What students need to know for…
STATISTICS (Regular and AP)

Students expecting to take Statistics should demonstrate the ability to:

General:

- keep an organized notebook
- take good notes
- complete homework every night
- be active learners
- ask questions and participate in class
- seek help outside of class if needed
- work with others
- work with and without a calculator

Specific Math Skills

1) **Algebra**
    - can manipulate with ease fractions, decimals and variables in a variety of settings including in equations and rational functions

2) **Graphing**
    - read and interpret the graphs of linear, quadratic, cubic, quartic, exponential, logarithmic, logistic and sinusoidal functions and their properties
    - identify the domain and range of functions
    - recognize end behaviors of graphs

3) **Exponents and logarithms**
    - be familiar with the exponent and logarithms rules
    - know how to work with negative and fractional exponents
    - be familiar with the graphs of exponential and logarithmic functions and their properties
    - solve equations involving logarithms and rational exponents

4) **Data Representation**
    - Read and create pie charts and stem-and-leaf-plots
    - Read and create histograms and box plots

Welcome to Statistics! Statistics will be challenging but rewarding!! This full year course requires that everyone work hard and study for the entirety of the class. You will need a large binder or notebook and a graphing calculator.

Review Problems:

*NOTE: Show all of your work. Your teacher may give a quiz on this material at the beginning of the year. **You should "Google" the topic if you are unsure how to complete the examples.**

Name_____ **Date**_____

I. Qualitative Data Representations

A) Display the data in the table below in both a **Bar Graph** (bars are separated) and a **Pie Chart**. Then, write several sentences about what you notice.

Weekly Home Expenditures	
Mortgage	$2,100
Food	$435
Natural Gas	$83
Electricity	$105
Water	$79
TV/Internet/Phone	$150

II. Quantitative Data Representations

B) Display the data in the table below in both a **Box Plot** and a **Stem-and-Leaf Plot**. Identify the mean, median, and mode of the data set. Then, write several sentences about what you notice.

Batting Averages for the top 30 MLB and AL players
.328 .322 .321 .320 .313 .311 .311 .309 .308 .307 .306 .305 .304 .304 .304 .303 .303 .302 .301 .300 .299 .298 .297 .297 .296 .296 .296 .295 .295 .294 .294

C) Display the data in the table below in a **Histogram** (bars are touching to show that x is a continuous variable). Make sure to label your x-axis with your data ranges, and your y-axis with the corresponding frequencies. Then, identify the mean, median, and mode of the data set.

Teen Pregnancy Rates	
1. New Mexico 93/1,000	13. Tennessee 76/1,000
2. Mississippi 90/1,000	14. Alabama 73/1,000
3. Texas 85/1,000	15. Florida 73/1,000
4. Nevada 84/1,000	16. North Carolina 72/1,000
5. Arkansas 82/1,000	17. California 72/1,000
6. Arizona 82/1,000	18. New York71/1,000
7. Delaware 81/1,000	19. Kentucky 71/1,000
8. Louisiana 80/1,000	20. Alaska 69/1,000
9. Oklahoma 80/1,000	21. Illinois 68/1,000
10. Georgia 78/1,000	22. Wyoming 68/1,000
11. South Carolina 76/1,000	23. Colorado 66/1,000
12. Hawaii 76/1,000	24. West Virginia 65/1,000

III. Relevant Data and Interpreting

For each experiment, specify who or what is the experiment being done to, what is being experimented, why, where and how the experiment is being done, and how the results will be measured.

Members of the research and development division of a bicycle tire manufacturer are investigating tread life of rubber bicycle tires. They have suggested that a study be conducted to determine whether bicycle tires produced using a new synthetic rubber compound have a longer tread life than the tread life of bicycle tires produced using the standard rubber compound.

A researcher in the division suggested the study be designed in the following way. Select 60 identical bicycles and randomly assign 30 of those bicycles to one group, A, and the rest to a second group, B. All 60 bicycles will be equipped with front tires produced using the standard rubber compound. However, the bicycles in group A will be equipped with rear tires produced using the new synthetic rubber compound, while the bicycles in group B will be equipped with rear tires produced using the standard rubber compound.

A total of 60 bicyclists will be randomly selected from the population of students at a local university who regularly ride a bicycle. The 60 bicycles will be randomly assigned to the 60 students (with a different bicycle assigned to each student), and the students will be asked to ride the bicycles for a six-month period. At the end of the six-month period, the researcher will compare the mean amounts of rear tire tread wear for the bicycles in the two groups.

A drug company currently sells a prescription pain reliever that has been shown to be effective at lowering arthritis pain. However, since the drug also causes stomach irritation in some patients, the company has created a new formulation that it hopes will reduce that side effect.

To see if the new formulation reduces the occurrence of stomach irritation for users of the pain reliever, the company conducted a small preliminary study to compare the new formulation with the current pain reliever. In the preliminary study of 100 subjects with arthritis, 50 were randomly assigned to take the current pain reliever and 50 were randomly assigned to take the new formulation.

IV. Combinations and Permutations

In English we use the word "combination" loosely, without thinking if the **order** of things is important. In other words:

"My fruit salad is a combination of apples, grapes and bananas" We don't care what order the fruits are in, they could also be "bananas, grapes and apples" or "grapes, apples and bananas", it's the same fruit salad.

"The combination to the safe was 472". Now we **do** care about the order. "724" would not work, nor would "247". It has to be exactly **4-7-2**.

So, in Mathematics we use more *precise* language:

- If the order **doesn't** matter, it is a **Combination (** ${}_nC_r$ **)**.
- If the order **does** matter it is a **Permutation (** ${}_nP_r$ **)**.

Write the following in factorial form and then simplify if possible.

${}_nC_r =$

${}_nC_0 =$

${}_nC_2 =$

${}_nC_{n-1} =$

${}_nC_n =$

${}_nP_r =$

${}_nP_1 =$

${}_nP_2 =$

${}_nP_{n-1} =$

${}_nP_n =$

How many permutations of 3 **different** digits are there, chosen from the ten digits 0 to 9 inclusive?

A password consists of two letters of the alphabet followed by three digits chosen from 0 to 9. Repeats are allowed. How many different possible passwords are there?

V. Simplify (by canceling factors):

A) $\frac{100!}{97!}$ B) $\frac{(n+1)!}{(n-1)!}$

VI. Find all values of x (to the nearest thousandth) which make the statement true.

$\sin x = e^{-x^2}$, *where* $-\pi \le x \le \pi$

VII. Solve for x:

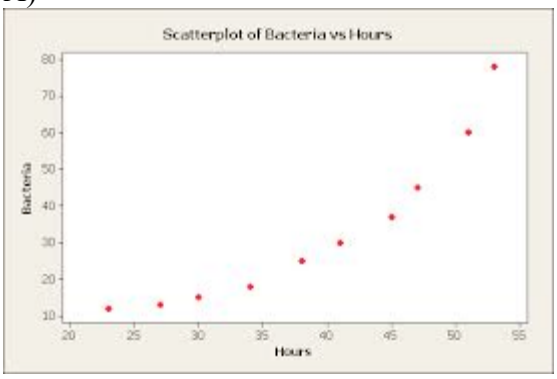
A) $1 + \frac{x}{3} = \frac{4}{5}$ B) $\frac{2}{3} - \frac{5}{7} = x$ C) $\frac{3}{8} = \frac{4}{1-x}$

D) $\frac{6}{x} + \frac{x}{2} = 4$ E) ln (x-2) = 4 F) -3ln(x+1) = 2

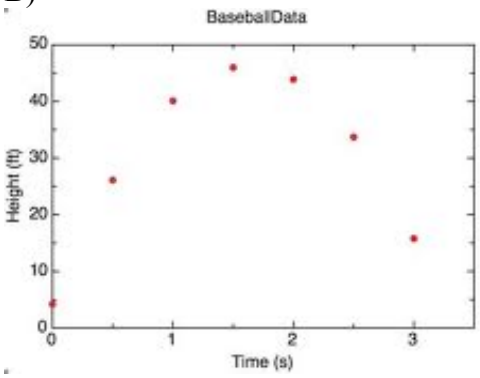
G) ln(x-2) + ln(3)= 5 H) $4e^{3x-2} = 8$ I) $100 = 200e^{-0.06x}$

VIII. Describe the relationship (linear, exponential, etc) between the variables in the following scatterplots.

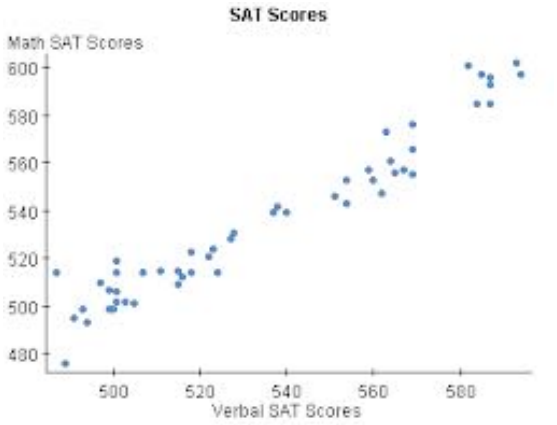
A)



B)



C)



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