2.4E7$

Write the answer in scientific notation.

The solution is  $2.4 \times 10^7$ .

Reminder: When finished, reset MODE to NORMAL

**Practice:** Simplify. Write each answer in scientific form.

1.)  $(1 \times 10^9)(5.4 \times 10^2)$

2.)  $(5 \times 10^6)(3 \times 10^8)$

3.)  $(3 \times 10^{-5})(8 \times 10^{-2})$

## Raising a Number to a Power in Scientific Notation

**Problem:** Write in scientific notation.  $(3 \times 10^8)^2$

Change mode from NORMAL to SCI using mode key

Press

(	3	×	1	0	^
8	)	^	2	ENTER	

$(3 \times 10^8)^2$  9E16

Write the answer in scientific notation.

The solution is  $9 \times 10^{16}$ .

Reminder: When finished, reset MODE to NORMAL

**Practice:** Simplify. Write each number in scientific notation.

1.)  $(5.76 \times 10^2)^5$

2.)  $(9.1 \times 10^6)^3$

3.)  $(1.63 \times 10^1)^{-4}$



## Dividing Numbers in Scientific Notation

**Problem:** Write in scientific notation.  $\frac{1.6 \times 10^5}{2 \times 10^4}$

Change mode from NORMAL to SCI using mode key

Press

(	1	.	6	×	1
0	^	5	)	(	2
×	1	0	^	4	)
ENTER					

```
(1.6*10^5)/(2*10^4)
                        8E0
```

Write the answer in scientific notation.

The solution is  $8 \times 10^0$ .

Reminder: When finished, reset MODE to NORMAL

**Practice:** Simplify. Write each answer in scientific form.

1.)  $\frac{5.6 \times 10^5}{7 \times 10^2}$

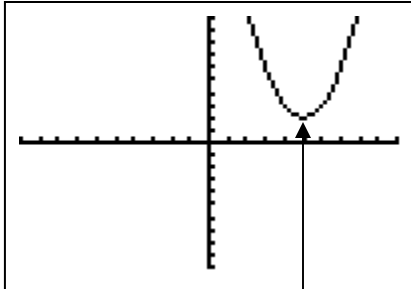
2.)  $\frac{5.2 \times 10^{-7}}{1.3 \times 10^8}$

3.)  $\frac{1.25 \times 10^5}{5 \times 10^{-3}}$

## Find the Vertex (Minimum/Maximum)

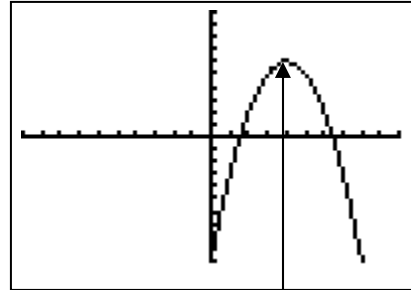
Remember:

Concave Up



Minimum

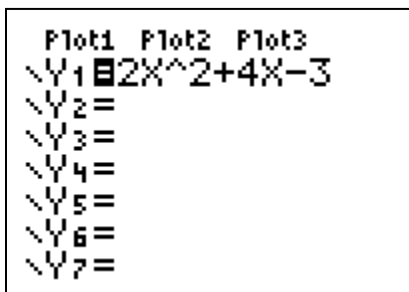
Concave Down



Maximum

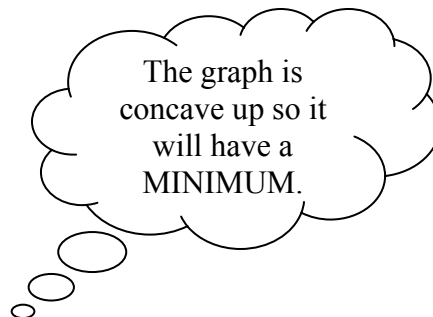
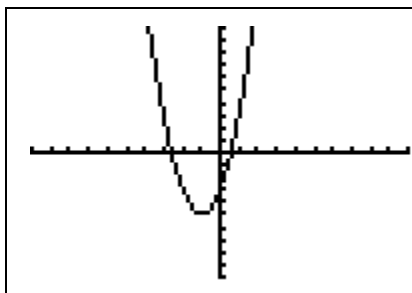
**Problem:** Identify the vertex. Tell whether it is a maximum/minimum.  $y = 2x^2 + 4x - 3$

Enter the equation exactly as it appears using the  $y =$  button.



Press

GRAPH



Press

2ND

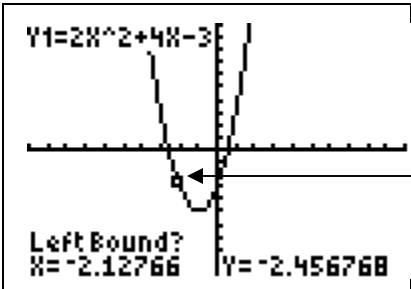
TRACE

```

W:|0|0|0|1|2
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:∫f(x)dx

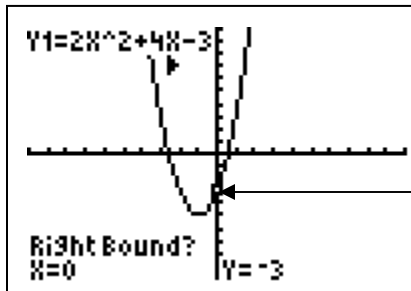
```

Press 3 ENTER to select minimum.



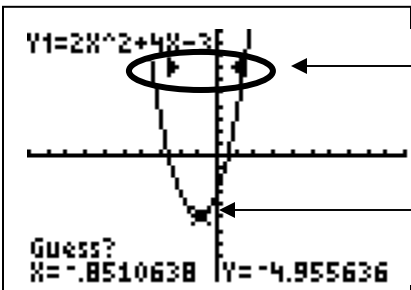
Position the cursor BEFORE the vertex.

Press ENTER



Position the cursor AFTER the vertex.

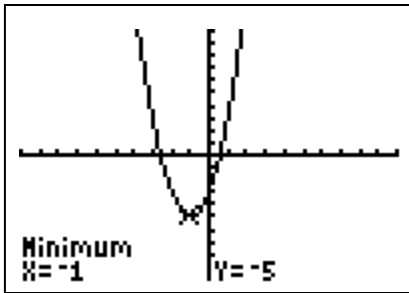
Press ENTER



The calculator will look for an answer between these arrows.

Position the cursor ON the vertex.

Press ENTER



The vertex is  $(-1, -5)$ ; minimum.

**Practice:** Identify the vertex. Tell whether it is a maximum/minimum.

1.)  $y = 3x^2 - 5$

2.)  $f(x) = -x^2 + 2$

3.)  $y = -3x^2 + 8$

## Quadratic Regression (Finding a Function Rule from a Table)

**Problem:** Find the equation of a line containing the following points in the table.

x	f(x)
-4	23
-2	22
4	-17
12	-153

Enter the values in the x column in L1.  
Enter the values in the f(x) column in L2.

L1	L2	L3	2
-4	23	-----	
-2	22		
4	-17		
12	-153		
-----			

L2(5) =

Press **STAT** **ENTER**

Press **2ND** **MODE** to return to the main screen

Press **STAT**

<b>2ND</b> <b>MODE</b> <b>TESTS</b>
1: Edit...
2: SortA(
3: SortD(
4: ClrList
5: SetUpEditor

Press **→** to select CALC

EDIT <b>2ND</b> <b>MODE</b> <b>TESTS</b>
1: 1-Var Stats
2: 2-Var Stats
3: Med-Med
4: LinReg(ax+b)
5: QuadReg
6: CubicReg
7: QuartReg

Press  to select QuadReg

```
QuadReg
```

Press

```
QuadReg L1,L2
```

Press

```
QuadReg
y=ax2+bx+c
a=-.75
b=-5
c=15
```

**Practice:** Find the equation of a line containing the following points in the table.

1.)

x	f(x)
-12	-33
-6	18
2	2
16	-257

2.)

x	f(x)
-10	119
-7	38
6	103
8	173

3.)

x	f(x)
-4	15
0	-9
6	-15
10	1