

Activity 4.1.1 Statistics Tutorial

Purpose

The results of research yield data. Once you have collected data, the data needs to be interpreted to decide whether it supports or refutes the proposed solution. Researchers often collect data in numerical or quantitative forms. The numbers must be analyzed to determine their meaning.

Statistics is the study of the collection, analysis, and interpretation of data. Using statistical analysis requires the correct application of statistical terms. Defining the concepts of mean, median, and mode is the beginning. Applying these concepts is a valuable skill for researchers. Data interpretation and organization can alter research results. When misrepresented, data can yield a false result. What does the data you collect mean? How can you interpret data in a useful and meaningful form?

Materials

Per pair of students:

- Computer with Internet access

Per student:

- Calculator
- Pencil
- *Agriscience Notebook*
- *Laboratory Notebook*

Procedure

In this activity, you will work with your partner to explore statistics and how they are used to interpret data. Complete the online tutorial to learn more about statistics, and then use your knowledge to interpret data on rainfall in your area.

Part One – Complete a Statistical Tutorial

1. Access the Pennsylvania State University's Basic Statistics Tutorial online:
<http://tutorials.istudy.psu.edu/basicstatistics/index.html>
2. Review and/or complete the information on the following pages. Record the definitions, formulas, and information in your *Laboratory Notebook*.
 - 1. Basic Statistics
 - 2. Definitions of Basic Statistical Terms
 - 3. Activity 1: Quiz Yourself on Statistical Terms
 - 4. Activity 2. Statistical Calculations
 - 8. Summary
3. Complete the information in Table 1 of the student worksheet as a reference for Part Two.

Part Two – Apply Statistical Concepts

1. Access local precipitation data for your county or zip code. Follow the steps below to access this information, or your teacher may provide the data to the class.
 - Visit <https://www.ncdc.noaa.gov/cdo-web/>

- Click on the Search Tool in the lower right corner.
 - Under *Select Weather Observation Type/Dataset*, select **Annual Summaries**.
 - Under *Date Range*, set the calendar to a start date of January of the previous year with an end date of December of the same year.
 - Under *Search for*, select **Zip Codes**.
 - In the *Enter a Search Term* box, enter your zip code and press **Search**. If no match returns, look up the zip code for a neighboring large town.
 - Once you have a result, select add. The item will be placed in your cart.
 - Go to Checkout. Follow the onscreen instructions to check out, this is a free service, but you will need to provide an email address.
 - NOAA will send the data chart to your email with a link to the requested data.
4. Record the monthly total precipitation in Table 2 on your student worksheet.
 5. Calculate the mean, median, and mode values for precipitation in the table. Use your notes from Part One to assist with calculations.
 6. Answer the analysis questions regarding significance and correlation.

Conclusion

1. What is the difference between significance and correlation?
2. How are mean, median, and mode used to analyze data?
3. When would each of the following statistics be useful?
 - Mean
 - Mode
 - Median
 - Significance
 - Correlation

Name: _____

Activity 4.1.1 Student Worksheet

Table 1. Terminology and Formulas

What does “Mean” measure?		Mean Formula	
What does “Median” measure?		Median Formula	
What does “Mode” measure?		Mode Formula	

Table 2. Precipitation Data

YEAR :		LOCATION:									
Enter data (in inches) in the rows below.											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Total Precipitation For Year: _____ inches											
MEAN:				MEDIAN:				MODE:			
Show work below											

Analysis Questions

- The level of fill in a local lake is correlated to monthly rainfall totals. Is the significance, or p-value, of the correlation between lake level and monthly rainfall data points low or high? Why?

- What is one data set that might be correlated (have a higher r-value) to monthly rainfall? Why?