

Lesson 6.1: Representing Data Sets

Instruction

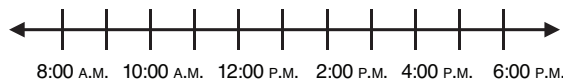
Guided Practice 6.1

Example 1

A pharmacy records the number of customers each hour that the pharmacy is open. The staff is using the information to determine how many people need to be working at the pharmacy at each time of day. The number of customers is in the table below. Use the table to create a histogram to help the pharmacy staff understand how many customers are in the pharmacy at each time of day.

Time frame	Number of customers
8:00 A.M.–9:00 A.M.	2
9:00 A.M.–10:00 A.M.	0
10:00 A.M.–11:00 A.M.	8
11:00 A.M.–12:00 P.M.	14
12:00 P.M.–1:00 P.M.	23
1:00 P.M.–2:00 P.M.	12
2:00 P.M.–3:00 P.M.	7
3:00 P.M.–4:00 P.M.	3
4:00 P.M.–5:00 P.M.	5

- Draw a number line on an x -axis that corresponds to the range of the data. The x -axis for this data will show the times the customers were counted. The number line for the pharmacy must include the times from 8:00 A.M. until 5:00 P.M. If using a number line that counts by twos, extend the number line to 6:00 P.M.

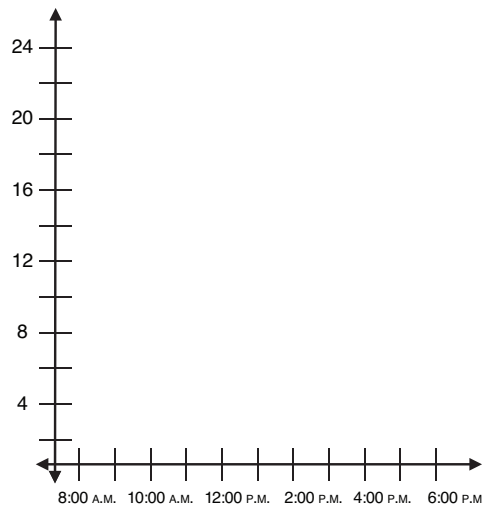


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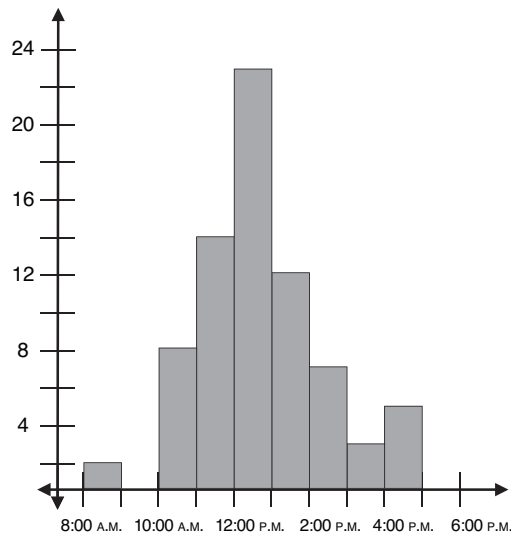
- Draw a y -axis that corresponds to the least and greatest number of times a data value is repeated. The y -axis should be to the left of the labeled x -axis.

The number of customers arriving in each time frame ranges from 0 customers to 23 customers. The y -axis needs to show values from 0 to 23. If using a number line that counts by twos, extend the number line to 24.



- Create a rectangle at each value showing the number of data points at each data value.

The rectangles will each span an hour, and will show the number of customers in that hour. There will be no rectangle from 9:00 A.M. to 10:00 A.M., because there were no customers at that hour.



(continued)

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You can also create a histogram using a graphing calculator.

On a TI-83/84:

Step 1: Press [STAT] [1] to enter the list editor.

Step 2: Arrow over to L_1 . If something has already been entered into the list, arrow up until the list title is highlighted. Press [CLEAR] [ENTER] to delete all entries in the list.

Step 3: Type in data, separating entries by pressing [ENTER]. You'll need a separate entry for each customer in a given time frame; type in the first number of the time frame a number of times equal to the value in the "number of customers" column. Use 24-hour time (i.e., 1 p.m. = 13, 2 p.m. = 14, etc.).

Step 4: Press [2ND][Y=] to bring up the STAT PLOTS menu. Select 1: Plot 1, and press [ENTER] to edit it.

Step 5: Press [ENTER] to turn on Plot 1.

Step 6: Arrow down to Type, and select the histogram plot (3rd option in first row).

Step 7: Make sure Xlist is set to L_1 . If it isn't, press [2ND][1] to input it as the Xlist.

Step 8: Press [Graph] to display the histogram. You can press [ZOOM][9] to get a better view of the graph.

(continued)

On a TI-Nspire:

Step 1: From the Home menu, select Lists & Spreadsheets. This will bring up a spreadsheet. If anything has been entered in Column A, you can delete it by arrowing up until the entire list is highlighted, then pressing the [del] button.

Step 2: Enter data into the list. You'll need a separate entry for each customer in a given time frame; type in the first number of the time frame a number of times equal to the value in the "number of customers" column. Use 24-hour time (i.e., 1 p.m. = 13, 2 p.m. = 14, etc.). You can separate entries either by pressing [enter] or by arrowing down. Arrow up to the top of the list to the top cell, and type in "customers."

Step 3: Press [home], then open a Data & Statistics page. A generic graph of the data will appear.

Step 4: Move the cursor to hover over the "click to add variable" box at the bottom of the screen. Click on the box and enter "customers" from the menu. A dot plot will appear.

Step 5: Press [menu] and change the graph type to Histogram. A histogram of the data will appear.



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Example 2

Anna and Ethan watch 20 thirty-minute shows during the month of June. They record the number of commercials that air during each show in the following table. Create a dot plot to display the number of commercials that aired during the 20 shows.

Television show	Number of commercials
A	17
B	17
C	15
D	17
E	14
F	17
G	15
H	19
I	15
J	16
K	12
L	14
M	15
N	17
O	18
P	18
Q	18
R	18
S	13
T	14

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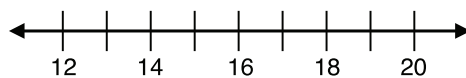
1. Arrange the data from least to greatest.

Television show	Number of commercials
K	12
S	13
E	14
L	14
T	14
C	15
G	15
I	15
M	15
J	16
A	17
B	17
D	17
F	17
N	17
O	18
P	18
Q	18
R	18
H	19



2. Draw a number line on an x -axis that corresponds to the range of the data values.

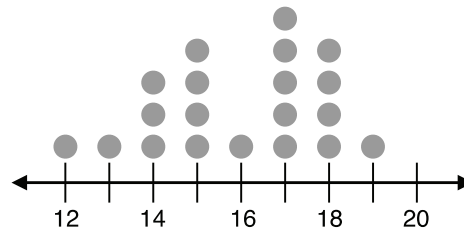
The x -axis for this data will show the number of commercials during a 30-minute television show. The number line must include values from 12 to 19. If counting by twos, extend the number line to 20.



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3. Draw each data value as a dot above the number line. The number of dots above each data value shows the number of times that value occurs in the data set.



You can also create a dot plot using a graphing calculator.

On a TI-83/84:

Step 1: Press [STAT] [1] to enter the list editor.

Step 2: Arrow over to L_1 . If something has already been entered into the list, arrow up until the list title is highlighted. Press [CLEAR] [ENTER] to delete all entries in the list.

Step 3: Type in data in the “number of commercials” column, separating entries by pressing [ENTER].

Step 4: Press [2ND][STAT] to open the list menu.

Step 5: Arrow over to OPS and select 1: SortA(. Type [2ND][1][)] and press [ENTER] to sort the list by numerical value, lowest to highest.

Step 6: Press [STAT] and select 1: Edit... to open the list page. We are going to enter values in L_2 to make the L_1 values stack in dot plot. For the first instance of every value in L_1 , enter 1 into L_2 . For the second instance of every value in L_1 , enter 1.2 into L_2 . For the third instance of every value in L_1 , enter 1.4 into L_2 . Continue assigning L_2 values in this way. L_2 should read {1, 1, 1, 1.2, 1.4, 1, 1.2, 1.4, 1.6, 1, 1, 1.2, 1.4, 1.6, 1.8, 1, 1.2, 1.4, 1.6, 1}.

Step 7: Press [2ND][Y=] to bring up the STAT PLOTS menu. Select 1: Plot 1, and press [ENTER] to edit it.

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- Step 8: Press [ENTER] to turn on Plot 1.
- Step 9: Arrow down to Type, and select the scatter plot (first option in first row).
- Step 10: Make sure Xlist is set to L_1 and Ylist is set to L_2 . Press [2ND][1] to input L_1 into the Xlist and [2ND][2] to input L_2 into the Ylist.
- Step 11: Choose a mark; we recommend the square.
- Step 12: Press [Graph] to display the dot plot.
- Step 13: For optimal viewing, set $x_{\min} = 11$ and $x_{\max} = 20$; set $y_{\min} = 0.8$ and $y_{\max} = 3$.

On a TI-Nspire:

- Step 1: From the Home menu, select Lists & Spreadsheets. This will bring up a spreadsheet. If anything has been entered in Column A, you can delete it by arrowing up until the entire list is highlighted, then pressing the [del] button.
- Step 2: Type in the data in the “number of commercials” column. You can separate entries either by pressing [enter] or by arrowing down. Arrow up to the top of the list to the top cell and type in “commercials.”
- Step 3: Press [home], then open a Data & Statistics page. A generic graph of the data will appear.
- Step 4: Move the cursor to hover over the “click to add variable” box at the bottom of the screen. Click on the box, and enter “commercials” from the menu. A dot plot will appear.



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Example 3

The website Rate My Phone conducts reviews of smartphones. One aspect of the phones that is tested is battery life. The minutes of battery life for the newest 25 phones is recorded in the following table. Draw a box plot to represent the data.

Smartphone	Minutes of battery life	Smartphone	Minutes of battery life
A	380	N	470
B	530	O	280
C	350	P	300
D	390	Q	440
E	520	R	490
F	520	S	530
G	430	T	340
H	330	U	250
I	550	V	260
J	290	W	730
K	360	X	520
L	550	Y	320
M	370		

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1. Order the data from least to greatest. Note the minimum and maximum data values.

Smartphone	Minutes of battery life	Smartphone	Minutes of battery life
U	250	G	430
V	260	Q	440
O	280	N	470
J	290	R	490
P	300	X	510
Y	320	E	520
H	330	F	520
T	340	B	530
C	350	S	530
K	360	I	550
M	370	L	550
A	380	W	730
D	390		

The minimum data value is 250, and the maximum data value is 730.

2. Find the median of the data.

The median is the middle-most data value. There are an odd number of data values, so the median is the 13th data value, 390.

3. Find the first quartile of the data.

The first quartile is the middle-most value of the lower half of the data. There are 12 data values in the lower half of the data, so the first quartile is the average of the sixth and seventh data values (320 and 330).

$$\frac{320 + 330}{2} = 325$$

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4. Find the third quartile of the data.

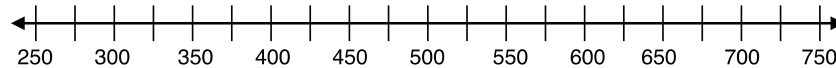
The third quartile is the middle-most value of the upper half of the data. There are 12 data values in the upper half of the data, so the third quartile is the average of the 19th and 20th data values (520 and 520).

$$\frac{520+520}{2} = 520$$



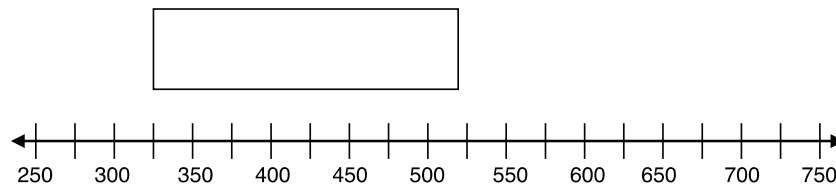
5. Draw a number line that includes the minimum and maximum data values.

The minimum data value is 250, and the maximum data value is 730. If counting by 50s, extend the number line to 750.



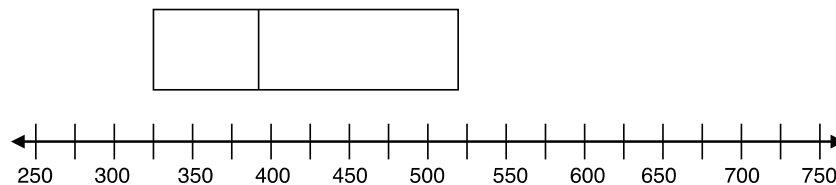
6. Draw a box, beginning at the first quartile and ending at the third quartile.

The first quartile is 325 and the third quartile is 520.



7. Draw a line in the box at the median.

The median is 390.

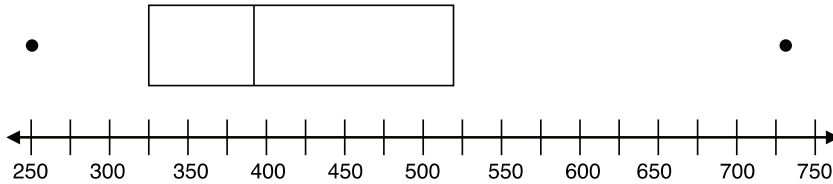


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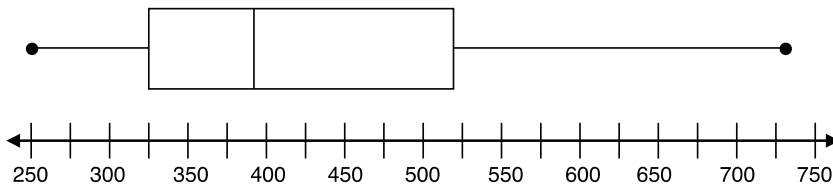
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8. Draw a point at the minimum and maximum data values.

The minimum is 250 and the maximum is 730.



9. Connect the minimum and maximum data values to the box.



You can also create a box plot using a graphing calculator.

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Step 2: Arrow over to L_1 . If something has already entered into the list, arrow up until the list title is highlighted. Press [CLEAR] [ENTER] to delete all entries in the list.

Step 3: Type in the data in the “minutes of battery life” column, separating entries by pressing [ENTER].

Step 4: Press [2ND][Y=] to bring up the STAT PLOTS menu. Select 1: Plot 1, and press [ENTER] to edit it.

Step 5: Press [ENTER] to turn on Plot 1.

Step 6: Arrow down to Type, and select the box plot (middle option in second row).

Step 7: Make sure Xlist is set to L_1 . If it isn't, press [2ND][1] to input it as the Xlist.

Step 8: Press [Graph] to display the histogram. You can press [ZOOM][9] to get a better view of the graph.

(continued)

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On a TI-Nspire:

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Step 2: Type in the data in the “minutes of battery life” column. You can separate entries either by pressing [enter] or by arrowing down. Arrow up to the top of the list to the top cell, and type in “customers.”

Step 3: Press [home], then open a Data & Statistics page. A generic graph of the data will appear.

Step 4: Move the cursor to hover over the “click to add variable” box at the bottom of the screen. Click on the box, and enter “customers” from the menu. A dot plot will appear.

Step 5: Press [menu] and change the graph type to Box Plot. A modified box-and-whisker plot will pop up with any outliers separated from the rest of the data display.

Step 6: Press [menu] and select 2: Plot Properties. From the Plot Properties menu, select 3: Extend Box Plot Whiskers to display a standard box plot.

