

Data & Statistics Project Instructions: Laser Tag

Step 1: Play Laser Tag!

If you are a participant of the Laser Tag Field trip, you are responsible to record the data from your 2 or 3 rounds of laser tag via the Google Form named, "Individual Laser Tag Data Entry Form" provided by your teacher.

Step 2: Develop a Research Question

Get into a group of no more than 4 people and submit a potential research question via Google Forms. This research question must be linked to one item of data from the scorecard. You will identify this potential research question, the item of data it is linked to on the scorecard, and then create a question you will ask your sample of the population via a survey.

Example:

Research Question: Did those that engaged in more first-person shooter video games, on average, prior to playing reflect a higher accuracy in the laser tag arena than those that don't?

Item of data driving this research question: Accuracy

Survey Question: Do you engage in more than 20 hours a week of first-person shooter video games?

Step 3: Survey Creation

With your group, create a survey via Google Forms that will be used to survey the population sample. Include a question for the participant to input his/her anonymous student number. Your survey question should only have two possible answers. You may need to conduct outside research to define terms in your survey so that those responding understand any subjective terms. (Ex: If you are asking if someone identifies themselves as a student athlete, you must define what a student athlete is). The settings of this form should be such that no information from a participant is collected. Upon completion, you will need to add your teacher as a Collaborator to the Google Form.

Step 4: Survey Completion

If you were a participant in the laser tag field trip, you are a part of the population being studied. Your responsibility is to then answer every survey created by each group so that data can be collected.

Step 5: Data Collection

Before you can start analyzing the data collected, you will need to organize it first. Use the responses of your group's Google Form to create a separate Google Sheet for your analysis (Do this by clicking the green box on the responses page). Separate the responses by the two groups you have established with your research question. Use the shared Google Sheet named, "Individual Laser Tag Data Entry Form" to record the item of data that relates to your research question for each round of each person that responded. Then use Google Sheets to find the average of these three rounds for both groups.

Step 6: Data Analysis

You will now be conducting data analysis and you will compare the two lists of data you have collected. (Ex: The list of average scores of those that play first-person shoot video games & the list of average scores of those that don't play first-person shooter video games). You will complete the following data analysis for the two lists of data:

Section 17.1

- Calculate the mean, median, mode of both lists.
- Represent both lists as a stem-and-leaf plot.
- Represent both lists as a histogram.

Section 17.2

- Find the upper and lower extremes, upper and lower quartiles, and interquartile ranges.
- Represent both lists in a box-and-whisker plot.
- Compare both box-and-whisker plots using S.O.C.S.

Sections 17.3/17.4

- Find the standard deviation and variance and use these to describe spread.
- Identify if each list is approximately normal by seeing if the distribution fits the empirical rule.
- Identify if each list is approximately normal by creating a Normal Probability Plot, a graph of x-values by their corresponding z-scores. If the plot is approximately linear, then you have evidence to say that the distribution is approximately normal.

Sections 17.5/17.6

- Create a 2-sample t-confidence interval for difference of means using the following formula:

$$(\bar{x}_1 - \bar{x}_2) \pm 2 \sqrt{\frac{S_{x_1}^2}{n_1} + \frac{S_{x_2}^2}{n_2}}$$

- Interpret the 2-sample t-confidence interval to conclude if there is a statistically significant difference between your two samples. It is okay if there is no statistical significance.
- If your results were not statistically significant, suggest ways that the study could have been conducted differently to maximize the likelihood of the results being statistically significant.

Part 7: Present Findings

Create a presentation via Google Slides with your group to present your findings. All bullet points in Step 6 should be present in your presentation. Each group member must contribute to the creation of the presentation (as well as participate in the oral presentation) and be comfortable explaining or justifying any claims made. Share your Google Slides document with your teacher.