POSNACK SCHOOL

Statistics Honors Summer Assignment

Dear Parents/Students,

In the summer time, many necessary mathematical skills are lost due to the absence of daily exposure. The loss of skills may result in a lack of success and unnecessary frustration for students as they begin the new school year. The purpose of this math assignment is to set the stage for instruction for the 2018-2019 school year. Packets are to be downloaded, printed out, and worked on neatly in the packet or on a separate piece of paper. Additionally, students should attempt all problems without calculators. The completed packet is due on the first day of school during math class and will be worth 30 points.

The packet is a review of previously taught concepts. Each concept includes a quick review and practice. Some might even include review videos students can access. Additional help can be found at www.khanacademy.org. These skills are required to be successful in the upcoming year. We will be briefly reviewing this information on the first day of school, and then moving into the class curriculum.

Thank you,

The High School Math Team

Dear Students,

Welcome to Statistics Honors! This class is going to be extremely interesting, challenging, and hopefully fun. It is impossible to cover all the material required in the time allotted, so you will have some work to do over the summer. The following packet contains topics and definitions that you will be required to know in order to succeed in Statistics Honors for the 2018-2019 school year. You must familiarize yourselves with each of the concepts. Upon your return, we will review this material and you will be taking a summative assessment the first week of school. I will not be covering them in class, so it is up to you to prepare yourself for a challenging summative as soon as you return. I will always expect you to have started studying before I cover a topic in class, so this will be your chance to get into good study habits.

You should purchase your digital textbook from the bookstore as soon as possible. There you will find plenty of reference material to complete the summer assignment. You can also go to www.stattrek.com which is another excellent source of reference material. You must learn to navigate the Microsoft Excel chart-making software. This is the software we will be using in class. Follow these steps:

1. Open an Excel document. You may need to add the Data Analysis Add-in
2. Click "File" then "Options" at the bottom on the left
3. Click "Add-ins" on the left, then "Manage" at the bottom
4. From the drop-down box, click "Excel Add-ins" then "Go"
5. The following four boxes should be checked:
    A. Analysis ToolPak
    B. Analysis ToolPak-VBA
    C. Euro Currency Tools
    D. Solver Add-in
6. Click "Ok"

Now you will have the ability to make bar charts, pie charts, scatter plots, and line graphs with Excel. Follow these steps:

1. Open an Excel document
2. Click the "Insert" tab at the top of the page
3. In the middle at the top, you will see "Recommended Charts" and to its right, you will see the different types of charts you can use: bar graphs, pie charts, scatter plots, line graphs, etc.
4. Click on the desired type of graph and practice trying to make bar charts, pie charts, and scatter plots

There are plenty of YouTube and Khan Academy videos to help you learn to navigate the chart making abilities of Excel, and believe it or not, it's actually fun! I will expect you to have this software on your computer on the first day of school. You will be using this software on the first assessment

Have a great summer!
Sincerely,
Mr. Jacobs

PART 1 - Definitions

Write a 1 or 2 sentence definition for each of the following vocabulary words.   You can use your online textbook if needed.   www.stattrek.com is a good resource!

1. **Mean:**

2. **Median:**

3. **Mode:**

4. **Range:**

5. **Categorical Variables:**

6. **Quantitative Variables:**

7. **Univariate Data:**

8. **Bivariate Data:**

9. **Population:**

10. **Sample:**

11. **Parameter:**

12. **Statistic:**

13. **Unimodal:**

14. **Random Sample:**

15. **Outlier:**

16. **Center:**

17. **Spread:**

18. **Symmetry:**

19. **Bar Chart vs. Histogram:**

20. **Dot Plot:**

21. **Stem Plot:**

22. **Box Plot:**

23. **Quartiles:**

24. **Interquartile Range (IQR):**

25. <u>Left Skewed</u>:

26. <u>Right Skewed</u>

<u>**PART 2 - Data Analysis**</u>

In a rural town in Oklahoma during the 1970's, the following data was collected concerning the heights children at the age of 15 years (in inches):

M	67	65	66	69	68	78	67	68	66	79	63	65	67	66	66	65
F	63	64	62	51	64	63	64	65	52	63	63	62	61	65	63	62

A. Calculate the following statistics for the male and female data separately:

	Females	**Males**	**Males without outliers**	**Females Without Outliers**
Mean				
Median				
Mode				
Range				

A. Use separate dot-plots to graph the data for the males and females. Draw them in the space provided below.

B. Looking at your plot, which data points would you consider to be outliers?

C. Summarize the effects of the outliers on the mean, median, mode, and the range. Do the outliers cause them to increase, decrease, or stay the same?
1. Females
   a. Mean:
   b. Median:
   c. Mode:
   d. Range:
2. Males
   a. Mean:
   b. Median
   c. Mode
   d. Range:
D. In statistics, often you will be required to interpret your data. In a paragraph use the summary statistics to compare males and females.

PART 3 – Categorical or Quantitative?

Determine if the variables listed below are quantitative or categorical.   Place an "X" in the appropriate column.

Variable	Categorical	Quantitative
Time it takes to get to school		
Number of minors living in a household		
Hair color		
Temperature of a cup of coffee		
Salary		
Gender		
Smoking status		
Height		
Amount of milk spilled		
Age of Oscar winners		
Type of shoes worn		
Jelly bean flavor		
Type of cheese		
Number of shoes owned		

PART 4 – Bar Charts and Pie Charts

In 1997 there were 92,353 deaths from accidents in the United States. Among these were 42,340 deaths from motor vehicle accidents, 11,858 from falls, 10,163 from poisoning, 4051 from drowning, and 3601 from fires. The rest were listed as "other" causes. In the spaces below, construct a bar chart and a pie chart using this data. You can make the charts by hand, or you can use a chart-making software like Excel. If you use software to create the charts, copy and paste them in the spaces below.

A. NEATLY create a well-labeled bar graph of the distribution of causes of accidental deaths. Be sure to include a bar for "other causes."

B. NEATLY create a well-labeled pie graph of the distribution of causes of accidental deaths. Be sure to include "other causes"

PART 5 – Box and Whiskers Plots

BOX AND WHISKER PLOTS – a box and whisker plot breaks the data into quartiles (25% of the data in each part). It shows the minimum (also called the lower extreme), the maximum (upper extreme), the median, the **lower quartile** (also called Q1) and the **upper quartile** (also called Q3). The lower quartile is the median of the lower half of a data set. The upper quartile is the median of the upper half of a data set. A box and whisker plot looks like:

Figure 1. Box and whisker plot
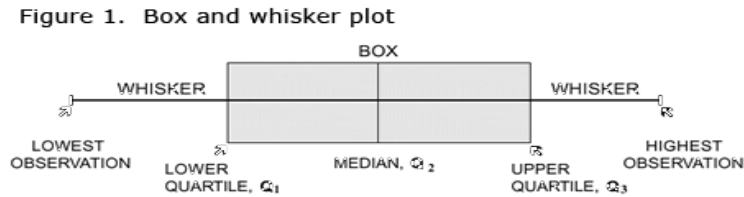
Here are the scores on the Survey of Study Habits and Attitudes (SSHA) for 18 first-year college women:

154	109	137	115	152	140	154	178	101
103	126	126	137	165	165	129	200	148

and for 20 first-year college men:

108	140	114	91	180	115	126	92	169	146
109	132	75	88	113	151	70	115	187	104

A. Compute numerical summaries for each gender.

	Women	Men
Mean		
Minimum		
Lower Quartile (Q$_1$)		
Median		
Upper Quartile (Q$_3$)		
Maximum		
Range		
IQR		

B. Use the minimum, Q1, median, Q3, and maximum to make a box plot for each gender. You can make the boxplots by hand, or you can use the boxplot software at http://www.imathas.com/stattools/boxplot.html. Don't forget to give the boxplots titles. Compare the two distributions.

PART 6 – Regression

The USDA reported that in 1990 each person in the United States consumed an average of 133 pounds of natural sweeteners. They also claim this amount has decreased by about 0.6 pounds each year.

A. If 1990 could be considered "year 0", which of the above numbers represents the slope and which represents the y-intercept?

B. What is the equation of the line of best fit using the slope and y-intercept above?

C. Predict the average consumption of sweeteners per person for the year 2016.

PART 7 – Correlation

Sue wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man each woman dates. Here are the data (heights in inches):

Women:	66	64	66	65	70	65
Men:	72	68	70	68	74	69

A. Construct a scatter plot of the data by hand or with Excel. You must include labels.

B. Describe the association between the heights of the women and the men they date.

PART 8 – Probability

1. A lottery is to be held to select the student who will live in the deluxe room in a dormitory. There are 100 seniors, 150 juniors, and 200 sophomores who applied. Each senior's name is placed in the lottery 3 times; each junior's name, 2 times; and each sophomore's name, 1 time. What is the probability that a senior's name will be chosen?

     A. 1/8   B. 2/7   C. 1/2   D. 2/9   E. 3/8

2. Which of the following has a probability closest to 0.5?

     A. The sun will rise tomorrow.

     B. It will rain tomorrow.

     C. You will see a dog with only three legs when you leave the room.

     D. A fair die will come up with a score of 6 four times in a row.

     E. There will be a plane crash somewhere in the world within the next five minutes.

3. If a coin is tossed twice, what is the probability that on the first toss the coin lands heads and on the second toss the coin lands tails?

     A. 1/6   B. 1/4   C. 1   D. 1/3   E. 1/2

4. If a coin is tossed twice what is the probability that it will land either heads both times or tails both times?

     A. 1/8   B. 1/4   C. 1   D. 1/6   E. 1/2

5. Calculate the following probabilities and arrange them in order from least to greatest.

    I.   The probability that a fair die will produce an even number. _____

   II.   A random digit from 1 to 9 (inclusive) is chosen, with all digits being equally likely. The probability that when it's squared the answer will contain the digit 1. _____

   III.   The probability that a letter chosen from the alphabet will be a vowel. _____

   IV.   A random number between 1 and 20 (inclusive) is chosen. The probability that its square root will not be an integer. _____

ORDER: _____, _____, _____, _____

1. The mean age of 12 of the members attending a mathematics department faculty meeting is 37.   Mr. Smith, who is 50, arrives late.   What is the average of all 13 members?   Show your work!!!

2. The class average in a class of 15 is 86%.   If one additional student earns a 100% in the class, what is the new class average?

3. What is the missing letter in this series: a   c   e   ?   i

4. What is the missing letter in this series: a   z   b   ?   c   x

5. How many times a day do the minute hand and the hour hand on a clock form a straight line?

6.

7. You are in the dark, and on the floor there are six shoes of three colors, and a heap of twenty-four socks, black and brown.   How many socks and shoes must you take into the light to be certain that you have a matching pair of socks and a matching pair of shoes?

8. There are three playing cards lying face up, side by side.   A five is just to the right of a two.   A five is just to the left of a two.   A spade is just to the left of a club, and a spade is just to the right of a spade.   What are the three cards?

9. The following verse spells out a word, letter by letter.   "My first" refers to the word's first letter, and so on.   What's the word that this verse describes?

    My first is in fish but not in snail
    My second in rabbit but not in tail
    My third in up but not down
    My fourth in tiara not in crown
    My fifth in tree you plainly see
    My whole a food for you and me