Algebra One
Calculator Tutorials
TI 84 Plus

Part Two
Unit 6 to Unit 10
**Introduction to Graphing: Graphing Window**

Press **ZOOM**

<table>
<thead>
<tr>
<th>MEMORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:ZBox</td>
</tr>
<tr>
<td>2:Zoom In</td>
</tr>
<tr>
<td>3:Zoom Out</td>
</tr>
<tr>
<td>4:ZDecimal</td>
</tr>
<tr>
<td>5:ZSquare</td>
</tr>
<tr>
<td>6:ZStandard</td>
</tr>
<tr>
<td>7:ZTrig</td>
</tr>
</tbody>
</table>

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 \( \text{WINDOW} \)

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

3. Press \( \text{GRAPH} \) to view the parabola.

4. Press \( \text{TRACE} \)

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`

```
1: Zoom Box
2: Zoom In
3: Zoom Out
4: Decimal
5: Square
6: ZStandard
7: ZTrig
```
Press 1 to select Zbox

Zbox draws a box to define a viewing window.

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

The graph actually curves.
Problem: Graph  \( y = -16x^2 + 72x + 520 \)

Press \( y = \)

```
\text{Plot1} \text{ Plot2} \text{ Plot3}
\text{Y1:} -16X^2 + 72X + 52
\emptyset
\text{Y2=}
\text{Y3=}
\text{Y4=}
\text{Y5=}
\text{Y6=}
```

Press \( \text{GRAPH} \)

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
\nY1=40X^2-1 
\nY2= 
\nY3= 
\nY4= 
\nY5= 
\nY6= 
\nY7= 
```

Press **GRAPH**

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

It is difficult to determine the shape of this graph.
Press 2 to select Zoom In

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

Press ENTER

Zoom In magnifies the graph around the cursor.

After using Zoom In, the shape of the graph is much clearer.
**Problem:** Solve the system. \[ \begin{align*}
    y &= 2x + 12 \\
    y &= 5x - 18
\end{align*} \]

Enter first equation in Y1:

Press \[ \begin{array}{cccccc}
    y = & 2 & X, T, \theta, n & + & 1 & 2 \\
\end{array} \]

Enter second equation in Y2:

Press \[ \begin{array}{cccccc}
    y = & 5 & X, T, \theta, n & - & 1 & 8 \\
\end{array} \]

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 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 \[
\begin{array}{cccc}
\text{y} & = & 2 & \text{X, T, θ, n} & + & 4
\end{array}
\]

Press \[
\text{GRAPH}
\]

**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
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 2ND TRACE

CALCULATE
1:value
2:zero
3:minimum
4:maximum
5:intersect
6:dy/dx
7:ʃf(x)dx
Press \[2\] to select zero

Press \textbf{ENTER}

Position cursor \textbf{BEFORE} the x-intercept

Position cursor \textbf{AFTER} the x-intercept

Press \textbf{ENTER}

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

Position cursor \textbf{ON} the x-intercept
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 \( \text{Y=} \)

Enter the part of the equation after the = sign.

Press \( \text{GRAPH} \)

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

Press \( \text{2ND TRACE} \)

| CALCULATE | 1: value | 2: zero | 3: minimum | 4: maximum | 5: intersect | 6: \( dy/dx \) | 7: \( \int f(x) \, dx \) |
Press ENTER to select value

![Graph with x=0 and y=-5]

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: \[ y = \quad (-) \quad X, T, 0, n \quad \div \quad 2 \quad - \quad 4 \]

\[
\begin{array}{c|c}
X & Y_1 \\
\hline
-2 & -2.5 \\
-1 & -1.5 \\
0 & -1 \\
1 & -0.5 \\
2 & 0 \\
3 & 1.5 \\
4 & 2.5 \\
\hline
\end{array}
\]

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.) \( y = 3x - 9 \) \hspace{1cm} 2.) \( y = x - 2 \) \hspace{1cm} 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.

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

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

1. Press `STAT` to select CALC
2. Press → to select `LinReg(ax+b)`

Press `2ND` `MODE` to return to the main screen.
Press $\boxed{4}$ to select LinReg(ax+b)

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

Press $\boxed{2ND}$ $\boxed{1}$ $\boxed{2}$ $\boxed{2ND}$ $\boxed{2}$

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

Press $\boxed{ENTER}$

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

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

1.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>11.5</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>14.5</td>
</tr>
</tbody>
</table>

2.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>-1</td>
<td>-8</td>
</tr>
<tr>
<td>1</td>
<td>-14</td>
</tr>
<tr>
<td>3</td>
<td>-20</td>
</tr>
</tbody>
</table>

3.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>-6</td>
</tr>
</tbody>
</table>
Solving a System of Equations Using a Table

**Problem:** Solve the system by using a table. \[ \begin{align*} y &= 3x - 3 \\ y &= 2x - 1 \end{align*} \]

The equation MUST be in “y =” form!!!

Enter first equation in Y1:
Press \[ y = \] 3 X, T, θ, n - 3

Enter second equation in Y2:
Press \[ y = \] 2 X, T, θ, n - 1

Press 2ND WINDOW

<table>
<thead>
<tr>
<th>X</th>
<th>Y₁</th>
<th>Y₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>-3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>-3</td>
<td>11</td>
</tr>
</tbody>
</table>

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.) \[ \begin{align*} y &= x - 7 \\ y &= -\frac{3}{2}x + 3 \end{align*} \]

2.) \[ \begin{align*} y &= 2x + 3 \\ y &= -\frac{3}{2}x - 4 \end{align*} \]

3.) \[ \begin{align*} y &= -2x + 6 \\ y &= -\frac{3}{4}x + 6 \end{align*} \]
Solving a System of Equations Using a Graph

Problem: Solve the system by using a table. \[ \begin{align*}
y &= 3x - 3 \\
y &= 2x - 1
\end{align*} \]

The equation MUST be in “y =” form!!!

Enter first equation in Y₁:

Press

Enter second equation in Y₂:

Press

Press to select intersect.

Press to select intersect.

Press
The solution is (2, 3)

Practice:

1.) \[
\begin{align*}
y &= -\frac{5}{4}x - 4 \\
y &= \frac{1}{4}x + 2
\end{align*}
\]

2.) \[
\begin{align*}
y &= -x + 2 \\
y &= -5x - 2
\end{align*}
\]

3.) \[
\begin{align*}
y &= 7x - 4 \\
y &= -x + 4
\end{align*}
\]
Graphing Linear Inequalities

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

The inequality MUST be solved for \( y \)!!!!

Press \( \text{APPS} \) \( 8 \) to select Inequalz

You will see the following screen:

Press any key to continue.

Your cursor should be on the equals sign.
Press \textbf{ALPHA} \textbf{ZOOM} to select \( \leq \)

Press \rightarrow and enter the rest of the inequality

\[
\begin{align*}
Y_1 &= -x + 3 \\
Y_2 &= \\
Y_3 &= \\
Y_4 &= \\
Y_5 &= \\
Y_6 &= \\
Y_7 &= 
\end{align*}
\]

Press \textbf{GRAPH}

\[
\text{Graph}
\]

\textbf{Practice:} Graph.

1.) \( f(x) \geq -2x - 5 \) \hspace{1cm} 2.) \( y < \frac{1}{2} x - 7 \) \hspace{1cm} 3.) \( y > \frac{1}{2} x - 7 \)
Solving Systems of Linear Inequalities by Graphing

Problem: \[
\begin{align*}
y & \leq 3x - 3 \\
y & > 0.5x - 1
\end{align*}
\]

Press APPS

Press 7

Press any key

Press Y=

[Graphing interface with inequality symbols]
With the cursor on the first equals sign, press **ALPHA** **ZOOM** to choose \( \leq \) 

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.) \[
\begin{align*}
  y & \geq x + 1 \\
  y & > 5x - 1
\end{align*}
\]

2.) \[
\begin{align*}
  y & \leq x - 2 \\
  y & < -0.2x + 4
\end{align*}
\]

3.) \[
\begin{align*}
  y & \leq -4x + 8 \\
  y & \geq 2x + 3
\end{align*}
\]
Writing a Number in Scientific Notation

Problem: Write 56,900,000 in scientific notation

Press \[ \text{MODE} \]

Highlight SCI and Press \[ \text{ENTER} \]

Press \[ 2 \text{ND} \] \[ \text{MODE} \]

Type 56,900,000 . Press \[ \text{ENTER} \]

\[ 56900000 \quad 5.69\times 10^7 \]

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

\((8 \times 10^4)(3 \times 10^2)\)

\(2.4 \times 10^7\)

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. \((3 \times 10^8)^2\)

Press \((\begin{array}{ccccccc}
3 & \times & 1 & 0 & ^{^2} & 8
\end{array})\)

Change mode from NORMAL to SCI using mode key

\((3\times10^8)^2\) \(9\times10^{16}\)

Write the answer in scientific notation.

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

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. \( \frac{1.6 \times 10^5}{2 \times 10^4} \)

Press ( 1 . 6 ^ 5 ) \( \times \) 1

0 \( ^ {\text{5}} \) \( ) \( ( 2 \times 10^4 \) \)

\( \times \) 1 \( 0 \) \( ^ {\text{4}} \) \( ) \)

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**
- **Concave Down**

**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.

```
Plot1 Plot2 Plot3
Y1=2X^2+4X-3
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Press **GRAPH**

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

Press **2ND** **TRACE**
Press \(3\) \(\text{ENTER}\) to select minimum.

Position the cursor BEFORE the vertex.

Position the cursor AFTER the vertex.

The calculator will look for an answer between these arrows.

Position the cursor ON the vertex.
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.

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>23</td>
</tr>
<tr>
<td>-2</td>
<td>22</td>
</tr>
<tr>
<td>4</td>
<td>-17</td>
</tr>
<tr>
<td>12</td>
<td>-153</td>
</tr>
</tbody>
</table>

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

Press 2ND MODE to return to the main screen.
Press **STAT** to select **CALC**.

**CALC TESTS**
1:Edit...
2:SortA...
3:SortD...
4:ClrList
5:SetUpEditor

Press → to select **CALC**.

**CALC TESTS**
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
Press 5 to select QuadReg

\[ \text{QuadReg} \]

Press 2ND 1 ; 2ND 2

\[ \text{QuadReg L1, L2} \]

Press ENTER

\[ \begin{align*}
\text{QuadReg} \\
y &= ax^2 + bx + c \\
a &= -\frac{75}{2} \\
b &= -5 \\
c &= 15
\end{align*} \]

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

1.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-12</td>
<td>-33</td>
</tr>
<tr>
<td>-6</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>-257</td>
</tr>
</tbody>
</table>

2.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td>119</td>
</tr>
<tr>
<td>-7</td>
<td>38</td>
</tr>
<tr>
<td>6</td>
<td>103</td>
</tr>
<tr>
<td>8</td>
<td>173</td>
</tr>
</tbody>
</table>

3.)

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>15</td>
</tr>
<tr>
<td>0</td>
<td>-9</td>
</tr>
<tr>
<td>6</td>
<td>-15</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>