

Mathematics

Grade 6AB



Lesson Plans

"Car Tally"

Subject:

Mathematics: 6AB

Level:

Grade 6

Abstract:

At the end of this lesson the students will demonstrate their understanding in ratios, percents, positive decimals, mean, median, mode, and bar graphs. This lesson is a project-based experiment that has the students analyze, make predictions, and present their findings of a data set that they collect. In addition, they will be asked to analyze why their data is valid or invalid when applied to the "real world."

The students will tally the colors of 50 cars. Then they will calculate the mean, median, and mode of the data they collected. They will also create a bar graph of this data. After this is completed, they will produce a spreadsheet in Excel that displays their data set in an organized manner. Finally, the students will produce a Lab Report Write-Up in Microsoft Word that summarizes their findings. They will also be required to present their reports to the class.

Invitation:

What is your favorite type of car? What is your favorite color? When you are walking or riding your bike do you ever notice how many, red, blue, green, white, and black cars there are?

Does the color of the car affect how many speeding tickets people get? Why do people think red cars get more speeding tickets? What color do you think is the best color to avoid getting ticket? What is the most popular color for cars? What is the least popular color for cars?

Situations:

Where: The majority of this lesson will take place in the classroom using a variety of teaching strategies and activity settings. When working in the classroom, emphasis can be placed on individuals, small groups, or the whole class. Nightly homework will be assigned. These assignments should be completed by the individual and checked daily for understanding.

When: This lesson should be taught after the students have a general understanding of what the mean, median, mode, and range of a data set demonstrate. This lesson should be taught concurrently with the text being used. Refer to your text's Table of Contents for the specific timing of when this lesson would be appropriate for your class.

How Long: This lesson is designed to be taught over a minimum of three to five class periods.

Tasks:

Task 1:

As a class, students will discuss their experiences with different types and colors of cars. Refer to the resources for ideas on interesting topics for discussion. Explain how the class will be tallying the different colors of cars.

Task 2:

The teacher will pass out the "Worksheet: Car Tally Lab" attachment. The students will take 3 to 5 minutes to read the entire lab sheet, and then answer the Hypothesis question. The purpose of the Hypothesis is to get students to read through the lab before actually performing it, and then make an educated guess as to what the lab outcomes might be. The students will use complete sentences when completing the lab sheet. Explain to the class where they will be going to conduct the experiment. Have students tally the cars in pairs. This will minimize the number of cars that students miss.

Task 3:

The students will go outside the classroom to a location where they can see a road with ample traffic. If a road is not nearby, show a video that has footage of cars on a road. Students will record the colors of 50 (at a minimum) different cars. After all the groups have completed the tallying, return to the classroom. Students will take 5 to 10 minutes to verify their data. In groups of four, each member will fill in any missed cars. Every person in each group should have the same data. The teacher will assist where necessary.

Task 4:

Students will complete the "Worksheet: Car Tally Lab" attachment. The whole class will read through the remainder of the lab. Then, in groups of four, they will complete the lab. This includes:

- Creating a bar graph
- Analyzing the data

Task 5:

In groups of two to four, students will create a spreadsheet in Excel that presents the collected data in an organized format. In general, the spreadsheet should contain the following information:

- The color of the cars
- The number of cars counted for each color
- The ratio of number of cars for every color to the total number of cars tallied should be displayed in fractional, decimal and percentage forms.

Refer to the "Step Sheet: Creating an Excel Spreadsheet" and "Sample: Spreadsheet with Bar Graph" attachments for details. Depending on the proficiency of the class they can use the "Template: Spreadsheet with Bar Graph" attachment or create the table on their own.

Task 6:

Using the Chart Wizard in Excel, students will create a bar graph representing the number of cars per color. The color will be the independent variable (x-axis) while the number of cars will be the dependent variable (y-axis). Refer to the "Step Sheet: Creating an Excel Spreadsheet with Bar Graph" attachment for directions on how to perform this task. In addition to the step sheet, refer to the "Sample: Spreadsheet with Bar Graph" attachment for an example.

Task 7:

Before Task 8 is performed, a whole-class discussion will take place regarding the mean, median, and mode of the data set the students collected. What does the mean represent for this set of data? Why would a mean value that contained a mixed number not be realistic? Why should one round the mean value to the appropriate integer value? What does the mode represent? If there is more than one mode (bi-modal, tri-modal, etc.) how could one fix this situation? Does the number of cars we tallied affect this outcome? The teacher will pose these questions to the students. They will discuss the answers in table groups and then report their findings to the rest of the class. Each table group could be responsible for reporting their answer of one of the questions listed above. After every group, follow up with clarifying statements.

Task 8:

This task can be performed in pairs or by individuals. Students will write a one-page report about the experiment using Word. In brief, the students will summarize their understanding of what the lab was about, analyze the data set, and justify any conclusions they reach using their bar graph as support for their findings. In addition, they will import their spreadsheet and bar graph from Excel into their Word document.

Refer to the "Handout: Lab Write-Up Requirements" attachment for details on this task. The reports can be assessed using the "Lab Write-Up Rubric."

Interactions:

Full Class: The teacher will facilitate whole-class discussions and activities. Refer to individual task numbers for specifics. All of the Invitations, transition periods, and direct instruction are full-class interactions.

Partners: Interaction between partners can occur when correcting homework, discussing answers, and using the computers.

Small Group: The small group activities include, correcting work, completing any guided practice, computer work, and group presentations.

Individual: Depending upon how many full class, partner, and small group activities you implement, you may use more or less individual activity settings. The individual should complete all Invitation exercises and nightly homework.

Standards:

Statistics, Data Analysis, and Probability

1.1 Compute the range, mean, median, and mode of data sets.

1.2 Understand how additional data added to data sets may affect these computations of measures of central tendency.

1.4 Know why a specific measure of central tendency (mean, median, mode) provides the most useful information in a given context.

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.

Mathematical Reasoning

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.

2.1 Use estimation to verify the reasonableness of calculated results.

2.3 Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.

2.4 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

2.5 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

3.1 Evaluate the reasonableness of the solution in the context of the original situation.

Assessment:

- Invitation Assessment: If "warm-ups"/transition exercises are normally collected in class, then collect this exercise. Otherwise, questioning and visual inspection can be used.
- Small Group Activities: The papers should be collected for all in-class small group activities and assessment for understanding.
- Small Group Computer Work: Each group member should have a specific task when using the computer(s). Each member should be evaluated on effort, on-task performance, and their individual understanding.
- "Spreadsheet with Bar Graph Rubric:" In conjunction with the "Sample: Spreadsheet with Bar Graph," use the "Spreadsheet with Bar Graph Rubric" to assess each group's spreadsheet and bar graph.
- "Lab Write-Up Rubric: " Use the "Lab Write-Up Rubric" to assess the lab write-ups. This rubric can be modified to suite what you are emphasizing for this project.

Tools:

- Calculators
- Microsoft Word
- Microsoft Excel
- Class computer
- Student computers

Project Tips and Alternatives:

Tip #1:

Research the web sites listed below to prompt a meaningful Invitation activity.

<http://www.colormatters.com/bubdarc2-car.html>

This is a nice website with useful information on how color affects accidents, number of speeding tickets, and other interesting information.

<http://www.aaafoundation.org/resources/index.cfm?button=carcolor>

Another website that offers insight into how color affects accidents, number of tickets, etc.

Tip #2:

Describe personal experiences how the color of a car affects one's perspective. Questions that can be posed are: When riding in your family car do you notice certain colored cars over others? Do you think the color of a car can affect how fast or how slow we *perceive* a car to be traveling?

Tip #3:

If there is no road nearby, watch a movie that contains adequate car traffic scenes. Another alternative would be viewing and displaying to the whole class a traffic cam on the Internet.

Tip #4:

Before the students create the bar graph in Excel, grade and return the lab. The students should make corrections on their (lab) bar graphs so their work is accurate for the lab write-up.

Attachments:

- "Worksheet: Car Tally Lab"
- "Step Sheet: Creating an Excel Spreadsheet with Bar Graph"
- "Sample: Spreadsheet with Bar Graph"
- "Template: Spreadsheet with Bar Graph"
- "Spreadsheet with Bar Graph Rubric"
- "Handout: Lab Write-Up Requirements"
- "Step Sheet: Importing Tables and **Graphs** from Excel"
- "Lab Write-Up 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.