PRECALCULUS STATISTICS PROJECT

Through observation, research, survey, or experimentation, compile a list of sample data. Obtain at least 40 values. Try to select data from an interesting or meaningful population. ***You must calculate statistics and compare at least two subgroups.***

KEYS TO SUCCESS!

- You must survey 40 students (20 per subgroup).
- Surveying takes time. Students should be able to perform an activity in 1-2 minutes.
- Will you be gone to one or more conferences/events in the next 2 weeks? If so, select a quickly surveyed topic.
- Once you have selected your sample of students, consider who will be most difficult to contact and make arrangements to meet with them. Consider students with poor school attendance, students who attend HCC for half of the day, students who will be absent to KAY & FCCLA events, etc.
- Plan to survey before school, during break, during lunch or after school—not just during seminar!!! Club meetings and the Trivia Contest may interfere.
- You must have pictures of the actual data collection process for your report. Take pictures early!

Complete #1-6 and then have your project approved. *Handwriting must alternate with each line!*

1. State the question you are **investigating** *(**not the question you are asking the subjects!)**. Write it in the form of a question. Your question should include the following:
   - Identify the type of data needed (hours, $, minutes)
   - Identify the population to be studied
   - Identify the subgroups you are forming
   - Be very specific.

Example question: Is there a difference in the average number of dollars spent by NCHS underclassmen compared to NCHS upperclassmen?

Question:

Population to be studied and subgroups to be formed:

Data needed:

Type of statistics (descriptive or inferential):

2. What type(s) of sampling will be used? Describe, *in detail*, the specific sampling method(s) you will use to collect the data?

3. Explain, *in detail*, what each subject must do to participate in your study.

4. Attach the exact script you will follow when speaking to each subject. It must include the following:
   a) Explain who you are (Precalc students) and what you are doing.
   b) Describe in detail what you are asking each person to do.
   c) Be polite, but do not give them the choice to participate.

5. Identify the people you will be sampling. Highlight them on the provided student list.

6. **STOP** **Have Mrs. Meyer approve all of your work before proceeding!**

7. Collect the data.
   a) **You must have at least 2 pictures of your data collection!** Pictures should be of the participants, **NOT** the people conducting the study!
   b) Attach the sheets showing your sampling method and who you sampled.
   c) Provide a list of the completed data in an Excel spreadsheet. It should be listed under the proper subgroup and include the person's name and the data collected.

POSSIBLE ERROR
1. Script read to every person at an understandable pace.
2. Were your results impacted by the day of the week or the time of day when you collected the data? Would results for individual subjects have been different if you had collected the data at a different time or on a different day?
3. Was everyone able to do the task in a consistent manner? (Example: hand/arm position to measure handspan or wingspan)
4. Were you able to see well enough to know that the task was completed accurately?
5. Did all subject have a similar environment?
    a. If your project required a surface to work on, did all subjects have an equivalent surface?
    b. Was lighting equivalent for all subjects and would it have impacted the results?
    c. Was there noise or other distractions that could have affected the subject's performance?
6. Is your sample reliable? Would your results have been more accurate if subjects had performed the task more than once?
7. Was the sample size large enough?
8. Did you visually measure or see the result or could subjects have given a guestimate?
9. Could data have been incorrectly recorded?
10. Did you have nonresponse in your study?
11. Were there errors in how you designed your procedure which made it more difficult for subjects to complete the task?
12. Were there potential errors in your calculations?
13. Did some subjects have an opportunity to view the task before participation, thus giving them an advantage?

__Handwriting for all sections, including the calculations, should alternate between partners__.

8. a) List and describe ALL errors (at least 3) that occurred while collecting the data. Identify the type of error for each (non-sampling, bias, sampling, reliability, validity, non-response)

b) For each error, explain what you could have done to prevent or reduce that error?

9. Calculate the following statistics. ***Show work for any statistics not directly calculated by your calculator***. Round decimal values to hundredths. *(Handwriting should alternate by line.)*

	Subgroup 1:	Subgroup 2:
Sample size		
Mean		
Median		
Mode		
Range *(work)*		
Interquartile Range *(work)*		
Outliers *(work)*		
Standard Deviation *Be sure to use the correct version.*		
Standard Error of Mean		
95% Margin of Error *(work)*		
95% Confidence Interval *(work)*		
99% Margin of Error *(work)*		
99% Confidence Interval *(work)*		

10. Construct the following visual displays of the data for each of your subgroups on your calculator or a computer:
    (a) Box-and-whisker plot
      - Both subgroups displayed on the same screen and labeled.
      - Subgroups are different colors
      - x-axis scaled appropriately and easily read.
    (b) Histogram
      - Each subgroup on a separate graph.
      - Subgroups are different colors
      - Both graphs labeled with the **EXACT SAME** window, bin width, and bin alignment.
    (c) Capture all three of the graphs and save them to your computer using the website: nspireconnect.ti.com
    (d) Print and attach all graphs to this document.

11. Write 5 statements which compare/contrast the two groups in your study using the statistics you calculated. There must be at least one statement that compares each of the following: measures of central tendency, measures of variation, confidence intervals, box-and-whisker plots, and histograms.
    Example: The upperclassmen had a significantly larger range than the underclassmen, but the middle half of the data (IQR) had a similar amount of variation.

    a)

    b)

    c)

    d)

    e)

12. Compare the graphs of your data with the calculated measures of central tendency and variation. Which measures of central tendency and variation best represent your data? *Explain.*

13. a) Check your notes and consider when confidence intervals should be used. Is this a valid situation? Explain why or why not.

    b) What inaccuracy has occurred in calculating your confidence intervals?

    c) Explain what the 95% confidence interval tells you about your data.

14. Reread your original question. What conclusion can you draw about the question you were investigating?

PROJECT IDEAS

1. How many minutes did NCHS students spend on their most recent bath/shower? *(Ask for the last one taken.)*
2. How many hours do NCHS students spend sleeping on a school night? *(Ask for last night.)*
3. What is the typical age of vehicles owned by NCHS students?
4. What is the typical price paid for student owned vehicles at NCHS?
5. How many text messages do NCHS students send/receive per day? *(Ask for the last 24 hours.)*
6. How fast can NCHS students type a given text message? (Sentences only, no paragraphs.)
7. How many minutes per day do NCHS students spend on entertainment (watching Netflix or playing video games)? on a school night? weekend?
8. How many seconds does it take an NCHS student to unlock his/her locker? *(Have a plan for how to handle mistakes.)*
9. How many movies did NCHS students watch in the last week?
10. How many vehicular accidents have NCHS students been involved in during the last year?
11. How many times have individual NCHS students changed the color of their hair in the last year?
12. How many piercings do NCHS students have?
13. How many tattoos do NCHS students have?
14. What is the weight of book bags carried to school (or from school) by NCHS students? *(Works better with a luggage scale, but can be done with a bathroom scale.)*
15. How much battery life do student laptops have left at seminar? *(Must be all regular seminars or all late seminars.)*
16. What is the typical hand span of teenage males and females?
17. How much money is spent per week/month on fuel by NCHS students?
18. How much money is spent per week on fast food by NCHS students? *(Ask for the last week.)*
19. How much time is needed to work a simple algebra problem, sheet of arithmetic facts or maze?
20. How many minutes do NCHS students spend on school work outside the school day? Per day? Per week?
21. How much money do NCHS students spend in the school vending machines in one week? *(Ask for the last week.)*
22. How much cash is carried by NCHS students? (You must be willing to actually count the cash, not just ask how much they have!)
23. What is the pulse rate of NCHS teens? Athletes vs. non-athletes?
24. How much exercise do NCHS students get per week? *(Ask for the last week.)*
25. How much time do NCHS students spend working per week? *(Ask for the last week.)*
26. How many times a day do students go to their lockers? *(Ask for yesterday.)*
27. How many pens/pencils do students carry to seminar? *(Must have them count them in front of you.)*
28. How many times do NCHS students wash their hands or use hand sanitizer per day? *(Ask for yesterday.)*
29. How many times can NCHS students chew a piece of gum in 30 seconds?
30. How long does it take NCHS students to chew a piece of gum and blow a bubble of _____ size?
31. How many times can an NCHS student jump rope in 30 seconds? do jumping jacks?
32. Who has the faster reaction time—NCHS athletes or non-athletes? (Use online reaction time test on laptop.)
33. Is there a difference in the vertical jump of NCHS males/females or athletes/non-athletes?
34. What is the average household size of NCHS students?
35. How many unread email messages do NCHS students have?
36. How many phone apps do NCHS students have installed?