

## Welcome to Probability and Statistics!

This summer packet is for all students enrolled in **Probability and Statistics** at Herndon High School for Fall 2022.

The packet will give you the opportunity to self-assess how prepared you are and get an idea of what to expect from the course this year.

Provided on the school website is a key for you to check your work. Part of being a good student is checking your work after you finish and keeping track of what questions you have when you get to class.



Below is a spot to keep track of anything you want to ask in the fall:

Questions I have:	

Congratulations on deciding to take statistics! Most students are surprised to find that statistics is very different from what they expected and that it is a very practical course. Though considered a math course, it is unlike any other you have ever taken. One element of the course work that surprises students is that solutions require **good written communication**, not just numerical answers. This is as much a writing course as it is a math course!

Have a great summer – we are looking forward to meeting you in August!

Dan Logan: [drlogan1@fcps.edu](mailto:drlogan1@fcps.edu)

Carol Treakle: [cltreakle@fcps.edu](mailto:cltreakle@fcps.edu)

## Part 1: Visualizing Data

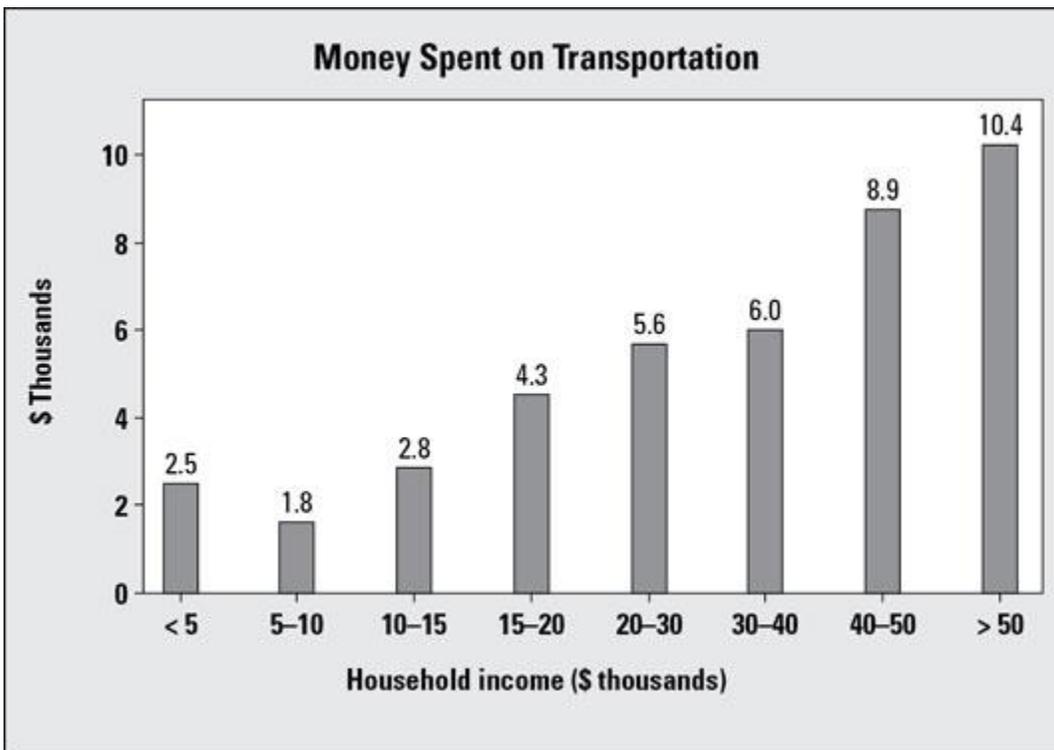
We will be creating and interpreting different types of graphs in the course. One of the goals of the class is to become informed interpreters of graphs.

- I. Watch the video: The Beauty of Data Visualization  
[https://www.ted.com/talks/david\\_mccandless\\_the\\_beauty\\_of\\_data\\_visualization](https://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization)

- II. Write a summary paragraph of what you learned about statistics that you did not know before:



- III. Answer the following questions about the bar graph below:



1) Do we know who collected this information? \_\_\_\_\_

2) Do we know how the information was collected? \_\_\_\_\_

3) Do we know when the information was collected? \_\_\_\_\_

4) Is it important to know how the information was obtained for this graph? Why or why not?

5) How much money does someone who makes \$25,000 spend on transportation? \_\_\_\_\_

6) What is the minimum amount spent on transportation? \_\_\_\_\_

7) What is the maximum amount spent on transportation? \_\_\_\_\_

8) What is the minimum amount of household income? \_\_\_\_\_

9) Does money spent on transportation increase with every increase in income? If not, at what income levels does it not increase?

10) Does it make sense that money spent on transportation generally increases with income level? Why or why not?

11) Now, calculate the amount spent on transportation as a percent of total income:

Percent is: part/whole  $2,500 \text{ spent on transportation} / \text{household income of } 5,000 = 2500/5000 = .5 = 50\%$

< 5     50%

5-10     \_\_\_\_\_

10-15     \_\_\_\_\_

20-30     \_\_\_\_\_

30-40     \_\_\_\_\_

40-50     \_\_\_\_\_

>50     \_\_\_\_\_

12) Does your conclusion about the amount of money spent on transportation change based on these figures? If so, how? Which category spends the most percent of their income on transportation?

13) What is a problem with the way the groupings are set up? For example, which group would you put someone with an income of exactly 40,000

14) How could you change the groupings so that an income could not be placed in two categories?

15) What else do you notice about the graph groupings that is inconsistent and could cause a misrepresentation of the data?

## Part 2: Why You Should Love Statistics

I. Watch the following video on why you should love statistics:  
[https://www.ted.com/talks/alan\\_smith\\_why\\_you\\_should\\_love\\_statistics](https://www.ted.com/talks/alan_smith_why_you_should_love_statistics)

II. Write a summary paragraph of what you learned about statistics that you did not know before:



III. Watch the following video on relative vs absolute risks:  
[https://www.ted.com/talks/gerd\\_gigerenzer\\_why\\_do\\_people\\_fear\\_the\\_wrong\\_things](https://www.ted.com/talks/gerd_gigerenzer_why_do_people_fear_the_wrong_things)

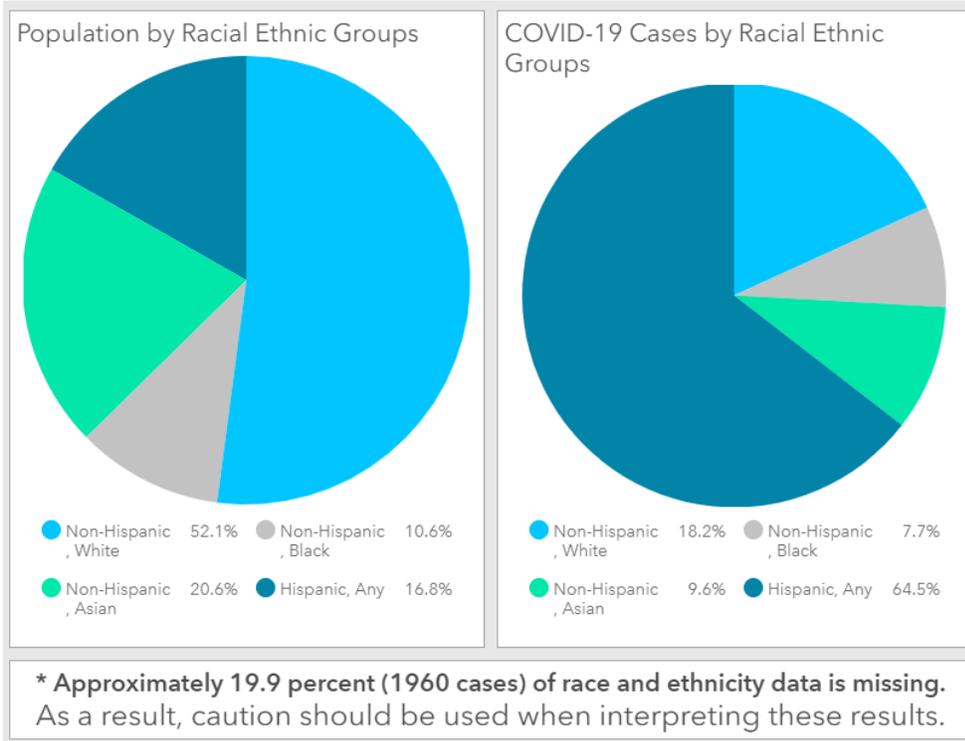
Imagine you could lower your chance of being struck by lightning from 0.5% to 0.4%. Which makes you feel safer, a 0.1% decrease in chance that you will be struck by lightning, or being 20% less likely to be struck by lightning?



Why is it important to be clear about the use of relative and absolute risks when giving people information?

IV. Use the following graph to answer the questions:

### Fairfax County Health Department Cases by Racial Ethnic Group



Note: Data is from May 15<sup>th</sup> 2020

- 1) Which ethnic group has the highest population? \_\_\_\_\_
- 2) Which ethnic group has the highest number of Covid 19 cases? \_\_\_\_\_
- 3) What are some possible reasons that the group with the highest population does not have the highest number of Covid-19 cases?
- 4) How could county health experts use this information to provide Covid-19 support services?
- 5) Why should “caution be used when interpreting these results” ?
- 6) Do the graphs give a true representation of population data and Covid-19 cases?

### Part 3: Thinking Ahead

This year you are going to READ and WRITE more than you have in your previous math classes. Over the summer I want you to think about a few things:

- I. Vocabulary: This year we are going to learn a lot of new words or use words you have heard before differently (population, sample, census etc). Think about how you best learn new vocabulary (flash cards, quizlet, etc) and prepare to study it during the year
  
- II. Articles: Be on the lookout while you read the news about anything that looks like statistics to you. Once a quarter we will find an article that interests us and write about it. You can be on the lookout for articles ahead of time so you will be ready for that assignment!
  
- III. And last, watch the following video on how why taking Statistics can be more important than Calculus:

[https://www.ted.com/talks/arthur\\_benjamin\\_teach\\_statistics\\_before\\_calculus](https://www.ted.com/talks/arthur_benjamin_teach_statistics_before_calculus)

I hope you are excited for a different kind of math class and look forward to seeing you in the fall!



*Struggling in mathematics is not the enemy, any more than sweating is the enemy in basketball; it is part of the process, and a clear sign of being in the game. Math asks our students to think in ways they are not used to thinking; they will be asked to look at the obvious in ways they're not accustomed to, and then we'll ask them to explore the not-so-obvious in similar ways. A rigor of thinking and a clarity of expression is demanded that will stretch them beyond familiar styles. It will also require an honest pursuit; there really are no shortcuts.*