

## Stem and Leaf Plots

**STRAND: Probability and Statistics**

**STRAND CONCEPT: Data Representation and Interpretation**

**SOL 5.16a**

### **Remediation Plan Summary**

Following a discussion of the stem-and-leaf plot, students will work in pairs to collect data. The data will then be graphed by the whole class. Students will again work in pairs to construct back-to-back stem-and-leaf plots comparing test data from two classes.

### **Common Misconceptions**

Students have a difficult time understanding how to read a stem and leaf plot. They are not sure what each number stands for. Students also forget to place the numbers in order from smallest to largest.

### **Materials**

- Post-it notes in two colors,
- Background Information Activity Sheet
- Copies of Test Data Activity Sheet
- Test Data Activity Sheet, Stem-and-Leaf Plot Activity Sheet
- Chart paper, Large post it paper
- Magic markers
- Clock with second hand (optional)
- Index cards for exit ticket

### **Introductory Activity**

A stem-and-leaf plot is a useful way to display data that range over several tens (or hundreds). The stem represents the tens and the leaves represent the ones. Each number is represented by one stem and one leaf.

Students surveyed fifth grade teachers at Ames School to find out the ages of their teacher's sons and daughters. The results of this survey are displayed on the stem-and-leaf plot below.

#### **Ages of Fifth Grade Teachers' Children**

0	2
1	0, 4, 5, 5
2	3, 6
3	9

key: 2 | 3 = one child age 23

As shown in the plot, the fifth grade teachers have a total of eight children ranging in age from 2 to 39 years. The median (15) and mode(s) (15) of the data are displayed on the stem-and-leaf plot and can easily be determined. Clusters can be identified; for instance, more teachers have teenagers than toddlers.

Two sets of comparable data can be displayed on a back-to-back stem-and-leaf plot.

Ages of 6 <sup>th</sup> Grade Teachers' Children		Ages of 5 <sup>th</sup> Grade Teachers' Children
9, 7, 6, 5, 4, 3, 1	0	2
6, 4, 2	1	0, 4, 5, 5
	2	3, 6
	3	9

Students can compare the information presented; find the range, mean, median, and mode; locate clusters; and make inferences such as the fact that 6th grade teachers' children are younger than the fifth grade teachers' children.

### ***Plan for Instruction***

1. Use a copy of "Ages of Teachers' Children" to go over background data with the whole class. Be certain to include:
  - Each number is represented by a combined stem and leaf. Each leaf may contain only one digit, but a stem may contain more than one digit. For example, 123 would be represented by a stem of 12 and a leaf of 3.
  - The leaves are arranged from the stem outward and are in numerical order.
2. Have students pair up to collect data on how long each can hold his or her breath. Give each student one color-coded post-it note. (The colors will be used for demonstrating an easy way to divide data into two groups. For example, you can give males one color and females another.) Have each student time how long their partner can hold his or her breath, recording that number on the appropriate post-it note.
3. Collect the post-it notes and arrange them all. Using large chart paper, construct a stem-and-leaf plot using the data collected for the group to see. Follow the model in the background information.
4. Briefly, have the students discuss with their partner what they see on the plot. Have them share their ideas. Be certain to discuss:
  - All the data is visible on a stem-and-leaf plot.

- It is easy to find the range and mode(s) of the data just by looking. This would be an appropriate time to introduce the terms “bimodal” (having two modes) and “trimodal” (having three modes) as it often happens in this type of data collection.
  - Share finding the median of the data by counting. Remind the students that, when starting with the largest number, one must count backward to find the median.
  - The mean can be found in the normal manner.
  - Discuss any other interesting clusters or trends that the group sees.
5. Discuss using two sets of comparable data to construct back-to-back stem-and-leaf plots. Dividing the data into two sets by using the color-coded sticky notes and large chart paper makes this an easy task. Using five or six pieces of data from the two colors of notes to quickly construct a sample of a back-to-back plot showing the students how to collect the information on one stem-and-leaf plot and then reorganizing it on another. Display the data for discussion.

Example:

<b>record</b>	
stem	leaf
2	5,3,7
3	1,8,4,7

<b>reorganize</b>	
stem	leaf
2	3,5,7
3	1,4,7,8

6. Give each pair of students a copy of the grade data from two math classes. Have the students work in pairs using large chart paper construct a back-to-back stem-and-leaf plot from the data. Have them write up their analysis and share with the class.
7. Display the grade data to share the measures of central tendencies for each class. Have the students analyze the data discussing such things as why one class may have done better than the other.
8. Have the whole class brainstorm suggestions for question stems that could be represented on stem-and-leaf plots such as hopping on 1 foot for 30 seconds and using data from other sources.

***Pulling It All Together (Reflection)***

Give each student an index card. Have them write how you create a stem-and-leaf plot. Ask them what types of data make good stem-and-leaf plots.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

## Ages of Teachers' Children

### Data Set for 6<sup>th</sup> Grade Teachers:

1, 3, 4, 5, 6, 7, 9, 12, 14, 16

### Back-to-Back Stem-and-Leaf Plots

<u>Ages of 6<sup>th</sup> Grade Teachers' Children</u>		<u>Ages of 5<sup>th</sup> Grade Teachers' Children</u>
9, 7, 6, 5, 4, 3, 1	0	2
6, 4, 2	1	0, 4, 5, 5
	2	3, 6
	3	9

key: 4 | 1 | = age 14

| 1 | 4 = age 14

## Data from Math Classes

The following are scores obtained by two classes of 25 grade five students on a math test. Compare the two sets of scores by using back-to-back stem-and-leaf plots. What conclusions might you draw by studying the data displayed in this way?

Class A	73	75	42	93	88	62	62	37	73	76
	96	54	80	75	69	66	81	79	83	56
	69	88	80	52	59					

Class B	65	80	67	80	87	44	82	71	91	93
	75	76	79	80	87	83	54	56	57	82
	62	69	75	80	91					



## Data from Math Classes

The following are scores obtained by two classes of 25 fifth grade students on a math test. Compare the two sets of scores by using back-to-back stem-and-leaf plots. What conclusions might you draw by studying the data displayed in this way?

Class A	73	75	42	93	88	62	62	37	73	76
	96	54	80	75	69	66	81	79	83	56
	69	88	80	52	59					
Class B	65	80	67	80	87	44	82	71	91	93
	75	76	79	80	87	83	54	56	57	82
	62	69	75	80	91					

Class B		Class A
	3	7
4	4	2
7, 6, 4	5	2, 4, 6, 9
9, 7, 5, 2	6	2, 2, 6, 9, 9
9, 6, 5, 5, 1	7	3, 3, 5, 5, 6, 9
7, 7, 3, 2, 2, 0, 0, 0, 0	8	0, 0, 1, 3, 8, 8
3, 1, 1	9	3, 6
range - 49		range - 59
median - 79		median - 73
mode - 80		mode - 62, 69, 73, 75, 80, 88
mean - 74.64		mean - 70.7