What's the Problem?

Reporting Categories Computation and Estimation, Probability and Statistics

Topic Adding and subtracting

Primary SOL 2.8 The student will create and solve one- and two-step addition and subtraction problems, using data from simple tables, picture graphs, and bar graphs.

2.17, 2.19

Materials

- One-inch grid paper
- Crayons, markers, pencils
- Sample data displayed in table form to be graphed (e.g., lunch choices, modes of transportation to school, favorite colors, favorite physical education activities)
- Notebook or plain white paper

Vocabulary

addition, add, data, difference, picture graph, subtraction, sum, table, tally mark, bar graph, pictograph

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Distribute copies of sample sets of data displayed in table form (see an example on next page), sheets of one-inch grid paper, and crayons, markers, and pencils. Have students use the data from the tables to create a picture graph and a bar graph on the grid paper. Review the expectations for the components of picture and bar graphs:
   - Title
   - Labels for the horizontal and vertical axes
   - Defined categories
   - Equal, labeled increments for the vertical axis
   - A space between the vertical axis and first category, equal spaces between the categories, and an equal space after the last category
2. Have each student create a survey to gather data about some everyday subject that can be quantified. After students decide on their data questions, have them collect data by asking the questions of at least 12 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.
3. Explain to students that they will now develop questions that can be answered by using their collected data. Give examples of appropriate types of problems to write, e.g., "How many students' favorite colors are blue and purple? How many more people like green than yellow?" Also, give nonexamples, e.g., "What is your favorite color? What color are you wearing today?" The students must write at least six questions that can be answered by using their collected data, and at least three of these questions must require solving addition or subtraction problems to answer. Allow students to create their questions. Circulate to help those who are unclear about the assignment.

4. As students complete the assignment, have them write their names on their papers, exchange papers, and answer each other's questions. Have students who answer the questions also record their names on the papers. When done, have students return all papers to their creators for evaluation. The students who answered the questions are responsible for explaining and/or justifying answers to the creators, and the creators are responsible for explaining and helping correct any errors.
5. Review and summarize with the class what students did and learned in the activity.

Assessment

- **Questions**
  - When attempting to solve mathematical problems using data from tables or graphs, what are some ways to figure out whether to add or subtract?
  - Today we used tally marks when collecting data. What are other ways to collect and organize data?
  - How are picture graphs similar to bar graphs? How are they different?
  - What are some problems with reading picture graphs that do not occur with reading bar graphs?
- **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 on their favorite recess activities. The following table shows how the class voted.

Recess Activity	Number of Votes
Jump Rope	4
Kick Ball	9
Freeze Tag	7

    Using the data in the table, write two addition and two subtraction problems, and explain how to solve each problem.
- **Other**
  - Collect completed graphs and questions to check for students' understanding of creating graphs, interpretations of graphs, and the ability to answer one-step addition and subtraction problems, using the given data.
  - Check to be sure that all components of the picture and bar graphs are present and correct.
  - Have the class complete a "3-2-1." Have students write (or tell verbally) three things they learned, two ways they can use what they learned in the future, and one unresolved question.

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). Have students write questions that incorporate one-step addition or subtraction problems based on the data. Have students exchange papers and complete, explain, and then evaluate each other's work.

Strategies for Differentiation

- Allow students who have difficulty drawing to use stickers or stamps when creating pictographs or picture graphs, 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.