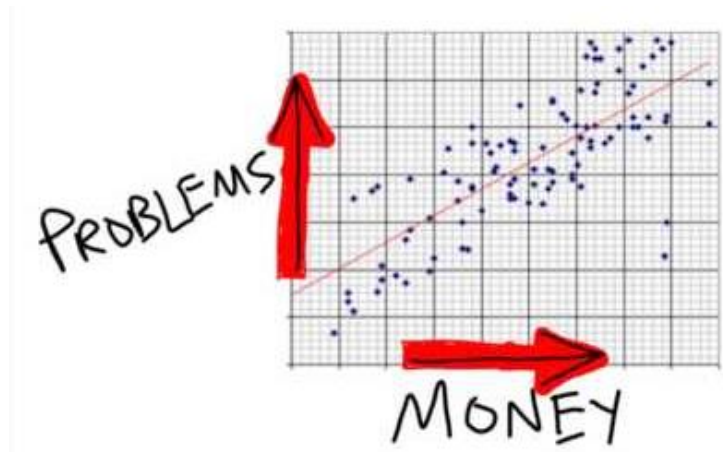# Advanced Mathematical Decision Making
Unit 3: Statistical Studies

Homework

- Does homework day it is assigned
- Does homework right before class
- Next day in class, "WE HAD HOMEWORK?!?"

PROBLEMS

MONEY

Name:_____
Dr. Oldham Fall 2019

MYTHBUSTERS

Internet Explorer vs Murder Rate

- Murders in US
- Internet Explorer Market Share

NBC2 VIEWER VOTE
NBC-2.COM

HOW CONCERNED ARE YOU ABOUT THE ZIKA VIRUS?

VERY	SOMEWHAT	NOT VERY	NOT AT ALL
34%	28%	25%	13%
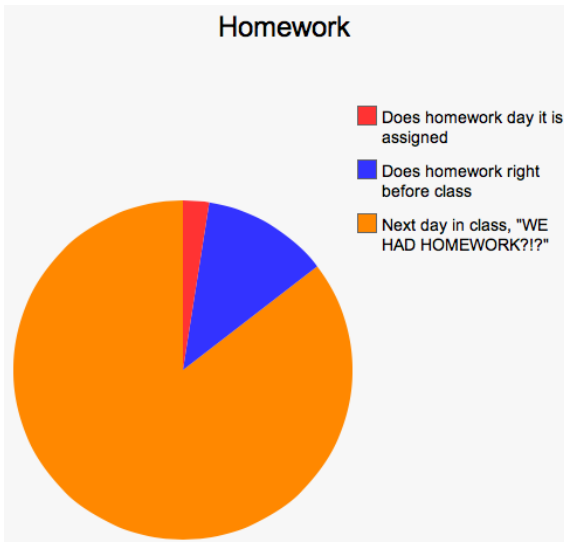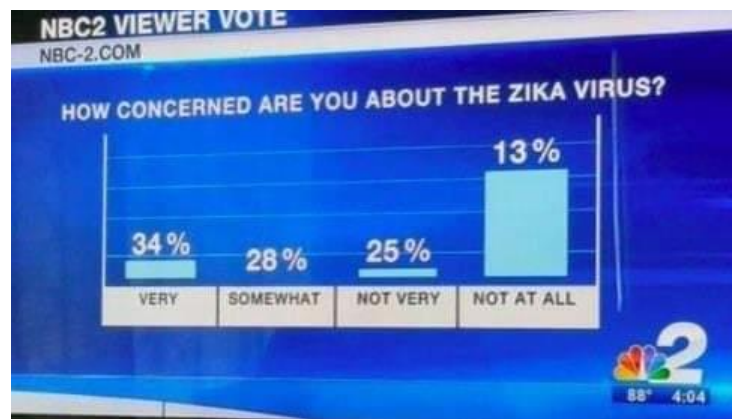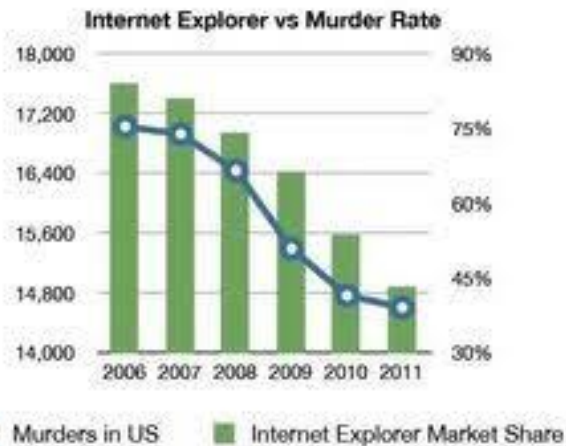
STATISTICS PROJECT: STATISTICAL INVESTIGATION

Please take important note of descriptions and due dates!

PROPOSAL:

DESCRIPTION	DUE DATE	POINTS
Turn in a typed proposal of your statistical investigation. This needs to be VERY thorough, you need to think about and address any possible bias you may encounter. ~What are you going to test and provide your null and alternative hypothesis ~What is your variable of interest ~What will your population be? ~How big will your sample be and how will you select it? ~Will it be observational or experimental? ~Briefly describe what your design will be to collect your data. If observational list questions (you need at least 5) you will ask. If experimental, what is the treatment is and what would your test and control groups be ~How are you going to avoid bias? ~Why does this question interest you	**Friday 10-4**	**20**

DESCRIPTION	DUE DATE	POINTS
The Question Cycle: Answer the following ~ What was your question ~What is your population? ~ State the Null and Alternative Hypothesis and your variable of interest ~ Why did you choose to do a statistical study on this question?	**Tuesday 10-22**	**10**
The Design Cycle: Answer the following ~Describe your design IN DETAIL; Why did you choose what you did? ~ How big was your sample, what method did you use to select them and why? ~ Was your investigation experimental or observational? IF EXPERIMENTAL ~ What were your treatments? ~ Describe the different groupings (what were your test groups and what was your control group) IF OBSERVATIONAL ~What were your questions (Must have AT LEAST 5!) ~Were your questions open or closed? Why did you choose open or closed?	**Tuesday 10-22**	**10**
The Collect Cycle: ~ Show all of the data you collected (best format would be some kind of table) ~ Include totals for either each question OR each test group (depending on experimental or observational)	**Tuesday 10-22**	**10**
The Analyze Cycle: ~ Make two graphs that best show your data (make sure each graph has a title and all axis are correctly labeled. Graphs should be easy to read) ~ For each graph write two sentences that describe what is being shown in the graph	**Tuesday 10-22**	**10**

The Report Cycle: You will need to analyze every part of your statistical investigation. This should be a formal report (similar to the examples I showed you in class). It should read like a newspaper article. Be sure to explain the following ~What was your question, population, and sample? ~Why is your question important? ~Discuss your general design ~Discuss the prevailing hypothesis and whether your research proved or disproved it ~Give details using actual data to describe the results	**Tuesday 10-22**	**10**
REFLECTION You will need to write a reflection paper about your investigation. This is informal; I want you to discuss the actual process of doing this project. Did you find it difficult or easy? Why? Did you encounter bias? Could you have avoided it? Would you change anything if you had to do this again? If so what would you change? What other questions were you left with after you finished your research? If you had a large amount of time and money, what statistical study would you really like to see studied? Why? And any other things that you thought of while working through this investigation.	**Tuesday 10-22**	**10**

PRESENTATION: In your presentation you should outline every part or your statistical investigation. Remember the audience (your classmates) do not know about your question or research. Give them information as you would prospective clients at a company.

DESCRIPTION	DUE DATE	POINTS
Visuals Has an **informative** visual (either video, ppt, poster, song etc.). There is not a lack of information and there is not too much information.	**(Presentations will be on Tuesday 10-22 and Wednesday 10-23)**	**10**
Presentation Presenter(s) fully describe their research without simply reading off of the visual. Information is being presented in an engaging way. Presenter(s) are very knowledgeable about their topic		**15**
Information: Presenter(s) give enough information for the audience to fully understand the full statistical investigation.		**10**
Presenter Evaluations: You will fill out a questionnaire for each presenter. You will give ALL attention to the presenters. -5 points if you put your head down or take out your phone during a presentation.		**15**
Dress for Success		+5

Name:_____/130 =_____

Name:_____/130 = _____

QUESTION: Does completing crosswords help the memory of the elderly?

Ho: Crosswords do help the memory of the elderly
Ha: Crossword do not help the memory of the elderly

My population are people aged 65 or older. My variable of interest is memory. My sample size will be 50 seniors from a local nursing home and I will select it through a systematic sample. I will ask every third senior that I see in the common area. This will be an observational study. Below are some examples of what my questions might be

1) What is your age?
2) What is your gender?

3) How often do you <u>work on</u> a crossword puzzle?

   Never   Once or twice   Every other day   Every day   Multiple times a day

4) How often do you <u>complete</u> a crossword puzzle?

   Never   Once or twice   Every other day   Every day   Multiple times a day

5) Where do you find your crossword puzzles?

   Newspaper   Online   Crossword book   Other:_____

6) On a scale of 1-10 (with 10 being perfect) How would you rate your memory?

7) Do you do any of the following? (Choose all that apply)

   _____ Brain Age/Lumosity   _____Play Video Games

   _____ Read books   _____ Take memory supplements/vitamins (i.e. Ginko Biloba)

   _____ Read Newspaper

8) How would you compare your memory now to when you were in your thirties?
Much worse   Worse   Same   Better   Much Better

I made sure to ask different questions about working and then completion to see if completing the crossword has an impact over just doing it. I also made sure to ask about how they ranked their memory so I could directly compare the crossword to the memory. Question number 7 is used in case they are doing other things that affect their memory other than just the crossword. This question interests me because my grandpa has a better memory than me and he does the crossword every day.

QUESTION: Does completing crosswords help the memory of the elderly?

Ho: Crosswords do help the memory of the elderly
Ha: Crossword do not help the memory of the elderly

My population are people aged 65 or older. My variable of interest is memory. My sample size will be 20 seniors from a local nursing home and I will select it through a systematic sample. I will select every third senior that I see in the common area. This will be an experimental study

I will conduct this study for a week. There will be two groups. Each group will take a memory test (concentration) in the morning. An online version can be found at https://games.yahoo.com/game/concentration-quick-play-flash.html.   I will time how long it take solve the puzzle.

Group 1 (test group): Will work on a crossword puzzle (from USA today) after their morning test. 2 hours later I will ask them do another game of concentration and time them. I will do this for one week.

Group 2: They will take the concentration test and get timed, they will NOT do a crossword, then two hours later will do the concentration game again and get timed.

I plan on doing two comparisons. I will average all the group 1 concentration times and compare it to all of group 2's concentration times to see if there is a difference.

I will also compare each person to themselves (first concentration game to second concentration game) to see if they improved just by getting more practice at a memory game.

This question interests me because my grandpa has a better memory than me and he does the crossword every day.

"The Imitation Game" Journal/Discussion Questions

1) How are statistics used to make life and death situations?

2) Joan and Alan both worked in a field where their culture (being a woman, being homosexual) is viewed as inferior or even illegal. How does this make you feel or think about now that it is 70 years later?

The Question Phase

<u>Null Hypothesis</u> –

<u>Alternative Hypothesis</u> –

<u>Population</u> –

The Design Phase

<u>Observational Study</u> –

<u>Experimental Study</u> –

<u>Treatment</u> –

<u>Variable of Interest</u> –

<u>Control Group</u> –

<u>Placebo</u> –

<u>Placebo Effect</u> –

<u>Categorical Data</u> –

<u>Quantitative Data</u> –

Closed Question –

Open Question –

Biased Question –

Biased Sampling –

Non-Representative Sampling –

Response Bias –

Non-Response Bias –

Observer Effect –

Wording of Questions –

High Variability –

Low Variability –

High Statistical Bias –

Low Statistical Bias –

Undercoverage –

The Collect Phase

Census –

Sampling Method –

Simple Random Sample –

Stratified Random Sample –

Systematic Sample –

Cluster Sample –

Convenience Sample –

The Analyze Phase

Population Mean –

Sample Mean –

Univariate Data –

Bivariate Data –

Histogram –

Bar Graph –

Box & Whisker Plot –

Pie Chart –

Dot Plot –

Frequency Table –

Skewed Right –

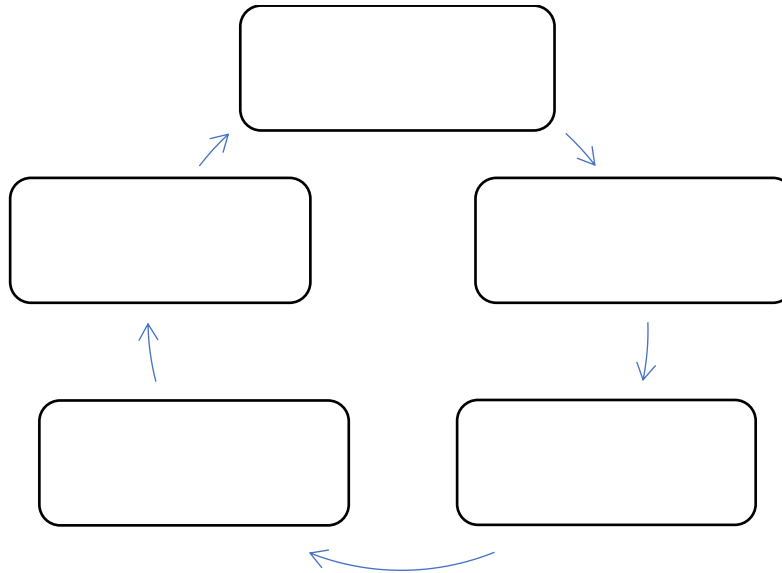Skewed Left –

Outlier –

Bin Size –

The Report Phase

No vocab here ☺

Unit 3: Statistical Investigations
Day 1: The Research Cycle and Forming Hypothesis QUESTION

1. Why do we do statistical research? Take a minute and think of one thing that can be researched and why it should be researched.

In order to properly research a topic researchers follow the **Research Cycle:**

2. Take 5 minutes in your group and brainstorm what you think each part of the cycle would consist of when researching a topic:

	QUESTION	DESIGN	COLLECT	ANALYZE	REPORT
What our group thinks					
What it really is					

Null and Alternative Hypotheses

Every researcher researches a topic because they are trying to prove something. Either proving something as true or false; or proving the effect of a treatment. So the first part of the Question cycle is creating hypotheses.

3. You bought a bag of potato chips and when you opened it up you noticed that it seemed mostly filled with air. The bag claims that there is 28.3 grams of chips in every bag. You think that this is an overestimate. Write a null and alternative hypothesis to this situation

    H_o:

    H_a:

4. Abe works for Honda and he is in charge of research and development for hybrid cars. Currently Toyota claims that the Prius MPG is 45.6. Abe thinks that Toyota is overestimating the gas mileage. Write a null and alternative hypothesis to the claim of the Prius.
    H_o:

    H_a:

5. Katie loves to listen to music while she does her school work. Her teacher does not allow headphones in class but Katie thinks that her grades are better when she listens to her music. (When there is not a set number you are trying to prove just use words!)

    H_o:

    H_a:

6. Super Delicious Pizza claims that they deliver a pizza in 20 minutes or less. Rudy thinks that they can't deliver that fast.

    H_o:

    H_a:

7. Coach Delicousham thinks that her students will score higher on their next test than the students of Coach Pidgeon's class.

    H_o:

    H_a:

Watch the clip from Mythbusters. What are the null and alternative hypotheses for each of the three pain myths? *Season 8 Episode 1: "No Pain no Gain"*
Men v. Women:
    H_o:

    H_a:
Red Heads
    H_o:

    H_a:
Cursing:
    H_o:

    H_a:

Mythbusters: No Pain, No Gain.
As you watch through this episode of mythbusters, identify each part of the research cycle as you see it. Write down what the mythbusters do for each part of the cycle. (Note: Only for the pain myths NOT for the exploding propane tank) *Season 8 Episode 1: "No Pain no Gain"*

QUESTION	DESIGN	COLLECT	ANALYZE	REPORT

Unit 3: Statistical Investigations
Day 2: Experimental v Observational DESIGN

Scenario #1: Jordan is a social networking maniac! Although she prefers Facebook, she also spends a lot of time using Twitter, Pinterest, and Google+. She is curious as to which social networking site is the most preferred for her age group, so she decides to conduct a study. Jordan creates a survey to hand out to other students at her school. She plans to collect data from this survey and analyze the results to help her decide which social networking site is the most preferred.

  1. Is this an experimental or an observational study? How do you know?

*Scenario #2: Mario loves to listen to music, and is convinced that listening to music while taking a test helps him get higher test averages. To prove this, Mario conducts a study amongst his classmates in his AMDM class. With the permission of his teacher, he randomly selects 15 out of 30 students in his class to listen to music during their next test. The remaining 15 students (**control group**) are not allowed to listen to music while they take their test. He intends to compare the test scores from each group, hoping to prove his hypothesis that listening to music while taking a test increases test scores.*

  2. Is this an experimental or an observational study? How do you know?

  3. Give an example of an observational study and an example of an experimental study.

  4. **Variable of Interest** is what it is that the researcher is studying. In the Mythbusters episode the variable of interest was pain tolerance. Note that it is not if a group did better or worse but only what was being tested. What is the variable of interest in scenario 1?

  5. What is the variable of interest in scenario 2?

  6. What are the variables of interest in your 2 examples from question 3?

  7. In experimental studies there is also a **treatment** which is something that the research does or adds to the sample (observational studies do NOT have treatments). In Mythbusters the treatment was the ice bath. What is the treatment in scenario 2?

  8. What is the treatment in your experimental example?

For each of the following examples determine
  a. Observational or Experimental
  b. Variable of Interest
  c. If experimental what were the treatments and how did the researcher decide on who got the treatment
  d. One advantage to this testing method (NOT the possible results- the design itself)
  e. One disadvantage to this testing method (NOT the possible results- the design itself)

9. Mrs. Johnson teaches American History and wanted to help her students do best on their exams. She wanted to see which format of tests students do better on. She flipped a coin for each student in her class. If the coin landed heads up, the student took a multiple choice test. If the coin landed tails up, the student received a fill-in-the-blank exam. Afterward, Mrs. Johnson compared the averages of the two test formats.

10. In World History, Mr. Lew had a similar question. He decided that instead of giving students different tests he would put a question on the bottom of the next test: "Which do you prefer, multiple-choice or fill-in-the-blank questions? Afterwards, Mr. Lew tallied the totals for each format.

11. Mr. Mitchell was interested in the effects of music on student performance. At the bottom of one of his tests, he asked students to circle their favorite type of music: rock, county, or hip-hop. He then computed the averages of each test based on what genre of music they circled and compared results.

12. Ms. Knox's senior English classes are working on theme papers. During 2nd period she allowed students to listen to music on their headphones while working but her 4th period class was required to work quietly without music. Ms. Knox averaged the grades and compared 2nd and 4th period's results.

13. Pick one of the previous scenarios that you think was designed the worst. Change it so that it would be an effective way to collect data.

14. Go back to your two examples for question 3. As a group come up with a way that you could test each one. **Be thorough** when designing and make sure to account for factors that could create error or bias in your study.

OBSERVATIONAL: Make sure that when you design this study that you include what questions you would ask.

EXPERIMENTAL:

Unit 3: Statistical Investigations
Day 3: Questioning (Observational)   ⌈DESIGN⌉
Coach Youngham wants to study if dressing for success actually helps increase test scores.
She decided to do an observational study and ask her students in her classes.

1. Write the null and alternative hypothesis for this study.

2. What is the variable of interest?

3. Go to survey monkey and take these survey questions to test the hypothesis
     https://www.surveymonkey.com/r/DH6XHPT

4. Are these questions a good way to test the hypothesis? Why or why not?

5. Take the new survey
     https://www.surveymonkey.com/r/DP7HV7D

6. Are these questions better than the last set? Why?

7. When creating questions for an observational study it is important to make sure your questions are not
    biased and that your questions will give you the best possible answers. There are two types of ways to
    answer questions. **Closed Questions** are when a participant is given set responses to a
    question/statement. The more responses available the better your results will be. Give an example of a
    closed question.

8. **Open Questions** are questions where the participant is not given set responses so they are able to
    elaborate on a question. Give an example of an open question.

9. A researcher must also be careful about how the questions are worded. The researcher needs to make
    sure that the questions are clear, easily answerable and do not incite bias. Look at the
    question/statement below:
    "School uniforms should not be required"   *agree   disagree*
    Is this a good way to ask this question or a bad way? Why? Rewrite the question so it would be more
    effective.

Each of the following questions/statements are worded ineffectively or badly. For each one:
   a. Identify why it is a bad question/statement
   b. Rewrite the question/statement as an effective **CLOSED** question/statement
   c. Rewrite the question/statement as an effective **OPEN** question/statement

10. I can *always* talk to my parents about my problems   *TRUE/FALSE*

11. Teachers and students like the new school schedule   *TRUE/FALSE*

12. I support all school activities   *TRUE/FALSE*

13. The school really needs more money to help provide after school care for needy children. Would you support a new tax increase to fund schools?

14. Eating healthy promotes longer life. Do you eat healthy everyday?   *Yes/No*

Recall the "Dress for Success" study from yesterday. Let's say that you have hypothesized that dressing for success really does help increase test scores. Discuss and make some notes on how you might collect a sample to test your hypothesis. Remember that the sample should be representative of the population.

1. What is the "population" that you are interested in studying?

2. What factors must be considered when selecting your sample?

Recall that a **census** is a study in which every member of a population of interest is a participant. This may seem like the most accurate way to get information about a population, but in fact it has many problems.

3. For the "Dress for Success" study, what are some reasons why a census would be problematic?

4. The U.S. Census is taken every ten years. What are some reasons why it might be difficult to accurately conduct the U.S. Census?

5. Look back at your vocabulary worksheet at the different kinds of sampling. Let's assume that our population we want to study is Sprayberry High School. Give a way to choose a sample from this population using each of the following sampling methods.

- Simple Random Sampling:

- Stratified Random Sampling:

- Systematic Sampling:

- Cluster Sampling:

- Convenience Sampling:

6. A university is conducting a survey to determine whether a public library has hours of business that satisfy most of its patrons. At the library, students question every tenth library patron who exits the library. What is the sampling method, how do you know?

7. Suppose the students conduct the survey by asking all patrons checking out books to fill out a form and mail it back to the university. What is the sampling method, how do you know?

8. Suppose the university students question 20 library patrons chosen at random on a Monday morning between 9:00 am and 11:00 am. Is this method likely to result in a representative sample or a biased sample? Explain. Would it be biased? Why?

9. The school board is trying to decide if the age of a student affects test achievement because they want to see what year the graduation test should be given. The testing coordinator separated the roster of high school students into freshmen, sophomores, juniors and seniors and then randomly selected 20 students from each group. Each student then took the same version of the Social Studies graduation test and their results were compared.
   a) What is the variable of interest?
   b) What sampling method is being used and how do you know?

10. The University of Georgia wants to find out if its transportation services are adequately serving the students who live off campus. There are 10 apartment complexes that are on the University bus line. Each of these apartment complexes contains a diverse group of students. The researchers randomly select one of the apartment complexes and surveyed every student who lives there about their opinions on the transportation service. What method of sampling is this? How do you know?

11. Mr. Polk thinks that the ACE center is not being used to its full potential by the students at the school. He decides to do a study by asking students how much they have used ACE this semester. He gets a list of student numbers from the front office and uses a random generator to choose 100 numbers off of the list. What type of sampling method is this? How do you know?

12. What if Mr. Polk had taken that same list and selected every 15th student number? What type of sampling method would it be and how do you know?

Group Presentation: CAVITIES AND KIDS

There is a widely held belief that eating candy increases cavities in kids and you want to test if this is true. In your groups you will need to do the following

1. Determine the Null and Alternative Hypothesis for this study
2. What is the variable of interest?
3. What factors do you need to take into account before coming up with a design for this study? What are you going to do to make sure you have an unbiased study?

EXPERIMENTAL
4. Create an experimental design to test your hypothesis. Be very descriptive on how you will run your study. How many subjects? What sampling method? What is your treatment? What are your groups and how will you determine them? How are you going to analyze your results after you have conducted your experiment? Etc.

OBSERVATIONAL
5. Create an observational design to test your hypothesis. Include a minimum of 5 survey questions with mixture of open and closed questions. How big will this sample be? What sampling method will you use to select them? How are you going to use your questions to answer your hypothesis? Etc.

~We are going to practice using excel as a way to input data. Use the data collection sheet to input the class data into excel. Open up a new excel sheet in 365 and SAVE IT before entering any data. Come up with an actual title for the document not just "workbook 1"

~When typing data into excel one of the best ways to do it is to make row A be a summary of each questions you asked for example, Gender so the first cell, drivers license? For the second and so on. You can click and drag the columns so that way the words are not all smushed together Then you can input each person's responses across the row. You can also select "Wrap text" and "Merge and Center" So the words don't bleed into another column (see diagram below)
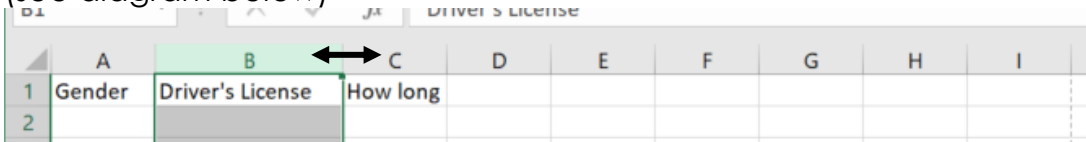
~Once you have typed in all of your data you can do lots of things with it. If you highlight all of your data and then choose "format as table" excel will make a nice color coded table of your table with headings at the top for your questions. Make sure to choose "my table has headers"
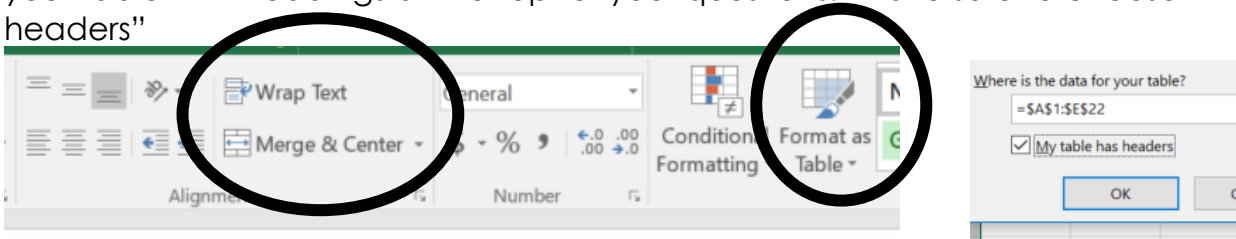
By formatting as a table (and using headers) you can easily sort your data if you are looking for a particular trend in data. For example you could sort by gender, or you could sort by number of tickets

MAKING GRAPHS IN EXCEL

~Open up a new sheet in excel (make sure you are saving often). To open a new sheet go to the bottom and select the + button. Decide what you are curious about comparing, or what proves your hypothesis. For our first graph let's compare gender with number of tickets. Leave the first cell blank and then across the top write female and male, in the first column (again leave the first cell blank) type the number of tickets. Go back to your data and tally up the number in each category and put it into your table.

~Now let's choose a graph that will show a good comparison of the data. A double bar graph would be good because we could easily see which bar is higher (males/females) in each category. Highlight your entire table, then at the top choose insert and then click on the bar graph diagram. A chart will appear directly on your workbook page. The graph it gives you will be very bare bones, so you will need to go through the settings to make it look nicer. FIRST, PLEASE, make sure you change the title so that it is not called "Chart Title". All of the setting are found by holding your mouse in the top right of the screen and using the +, and paintbrush icons.

~Now let's try another kind of graph, a pie chart. A pie chart only shows one type of data not two. Open up a new workbook page. Let's make a pie chart on how people use their phones. (leave the first cell empty) Make a column of each of the choices, never, only at stop lights, sometimes while in motion, often while in motion. At the top of the second column type the question (this will end up being the title of your graph) then count up the total of each category. Follow the same steps as before, highlight the entire data, then insert, then click on the pie chart. It will give you a very ugly generic pie chart that doesn't even have % on it. Click on the plus sign, scroll to Data Labels and the little triangle and select more options. On the more options screen you can click ON percentages and click OFF values. This will put percentages on your graph. You can also play around with all the settings to change the color, or have the percentages show up outside of your graph etc. Make your graph look professional and easy to read- and not just the generic option.
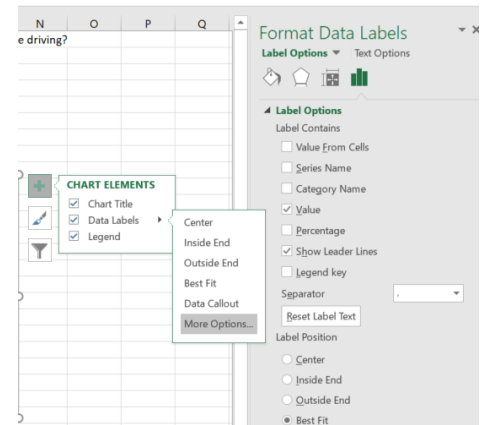
PRACTICE
Make your OWN double bar graph based on the data. It cannot be the one we already did. Pick two questions that you think would be interesting to see them compared. Make it look professional, clean (and not generic). Create a NEW WORD document. Copy and paste your graph into the word document and write a 2-3 sentence summary of what the graph tells us about the data. Then name your file something OTHER than "document 1". Use your name and/or the name of your topic. Then share the document with me (Hannah.oldham@cobbk12.org). I will give you feedback on the document that you will be able to see any time you open the file.

MYTHBUSTERS ....AMDM Edition
Can you really tell the taste difference in water?

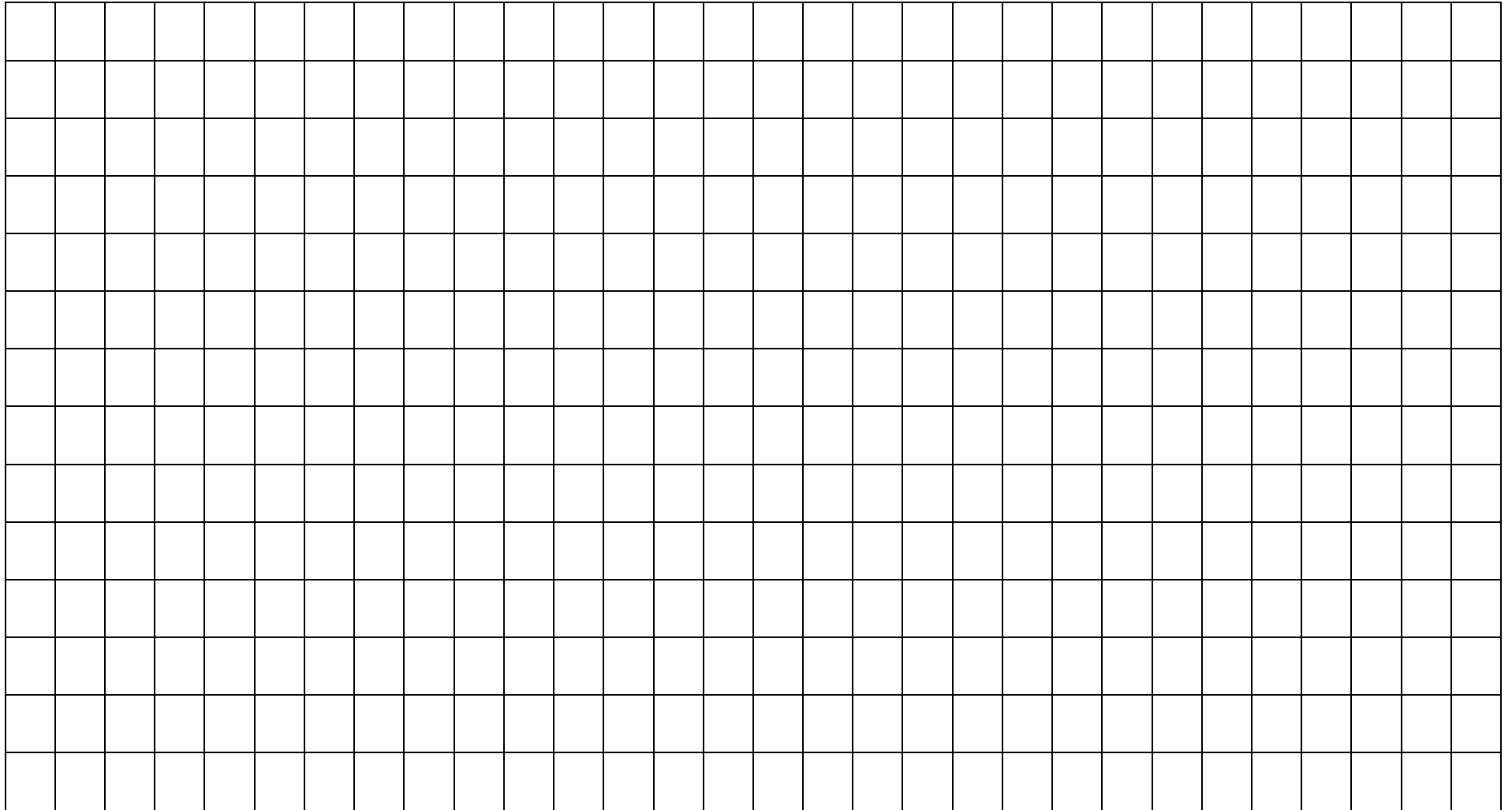**QUESTION CYCLE:** What are the null and alternative hypothesis?

DESIGN CYCLE: Describe the design IN DETAIL!!

	WATER 1	WATER 2	WATER 3	WATER 4	WATER 5
A					
B					
C					
D					
F					

Distribution of Water Preferences

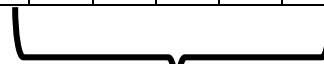☐ Water 1   ☐ Water 2   ☐ Water 3   ☐ Water 4   ☐ Water 5

"A"   "B"   "C"   "D"   "F"

Analysis Questions:

1) Which water had the most A votes?

2) Which water had the most B votes?

3) Which water had the most C votes?

4) Which water had the most D votes?

5) Which water had the most F votes?

6) What would you say are the top two waters?

7) What would you say are the bottom two waters?

8) Based on the data which waters do you think are which?

WATER 1	
WATER 2	
WATER 3	
WATER 4	
WATER 5	

9) On a separate sheet of paper, write a report about the findings. Remember:
- It should have an informative title
- It should briefly describe the design
- It needs to be written in the third person (no "I" or "we")
- Describe the results using actual data! (percentages and numbers)

"Is yawning contagious" Season 1: Episode 9

1. What are the mythbusters trying to test?

2. What is their original design?

3. What is the variable of interest?

4. What was wrong with the pilot study? What are they going to change?

5. In the large scale study how was the **treatment** administered?

6. How many subjects did they test?

7. What were the results?

8. What were some weaknesses of their design?

"Slapping Sense" Season 9 Episode 12 ("Operation Valkyrie")

9. What are the null and alternative hypothesis for the slapping myth?

10. How are they going to make sure that every slap is the same?

11. What are the three ways that Grant is going to go through the experiment?

12. What tests are they going to have Grant do?

13. What were the results for Grant?

14. Why did they have to do the test again?

15. How is this test different from Grant's test?

16. What were the results from this study?

17. What is one strength of the overall design (for Grant/ or for Kari/Tory) and what is one weakness with their design?

Video games can make better students, surgeons

By Steve Leblanc,
Parents, don't put away those video games just yet — today's gamer may be tomorrow's top surgeon.

Researchers who gathered in Boston for the American Psychological Association convention detailed a series of studies suggesting video games can be powerful learning tools — from increasing younger students' problem-solving potential to improving the suturing skills of laparoscopic surgeons.

One study even looked at whether playing *World of Warcraft*, the world's biggest multiplayer online game, can improve scientific thinking.

The conclusion? Certain types of video games can have benefits beyond the virtual thrills of blowing up demons.

In one Fordham University study, 122 students in fifth, sixth and seventh grades were asked to think out loud for 20 minutes while playing a game they had never seen before. Researchers studied the children's statements to see if playing the game improved cognitive and perceptual skills.

While older children seemed more interested in just playing the game, younger children showed more interest in setting up a series of short-term goals needed to help them learn the game.

"The younger kids are focusing more on their planning and problem solving while they are actually playing the game, while adolescents are focusing less on their planning and strategizing and more on the here and now," said Fordham psychologist Fran Blumberg, who conducted the research last year and plans to submit it for publication. "They're thinking less strategically than the younger kids."

Studies by Iowa State University psychologist Douglas Gentile and Dr. James Rosser, chief of minimally invasive surgery at Beth Israel Medical Center in New York, compared surgeons who play video games to those who don't.

The edge went to gamer surgeons, they found, even after taking into account differences in age, years of medical training and the number of laparoscopic surgeries performed. In laparoscopic procedures, surgeons use small incisions, thin surgical tools and video cameras to see inside the body.

One study of 33 laparoscopic surgeons found that those who played video games were 27% faster at advanced surgical procedures and made 37% fewer errors than those who didn't.

Advanced video game skills also were a good way to predict suturing abilities, according to their study, which was published in the Archives of Surgery in 2007.

Research Gentile and Rosser conducted for a second as yet unpublished study of 303 laparoscopic surgeons found those who played video games requiring spacial skills and hand dexterity performed better at those skills when tested later compared to surgeons who didn't play videos, Gentile said.

"The single best predictor of their skills is how much they had played video games in the past and how much they played now. Those were better predictors of surgical skills than years of training and number of surgeries performed," Gentile said. "So the first question you might ask your surgeon is how many of these (surgeries) have you done and the second question is 'Are you a gamer?'"

Some videos games even appear to sharpen scientific thinking skills.

Researchers at the University of Wisconsin at Madison looked at a random sample of 2,000 chat room posts about *World of Warcraft* to see what the players were discussing. The game is set in a fantasy world where players hunt, gather and battle to move their characters to higher levels. Players who work together succeed faster.

The research found the game encouraged scientific thinking, like using systems and models for understanding situations and using math and testing to investigate problems.

The vast majority of the discussion participants, 86%, shared knowledge to solve problems and more than half, 58%, used systematic and evaluative processes, researchers found.

But the news wasn't all good. Other studies confirmed earlier research that found students who played violent games tended to be more hostile, less forgiving and believed violence to be normal compared to those who played nonviolent games. And those who played more entertainment games did poorer in school and were are greater risk of obesity.

Happiness is a warm controller: Study shows that gaming can help the elderly lead happier lives

Video games are good for you. Studies conducted over the past fifteen years have shown that games can do everything from improve problem solving acumen to help fight the effects of Alzheimer's disease, and can even lower feelings of hostility. As the Violent Content Research Act of 2013 plums forward to study the effects of violent video games on children, other researchers are finding more and more evidence of how games can aid seniors. A new study by North Carolina State researchers has found that games can help older people feel better about life – they can make people happy.

In their study "Successful aging through digital games: Socioemotional differences between older adult gamers and non-gamers," NC State researchers, Dr. Jason Allaire and Dr. Anne McLaughlin, surveyed 140 people 63-years-old and up about how often they played video games, and their feelings of well-being, both social and emotional.

Their findings were enlightening. "The research published here suggests that there's a link between gaming and better well-being and emotional functioning," said Dr. Allaire, bringing a smile to all those senior still carrying around a Nintendo DS with *Brain Age* in it, "We are currently planning studies to determine whether playing digital games actually improves mental health in older adults."

Most telling, the study found that even seniors who only played games occasionally tended to think of their lives as emotionally and socially good. Those that didn't play games tended towards negative emotions and even more cases of depression.

Seniors haven't replaced the all-encompassing 18- to 35-year-old male demographic that keeps the engine of the video game industry running quite yet, but games and game hardware are increasingly becoming fixtures in senior living. The Windows Kinect SDK has allowed medical professionals and researchers to use the Kinect for more than making Han Solo do an awkward jig. The University of Missouri, for example, started using Kinect for physical therapy sessions in 2011. The motion sensor can be used to monitor how elderly patients move and help prevent falls that might break fragile bones. The National Senior League of bowlers actually hosts a championship tournament using only *Wii Sports*, since it offers a close approximation of the sport but little of the physical impact.