Math TODAY™ Teacher Edition

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Good-to-fair environment declining

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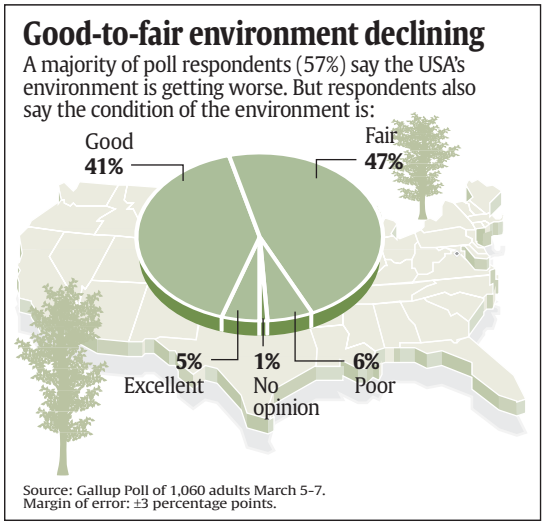
USA TODAY Snapshots®



By William Risser and Keith Simmons, USA TODAY

Activity Overview:

The USA TODAY Snapshot "Good-to-fair environment declining" is a circle graph based on a Gallup Poll survey. Students will calculate the actual number of those surveyed who believe the environment is in "fair" condition. Using the margin of error they will calculate a range of percents for the "fair" condition category and translate that into a range of the actual adult population. They will calculate the percent of the overall population the survey represents. Finally, students will recreate the circle graph in attempt to write a persuasive argument for or against increased provisions for the environment.

Concepts:

- Percent of error
- Polling techniques
- Graphical analysis of statistical data

Activity at a Glance:

- Grade level: 11-12
- Subject: Statistics
- Estimated time required: 30-45 minutes

Materials:

- TI-83 Plus family or TI-84 Plus family
- Overhead view screen calculator for instruction/demonstration
- Student handout
- Transparency
- TI Keyboard (optional)
- Colored pencils
- Protractor

Prerequisites:

Students should be able to:

- do basic manipulations with a cell sheet.
- create a circle graph.
- solve radical equations.

This activity works with TI navigator A Classroom Learning System

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Objectives:

Students will:
- calculate the number of people interviewed with a specific opinion.
- project the number of U.S. adults with a specific opinion using the margin error to produce a range.
- manipulate the data to support an opinion.
- approximate the sample size needed to reduce the margin of error by 1%.

Background:

In this activity students will examine data provided in a Gallup Poll. The information gathered in polls affects our lives every day in a variety of ways. Poll results determine which commercials we see, help our government make social and economic decisions as well as predict election outcomes.

This activity starts with simple calculations using percents and the number of people the percent represents. The margin or error is used to calculate a range of percents and then the number of people in the U.S. that it actually represents. Students must read the USA TODAY Snapshot carefully. There is more information contained in this graphic than students realize. In teaching students to be attentive consumers and good citizens, it is important that they be able to read and understand and interpret statements and ideas based on poll information.

Students will explore the relationship of the number of people polled and the actual number of people those few represent. Since the population data is expressed in extremely large numbers, and some of the percents are expressed in extremely small numbers, good number sense is essential in interpreting and doing calculations with the data.

Through this activity, students will be develop higher order thinking skills such as application of concepts, analysis of information and synthesis to arrive at their solutions. It requires students to truly understand place value as well as using statistics to help them predict the future. This activity will also encourage students learn to clearly communicate this information to others. This current example reinforces and motivates students to learn, apply and integrate these mathematical concepts in the real world.

Preparation:

- Provide one graphing hand held for each student (and TI Keyboard if available).
- Each student should have a copy of the corresponding student activity sheet.
- Provide a protractor and colored pencils for graphing.

Data Source:

Gallup Poll

National Council of Teachers of Mathematics (NCTM) Standards*:

Data Analysis Standard
- Develop and evaluate inferences and predictions that are based on data.

Communication Standard
- Analyze and evaluate the mathematical thinking and strategies of others.

Connections Standard
- Recognize and apply mathematics in contexts outside of mathematics.

Representation Standard
- Select, apply and translate among mathematical representation to solve problems.

*Standards are listed with the permission of the National Council of Teachers of mathematics (NCTM), www.nctm.org. NCTM does not endorse the content or validity of these alignments.

Additional Resources:

- Student handout
- Transparency
- TI Technology Guide, for information on the following: TI-83 Plus family, TI-84 Plus family, List Editor, Science Tools, Finance, Cabri® Jr. and CellSheet™ App
- TI-Navigator™ Basic Skills Guide for information on using the TI-Navigator Classroom Learning System

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Classroom Management Tips:

- Students will have a better understanding of how to read the graphic and retrieve data if you use the transparency for a class discussion before the students start working.
- Students can work individually or in small groups on this activity. Working in groups is especially helpful as they learn the various features of the hand-held.
- Allow students to talk about the "how" and "why" approach they used to find the solutions.
- TI Keyboards are not a necessity for this activity but make working with the CellSheet™ App easier.
- Have students make their persuasive arguments on their own paper or the back of the assessment sheet.

Activity Extension:

- Have students research environmental issues and trends using USA TODAY, the Internet or other resources. Then have them debate the necessity of environmental policy using their research and data. They should manipulate the data within the margin of error to support their opinion.
- Have students create an alternate type of graph with the same data (bar graph or line graph).
- Have students find another poll presented by Gallup Poll in USA TODAY and do similar analyses on that poll.

Curriculum Connections:

- Social Studies/Government
- Earth Science/Biology
- Agriculture

Teacher Notes:

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Assessment and Evaluation:

Q. How many adults participated in the poll? How many responded that they considered the environment in "fair" condition? Round your answer to the nearest person.

A. There were 1060 adults interviewed. 435 participants considered the environment in “fair” condition.

Q. According to the survey, 47% of the adults interviewed believe the environment is in "fair"condition. If the survey is representative of the entire adult population, and using the margin of error in the USA TODAY Snapshot, what is the range of percents and what is the number of adults who feel the same as the respondents? Assume there are approximately 187 million adults in the U.S.

A. The range of percents would be 44% - 50%. The minimum of people this represents is 82.28 million and the maximum would be 93.5 million.

Q. The formula for calculating the margin of error is %of error = $\frac{2\ (.5)}{\sqrt{\text{sample size}}}$ **How many adults would need to be surveyed to decrease the error to +/-2%?**

A. 2500 adults would have to be surveyed to decrease the margin of error to +/-2

Q. What percent of the adult population was actually polled? How many U.S. adults does each person surveyed represent? What insures that this is a sufficient number to create an accurate poll of the entire adult population in the U.S.?

A. .0057%. Each person in the poll represents 176,415 U.S. adults. Gallup Poll chooses those surveyed completely at random.

Q. You are a lobbyist and want to convince key senators to vote for or against a more stringent environmental protection law. How could you present the data from this survey to persuade them. Adjust the numbers in the CellSheet™ App and using the handheld draw a new circle graph to support your argument. Sketch your graph on the back of this page.

A. Answers will vary.

This activity works with TI navigator A Classroom Learning System

If you are using the TI-Navigator Classroom Learning System, send the provided LearningCheck assessment to your class to gauge student understanding of the concepts presented in the activity. See the TI-Navigator Basic Skills Guide for additional information on how this classroom learning system may be integrated into the activity.