

Statistics: Learning about Our Class from Mystery Data

- Strand:** Probability and Statistics
- Topic:** Representing, interpreting, and comparing data displayed in line plots and stem-and-leaf plots
- Primary SOL:** 5.16 The student, given a practical problem, will
- Represent data in line plots and stem-and-leaf plots;
 - interpret data represented in line plots and stem-and-leaf plots; and
 - compare data represented in a line plot with the same data represented in a stem-and-leaf plot.

Materials

- 5 large envelopes
- 5 sentence strips
- Stick-on colored dots (blue, green, yellow, purple, red)
- Small pieces of paper
- Construction paper
- Markers

Vocabulary

data, compare data, interpret data, leaf, line plot, stem, stem-and-leaf plot

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Tell students they will be finding mystery data from the class today, but first we need to collect some data. Prepare a set of five large envelopes, each with a different colored dot on it. Post the following questions on the board for students to view. Give each student five small pieces of paper on which to record their responses to the questions. Ask students to write numerical answers to each of the questions on separate pieces of paper. Collect the students' responses after each question and put them in the appropriate envelope.
 - What is a multiple of 5 starting at 10 and ending at 50? (Place the answers in the envelope with the blue dot.)
 - On what day of the month (number) is your birthday? (Place the answers in the envelope with the green dot.)
 - What is the total number of letters in your whole name—first, middle, and last? (Place the answers in the envelope with the yellow dot.)
 - What is the age, or approximate age, of one adult that lives in your home? (Place the answers in the envelope with the purple dot.)

- What is your favorite two-digit number? (Place the answers in the envelope with the red dot.)
2. Have students form five cooperative learning groups. Give each group one of the large envelopes, and have each group organize the data in a chart or table. Then, give each group a large sheet of construction paper and tell them to use the data and markers to create a stem-and-leaf plot and a line plot for their data. Advise them to create the graph in pencil first and then, when all group members agree on the graphs, trace the graph with a marker so it is easy to see. The stem-and-leaf plot and line plot will not have a title. If students have not been introduced to stem-and-leaf plots, facilitate this as a learning experience. If stem-and-leaf plots have been introduced, review the steps with the class. Make sure to do the following:
 - Organize the data from least to greatest.
 - List the stems vertically from least to greatest with a line to their right.
 - The leaves are listed horizontally, also from least to greatest, and can be separated by spaces or commas.
 - Record every value, regardless of the number of repeats.
 - No stem can be skipped.
 - A key is included to explain how to read the plots.
 3. Use five sentence strips to create the titles based on the questions asked. These strips will display the five graphs. Then, tell each group to display their stem-and-leaf plot and line plot under the correct heading. When students have posted their graphs, ask for thumbs-up if you agree with the placement of all the graphs, thumbs-down if you disagree with the placement of one or more of the graphs, and thumbs sideways if you are not sure about some of the placements. Facilitate a discussion so that students can resolve their questions and reach consensus on the placement of the graphs. Ask questions, such as, *“How did you decide what your set of data represented?”* *“How did you reach consensus in your groups about where to put your graphs?”*
 4. Have students compare the similarities and differences between the data displayed for each plot. Ask, *“Was it easier to represent data in one type of plot than the other?”* Listen for responses, such as, *“line plots are easier to create when the range of the data is smaller.”* Discuss whether one graph is easier to find the mode, the median, the mean and why. Continue to compare and contrast the two plots.
 5. With students still in their groups, have the students prepare a presentation interpreting the mystery data for a new student. The task: *“A new student is coming to class tomorrow. Based on what we have learned about our class, what will your group predict the new student’s response would be to each of the five questions and describe how you reached your decisions.”* Have each group share their predictions and how they arrived at them. Record each group’s prediction on the board and then compare each group’s predictions. Allow students share why they think there are differences in the predictions. Then ask them to define what they think a prediction represents when they hear people using that term.

Assessment

- **Questions**
 - What is the difference between a line plot and stem-and-leaf plot? What are the similarities?
 - What are some other types of data that can be displayed in a stem-and-leaf plot?
- **Journal/writing prompts**
 - Explain how a stem-and-leaf plot and line plot can be used to organize data.
 - Explain why the key and title are important for graphs.
- **Other Assessments**
 - Create a survey question that can be displayed in stem-and-leaf and line plots. Collect data from the class and present it in stem-and-leaf and line plots.
 - What type of data would be difficult to use on a stem-and-leaf plot? Line plot?

Extensions and Connections (for all students)

- Remove the title from some stem-and-leaf and line plots. Have students work with a partner to match titles to the plots. Have them write an explanation of how they matched them.
- Have students throw cotton balls and measure the distance in inches. Record the data in a stem-and-leaf or line plot and explain why you chose that plot to represent the data.
- Give students a chance to create a survey question and collect data from another grade. Students create a line plot or stem-and-leaf plot on a poster with interpretations of the data below it.

Strategies for Differentiation

- Some students may need to display a smaller amount of data.
- Some students may need the support of a diagram to organize their data.
- Some students may need guidelines to which numbers are represented for each title.