

Mathematics
Statistics
Grade 6AB



Lesson Plans

"Data at Our Service"

Subject:

Mathematics: 6AB

Level:

Grade 6

Abstract:

In this lesson, students will work cooperatively to design and conduct a survey, analyze and represent survey data, then use those results in a persuasive presentation. Through this lesson, students will gain experience in the following processes:

- Designing a survey instrument
- Conducting a survey with a pool of peer respondents
- Processing, analyzing, and interpreting survey data
- Selecting the most appropriate type of chart(s) to visually represent particular types of survey data
- Creating charts representing survey data
- Designing and creating a persuasive PowerPoint presentation that includes survey data results and charts
- Using this PowerPoint presentation in a persuasive presentation to their peers

Invitation:

Joseph is a Student Body representative. It is his turn to bring an idea from his grade level to the meeting with the Activities Director and the Principal. Joseph wants to succeed, because he wants to run for re-election the following year. How can he make sure to bring an idea with strong support from the students that will be approved by the school authorities?

Joseph just completed a Statistics Unit in Math class. This gave him the idea to conduct a poll. Then, he plans to use the data to make a persuasive presentation that will support his idea. Will he succeed?

Situations:

Where: The activities will take place in school. The activities will occur in the classroom, a location where students will have access to computers, and within the school where students can poll their grade-level peers.

When: The unit will take place during Mathematics, Statistics class. Students will apply their knowledge about collecting, tabulating, interpreting, and representing raw data. Polls and surveys may take place at break, lunch, and before or after school as directed by the teacher.

How Long: The unit will take between eight to 10 class periods, depending on student access to computers and the type of surveys conducted by the students.

Tasks:

Task 1:

As a class, students will discuss and brainstorm ideas for activities for their grade level that could take place at school. Students may be given guidance to use a decision making process to narrow the ideas to four or five, as they will be working with them in small groups.

Task 2:

Students will use the "Worksheet: Yes/No Question" attachment to complete this and the next task.

Working in small groups, with one of the four or five activities selected in Task 1, students will brainstorm and generate two or three Yes/No questions that could be used to survey their peers about the selected proposed activity. This will be a good opportunity to talk about the appropriateness of a sample, and how the way questions are asked can influence people to respond in one way or another. Discuss with students how they feel when they have to give a Yes/No answer. Discuss what happens if a decision is based on answers given by a preselected sector of the population versus a random sample.

Task 3:

In the same small groups, students will use one of their Yes/No questions in a test survey of their classmates, then make a simple table tallying the results. Next, students will discuss and select the chart that best communicates their findings. Is it better to do one table and one chart per question, or multiple tables and charts? Why would a pie chart be a better choice than a line chart in this instance? Could a bar chart accomplish the same results? What is being emphasized by each chart?

Task 4:

Students will work with a partner and use an Excel spreadsheet to enter the results of their sample survey and to make their chart based on the decision made on the previous task. The use of the Chart Wizard is encouraged at this time.

Task 5:

Students will find the "Worksheet: Poll Question" attachment useful for this and the next task. In small groups, students will discuss and brainstorm two or three more questions related to their idea for an activity. For example, polling peers to get a sense of what day of the week they would like the activity take place, at what time, how often, in what location, etc. Facilitate a discussion about how different types of questions may require different charts to represent survey results. Discuss why polling the school's soccer team members about a soccer activity may show a bias versus polling the basketball team members or students not involved in school sports at all. This discussion will bring up the concept of sampling errors and ways to select a sample.

Task 6:

After conducting the surveys, students will again work in their small groups to enter their survey data into an Excel spreadsheet. They will then discuss the best type of chart to use to depict their results for each survey question (keeping the purpose in mind: persuade the Activities Director and the Principal that the activity is supported by students). Bring to the discussion the possibilities and consequences of modifying a graph: draw it in different ways, using a break in either axis scale, choosing different spacing in the axes, selecting the data to be displayed, drawing a bar wider than the rest, etc.

Task 7:

Students will work with a partner to summarize the data for each survey question in their Excel spreadsheet, and then create a corresponding chart. Students will modify their chart as needed to best represent the data and support their persuasive presentation. Students will note the changes made and their justification for doing so (for example, visual impact, emphasize a particular aspect, etc.)

Task 8:

In small groups, students will select the tables and charts that will be included in the group's persuasive presentation. Students will divide the tasks to create the presentation in PowerPoint and to give the presentation to the class. Students may work with partners or individually to complete their contribution to the group. The class will discuss which presentation they believe is the best one to persuade the Activities Director and the Principal to approve the proposed activity.

Interactions:

Full Class: The teacher will facilitate and guide full-class brainstorming of ideas and discussions at the beginning and the end of the unit, when the best presentation will be chosen.

Small Groups: Students will work in small groups to generate questions, tabulate and depict results in chart form, and to select what will be included in their group presentation. Students will also give their final presentation to the class as a small group. The teacher will monitor small-group activities and assist as needed.

Partners: Students will work with one partner while working at the computer using an Excel spreadsheet to generate a printed table and a chart for their questions, and when using PowerPoint to create their persuasive presentation.

Individual: Students will work individually while conducting polls and to support small group and partner activities as needed.

Standards:

Mathematics: Statistics, Data Analysis, and Probability

2.2 Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.

2.3 Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.

2.4 Identify data that represent sampling errors and explain why the sample (and the display) might be biased.

2.5 Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

Assessment:

- "Worksheet: Yes/No Question:" All boxes must be completed. Data area may contain either a Tally or a Table with the number of responses. Chart choice must be accompanied by justification.
- "Worksheet: Poll Question:" All boxes must be completed. Data area must contain a Table. Chart choice must be accompanied by justification.
- "Data at Our Service Rubric:" Filled out by teacher, assesses the final products of the Unit (Excel Table and Chart, Report and Presentation).

Tools:

- Microsoft Excel
- Microsoft PowerPoint

Project Tips and Alternatives:**Tip #1:**

This lesson provides an opportunity to explore a range of typical charts used to represent data. To assist your facilitation of a class discussion on this topic, the Sample Survey Spreadsheet contains three sample typical survey questions and two chart options for the response data to each question. Have your students compare the charts for each question, and discuss comparative strengths and weaknesses of each. Column, bar, and pie charts are frequently used to depict survey data. Column and bar charts compare values between items. Pie charts compare items/responses to the sum of all items/responses. These are most likely the types of charts your students will use. You may also care to use Microsoft Excel's Help files as part of this discussion, and to help students understand chart options and the typical use of each type of chart. Open the Microsoft Excel Help files, and using the Answer Wizard, enter "examples of chart types" for a listing of chart types and explanations of each.

Tip #2:

"About Formatting Charts," also from Excel Help, provides information about modifying charts. This may be useful if the students want to alter the scale or spacing in their chart's axes.

Tip #3:

If the school publishes a periodical or a yearbook, the data gathered by the students while completing this unit may be of enough interest to be included in school's publications.

Tip #4:

The focus of this unit is the data collection, depiction, interpretation and use. However, Mathematics and Language Arts teachers may want to collaborate in the completion of this unit. Writing a persuasive composition and delivering a persuasive presentation are part of the Writing and Speaking Applications standards for sixth grade.

Tip #5:

The openness of this unit makes it suitable to undertake a real issue within the school environment. Student organizations may be included (Student Clubs, Student Government, and Leadership).

Attachments:

- "Worksheet: Yes/No Question"
- "Worksheet: Poll Question"
- "Sample: Spreadsheet and Charts"
- "Preferred Student Activities: A PowerPoint Presentation"
- "Step Sheet: Creating a Data Table and Accompanying Charts in Excel"
- "Step Sheet: Creating a New Document"
- "Step Sheet: Inserting Graphs from Excel"
- "Data at Our Service Rubric"

Web Resources – Content:

A list of [linked web resources](#) related to the content of this lesson can be found on the Lesson Page.

Web Resources – Excel:

A list of [linked web resources for Excel](#) can be found on the Excel Resources page.

Assistive Technology:

Please refer to the [Assistive Technology section](#) for information on methods and devices to help ensure that all students have access to the curricula in the least restrictive environment.