

8.3 Two-Sided Stem-and-Leaf Plots

Here you'll learn how to construct and interpret two-sided stem-and-leaf plots and use two-sided stem-and-leaf plots to solve problems.

You're a nutritionist and part of your job is to help people eat a better diet. You've done some research with your patients and you've discovered that teenage boys seem to eat a lot more grams of fat than teenage girls. You have some data for a sample and you want to draw some conclusions. How would you compare the data in the same chart?

Watch This

First watch this video to learn about two-sided stem-and-leaf plots.



MEDIA

Click image to the left for more content.

[CK-12 Foundation: Chapter8TwoSidedStemandLeafPlotsA](#)

Then watch this video to see some examples.



MEDIA

Click image to the left for more content.

[CK-12 Foundation: Chapter8TwoSidedStemandLeafPlotsB](#)

Guidance

As you have learned in a previous Concept, stem-and-leaf plots are an excellent tool for organizing data. Remember that stem-and-leaf plots are a visual representation of grouped discrete data, but they can also be referred to as a modal representation. This is because by looking at a stem-and-leaf plot, we can determine the mode by quick visual inspection. The previous Concept was about single-sided stem-and-leaf plots. In this Concept, you will learn about **two-sided stem-and-leaf plots**, which are also often called back-to-back stem-and-leaf plots.

Example A

The girls and boys in one of BDF High School's AP English classes are having a contest. They want to see which group can read the most number of books. Mrs. Stubbard, their English teacher, says that the class will tally the number of books each group has read, and the highest mode will be the winner. The following data was collected for the first semester of AP English:

Girls 11 12 12 17 18 23 23 23 24 33 34 35 44 45 47 50 51 51
 Boys 15 18 22 22 23 26 34 35 35 35 40 40 42 47 49 50 50 51

- Draw a two-sided stem-and-leaf plot for the data.
- Determine the mode for each group.
- Help Mrs. Stubbard decide which group won the contest.

Answer:

a.

Girls		Boys
7, 8, 2, 2, 1	1	5, 8
3, 3, 3, 2	2	2, 2, 3, 6
5, 4, 3	3	4, 5, 5, 5
7, 5, 4	4	0, 0, 2, 7, 9
1, 1, 0	5	0, 0, 1

- The mode for the girls is 23 books. It is the number in the girls column that appears most often. The mode for the boys is 35 books. It is the number in the boys column that appears most often.
- Mrs. Stubbard should decide that the boys group has won the contest.

Example B

Mrs. Cameron teaches AP Statistics at GHI High School. She recently wrote down the class marks for her current grade 12 class and compared it to the previous grade 12 class. The data can be found below. Construct a two-sided stem-and-leaf plot for the data and compare the distributions.

2010 class 70 70 70 71 72 74 74 74 74 75 76 76 77 78 79 80 81
 82 82 82 83 84 85 85 86 87 93 98 100
 2009 class 76 76 76 76 77 78 78 78 79 80 80 82 82 83 83 83 85
 85 88 91 95

2009 class		2010 class
9, 8, 8, 8, 7, 6, 6, 6, 6	7	0, 0, 0, 1, 2, 4, 4, 4, 4, 5, 6, 6, 7, 8, 9
8, 5, 5, 3, 3, 3, 2, 2, 0, 0	8	0, 1, 2, 2, 2, 3, 4, 5, 5, 6, 7
5, 1	9	3, 8
	10	0

There is a wide variation in the marks for both years in Mrs. Cameron's AP Statistics Class. In 2009, her class had marks anywhere from 76 to 95. In 2010, the class marks ranged from 70 to 100. The mode for the 2009 class was

76, but for the 2010 class, it was 74. It would seem that the 2009 class had, indeed, done slightly better than Mrs. Cameron's current class.

Example C

The following data was collected in a survey done by Connor and Scott for their statistics project. The data represents the ages of people who entered into a new hardware store within its first half hour of opening on its opening weekend. The M's in the data represent males, and the F's represent females.

12M 18F 15F 15M 10M 21F 25M 21M
26F 29F 29F 31M 33M 35M 35M 35M
41F 42F 42M 45M 46F 48F 51M 51M
55F 56M 58M 59M 60M 60F 61F 65M
65M 66M 70M 70M 71M 71M 72M 72F

Construct a back-to-back stem-and-leaf plot showing the ages of male customers and the ages of female customers. Compare the distributions.

Male		Female
5, 2, 0	1	5, 8
5, 1	2	1, 6, 9, 9
5, 5, 5, 3, 1	3	
5, 2	4	1, 2, 6, 8
9, 8, 6, 1, 1	5	5
6, 5, 5, 0	6	0, 1
2, 1, 1, 0, 0	7	2

For the male customers, the ages ranged from 10 to 72. The ages for the male customers were spread out throughout this range, with the mode being age 35. In other words, for the males found to be at the store in the first half hour of opening day, there was no real age category where a concentration of males could be found.

For the female customers, the ages ranged from 15 to 72, but they were concentrated between 21 and 48. The mode for the ages of the female customers was 29 years of age.

Guided Practice

The boys and girls basketball teams at a high school had their heights measured at practice. The following data was recorded for their heights (in centimeters):

Girls	171	170	176	176	177	179	162	172	160	157	155
	168	178	174	170	155	155	154	164	145	171	161
Boys	168	170	162	153	176	167	158	180	181	176	172
	168	167	165	159	185	184	173	177	167	169	177

Construct a two-sided stem-and-leaf plot for the data. Determine the median and mode using the two-sided stem-and-leaf plot for each distribution. What can you conclude from the distributions?

Answer:

Girls		Boys
5	14	
7, 5, 5, 5, 4	15	3, 8, 9
8, 4, 2, 1, 0	16	2, 5, 7, 7, 7, 8, 8, 9
9, 8, 7, 6, 6, 4, 2, 1, 1, 0, 0	17	0, 2, 3, 6, 6, 7, 7
	18	0, 1, 4, 5

The data suggests that there is a slightly wider variation in the heights for the group of girls than for the group of boys. For the girls, the heights ranged from 145 to 179 centimeters, whereas for the boys, the heights ranged from 153 to 185 centimeters. The median for the girls group is at 168.5 centimeters, and the mode is at 155 centimeters. For the group of boys, however, the median is at 169.5 centimeters, and the mode is at 167 centimeters. The boys seem to be taller than the girls.

Practice

The two-sided stem-and-leaf plot below shows the number of home runs hit by the members of 2 major league baseball teams. Use the two-sided stem-and-leaf plot to answer the following questions:

Mets		Phillies
9, 2, 1, 1, 0, 0, 0, 0, 0	0	0, 0, 0, 1, 1, 1, 1, 2, 4, 5
9, 9, 4	1	5, 6, 7, 7, 8
9, 8, 5, 3, 2	2	4, 6
6, 2, 2, 1, 0	3	3, 3, 4, 4, 9
4, 3	4	0, 2, 8
1	5	

1. What was the range for the number of home runs hit by the Mets? What was the range for the Phillies?
2. What was the median for the number of home runs hit by the Mets? What was the median for the Phillies?
3. What was the mode for the number of home runs hit by the Mets? What was the mode for the Phillies?
4. Which team had more players hit 20 or more home runs?

30 girls and 35 boys participated in an intramural bowling league. The two-sided stem-and-leaf plot below shows the highest score of each of the participants. Use the two-sided stem-and-leaf plot to answer the following questions:

Girls		Boys
9, 2	9	
6, 1, 0, 0	10	5, 8, 9
8, 7	11	0, 1, 1, 7
6, 6, 5, 5, 5, 4, 2	12	3, 7, 7, 8
7, 1, 0	13	3, 3, 4, 4, 6, 9
9, 8	14	4, 4, 5
8, 6, 2, 0, 0	15	0, 1, 2, 3, 7
7	16	2, 2, 2, 5, 8
	17	1, 6
8, 0	18	2, 8
9	19	5
4	20	

- What was the range for the highest scores for the girls? What was the range for the boys?
 - What was the median for the highest scores for the girls? What was the median for the boys?
 - What was the mode for the highest scores for the girls? What was the mode for the boys?
 - Did a girl or a boy have the highest score in the intramural bowling league?
9. Mr. Dugas, the senior high physical education teacher, is doing fitness testing this week in gym class. After each test, students are required to take their pulse rate and record it on the chart in the front of the gym. At the end of the week, Mr. Dugas looks at the data in order to analyze it. The data is shown below:

Girls	70	88	80	76	76	77	89	72	72	76	72	75	77	80	76	68	68
	82	78	60	64	64	65	81	84	84	79	78	70					
Boys	76	88	87	86	85	70	76	70	70	79	80	82	82	82	83	84	85
	85	78	81	85													

Construct a two-sided stem-and-leaf plot for the data and compare the distributions.

10. Starbucks prides itself on its low line-up times in order to be served. A new coffee house in town has also boasted that it will have your order in your hands and have you on your way quicker than the competition. The following data was collected for the line-up times (in minutes) for both coffee houses:

Starbucks	20	26	26	27	19	12	12	16	12	15	17	20	8	8	18
Just Us Coffee	17	16	15	10	16	10	10	29	20	22	22	12	13	24	15

Construct a two-sided stem-and-leaf plot for the data. Determine the median and mode using the two-sided stem-and-leaf plot. What can you conclude from the distributions?