

Statistics Throughout the Year

- Strand:** Probability and Statistics
- Topic:** Exploring data collection and graphing
- Primary SOL:** 3.15 The student will
- a) collect, organize, and represent data in pictographs or bar graphs; and
 - b) read and interpret data represented in pictographs and bar graphs.

Materials

- Chart paper
- Photos of students
- Egg cartons
- Pom-poms
- Clear plastic cups
- Popsicle sticks
- Linking cubes
- Pushpins

Vocabulary

analyze, bar graph, categories, data, data point, formulate, horizontal axis, increments, interpret, key, labels, pictograph, picture graph, poll, scale, survey, title, vertical axis, x axis, y axis

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

1. Engage students in a variety of data-collection activities based on real life. The beginning of the school year presents opportunities to collect data about students as they get to know one another. Have students suggest questions that they would like to ask to find out information about their classmates. Typical information that could be collected through a survey includes favorite TV shows, favorite vacation spot, number of pets, types of pets, favorite number, bus number, hours of sleep per night, bed time, number of teeth lost, lunch counts, attendance numbers, measures of height, measures of long-jump distance, and number of letters in first name. Record students' questions.
2. Each day, post one of the questions in a prominent place with answer options shown below. As students enter the classroom, have them answer the question by placing a marker in the appropriate place among the answers.
3. Have students represent the data gathered from the surveys by constructing graphs. Ideas for graphing include the following:
 - Chart paper marked with a grid for a bar graph in which increments on the numerical axis are in multiples of 1, 2, 5, or 10.
 - Clear plastic cups labeled; popsicle sticks labeled with student names for recording data placed in the cups

- Linking cubes placed on the bars of a graph to record individual counts of data.

Note: The graphing process can be applied in all subject areas, particularly in science and history and social science. Use opportunities in other areas to reinforce the graphing process.

Note: When students are constructing data in a pictograph or a bar graph, limit the data points to 16 or fewer and include no more than four categories.

4. Once the graph has been created, ask the students questions about the graph. You can also have students create questions to ask their classmates about the graph. For example, “How many more people like watching football than baseball?” or “How many more people ordered mac and cheese for lunch than salad or yogurt?”
5. To close the lesson, ask students where or how they might use graphs, and what they learned in making them and interpreting them.

Assessment

- **Questions**
 - Which category has the greatest number? Which has the smallest number?
 - Are there more students with ____ or with ____?
 - Are there fewer students with ____ or with ____?
 - Are there any categories that have the same number?
 - How many ____ and ____ are they altogether?
 - How many more (or fewer) ____ are there than ____?
 - What are some questions you would pose for this graph?
 - If another student joined our class, what do you think they would choose on our graph? Why?
- **Journal/writing prompts (include a minimum of two)**
 - Write about the process of collecting data in a survey, including reasons you might want to collect such data.
 - Write about the process of constructing a graph, including the type of information that can be determined from a graph.
 - Write at least one statement that analyzes the data shown on a graph you have constructed.
- **Other Assessments (include informal assessment ideas)**
 - Show the students two different graphs that graph the same data. Make sure something is different about the graphs that the students would analyze and figure out what is different. For example, you may have two bar graphs that show the same data but use a different scale.
 - Show students a pictograph and a bar graph that displays the same data. Ask students what is similar and different about both graphs.

Extensions and Connections (for all students)

- **Technology**
 - Have students graph the survey results on a computer.
- **Community Connections**
 - Invite a meteorologist to visit the class to discuss weather patterns and graphs of weather data.
 - Take a field trip to a television station to learn how statistics influence programming and how graphs are used.

Strategies for Differentiation

- **Multisensory**
 - Have students respond to survey questions, using tactile methods, such as wooden sticks on paper cups.
- **Small-group Learning**
 - Have students develop survey questions and elicit responses from classmates.
 - Have students develop three to five questions to use in interviewing each other, and have them graph the results.
- **Vocabulary**
 - Key vocabulary may vary depending on the survey questions and responses, but students need to know the following:
 - *bar graph*
 - *categories*
 - *data*
 - *data point*
 - *graph*
 - *horizontal axis*
 - *increments*
 - *key*
 - *labels*
 - *pictograph*
 - *picture graph*
 - *point*
 - *scale*
 - *survey*
 - *vertical axis*
 - *title*
 - *x axis*
 - *y axis*
 - Have students create a word wall with the words above and any other vocabulary words that are used during this lesson.

- **Student Organization of Content**
 - Have students keep binders or folders with their individual graphs and the results of the classroom surveys.

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