

# Organizing and Summarizing Data

## CHAPTER

## 2

## Section 2.2

▶ Example 2 (pg. 72) A Histogram for Discrete Data

To create a histogram, you have two choices: 1) enter all the individual data points from Table 8 on pg. 77 into one column or 2) enter the data values into one column and the frequencies into another column using the summarized data in Table 9 on pg. 78. For this example, we will use the summarized data.

To create this histogram, you must enter information into List1 (**L1**) and List 2 (**L2**) on your calculator. You will enter the 'number of customers' into **L1** and the frequencies into **L2**. Press **STAT** and the Statistics Menu will appear.

```

2ND CALC TESTS
1:Edit
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
  
```

Press **ENTER** and lists **L1**, **L2** and **L3** will appear.

L1	L2	L3	2
-----	██████	-----	
L2(1)=			

If the lists already contain data, you should clear them before beginning this example. Move your cursor so that the List name (**L1**, **L2**, or **L3**) of the list that contains data is highlighted.

L1	L2	L3	1
1 2 3 10 -----	4 6 8	-----	
L1 = {1, 2, 3, 10}			

Press **CLEAR** **ENTER**. Repeat this process until all three lists are empty.

L1	L2	L3	1
-----	4 6 8 -----	-----	
L1() =			

To enter the data values into **L1**, move your cursor so that it is positioned in the 1<sup>st</sup> position in **L1**. Type in the first value, **1**, and press **ENTER** or use the down arrow. Enter the next value, **2**. Continue this process until all 11 data values are entered into **L1**. Now use the up-arrow to scroll to the top of **L1**. As you scroll through the data, check it. If a data point is incorrect, simply move the cursor to highlight it and type in the correct value. When you have moved to the 1<sup>st</sup> value in **L1**, use the right arrow to move to the first position in **L2**. Enter the frequencies into **L2**.

L1	L2	L3	3
1 2 3 4 5 6 7	1 6 1 4 7 11 5	-----	
L3() =			

Before graphing the histogram, make sure that there are no functions in the Y-registers. To do this, press the **Y=** key. If there are any functions stored in any of the Y-values, simply move the cursor to the line that contains a function and

press **CLEAR**. Now you are ready to graph the histogram. Press **2<sup>nd</sup>** **[STAT PLOT]** (located above the **Y=** key).

```

STAT PLOT
1:Plot1...On
  ▯ L1  1
2:Plot2...Off
  ▯ L1  L2  ▯
3:Plot3...Off
  ▯ L1  L2  ▯
4↓PlotsOff
  
```

Select Plot1 by pressing **ENTER**.

```

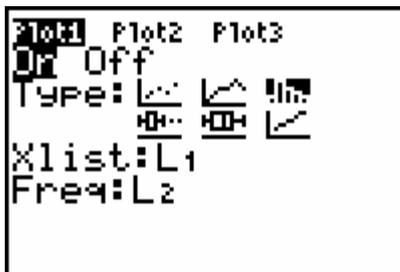
Plot1 Plot2 Plot3
On Off
Type: ▯ ▯ ▯
      ▯ ▯ ▯
Xlist:L1
Ylist:L2
Mark: ▯ + .
  
```

Notice that Plot1 is highlighted. On the next line, notice that the cursor is flashing on **ON** or **OFF**. Position the cursor to **ON** and press **ENTER** to select it. The next two lines on the screen show the different types of graphs. Move your cursor to the symbol for histogram (3<sup>rd</sup> item in the 1<sup>st</sup> line of **Type**) and press **ENTER**.

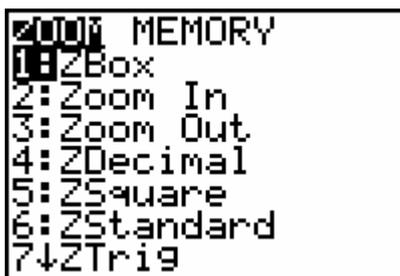
```

Plot1 Plot2 Plot3
On Off
Type: ▯ ▯ ▯
      ▯ ▯ ▯
Xlist:L1
Freq:1
  
```

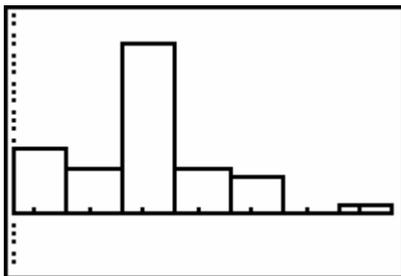
The next line is **Xlist**. Use the down arrow to move to this line. On this line, you indicate where the data values are stored. In most graphing situations, the data are entered into **L1**, so **L1** is the default option. Notice that the cursor is flashing on **L1**. Push **ENTER** to select **L1**. The last line is the frequency line. On this line '1' is the default. The cursor should be flashing on **1**. Change **1** to **L2** by pressing **2<sup>nd</sup>** **[L2]**. (Note: **L2** is found above the **2** key.)



To view a histogram of the data, press **ZOOM**.



There are several options in the Zoom Menu. Using the down arrow, scroll down to option 9, **ZoomStat**, and press **ENTER**. A histogram should appear on the screen.



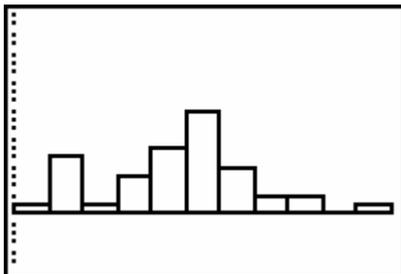
This histogram is not exactly the same as the ones on pg. 79 of your textbook. You can adjust the histogram so that it does look exactly like the one in your text. Press **Window** and set **Xmin** to 1, **Xmax** to 12 (this one extra data value is needed to complete the last bar of the histogram), and **Xscl** equal to 1, which is the difference between successive data values in the frequency distribution. Note: In many cases it is not necessary to change the values for **Ymin**, **Ymax** or **Yscl**. What you must do is to check these values and make sure that **Ymin** is a small negative value (a value between  $-6$  and  $-1$  would be good) and **Ymax** should be slightly larger than the largest frequency value in your dataset. You never need to adjust **Yscl**.

```

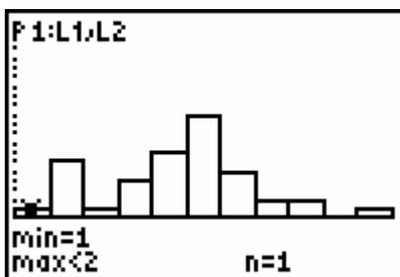
WINDOW
Xmin=1
Xmax=12
Xscl=1
Ymin=-5.41242
Ymax=21.06
Yscl=1
Xres=1

```

Press **GRAPH**.



Notice the **TRACE** key. If you press it, a flashing cursor, (, will appear at the top of the 1<sup>st</sup> bar of the histogram.



Notice the information at the bottom of the screen. **Min** is the actual data value for the first bar of the histogram. In this example, the first data value is **1**. We do not need to use the Max value in this example. “n=1” tells us that there is only one data point in the dataset that has a value of **1**. You can use the right arrow to move through each of the bars. For example, if you move to the 5<sup>th</sup> bar in the histogram, you will see that the data value for that bar is **5** and that there are 7 data points in the dataset that have a value of **5**.

Now that you have completed this example, turn Plot1 **OFF**. Using **2<sup>nd</sup> [STAT PLOT]**, select Plot1 by pressing **ENTER** and highlighting **OFF**. Press **ENTER** and **2<sup>nd</sup> [QUIT]** (located above the **[MODE]** key.) (Note: Turning Plot1 **OFF** is optional. You can leave it ON but leaving it ON will effect other graphing operations of the calculator.)

▶ Example 5 (pg. 76) A Histogram for Continuous Data

Press **STAT** and **ENTER** to select **1:Edit**. If there is data in **L1**, highlight **L1** at the top of the first list and press **CLEAR** and **ENTER** to clear the data. You should also clear **L2**.

To create this frequency histogram you can use the raw data in Table 12 on pg. 80 or the summarized data in Table 13 on page 80. For this example, we will use the summarized data. You must enter the midpoints of each class into List1 (**L1**) and the frequencies into List 2 (**L2**). To obtain the midpoints of each class, add two consecutive lower limits and divide by 2. For example, here is the calculation for the first class:  $(0+2)/2=1$ .

To enter the midpoints in L1, you can do the calculation for the midpoints right on this screen. Simply type the calculation on the data entry line and push **ENTER**. The calculation will be automatically converted to the midpoint.

L1	L2	L3	1
-----	-----	-----	
L1(1)=(0+2)/2			

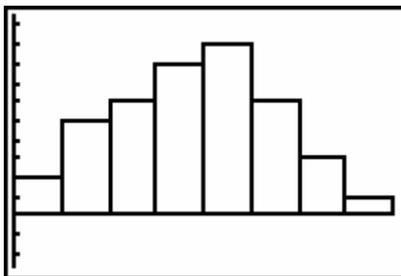
To set up the histogram, push **2<sup>nd</sup>** **STAT PLOT** and **ENTER** to select **Plot 1**. Turn ON **Plot 1**, set **Type** to **Histogram**, set **Xlist** to **L1**, set **Freq** to **L2**.

Plot1	Plot2	Plot3
On	Off	
Type:	  	
Xlist:	L1	
Freq:	L2	

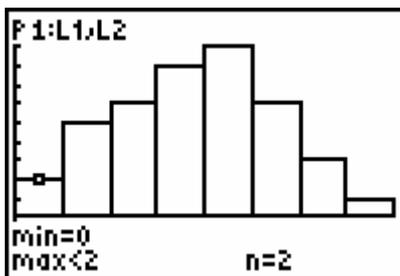
Press **ZOOM**, scroll down to **9:ZoomStat** and press **ENTER** to create a histogram. Press **Window** to adjust the Graph Window. Set **Xmin** equal to 0 (the lower limit of the first class) and **Xmax** equal to 16 (a value that would be the lower limit of an additional class at the end of the table. This extra value is needed to complete the last bar of the histogram). Set **Xscl** equal to 2, which is the class width. (Note: In many cases it is not necessary to change the values

for **Ymin**, **Ymax** or **Yscl**. What you must do is to check these values and make sure that **Ymin** is a small negative value (a value between  $-6$  and  $-1$  would be good) and **Ymax** is slightly larger than the largest frequency value in your dataset. You never need to adjust **Yscl**.

Press **GRAPH** and the histogram should appear.



You can press **TRACE** and scroll through the bars of the histogram. The minimum value of the class will appear as **Min**. **Max** is written as an inequality that states that the maximum value in the class is *less than* the given value. **n** is the number of data points in the class.



Notice, for example, with the cursor highlighting the first bar of the histogram, you will see that the first class contains values greater than or equal to 0 and less than 2 and that there are 2 data points in this class.

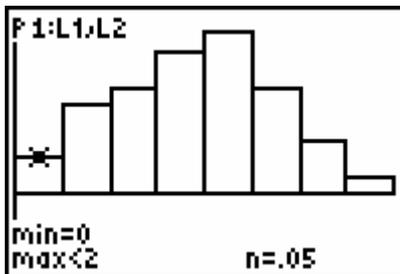
To create the relative frequency histogram, replace the frequencies in L2 with relative frequencies. One way to do this is to **CLEAR** L2 and enter the relative frequencies from Table 13 on pg. 80. Alternately, without clearing the frequencies, move the cursor so that it highlights the label, L2, at the top of the column and press **ENTER**. On the data entry line, type in  $\frac{2}{40}$  and press **ENTER**.

L1	L2	L3
1	2	-----
3	2	
5	2	
7	2	
9	2	
11	2	
13	2	
L2 = L2 / 40		

L1	L2	L3
1	.05	████████
3	.125	
5	.15	
7	.2	
9	.225	
11	.15	
13	.075	
L3(1)=		

Press **Window** to adjust the Graph Window. Set **Xmin** equal to 0 and **Xmax** equal to 16. Set **Xscl** equal to 2. Set **Ymin** to -.1 and **Ymax** to .25. Press **GRAPH** and the relative frequency histogram should appear.

You can press **TRACE** and scroll through the bars of the histogram. The minimum and maximum values of the class will appear. **n** is the relative frequency of the class.

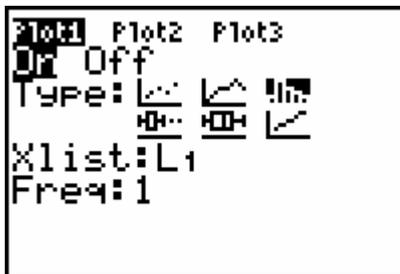


► Problem 30 (pg. 86)

For this example, we will construct the histogram first (part c.) and then use it to find the frequencies for the frequency distribution (part a.).

Press **STAT** and select **1:Edit** and press **ENTER**. Highlight the name "**L1**" and press **CLEAR** and **ENTER**. You can also clear **L2** but you will not be using **L2** in this example. **ENTER** the data values into **L1**.

To set up the histogram, push **2<sup>nd</sup>** **[STAT PLOT]** and **ENTER** to select **Plot 1**. Turn ON **Plot 1**, set **Type** to **Histogram**, set **Xlist** to **L1**. Since you are using the raw data, you must set **Freq** to **1**, which indicates that you are entering individual data values. If the frequency is set on **L2** move the cursor so that it is flashing on **L2** and press **CLEAR**. The cursor is now in ALPHA mode (notice that there is an "A" flashing in the cursor). Push the **ALPHA** key and the cursor should return to a solid flashing square. Type in the number **1**.



```

Plot1 Plot2 Plot3
On Off
Type: L1
Xlist: L1
Freq: 1
  
```

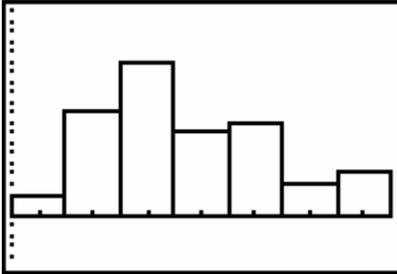
Press **ZOOM**, scroll down to **9:ZoomStat** and press **ENTER** to create a histogram. Press **Window** to set the Graph Window. The first value you must enter is the value for **Xmin**. This value will be the lower class limit of the first class which is **5**. The value for **Xmax** would be the lower class limit of the one extra class that would be needed to complete the last bar of the histogram. Look through the data in your textbook. Notice that the largest data point is **17.8**, therefore, the last class would be **17 – 17.9**. The lower class limit of the next class would be **18**. This is the value for **Xmax**. Set **Xscl** equal to **1**, which is the class width. (Note: In many cases it is not necessary to change the values for **Ymin**, **Ymax** or **Yscl**. What you must do is to check these values and make sure that **Ymin** is a small negative value (a value between  $-6$  and  $-1$  would be good) and **Ymax** is slightly larger than the largest frequency value in your dataset. You never need to adjust **Yscl**.)

Press **GRAPH** and the histogram should appear.



To complete the relative frequency column (for part b.), simply divide each frequency by the total frequency. For example, the relative frequency for the first class would be  $1/51$ .

To do part (f) of the problem, press **Window** to set the Graph Window. Set **Xscl** equal to 2, set **Xmax** to 19 and set **Ymax** to 20. Press **GRAPH** and the histogram should appear.



(Note: A relative frequency histogram (part d.) uses relative frequencies rather than frequencies. The actual picture on the TI-84 would be identical to the frequency histogram.)

