

2022 Pennsylvania Statistics Poster Competition

Electronic Submission

A statistics poster is a display containing graphs that summarize data, provide different points of view, and answer a question about the data.

Ordinarily, a \$96 first prize, a \$72 second prize, a \$48 third prize, and a \$24 fourth prize will be awarded in each of the four grade level categories.

Judges will look for the following:

- Overall impact of the display for eye-catching appeal and visual attractiveness, and for its ability to draw in the viewer to investigate the graph or graphs.
- Clarity in the demonstration of relationships and patterns, obvious conclusions, and the ability to stand alone, even without the documentation on the back of the poster.
- Appropriateness of the graphics for the data.
- Creativity, neatness, and originality.

Submission Deadline: Friday, March 11, 2022
Poster Judging: End of March 2022
Winners Announced: April 2022

Registration will open February 1st at this site:
www.francis.edu/pa-statistics-poster-competition
Poster submission and registration will all be electronic this year.

QUESTIONS? PLEASE CONTACT US:

scienceoutreach@francis.edu or (814) 471-1215
Dr. Pete Skoner at pskoner@francis.edu or (814) 472-3085

Open to all K-12 students in Pennsylvania

Four grade level categories:
K-3, 4-6, 7-9, and 10-12

Cash prizes and certificates are awarded for first, second, third, and fourth place in each category

Winning posters are also submitted to the American Statistical Association Data Visualization Poster judging competition



Science Outreach Center
become that someone

Where "In The World" Is Antihallan?

Question

Where is Antihallan, the most powerful deity, in the world?

Purpose

I find from the more "ironic" than the more "serious" the divine Antihallan, in which he might power comes from the limited data of the world, and he has the same might power on the world, and he has the same might power on the world.

Hypothesis

My hypothesis is that Antihallan is in Antarctica, because it is the coldest place in the world and could be the most powerful place in the world.

Method

- I collected the daily snow map data between 2015 and 2020 from the three online sources:
 - <https://www.jamstec.go.jp/frc/research/ice/snowmap/>
 - <https://climate.geology.si.edu/about/ice-sheets/snowmap/>
 - <https://www.nasa.gov/data/earth/active/ice/snowmap/>
- I selected 11 places from the snow map and counted how many snow days of individual locations on their birthday (anniversary), December 12 and 13 and a typical summer day (August 17) for the number of snow days.
- I calculated the number of snow days in 2020 from the top two places having the most snow days (last day of the year and 1st day), as well as in Antarctica (my original hypothesis).

Result

- I found that snow in Greenland and Caribbees Bay in the North Atlantic Ocean, snowing from June 1st to the 11th, followed places, snowing including summer days in the past 10 years.
- I found in Greenland, 100% of snow days in 2020, is the highest among snow days in Canada (79%) and Antarctica (snowed only 75% each of snow days in the past 10 years). Surprisingly, Antarctica only has few snow days in 2020, due to its low biodiversity.

Conclusion

Since Antarctica is the coldest place in the world, and it is covered in snow in 2020, while in the northern hemisphere, my original hypothesis, I found that Antihallan could be in the world.

Location	Dec 12	Dec 13	Aug 17
Greenland	100%	100%	100%
Caribbees Bay	79%	79%	79%
Canada	79%	79%	79%
Antarctica	75%	75%	75%
Other Locations	0%	0%	0%

Location	Dec 12	Dec 13	Aug 17
Caribbees Bay	100%	100%	100%
Antarctica	75%	75%	75%

Legend: Blue = Snow, Yellow = No Snow, Green = No Snow

[illegible]

The Rotten Race

Question: Which fruit will decay the fastest?

Hypothesis: Our hypothesis was that the orange and the lime were going to last the longest before rotting. We thought that because the lime and orange are more acidic than the others. They also looked more juicy than the other fruits. We both thought that all the fruits would get moldy and attract fruit flies.

Method: We collected our data by observing the fruits for 21 days. We also purpose was to learn more about the fruit categories.

Purpose: Our purpose was to know how long we have to eat or enjoy our fruits before they rot.

The Rate of Detrition

Percentage of Fruits

Number of Days

Legend: Lime, Pear, Apple, Strawberry, Kiwi, Orange, Lemon, Banana

Average Rate of Rot Based on Fruit Type

Days

Legend: Pear, Apple, Strawberry, Kiwi, Orange, Lemon, Banana

How Fast Does Rotter?

Number of Days

Fruits

Results: Our results were that the orange was the fastest to rot. It took 15 days to be completely rotten. All the other fruits lasted between 4 to 15 days.

Conclusion: The orange rot looked at the end of the experiment. Surprisingly, none of the fruits got really to fly twenty one, but they all got discolored and unclean. The orange looked normal and was the cleanest. We have interested in the different types of fruit categories and we wanted to see if had any connection on our findings. Based on our research citrus fruits last the longest and berries on the fastest.

DO YOU GET WHAT YOU PAY FOR???

Unmasking Pet Adoption

Research Question

Are more pets getting adopted during the pandemic than before?

Data Collection

I emailed 27 animal shelters in Pennsylvania a 10-question [survey](#), and got 8 responses. I also used national data from [PawPrints](#), [Petfinder](#), and other animal shelters.

Analysis

The 8 shelters that responded to my survey reported 6,526 cats and dogs adopted *this year before the pandemic*. They also reported 5,642 adoptions during the pandemic, which was a decrease of 14%.

PetFinder reported for all United States shelters that 1,008,540 cats and dogs were adopted *this year before the pandemic*. They also reported 808,790 adoptions during the pandemic, which was a decrease of 20%.

Interpretation

For Pennsylvania and the United States I found out that more pets got adopted *this year before the pandemic*. This is the opposite of what I expected and what has been [reported](#).

Conclusion

Cats and dogs adopted from U.S. shelters

Month	Pre-pandemic (May 2019 - Dec 2020)	Pandemic (Jan 2021 - Jun 2021)
May	~6,500	~5,600 (-14%)
June	~6,500	~5,200 (-20%)
July	~6,500	~6,000
August	~6,500	~6,500
September	~6,500	~6,500
October	~6,500	~6,500
November	~6,500	~6,500
December	~6,500	~6,500
January	~6,500	~6,500
February	~6,500	~6,500
March	~6,500	~6,500
April	~6,500	~6,500
May	~6,500	~6,500
June	~6,500	~6,500

Source: Pre-pandemic (May 2019 - Dec 2020) | Pandemic (Jan 2021 - Jun 2021)

[illegible][illegible]

How Does a Middle School Student's Sleep Schedule Differ During Online and In-person School?

Do High School Students Really Drink a Latte Coffee?



<p>Latte coffee</p> <p>Latte coffee is a milk-based coffee beverage that is made with espresso and steamed milk. It is a popular choice for many people, especially those who enjoy a creamy and smooth taste. The texture of Latte coffee is often described as velvety and smooth, with a slight sweetness from the milk. It is typically served in a white cup with a brown lid, and is often topped with a dusting of brown powder.</p>	<p>Latte coffee</p> <p>Latte coffee is a milk-based coffee beverage that is made with espresso and steamed milk. It is a popular choice for many people, especially those who enjoy a creamy and smooth taste. The texture of Latte coffee is often described as velvety and smooth, with a slight sweetness from the milk. It is typically served in a white cup with a brown lid, and is often topped with a dusting of brown powder.</p>	<p>Latte coffee</p> <p>Latte coffee is a milk-based coffee beverage that is made with espresso and steamed milk. It is a popular choice for many people, especially those who enjoy a creamy and smooth taste. The texture of Latte coffee is often described as velvety and smooth, with a slight sweetness from the milk. It is typically served in a white cup with a brown lid, and is often topped with a dusting of brown powder.</p>	<p>Latte coffee</p> <p>Latte coffee is a milk-based coffee beverage that is made with espresso and steamed milk. It is a popular choice for many people, especially those who enjoy a creamy and smooth taste. The texture of Latte coffee is often described as velvety and smooth, with a slight sweetness from the milk. It is typically served in a white cup with a brown lid, and is often topped with a dusting of brown powder.</p>
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Goal

Our strategy is to first perform the **independent** test and then use the **confidence interval** to determine if the difference is significant. **Before** we do this, we need to check the **assumptions** for the **independent** test.

Assumptions:

- 1. **Randomness:** The data must be randomly selected.
- 2. **Independence:** The two groups must be independent of each other.
- 3. **Normality:** The data must be normally distributed.

Check: The data is randomly selected and the two groups are independent. The data is normally distributed.

Double Trouble

Do you double-mask?

Do you double-mask?

Conditions

Independence/10%: Our sample size is less than 10% of the population. We can assume that the sample is representative of the population.

Random: The data is randomly selected. We can assume that the sample is representative of the population.

Normal: The data is normally distributed. We can assume that the sample is representative of the population.

Hypothesis

We predicted that the percentage of people who double-mask would be higher for females than for males. This is our **alternative hypothesis**. The null hypothesis is that the percentage of people who double-mask would be the same for males and females.

$H_0: p_1 = p_2$

$H_a: p_1 > p_2$

The **test statistic** is the difference between the sample proportions. The **p-value** is the probability of observing a test statistic as extreme as the one observed, assuming the null hypothesis is true.

Confidence Interval

$0.73 \pm 0.13 \times 1.96 = (0.48, 0.88)$

Interval **capture** = $1 - \alpha = 0.95$

We are 95% confident that the interval from 0.48 to 0.88 captures the true difference in proportions.

Conclusion

The **p-value** is **less than** α , so we **reject** the null hypothesis. There is **significant** evidence that the percentage of people who double-mask is **higher** for females than for males.

Follow up

If the **p-value** is **greater than** α , we **fail to reject** the null hypothesis. This means that there is **not enough** evidence to conclude that the percentage of people who double-mask is **higher** for females than for males.

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2-Sample Proportion Z-Test

$P_1 = 0.35$

$P_2 = 0.65$

$n_1 = 100$

$n_2 = 100$

$\alpha = 0.05$

$z = 1.96$

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Is Snooze Land?



Goal:
 Determine if Snooze Land exists, along with their current year of travel.

Plan:
 We will use the proportion of animals who snorled during the current year of our survey to find the probability of animals in the snooze land.

Plan:
 Using survey data we will calculate p and p_0 and use that to determine whether the current year's results are significantly different from the snooze land's results.

Do:
 Using survey data we will calculate p and p_0 and use that to determine whether the current year's results are significantly different from the snooze land's results.

Check:
 Using survey data we will calculate p and p_0 and use that to determine whether the current year's results are significantly different from the snooze land's results.

Year 1 (2019) Survey Data:

Year	Snorled	Did Not Snorled	Total
2019	10	90	100

Year 2 (2020) Survey Data:

Year	Snorled	Did Not Snorled	Total
2020	15	85	100

Year 3 (2021) Survey Data:

Year	Snorled	Did Not Snorled	Total
2021	20	80	100

Conclusion:
 Based on the data collected, we will provide our decision.

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2019			

Is zoom land really snooze land?

3rd Place, 10-12 Grade Level