All About the Data

Strand: Probability and Statistics

Topic: Data collection, graphing

Primary SOL: **2.PS.1 The student will apply the data cycle (pose questions; collect or acquire data; organize and represent data' and analyze data and communicate results) with a focus on pictographs and bar graphs.**

  a) Pose questions, given a predetermined context, that require the collection of data (limited to 25 or fewer data points for no more than six categories).
  b) Determine the data needed to answer a posed question and collect the data using various methods (e.g., voting; creating lists, tables, or charts; tallying).
  c) Organize and represent a data set using a pictograph where each symbol represents up to 2 data points. Determine and use a key to assist in the analysis of the data.
  d) Organize and represent a data set using a bar graph with a title and labeled axes (limited to 25 or fewer data points for up to six categories, and limit increments of scale to multiples of 1 or 2).
  e) Analyze data represented in pictographs and bar graphs and communicate results:
     i) ask and answer questions about the data represented in pictographs and bar graphs (e.g., total number of data points represented, how many in each category, how many more or less are in one category than another). Pictograph keys will be limited to symbols representing 1, 2, 5, or 10 pieces of data and bar graphs will be limited to scales with increments in multiples of 1, 2, 5, or 10; and
     ii) draw conclusions about the data and make predictions based on the data.

Materials

- One-inch grid paper
- Crayons, markers, pencils
- Notebook or plain white paper
- Slow Reveal Graph Power Point (separate file on VDOE website)
- Student Survey Collection Sheet (attached)

Vocabulary

bar graph, data, key, pictograph, table, tally mark, title, labels, categories, increments

Student/Teacher Actions: What should students be doing? What should teachers be doing?
Note: This lesson encompasses many components of the data cycle and should be taught in more than one session.

1. Open the Slow Reveal Graph in presentation mode in PowerPoint. (Note: PowerPoint is in separate file on VDOE website.) Show students the first slide of the graph. Ask students, "What do you notice?" "What do you wonder?" Record student questions as you go through the presentation, showing one slide at a time and pausing after each slide. You will refer back to these to develop further data collection.

2. As you move through the remaining slides, engage students in noticing and wondering about the data shown. Continue to record the questions they ask or wonder about the data as each slide reveals more information.

3. Once the entire graph is presented help students analyze the data presented by asking questions such as:
   - "How many more people preferred popcorn over trail mix?"
   - "How many people, combined, chose fruits and vegetables?"
   - "How many people were polled?"
   - "What's the difference between the least favorite snack and the most favorite?"
   - "Do you think this poll was given to children or adults?" "Why?"
   - "What's your favorite snack?"
   - "Do you think the results would be similar if we surveyed our class? Why or why not?"

4. Looking at the graph, ask students, "What about the data are you curious about? What do you want to know more about?"
   - Do they want to know what kinds of fruits people like for a snack? What kinds of vegetables do people like as a snack?

5. Have students write a question that they are curious about after having reviewed the snacks graph that would allow them to collect and record data.

6. Next, they need to communicate the data that they need to collect. Who will they survey? How will they collect the data (vote, tally, table, chart)? Have each student create a survey to gather data about the question they created about the snack graph. Have students collect data by asking their questions of at least 16 other students in the class. Direct them to record their collected data in a table, using tally marks. Model this process for the students, if needed.

7. Once students have collected their data from their survey, review the expectations for the components of pictographs and bar graphs:
   - Title
   - Labels for the horizontal and vertical axes
   - Defined categories (limited to four)
   - Equal, labeled increments for the vertical axis (multiples of 1 or 2)

- A space between the vertical axis and first category, equal spaces between the categories, and an equal space after the last category
- A key is provided in pictographs to assist with analysis

8. Distribute sheets of one-inch grid paper, crayons, markers, and pencils. Have students use the data from their tables to create a pictograph or a bar graph on the grid paper.

9. Have students display their graphs around the room. Using a gallery walk format, have students walk around and observe all graphs. As they analyze the data, have them write statements that align with each graph. Refer back to the snack graph to provide examples of statements such as "This graph shows favorite snacks. The greatest number of people liked fruit. More people liked popcorn than trail mix. Crackers were the least liked snack. We predicted a favorite fruit would be apples." The students can write these on sentence strips or sticky notes and post close to each graph.

10. Review and summarize with the class what students did and learned in the activity.
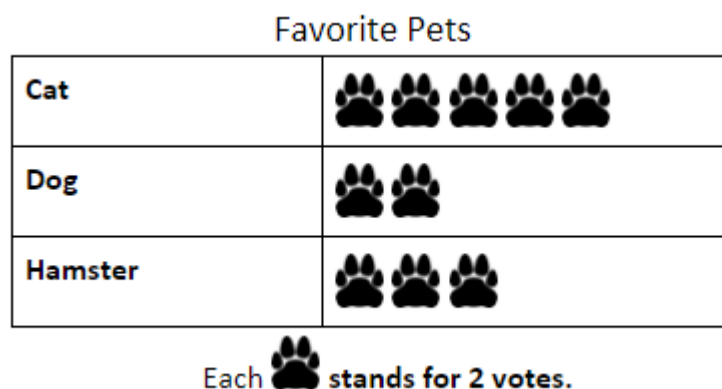
Assessment
- **Questions**
  - What are some ways to read and interpret data from your data collection?
  - What are various ways to collect and organize data?
  - How are pictographs similar to bar graphs? How are they different?
  - What are some problems with reading pictographs that do not occur with reading bar graphs?
  - How did you decide whether to make a pictograph or a bar graph for your representation?

- **Journal/Writing prompts**
  - Eric wants to survey his friends to find out which sport—basketball, football, or soccer—is the most popular. Explain to Eric what he needs to do to collect and organize his information.
  - Celia's class voted for their favorite pet. The following pictograph shows how the class voted.

Favorite Pets

Cat	🐾 🐾 🐾 🐾 🐾
Dog	🐾 🐾
Hamster	🐾 🐾 🐾

Each 🐾 stands for 2 votes.

Using the data in the pictograph, write two statements about the data in the pictograph. (See handout.)

- **Other Assessments**
  - Have students write three questions they would like to answer where data could be collected. Who would they survey to collect the data?
  - Give students an exit ticket and have them turn questions into statements (How many students preferred cheese pizza? 12 students preferred cheese pizza. How many students preferred pepperoni pizza over cheese pizza? 8 students preferred pepperoni pizza over cheese pizza).
  - Have the class complete a "3-2-1." Have students write (or tell orally) three things they learned, two ways they can use what they learned in the future, and one unresolved problem.

Extensions and Connections (for all students)
- Have students collect information and create graphs related to topics in reading (e.g., favorite character in a story), social studies (e.g., favorite famous American, distance from Virginia to China, England, Mexico, and Egypt), and science (e.g., height of a plant as it grows from a seed, daily temperature).
- Distribute graphs from everyday life (e.g., from a newspaper, a soup can label, a weather report, a news article). Have students write at least one statement that describes the categories of data and the data as a whole and identifies the parts of the data that have special characteristics (greatest, least, same).

Strategies for Differentiation
- Allow students who have difficulty drawing to use stickers or stamps when creating pictographs, rather than drawing symbols.
- Provide students with pre-drawn data tables and grid paper with pre-drawn axes, as needed.
- Guide students in creating headings, labels, and scale calibrations, as needed.
- Redirection and corrective feedback should be given throughout lesson.
- Provide some topics for collecting quantitative data.
- Pair students, if needed.

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

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Journal/Writing Prompt

Celia's class voted for their favorite pet. The following pictograph shows how the class voted.

Favorite Pets

Cat	🐾🐾🐾🐾🐾
Dog	🐾🐾
Hamster	🐾🐾🐾

Each 🐾 **stands for 2 votes.**
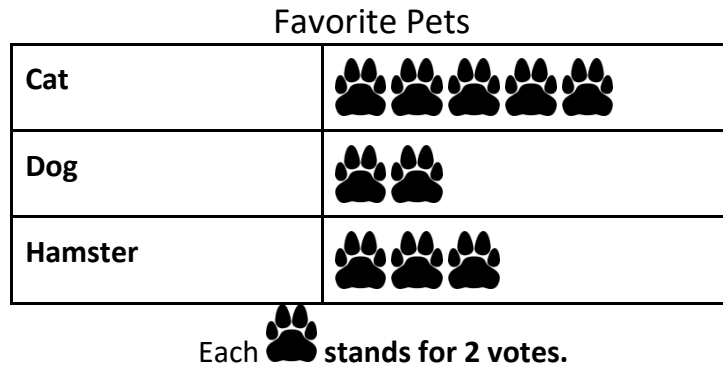
Using the data in the pictograph, write two statements about the data in the pictograph.

1. _____

_____

_____

2. _____

_____

_____

All About the Data

Student Survey Collection Sheet

1. What question do you have about the data in the snack graph? What do you want to know more about?

    _____

    _____

    _____

    _____

2. Who will you survey to collect data about your question?

    _____

    _____

3. How will you collect your data?

    _____

    _____

4. Create your survey here and collect your data.