NAME: _____

# Algebra One
# Calculator Tutorials
# TI 84 Plus

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Part Two
Unit 6 to Unit 10

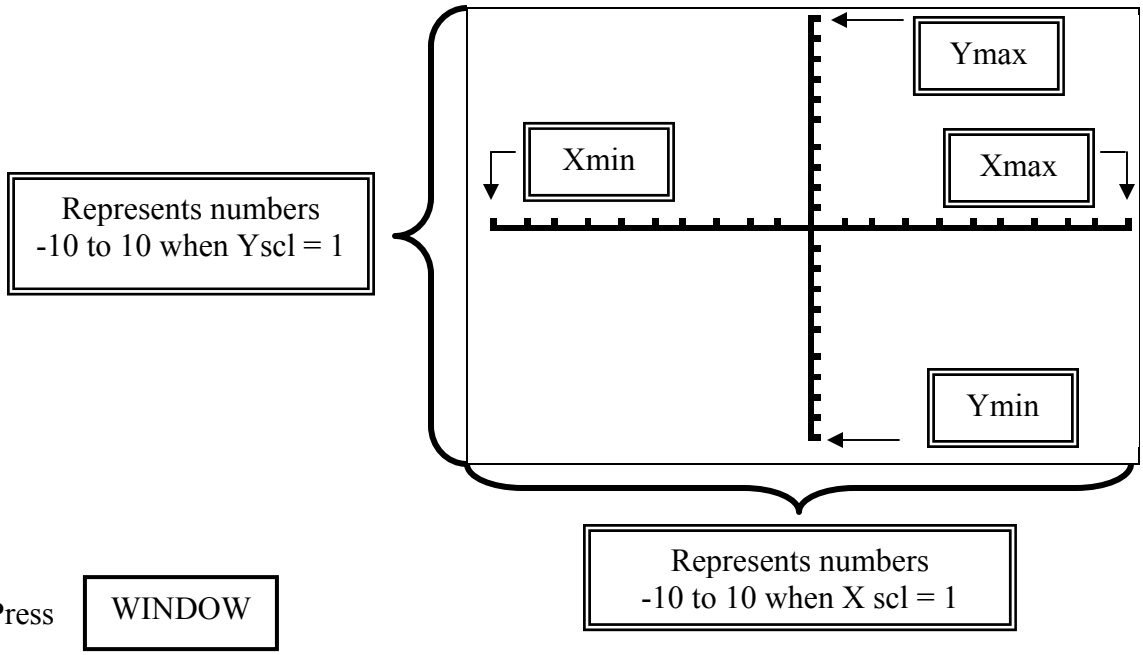
# Contents

*Please Note: You must select "Current Page" to avoid printing the entire document.*

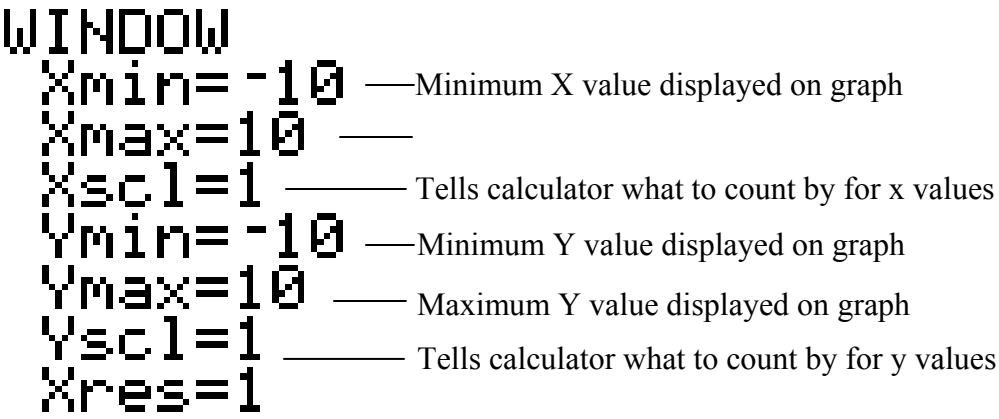
# Introduction to Graphing: Graphing Window

Press ZOOM


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




Press WINDOW




—Minimum X value displayed on graph

—

——— Tells calculator what to count by for x values

—Minimum Y value displayed on graph

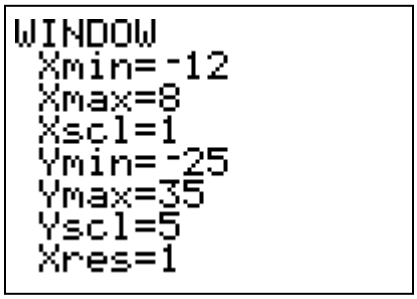
—— Maximum Y value displayed on graph

——— Tells calculator what to count by for y values

# Trace Feature Activity

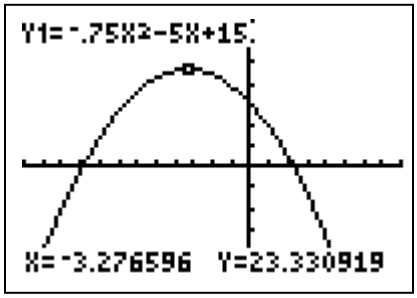
1. **Press** [Y=] **. Enter the function** $f(x) = -0.75x^2 - 5x + 15$ **.**

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




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.**

   a. **What is the x value when the y value is approximately 19?**

   b. **What is the y value when the x value is -2?**

   c. **What is the x value when the y value is approximately 0?**

   d. **What is the y value when the x value is –7.11?**

   e. **What is the x value when the y value is approximately -13?**

   f. **What is the y value when the x value is -10.51?**

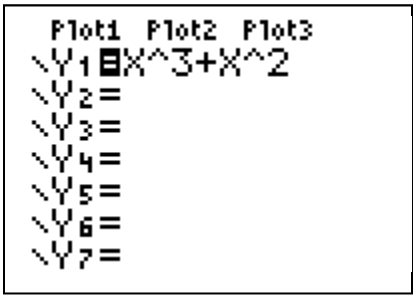
   g. **What is the highest point on the graph?**

# Zoom Menu Features
# Zbox – Zoom Box

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

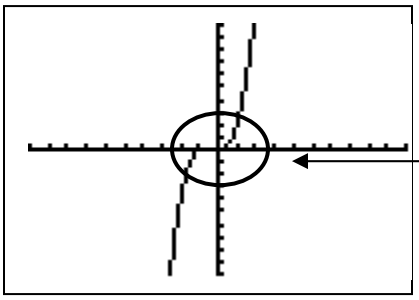
Press: | y = | | x | | ^ | | 3 | | + | | x |

| ^ | | 2 |



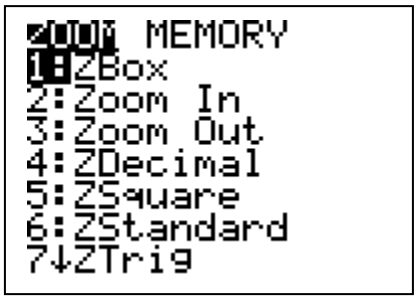

Press | GRAPH |

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

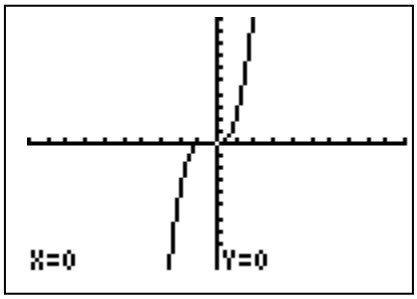


The graph appears to be straight; however, let's take a closer look.

Press | ZOOM |

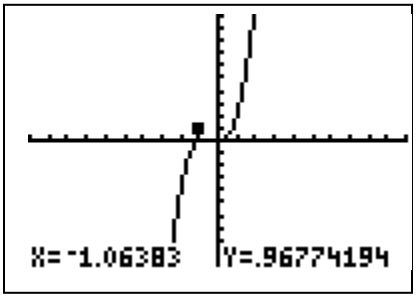


Press [1] to select Zbox

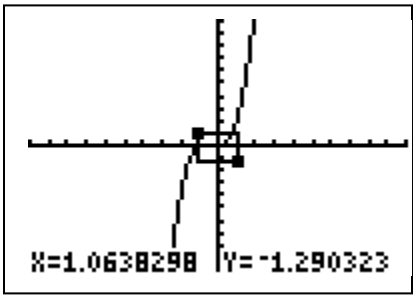



Zbox draws a box to define a viewing window.

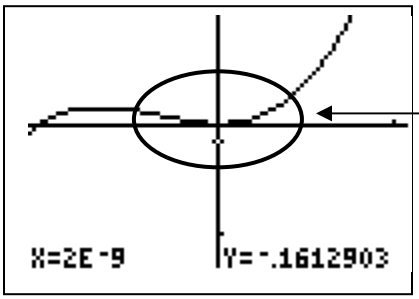
Move cursor approximately to (-1, 1) and Press [ENTER]




Move cursor approximately to (1, -1)




Press [ENTER]

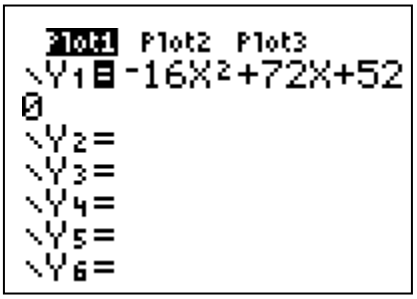



The graph actually curves.

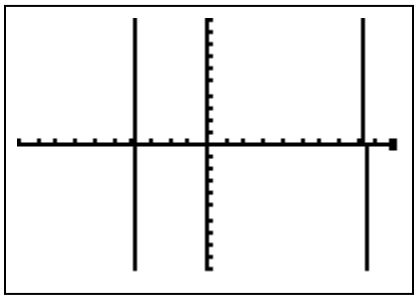
# Zoom Menu Features ZFit-Zoom Fit

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

**Press** [y =]

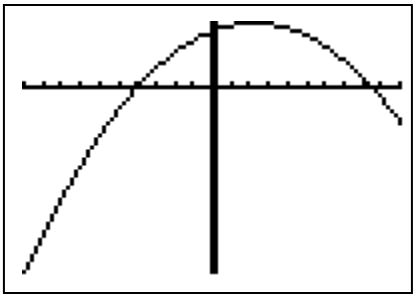



**Press** [GRAPH]



**Press** [ZOOM] [0]

(You can also scroll down to 0:ZoomFit using the arrow keys, then press [ENTER])



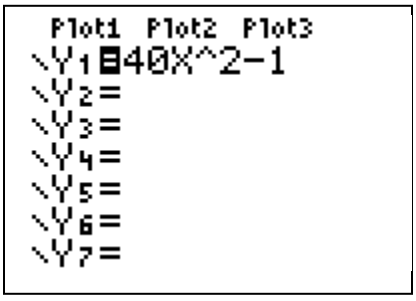
The graph now shows the maximum y value.

# Zoom Menu Features
# Zoom In

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

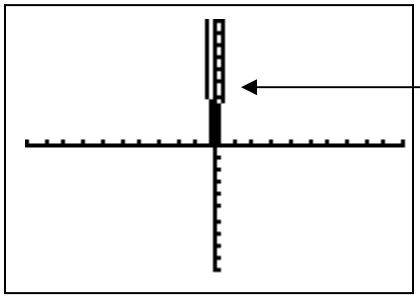
Press | y = | 4 | 0 | X, T, θ, n | x | ^ |
|---|---|---|---|---|---|---|
| | 2 | - | 1 | | | |

Press | Zoom | 6:ZStandard |
|---|---|---|




Press | GRAPH |
|---|---|

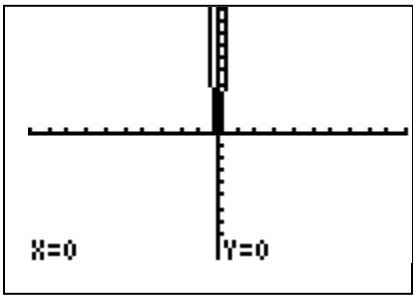
(Graph is shown in the Standard Viewing Window using ZStandard)



It is difficult to determine the shape of this graph.

Press | ZOOM |
|---|---|

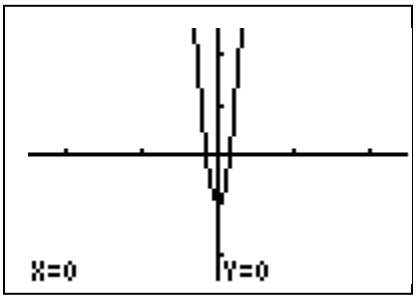
Press 2 to select Zoom In




Zoom In magnifies the graph around the cursor.

Press ENTER

(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

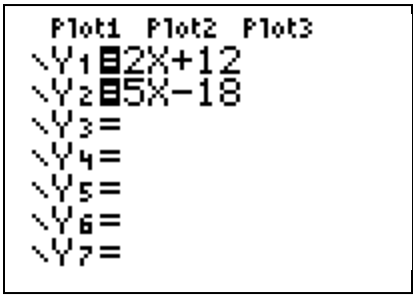
**Problem:** Solve the system. $\begin{cases} y = 2x + 12 \\ y = 5x - 18 \end{cases}$

Enter first equation in $Y_1$:

| Press | y = | 2 | X, T, θ, n | + | 1 | 2 |
|---|---|---|---|---|---|---|

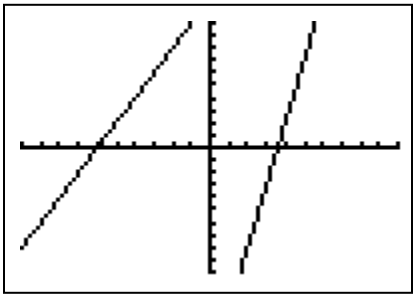
Enter second equation in $Y_2$:

| Press | y = | 5 | X, T, θ, n | - | 1 | 8 |
|---|---|---|---|---|---|---|




Press | GRAPH |

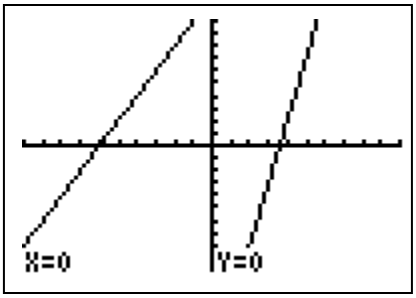
(Graph is shown in the Standard Viewing Window using ZStandard)



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

Press ZOOM

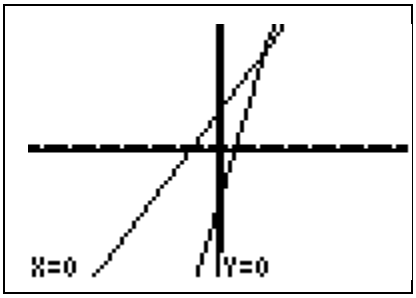

Press 3 to select Zoom Out




Zoom Out views mores of the graph around the cursor.

Press ENTER

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



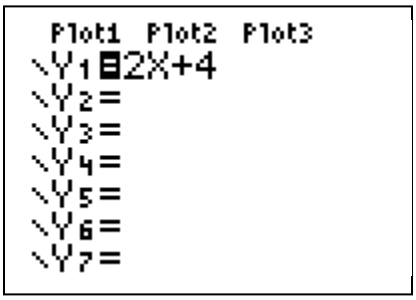

After using Zoom Out, an intersection point is visible on the screen.

# Graphing a Linear Equation

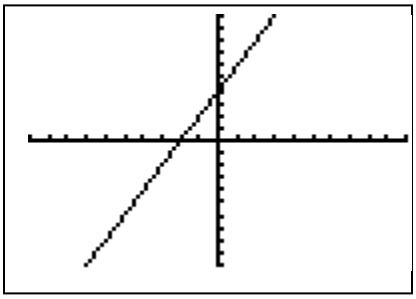
**Problem:** Graph. $y = 2x + 4$

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

Press | y = | 2 | X, T, θ, n | + | 4 |




Press | GRAPH |



If graph does not appear, you must change values in your WINDOW.

**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

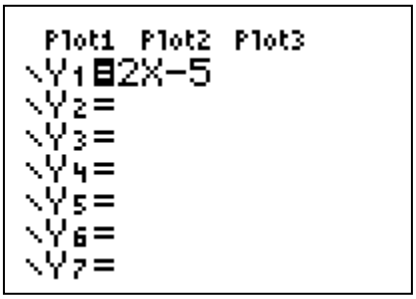
# Find X Intercept Using A Graph

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

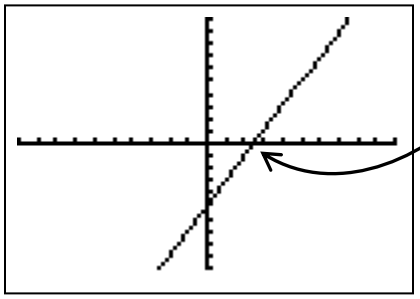
| The equation MUST be in "y =" form!!!! |
|---|

Press [Y=]

Enter the part of the equation after the = sign.

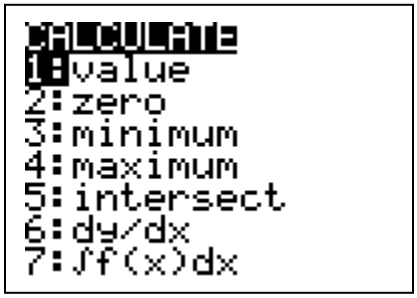



**Press** [GRAPH]

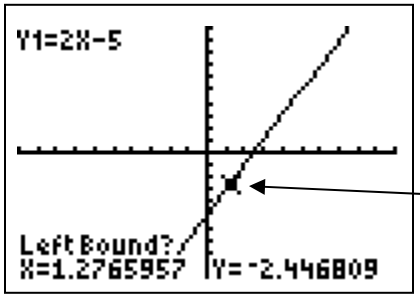


Make sure you can see the x-intercept in the window!

Press [$2^{ND}$] [TRACE]

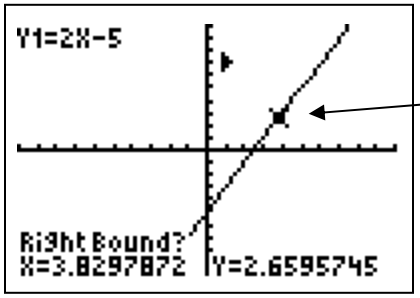


Press [ 2 ] to select zero



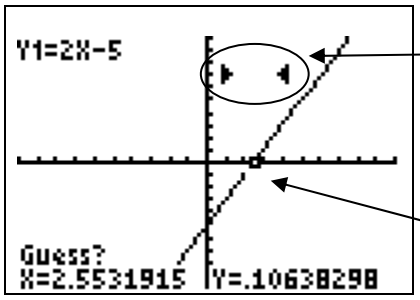

Position cursor BEFORE the x-intercept

Press [ENTER]




Position cursor AFTER the x-intercept

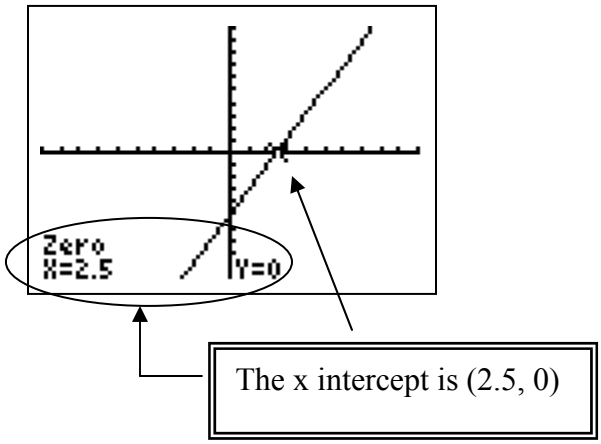
Press [ENTER]




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

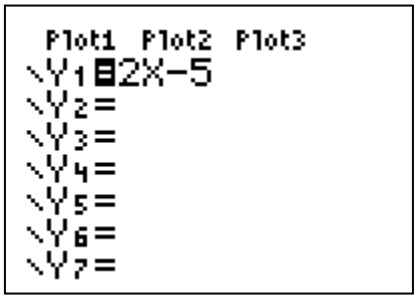
# Find Y Intercept Using A Graph

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

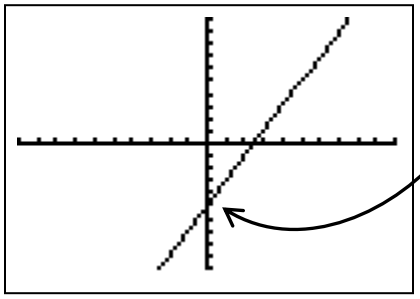
| The equation MUST be in "y =" form!!!! |
|---|

Press Y=

Enter the part of the equation after the = sign.

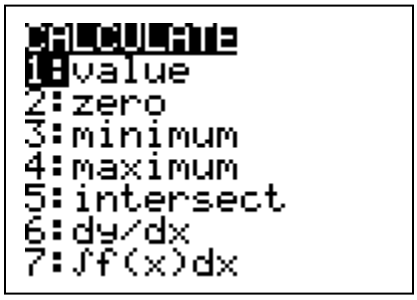



**Press** GRAPH

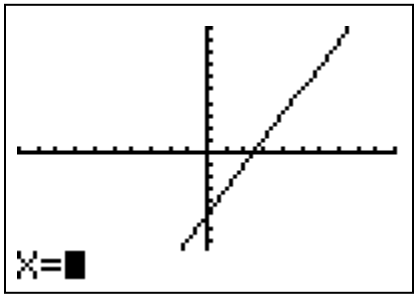


Make sure you can see the y-intercept in the window!

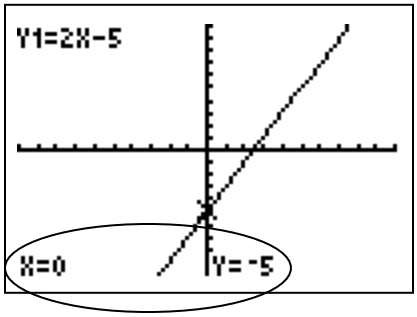
Press $2^{ND}$ TRACE



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

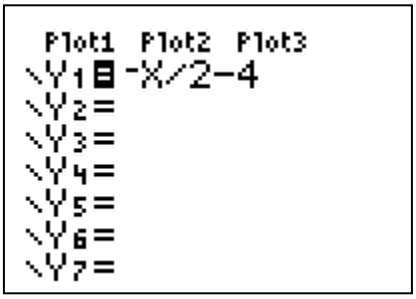
**Challenge:** $f(x) = 3\sqrt{(x+8)} - 4$

# Find X and Y Intercepts Using A Table

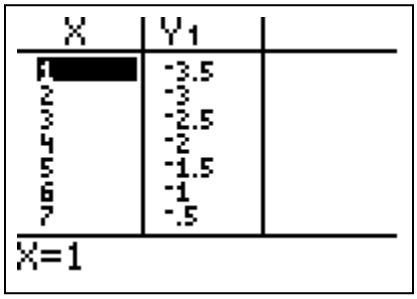
**Problem**: Find the x-intercept and y-intercept of $y = -\frac{x}{2} - 4$

| The equation MUST be in y = form. |
|---|

Press | y = | (-) | X, T, θ, n | ÷ | 2 | - | 4 |

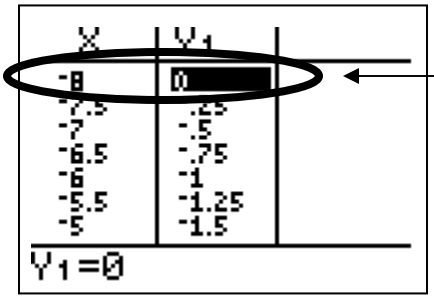



**Press** | 2ND | | GRAPH | to select TABLE




To find x-intercept:

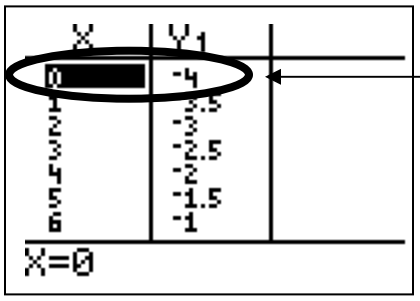
In the $Y_1$ column, move the cursor up or down until your $Y_1$ value reaches 0.




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.




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

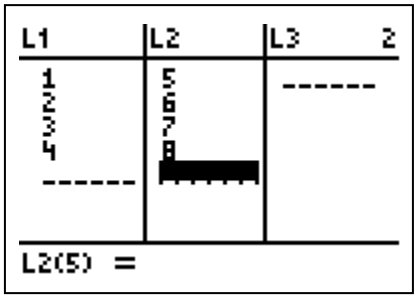
# Linear Regression (Finding Line of Best Fit)

**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 |

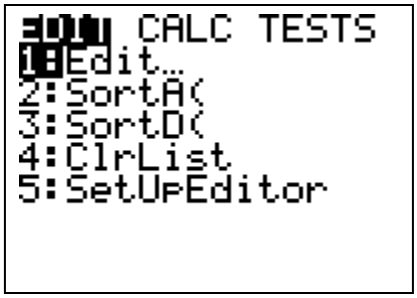
Enter the values in the x column in L1.
Enter the values in the f(x) column in L2.

Press STAT ENTER

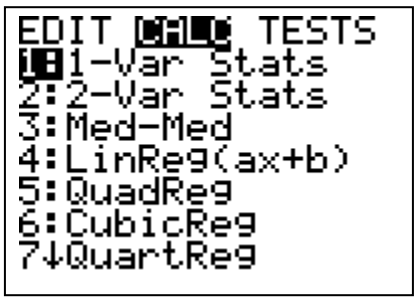



Press 2ND MODE to return to the main screen

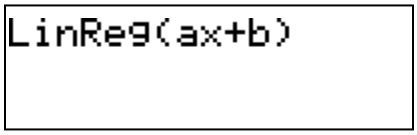
Press STAT



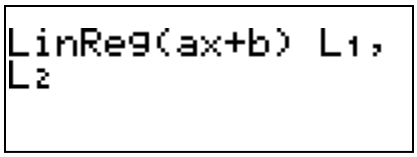

Press → to select CALC



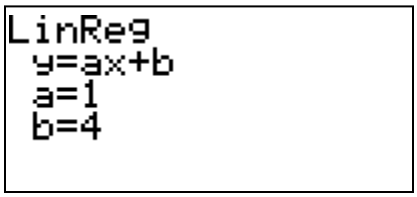
Press [4] to select LinReg(ax+b)




Press [2ND] [1] [,] [2ND] [2]




Press [ENTER]




**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!!! |
|---|

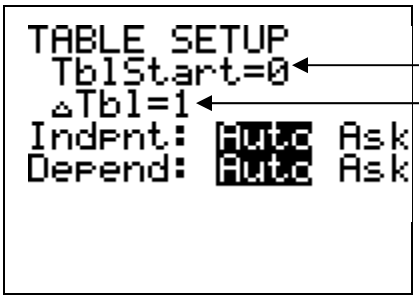
Enter first equation in $Y_1$:

Press | y = | 3 | X, T, θ, n | - | 3 |

Enter second equation in $Y_2$:

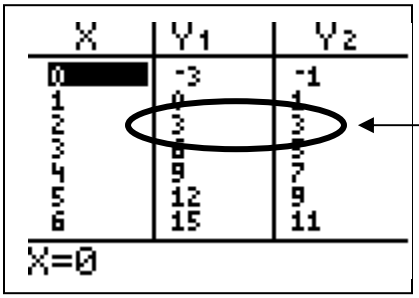
Press | y = | 2 | X, T, θ, n | - | 1 |

Press | 2ND | WINDOW |




Set TBLSET to 0
Set ΔTBL to 1

Press | 2ND | GRAPH |



| X | $Y_1$ | $Y_2$ |
|---|---|---|
| 0 | -3 | -1 |
| 1 | 0 | 1 |
| 2 | 3 | 3 |
| 3 | 6 | 5 |
| 4 | 9 | 7 |
| 5 | 12 | 9 |
| 6 | 15 | 11 |

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!!! |
|---|

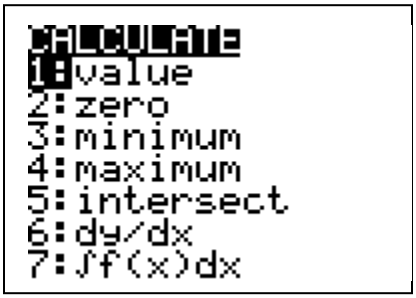
Enter first equation in $Y_1$:

Press | y = | 3 | X, T, θ, n | - | 3 |

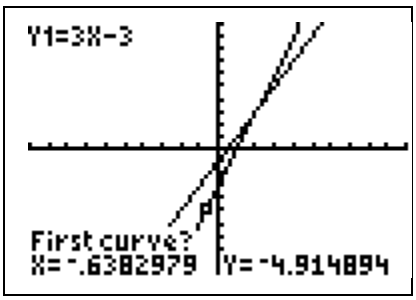
Enter second equation in $Y_2$:

Press | y = | 2 | X, T, θ, n | - | 1 |

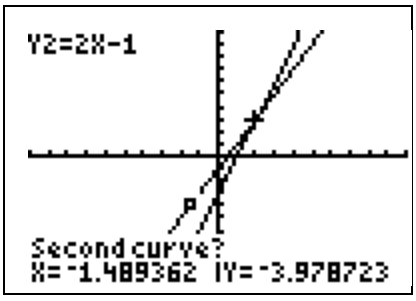
Press | 2ND | TRACE |



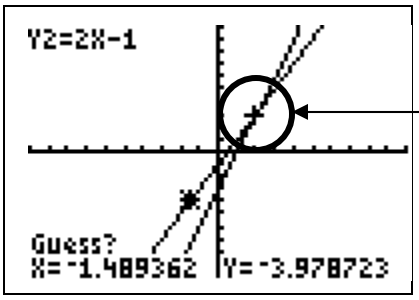

Press | 5 | ENTER | to select intersect.




Press | ENTER |

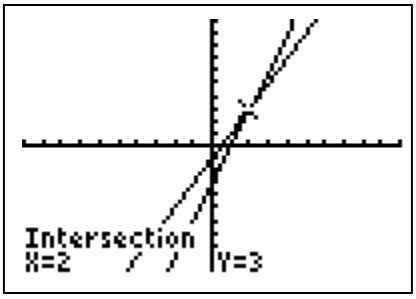



Press ENTER




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

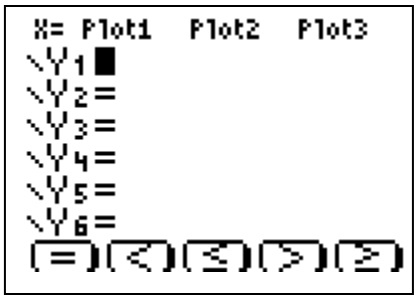
**Problem**: Graph $f(x) \leq -x + 3$

| The inequality MUST be solved for y!!!! |
|---|

Press [APPS] [8] to select Inequalz


You will see the following screen:

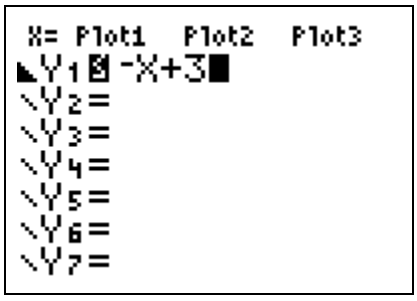

Press any key to continue.



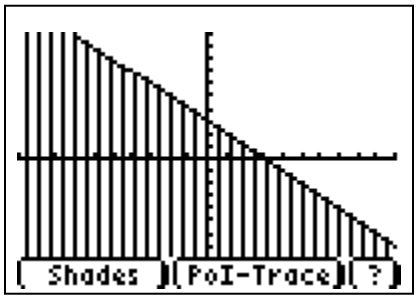

Your cursor should be on the equals sign.

Press ALPHA ZOOM to select ≤

Press → and enter the rest of the inequality




**Press** GRAPH



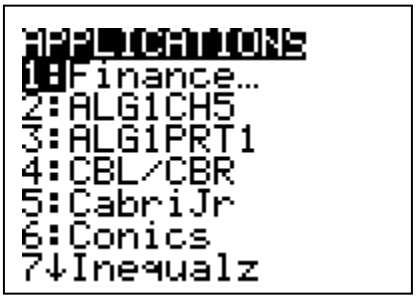

**Practice:** Graph.

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**: $\begin{cases} y \le 3x - 3 \\ y > 0.5x - 1 \end{cases}$

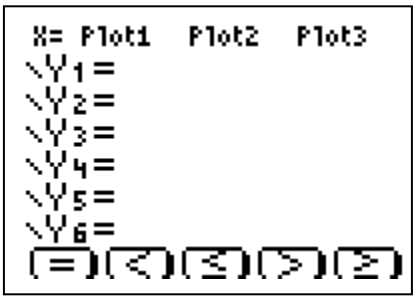
Press APPS



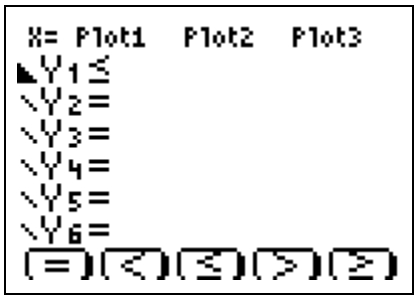

**Press** 7


Press any key

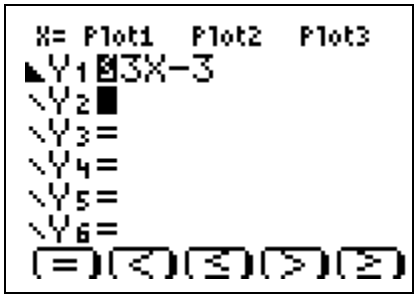
**Press** Y=



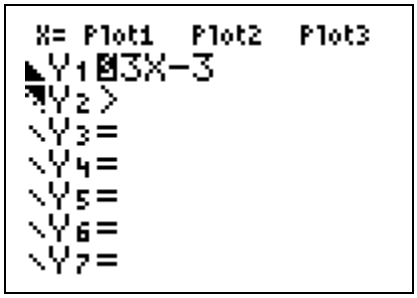
With the cursor on the first equals sign, press ALPHA ZOOM to choose (≤)



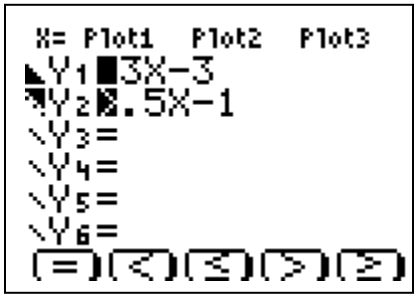

Enter the first inequality:



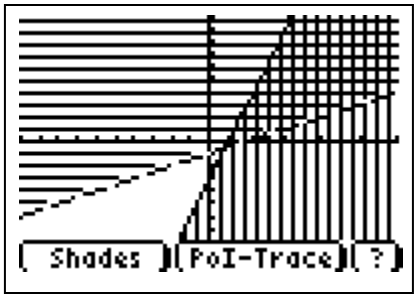

With the cursor on the first equals sign, press ALPHA TRACE to choose (>)



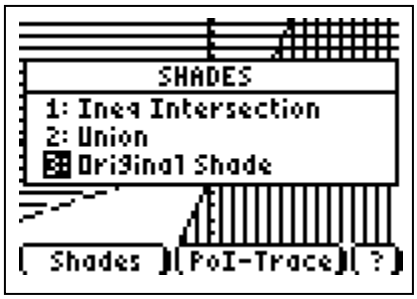

Enter the second inequality:



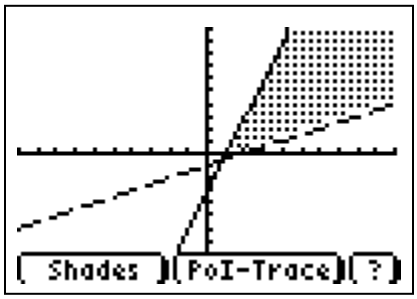
Press GRAPH




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

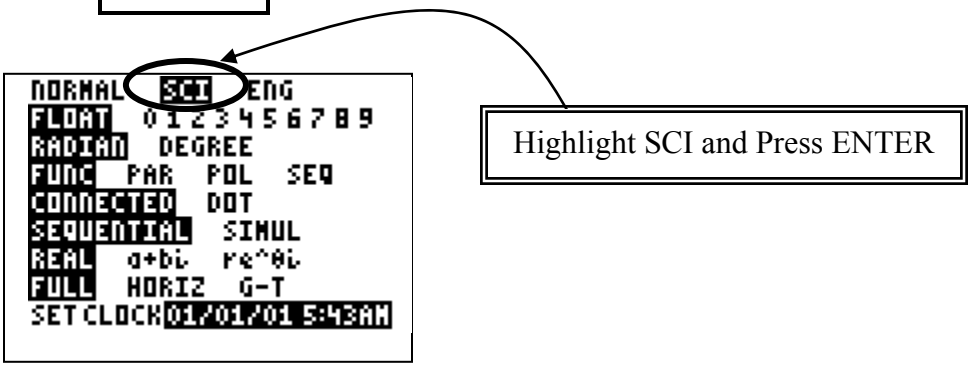
2.) $\begin{cases} y \leq x-2 \\ y < -0.2x+4 \end{cases}$

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

# Writing a Number in Scientific Notation

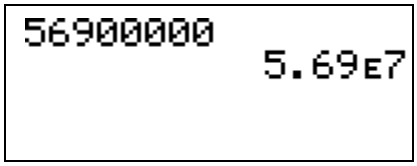
**Problem:** Write 56,900,000 in scientific notation

Press MODE




Press 2ND MODE

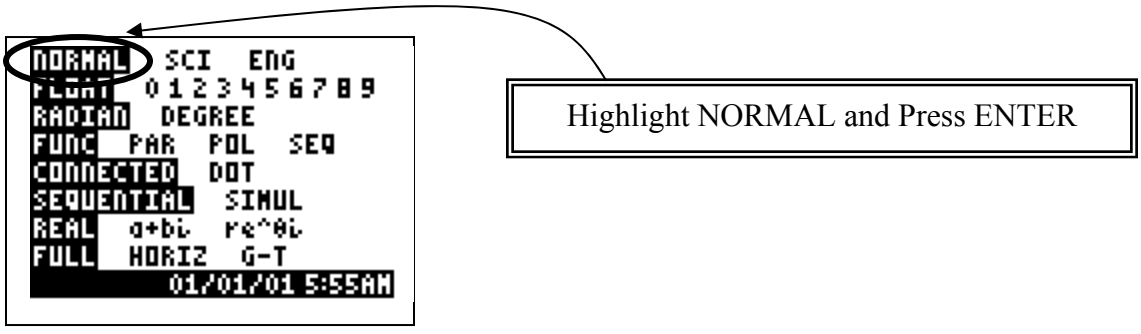
Type 56,900,000 . Press ENTER




Write the answer in scientific notation.

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

Reminder: When finished, reset MODE to NORMAL




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

1.) 34,000 2.) 0.000017 3.) 67,894,000

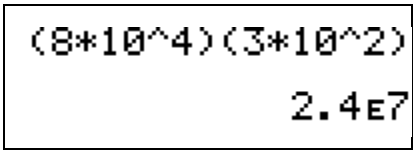
# Multiplying Numbers in Scientific Notation

**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 | |




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

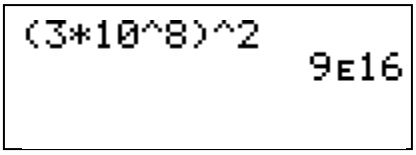
# Raising a Number to a Power in Scientific Notation

**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 | |




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

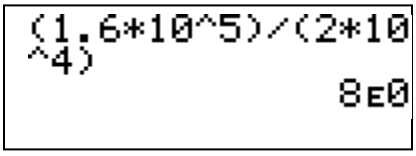
# Dividing Numbers in Scientific Notation

**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 | | | | | |




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

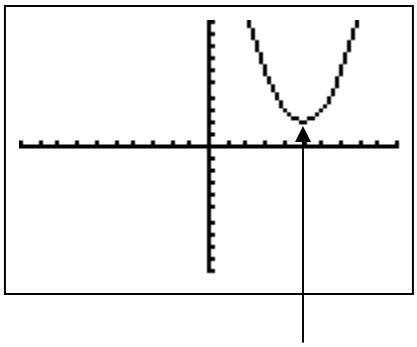
2.) $\frac{5.2 \times 10^{-7}}{1.3 \times 10^8}$

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

# Find the Vertex (Minimum/Maximum)

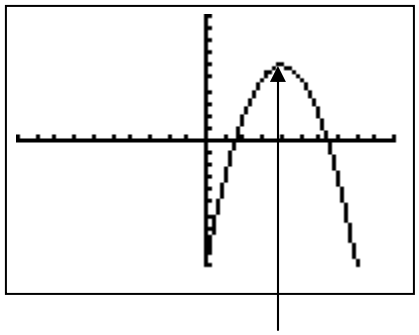
Remember:

Concave Up



Minimum

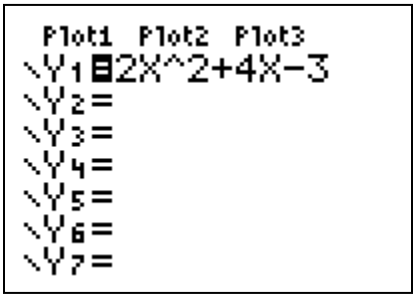
Concave Down



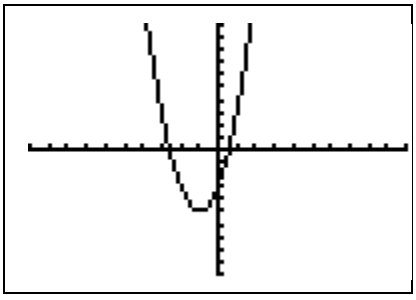
Maximum

**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.

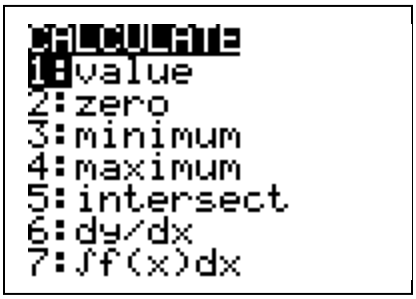



Press GRAPH

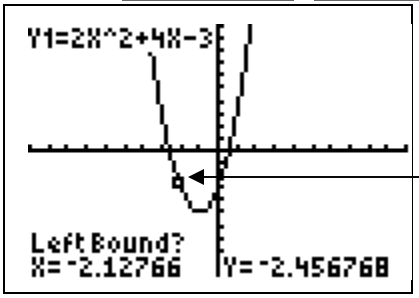


The graph is concave up so it will have a MINIMUM.

Press 2ND TRACE

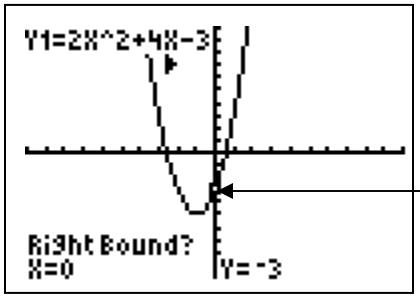



Press | 3 | ENTER | to select minimum.



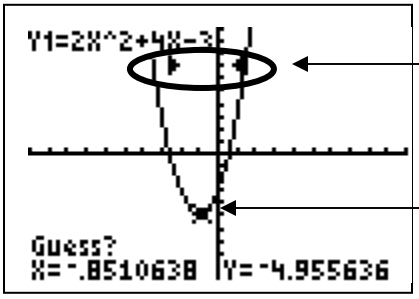

Position the cursor BEFORE the vertex.

Press | ENTER |




Position the cursor AFTER the vertex.

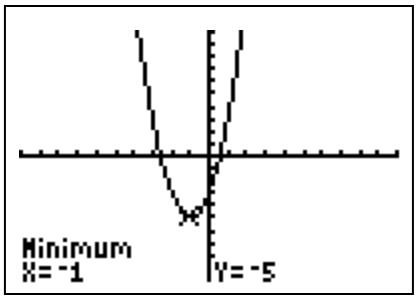
Press | ENTER |




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

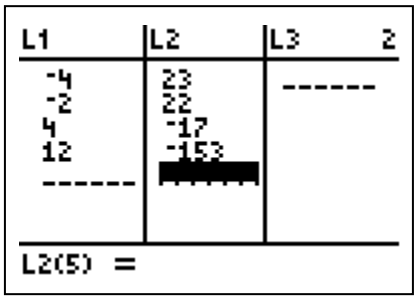
# Quadratic Regression (Finding a Function Rule from a Table)

**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 |

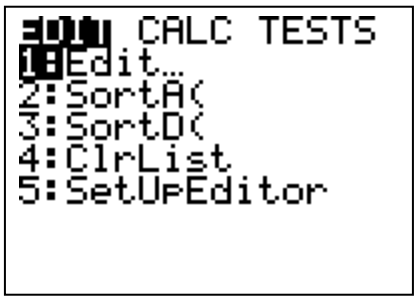
Enter the values in the x column in L1.
Enter the values in the f(x) column in L2.

Press **STAT** **ENTER**

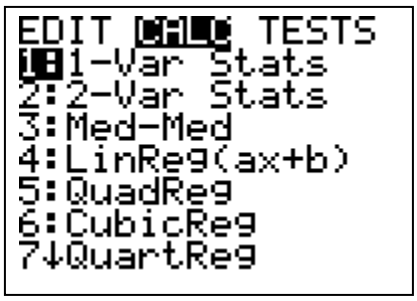



Press 2ND MODE to return to the main screen

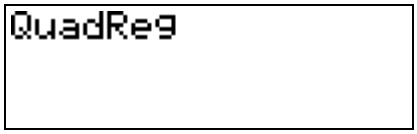
Press STAT



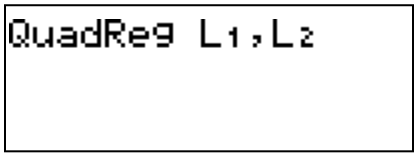

Press → to select CALC



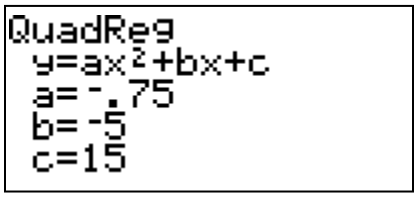
Press [5] to select QuadReg




Press [2ND] [1] [,] [2ND] [2]




Press [ENTER]




**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 |