

## Conventions for Histograms

Histogram with discrete numerical data:

- each bar represents an interval on a numerical scale;
- the length of each bar represents the frequency of data in an interval (how many);
- the bars (intervals) are equal width (determined by the Xscl setting in WINDOW);
- each interval includes the lower boundary value up to (but not including) the upper boundary value (automatically by the TI-73);
- the order of the bars (intervals) are placed along the x-axis scale (automatically by the TI-73).
- gaps may appear between bars when no data values occur within an interval (i.e., the frequency of an interval equals zero).

Sample Questions:

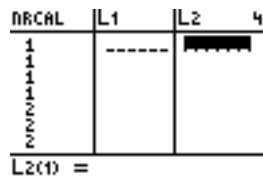
How many calculators (of any kind) do you own?

How many letters are in the name of each of the 50 states in the U.S.A.?

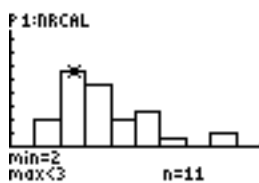
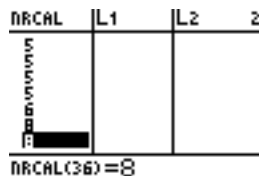
How many drops of water fit on the head of a penny?

How many candies/raisins were in each bag?

How many calculators (of any kind) do you own?



```
WINDOW
Xmin=0
Xmax=10
ΔX=.1063829787...
Xscl=1
Ymin=-5
Ymax=20
Yscl=2
```

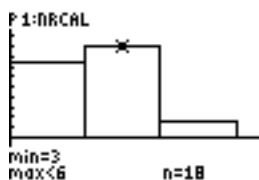


```
Plot1 Off
Type:
Xlist:NRCAL
Freq:1
```

11 people surveyed each own two calculators.

Choosing the size of the interval can change the shape of the graph.

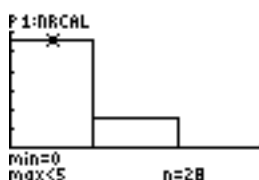
```
WINDOW
Xmin=0
Xmax=10
ΔX=.1063829787...
Xscl=3
Ymin=-8
Ymax=25
Yscl=2
```



18 people surveyed each own three to five calculators.

There might be a good reason to choose a certain size interval; maybe I only want to know how many people surveyed own less than 5 calculators compared with how many own 5 or more calculators.

```
WINDOW
Xmin=0
Xmax=15
ΔX=.1595744680...
Xscl=5
Ymin=-8
Ymax=35
Yscl=5
```

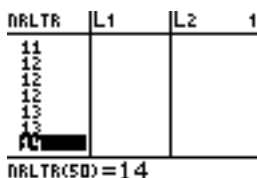


28 people surveyed each own less than 5 calculators.

Choosing a smaller size interval may create the illusion of a bar graph with spaces between bars, especially when discrete numerical data has only integers for data values and the interval size is set to something between zero and one (see example below).

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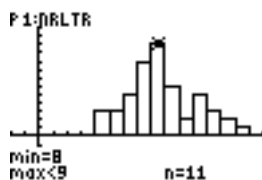
How many letters are in the name of each of the 50 states in the U.S.A.?



```
Plot1 Off
Type: L1
Xlist:NLRTR
Freq:1
```

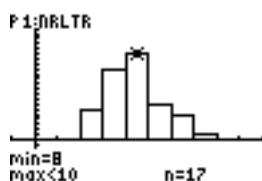
Choosing the size of the interval can change the shape of the graph.

```
WINDOW
Xmin=-2
Xmax=16
ΔX=.1914893617...
Xscl=1
Ymin=-5
Ymax=15
Yscl=1
```



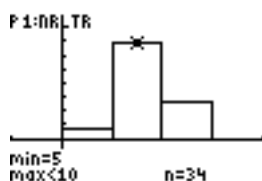
Eleven state names are 8 letters long.

```
WINDOW
Xmin=-2
Xmax=20
ΔX=.2340425531...
Xscl=2
Ymin=-8
Ymax=25
Yscl=1
```



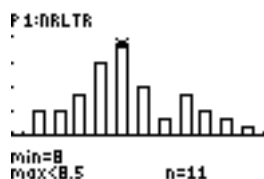
Seventeen state names have 8 or 9 letters.

```
WINDOW
Xmin=-5
Xmax=20
ΔX=.2659574468...
Xscl=5
Ymin=-15
Ymax=45
Yscl=5
```

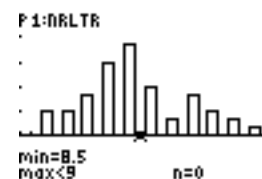


Thirty-four state names have 5 – 9 letters.

When the interval is less than one and the data values are integers, the histogram may look like a bar graph with spaces between each bar; however, the trace feature clearly shows the intervals for data values represented in the histogram.



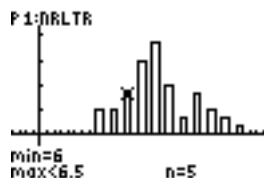
```
WINDOW
Xmin=3
Xmax=15
ΔX=.1276595744...
Xscl=.5
Ymin=-5
Ymax=15
Yscl=3
```



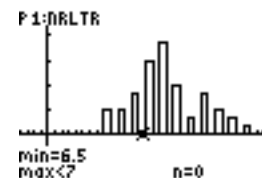
11 state names have 8 letters.

No states have more than 8.5 and less than 9 letters.

When the interval is relatively small, and the range of x values (Xmin to Xmax) is relatively large for the set of data, the graph begins to look distorted (unequal width bars/intervals) even though the intervals are actually equally spaced on the x-axis, as verified by using the trace feature.



```
WINDOW
Xmin=-2
Xmax=16
ΔX=.1914893617...
Xscl=.5
Ymin=-5
Ymax=15
Yscl=3
```



Five state names have 6 letters.

No states have more than 6.5 and less than 7 letters.

If the intervals are too small (Xscl) for the data relative to the number of screen pixels needed to display the bars, an error message will occur. For this set of data, an error will occur when the Xscl is set to 0.38 or less.

## Conventions for Histograms

Histogram with continuous numerical data:

- each bar represents an interval on a numerical scale;
- the length of each bar represents the frequency of data in an interval (how many);
- the bars (intervals) are equal width (determined by the Xscl setting in WINDOW);
- each interval includes the lower boundary value up to (but not including) the upper boundary value (automatically by the TI-73);
- the order of the bars (intervals) are placed along the x-axis scale (automatically by the TI-73);
- gaps may appear between bars when no data values occur within an interval (i.e., the frequency of an interval equals zero).

### Sample Questions:

How tall are you in centimeters?

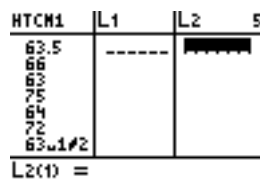
How many minutes (approximately) do you use on your cell phone each day?








How many hours did you sleep last night?

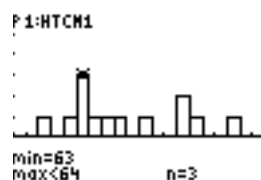
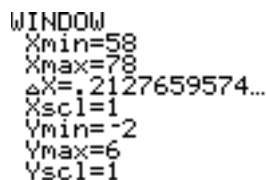
How heavy (pounds) is your backpack/book bag?

How much money did you spend on school supplies this semester/year?

How tall are you in centimeters? (Note: the data below is from Class 1.)

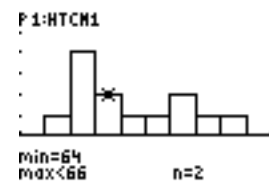
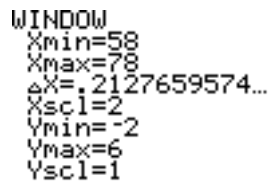
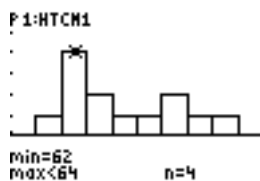


Plot1  Off  
Type:        
Xlist: HTCM1  
Freq: 1



Three people surveyed are at least 63 cm tall and less than 64 cm tall.

Choosing the size of the interval can change the shape of the graph.



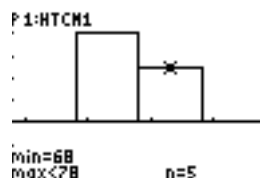
Four people surveyed are at least 62 cm tall and less than 64 cm tall.

Two people surveyed are at least 64 cm tall and less than 66 cm tall.

P1:HTCM1

min=60  
max=65  
n=6

```
WINDOW
Xmin=48
Xmax=88
ΔX=.4255319148...
Xscl=10
Ymin=-5
Ymax=10
Yscl=2
```



When the interval is small, the graph begins to look distorted (unequal width bars/intervals) even though the intervals are actually equally spaced on the x-axis.






P1:HTCM1

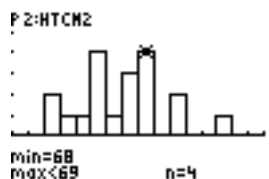
min=63.5  
max=64 n=2

\*\*\*\*\*

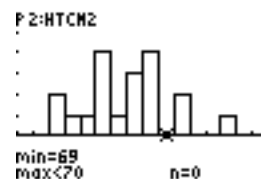
| HTCH2 | L1    | L2 | 6 |
|-------|-------|----|---|
| 65    | ----- |    |   |
| 73    |       |    |   |
| 66    |       |    |   |
| 65    |       |    |   |
| 62.25 |       |    |   |
| 67    |       |    |   |
| 67    |       |    |   |

L2(1) =

Plot2 Off  
Type:       
Xlist: HTCM2  
Freq: 1



```
WINDOW
Xmin=60
Xmax=76
ΔX=.1702127659..
Xscl=1
Ymin=-2
Ymax=6
Yscl=1
```

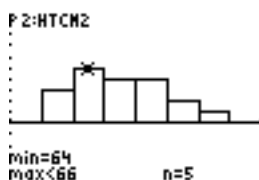


Four people surveyed are at least 68 cm tall and less than 69 cm tall.  
No one surveyed is at least 69 cm tall and less than 70 cm tall.

```

WINDOW
Xmin=60
Xmax=76
ΔX=.1702127659...
Xscl=2
Ymin=-5
Ymax=10
Yscl=1

```

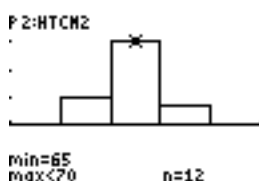


Five people surveyed are at least 64 cm tall and less than 66 cm tall.

```

WINDOW
Xmin=55
Xmax=80
ΔX=.2659574468...
Xscl=5
Ymin=-8
Ymax=16
Yscl=4

```

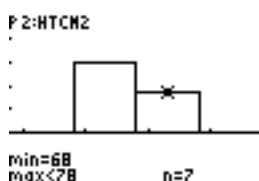


Twelve people surveyed are at least 65 cm tall and less than 70 cm tall.

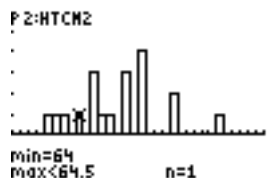
```

WINDOW
Xmin=48
Xmax=88
ΔX=.4255319148...
Xscl=10
Ymin=-8
Ymax=20
Yscl=4

```



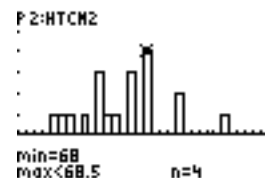
Seven people surveyed are at least 68 cm tall and less than 78 cm tall.



```

WINDOW
Xmin=60
Xmax=76
ΔX=.1702127659...
Xscl=.5
Ymin=-2
Ymax=6
Yscl=1

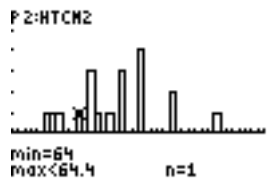
```



One person surveyed is at least 64 cm tall and less than 64.5 cm tall.

Four people surveyed are at least 68 cm tall and less than 68.5 cm tall.

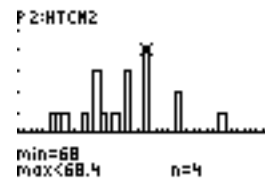
When the interval is relatively small, and the range of x values (Xmin to Xmax) is relatively large for the set of data, the graph begins to look distorted (unequal width bars/intervals) even though the intervals are actually equally spaced on the x-axis.



```

WINDOW
Xmin=60
Xmax=76
ΔX=.1702127659...
Xscl=.4
Ymin=-2
Ymax=6
Yscl=1

```



One person surveyed is at least 64 cm tall and less than 64.5 cm tall.

Four people surveyed are at least 68 cm tall and less than 68.5 cm tall.