

HAPPY BIRTHDAY A Data Collection Activity

Page 1 of 9

Note: This activity was originally designed by Mano Barberena, Fort Worth Public Schools, for the TI-83. I adapted it for the TI-73.

Objectives:

- Students will collect data using the birthday of their classmates to develop box & whisker plots and histograms: 1) truly physical models
2) sketch by hand
3) calculator generated
- Students will develop an understanding of the vocabulary associated with one-variable data collection.
- Students will analyze box & whisker plots and histograms.

Skills Developed:

- Sending and receiving programs (Linking)
- Executing a Program
- Gathering Data
- Using Lists to enter data
- Using Stat Plot to generate Box & Whisker Plots and Histograms

Materials Needed:

- TI-73 with a link cable for each participant
- The DAY program
- Data Collection Form
- Signs as needed
- Markers to record data on the board or overhead
- A transparency listing the number of days in each month
- Post-its (at least as many as number of students in class plus twelve)
- Ruler for each student

Data Collection

1. Have students obtain the DAY program by linking.
2. Complete the Data Collection form. (Put up the transparency of number of days in the months)
3. Use the DAY program to “calculate” the day on which the student was born.

Graph Making

For each of the 4 numbers written on the data collection form, we will either make a histogram or a box & whisker plot. First a physical graph, then a hand sketch, and finally a graphing calculator generated graph.

C 1999 REARDON TI-73 ADAPTED FROM OTHER SOURCES GIFTS, INC.

For this set of data we will make a **histogram**. Discuss with your students again what that is, how to make it,... Let them discuss that among themselves also.

1. *The physical graph*

Give each student a post-it and have him/her print first and last name and month number born.

On the chalkboard or bulletin board, the teacher should put up from left to right, 12 post-its marked 1 through 12 (Jan through Dec, respectively).

Have students go up to the board one row at a time and place their post-it in the same row/column as their birth month, making a physical histogram.

2. *The sketch by hand*

With the data that was summarized with the post-its, have the students make a decent sketch of a histogram that represents this data. Have them use a ruler. Have them discuss why this "picture" (graph) helps one to understand the data by sight.

3. *The calculator generated graph*

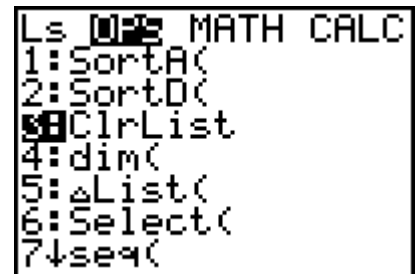
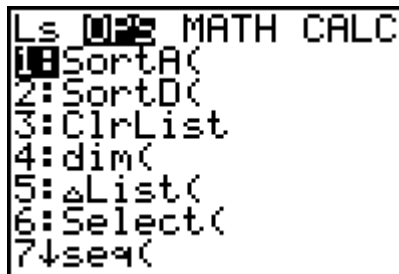
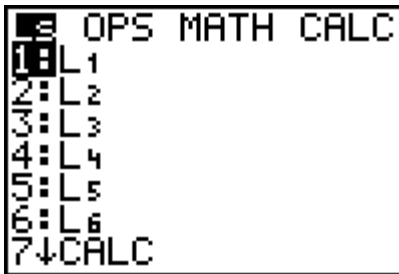
In order to enter the data, the lists must be cleared.

Have the students clear lists L1 through L6:

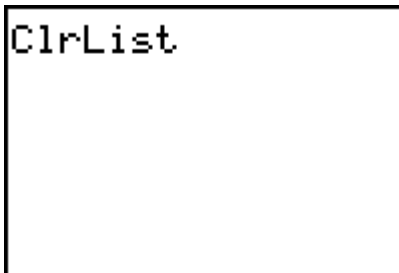
From the HOME screen type:
<2nd> <STAT>

Cursor over to OPS
(for Operations)

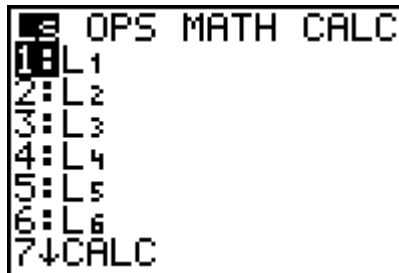
Press 3 for ClrList



This screen comes up:



Type in L1, L2, L3, L4, L5, L6. To do this type
<2nd> <STAT>



Press the number of the list you want. For the first list press 1 or <ENTER>



Type a comma

Again <2nd> <STAT>
But this time 2 for L2

Result is: Page 3 of 9

```
ClrList L1,█
```

```
OPS MATH CALC
1: L1
2: L2
3: L3
4: L4
5: L5
6: L6
7: CALC
```

```
ClrList L1,L2
```

Continue in the same fashion until your screen is like the one below. Then press <ENTER> to clear all the lists.

```
ClrList L1,L2,L3
,L4,L5,L6
```

The calculator tells you it is Done.

Now to enter the data into lists L1 and L2. We will put the numbers 1, 2, 3, ..., 12 into L1.

From the HOME screen,
Press <LIST>

Type 1 and
press <ENTER>

Continue until 1, 2, 3,
... 12 are entered into L1

L1	L2	L3	1
█	---	---	
L1(1)=			

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

L1	L2	L3	1
7			
8			
9			
10			
11			
12			
L1(13) =			

Next we will enter the appropriate data into L2: how many people were born in the first month (Jan), the second month (Feb), and so on...

Go ahead. Do it.

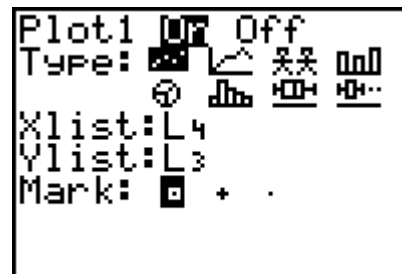
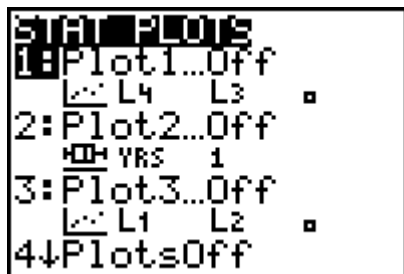
Once the data has been entered it is time to tell the calculator what type of graph we want and how we want it displayed.

Get back to the HOME screen by pressing $\langle 2^{nd} \rangle \langle QUIT \rangle$ and then $\langle CLEAR \rangle$ the screen.

Press $\langle 2^{nd} \rangle \langle PLOT \rangle$
To set up the Stat Plot

Press 1 or
 $\langle ENTER \rangle$

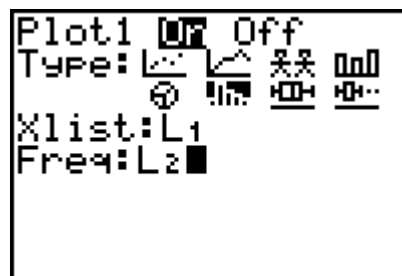
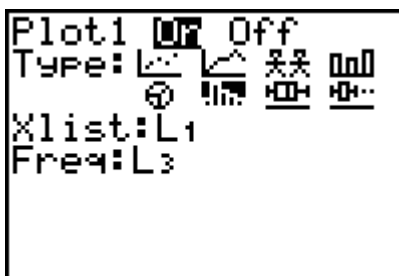
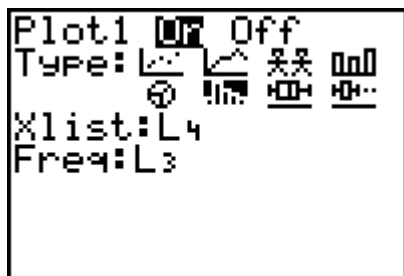
Turn the Plot1 On
by pressing $\langle ENTER \rangle$



For the Type, cursor down once, and then over to histogram (NOT the bar graph) press $\langle ENTER \rangle$ see below:

The Xlist, what will be along the horizontal or x-axis, is in L1, so using $\langle 2^{nd} \rangle \langle STAT \rangle 1: L1$

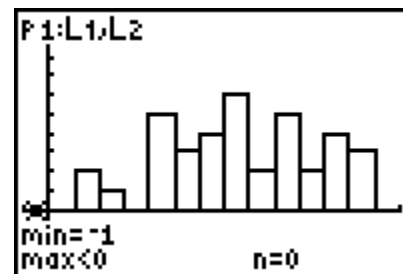
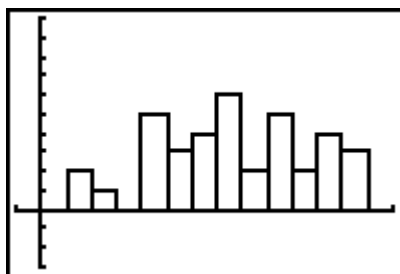
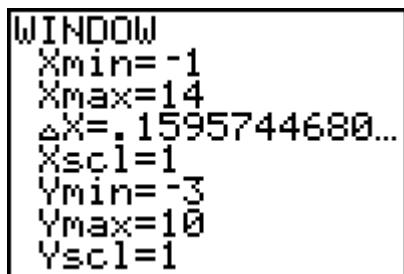
The freq (frequency) is how many times that month's birthday came up. Type in L2



Press $\langle WINDOW \rangle$
And enter appropriate Values. These will vary With different data.
I chose:

Now press $\langle GRAPH \rangle$
to see the beautiful picture.

Press $\langle TRACE \rangle$
and discuss what this means.



Compare the calculator generated graph with the hand drawn one, and the physical one.

For this set of data we will make a **box & whisker plot**. Discuss with your students again what that is, how to make it,... Let them discuss that among themselves also.

1. *The physical graph*

Give each student a post-it and have him/her write on it the day of the year he/she was born.

Have the students arrange themselves in order from 1 to 365 along a wall. Determine the students that represent the Xmin, Xmax, and the 1st, 2nd, and 3rd quartiles. Pass out the appropriate signs.

- Xmin the person at the beginning of the line with the smallest DOY
- Xmax the person at the end of the line with the largest DOY
- Median a) If there are an odd number of participants, the median will be the person in the middle.
 b) If there are an even number of participants, the median will be the average of the two people in the middle.
 Recall that the median is the number such that half of the data is above the median and half of the data is below the median.
 The median is also called the 2nd quartile and also the 50th percentile.
- 1st quartile To find the first quartile, determine the median of the lower half, that is, the person in the middle of the lower half.

 If there are an odd number of participants, do not count the person representing the median to find the middle of the lower half.

 If the quartile is an average of two numbers, have both people hold up the sign.
- 3rd quartile Follow a similar procedure as above.

Analysis of the grouping

- Have the Xmin and Xmax step forward. The difference between these is called the range.
- Have the people holding the 1st and 3rd quartiles and median signs step forward. There should be four groups.
 Explain how the two groups on each end represent the whiskers. Discuss which whisker should be longer.
 The two groups in the middle will represent the boxes. Discuss which box should be larger.
- Discuss the relationship between Quartiles and Percentiles.

- **MODES** Have the participants determine any modes. **NOTE:** Because of leap years, there could be modes where the same number appears but the participants have different birthdays.

2. *The sketch by hand*

Write the values of Xmin, Xmax, 1st, 2nd, and 3rd quartiles on the board. Have the students make a decent sketch of a box and whisker plot that represents this data. Have them use a ruler. Have them discuss why this “picture” (graph) helps one to understand the data by sight.

3. *The calculator generated graph*

Type the data into list L3. The DOY data could be typed in any order or ascending order. For this activity we will enter the data in ANY order and then let the calculator sort the data for us.

Once the data is typed into L3 go back to the HOME screen by pressing <2nd> <QUIT>.

To sort the data into ascending order, press <2nd> <STAT>

Cursor over to OPS

Press 1 or <ENTER>

```

OPS MATH CALC
1: L1
2: L2
3: L3
4: L4
5: L5
6: L6
7: ↓CALC

```

```

L3 OPS MATH CALC
1: SortA(
2: SortD(
3: ClrList
4: dim(
5: ΔList(
6: Select(
7: ↓seq(

```

```

SortA(

```

To get L3, press <2nd> <STAT> 3

Then close the function with a right parenthesis and press <ENTER>

Go to L3 to see that it was, in fact, sorted in ascending order

```

OPS MATH CALC
1: L1
2: L2
3: L3
4: L4
5: L5
6: L6
7: ↓CALC

```

```

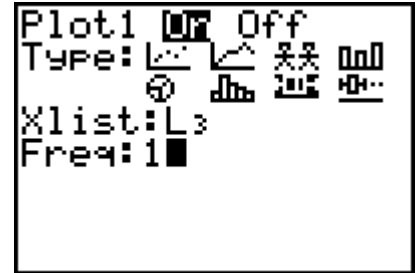
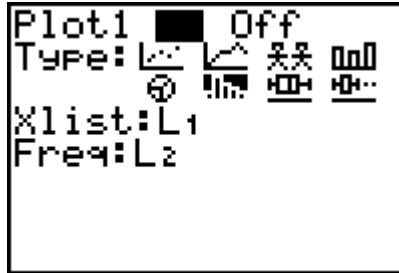
SortA(L3) Done
█

```

To have the calculator
Generate the box &
Whisker plot, press <2nd>
<PLOT>

Press 1 or
<ENTER>

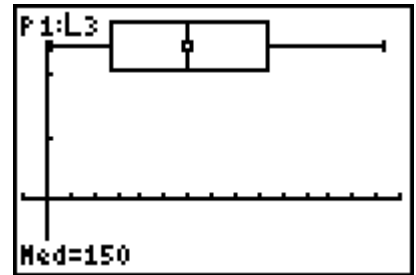
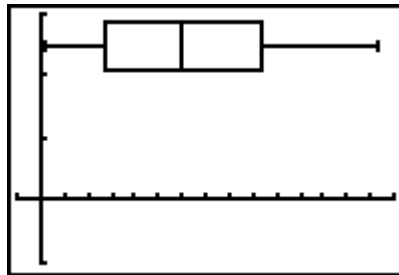
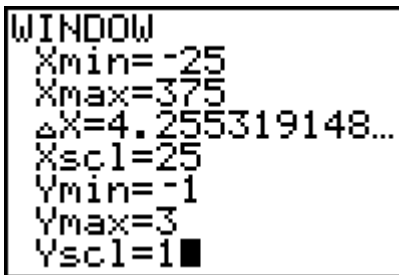
Make the Plot
window look like the
following:



Create a WINDOW
like the following:

Press <GRAPH>
and ... VOILA!

Press <TRACE>
to investigate



Compare the calculator generated graph with the hand drawn one, and the physical one.
Neat, huh?

ONE VARIABLE STATISTICS (without the pictures)

The calculator will perform one variable statistics on data in lists without drawing the graphs.
Back to the HOME screen.

<2nd> <STAT>
over to <CALC>
and press 1 or <ENTER>

Use <2nd> <STAT>
to type in L3

Press <ENTER>

```

Ls OPS MATH [ ] [ ]
1:1-Var Stats
2:2-Var Stats
3:Manual-Fit
4:Med-Med
5:LinReg(ax+b)
6:QuadReg
7:ExpReg
  
```

```

1-Var Stats L3
  
```

```

1-Var Stats
x=162.6
Σx=4065
Σx²=924147
Sx=104.7174771
σx=102.6017544
n=25
  
```

Discuss what all this
Jabberwocky means.

EXTENSIONS

DOW (Day Of the Week) DATA

As an exercise or more class or group work, students can repeat the activity using the MONTH directions. (Histogram)

DOM (Day Of the Month) DATA

As an exercise or more class or group work, students can repeat the activity using the DOY directions. (Box & Whisker)

Happy Birthday Data Collection NAME _____

Write the number of the month you were born: _____

Jan. = 1, Feb. = 2, ...

Write the number of the Day Of the Month (DOM) you were born:

Compute the number of the Day Of the Year (DOY) you were born:

Jan. 1 = 1, Feb. 1 = 32, ...

By using the DAY program, find out on what Day Of the Week (DOW) you were born as a number:

Sunday = 1, Monday = 2, ...

Place all calculations and sketches below: