

## AP STATISTICS SUMMER PACKET

Mathematician: \_\_\_\_\_

Dear Future Statistician,

I can't begin wait to begin our mathematical journey of Statistics this school year. This course will be very different from any math course that you have ever taken. It is a combination of Math, English, and Science Communication skills. There is much more reading and writing than what you are used to in a math class. AP Statistics is not an easy class but I know that every student can be successful with the right amount of effort.

There are a couple of items that you need to take care of before we begin our mathematical journey together this upcoming school year. The first one is that you will need a graphing calculator or else you will not have much success in this course. There are many things that the graphing calculator will do for us so that we don't have to calculate the math by hand. We use our graphing calculator almost every day. I recommended that you have a calculator from the TI-84 family. If you have an TI-83, I will transfer some programs to your calculator but you can still be successful. Please have a plan to purchase or utilize the calculator loan program through Willowbrook. Please don't forget to charge your calculator or change the batteries! If you have an N-Spire calculator that is acceptable but I will not show students how to use this specific model of calculator during class.

The second item is that you need to join our Google Classroom. This is worth a homework grade. I will be making announcements as well as posting answer keys, class notes and other important materials such as AP Statistics Memes about the importance your calculator. The class code to join our Google Classroom is

kn55yrx

Finally, you need to complete this packet. The concepts in this packet are basic knowledge needed to pass the AP test as well as some basic algebra skills that we will use throughout our journey. Since AP Statistics is very different from other math courses, you need to train your brain to think differently. If you get stuck then please go to [www.kahnacademy.com](http://www.kahnacademy.com). The answers to the summer packet will be posted on our Google Classroom as well as the Google Drive folder (This can be accessed through Classroom). This summer packet will count as a grade and is due on the first day of school!

Please note that there is a textbook but I will distribute copies on the first day of school. You will check this textbook out from the math department for the school year. There is a pdf of the textbook in the Google Drive folder on Classroom, if you are interested in looking at the enjoyment that is to come!

If you have any questions, please email me at [cskala@dupage88.net](mailto:cskala@dupage88.net). I am 95% confident that you will have between 99% and 100% of enjoyment in this this course. HAHAHAHA (By the end of next school year, you will get my joke!) Have a great summer and I look forward to meeting you this fall!

Sincerely,

Ms. Skala

## Algebra Review: Literal Equations

Solve each literal equation for the indicated variable.

1. Solve  $y = x - k$  for  $x$ .

2. Solve  $-3x + 2c = -3$  for  $x$

3. Solve  $g = \frac{1+2a}{b}$  for  $a$

4.  $z = \frac{x - \mu}{\sigma}$  for  $\sigma$

5.  $z = \frac{x - \mu}{\sigma}$  for  $\mu$

6.  $0.05 = 1.96\sqrt{\frac{pq}{n}}$  for  $n$

$$7. -1.64 = \frac{60 - \mu}{\sigma} \quad \text{and} \quad 1.96 = \frac{95 - \mu}{\sigma} \quad \text{for } \mu \text{ and } \sigma.$$

$$8. 0.75 = 0.8 + \sqrt{\frac{pq}{n}} \text{ for } n$$

## Algebra Review: Algebraic Equations

Solve for the variable.

$$9. 0.05 = 1.96 \sqrt{\frac{0.6 \bullet 0.4}{n}}$$

$$10. 0.75 = 0.8 + \sqrt{\frac{(0.8)(0.2)}{n}}$$

$$11. y = \frac{1}{3}x + 4 \text{ where } x = 3$$

$$12. y = 0.8x^2 + 1.2x + 1 \text{ where } x = 3$$

$$13. z = \frac{x - \mu}{\sigma} \text{ where } x = 4, \sigma = 12, z = 15$$

## Algebra Review: Log Equations

For each of the models below, predict  $y$  when  $x = 2$ .

$$14. \hat{y} = 1.2 + 0.8 \log(x)$$

$$15. \hat{y} = 1.2 + 0.8 \sqrt{x}$$

$$16. \hat{y} = 1.2(0.8^x)$$

$$17. \log \hat{y} = 1.2 + 0.8x$$



# Mean, Median, Mode, and Range

First, arrange the numbers in order by size.

Example: 3, 5, 5, 6, 8, 10, 12

## Mean

the average  
of the numbers

1. Add the numbers together.
2. Divide by how many numbers were added.

$$3+5+5+6+8+10+12=49$$

$$49 \div 7 = 7$$

**The mean is 7.**

## Median

the middle  
number of  
a sequence

The median is the middle number when numbers are arranged in order by size.

For an even number of numbers, the median is the average of the two numbers in the middle.

**The middle  
number is 6.**

**The median is 6.**

## Mode

the number  
that occurs  
most often

Find the number(s) that occurs most often in the sequence (there may be more than one).

**There are two 5s  
and one of each of  
the other numbers.**

**The mode is 5.**

## Range

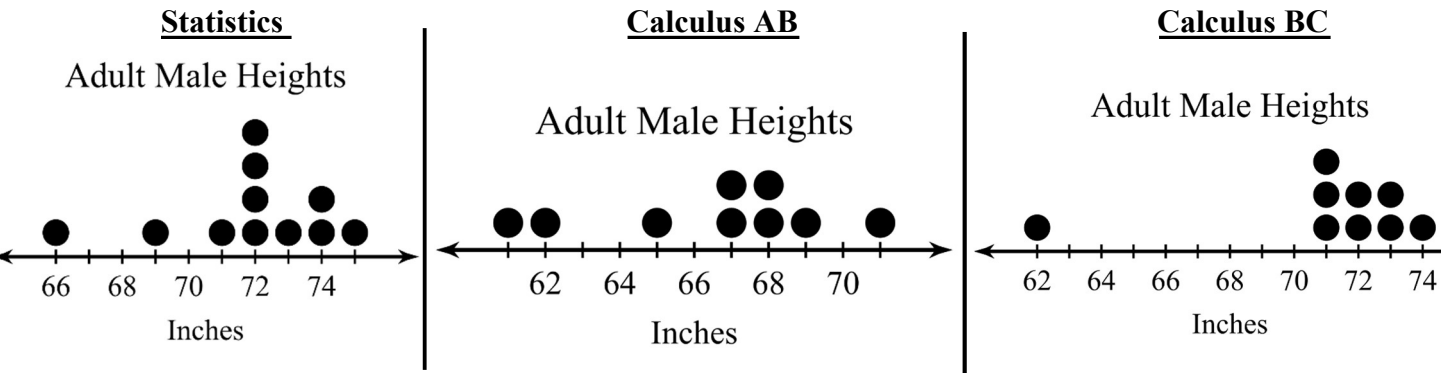
the difference  
between the  
lowest and  
highest values

Subtract the smallest number from the largest number.

$$12 - 3 = 9$$

**The range is 9.**

The following data are the height of the male students in AP Statistics, AP Calculus AB and AP Calculus BC. Assume no two students are in two of these AP Courses.



18. Determine the following statistics for each of the distributions of heights for these classes. Show work where possible!

	Statistics	Calculus AB	Calculus BC
Mean			
Median			
Mode			
Range			

19. For each distribution, draw a triangle around the median and draw a circle around the mean. For which distributions if any, is the mean less than the median?

20. An outlier is an observation (data point) that falls outside the overall pattern. What is the outlier for the distributions of height in Calculus BC?

21. Are they any outliers in the distribution of height of the Statistics students? Explain.

22. Make 3 comparisons between the distributions of data. A comparison statement should use have specifics about which distribution that you are discussing, numerical values from the table of statistics and a word that implies a comparison.

**EX.** The outlier for the distribution for heights of Calculus BC students, 62 inches, is **LESS THAN** the outlier for the distribution of heights of Statistics students, 66 inches.

1.

**Words of  
Comparison**

The same as  
Greater than  
More than  
Less than  
Is larger than  
Is smaller than

2.

3.

## Algebra Review: Linear Regression

To Start:

1. Press **ON**.
2. Press **CLEAR**.
3. Press **2<sup>nd</sup> Y=**, scroll down to option 4, press **ENTER**, then press **ENTER** again.
4. Press **Y=**, clear  $y_1$  through  $y_0$ .
5. Press **STAT**, scroll down to option 4:ClrList, press **ENTER** **2<sup>nd</sup> L<sub>1</sub>**, **2<sup>nd</sup> L<sub>2</sub>** **ENTER**.

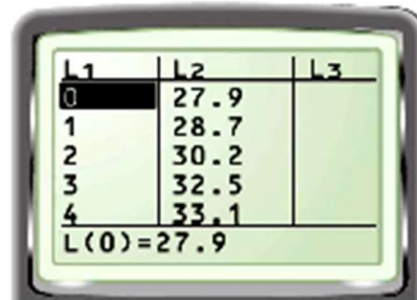
Follow the instructions below to begin using your graphing calculator.

Example:

Year	1997	1998	1999	2000	2001	2002
Sales (billions of dollars)	27.9	28.7	30.2	32.5	33.1	34.3

### STEP 1: Enter data

Press **STAT** and select Edit. Enter years Since 1997 (0, 1, 2, 3, 4, 5) into list 1 ( $L_1$ ). These will be the x-values. Enter sales (in billions of dollars) into list 2 ( $L_2$ ). These will be the y-values.



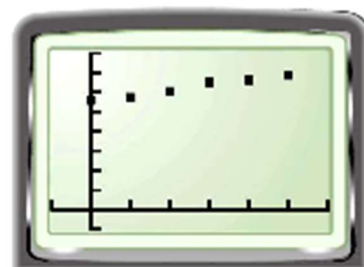
### STEP 2: Choose plot settings

Press **2<sup>nd</sup> Y=** and select Plot1. Turn Plot1 On. Select scatter plot as the type of display. Enter  $L_1$  for the Xlist and  $L_2$  for the Ylist.



### STEP 3: Make a scatter plot

Press **ZOOM** 9 to display the scatter plot so that the points for all data pairs are visible.

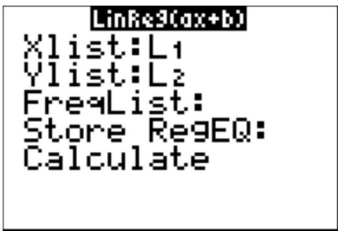









#### STEP 4: Perform regression

Press **STAT**. From the CALC menu,  
Choose #4 LinReg(ax+b).

- You should have one of the two screens below:

TI – 84	TI – 83
	
1.) Move your cursor to the “Store RegEQ:” 2.) Press  , use your arrow to select Y-VARS 3.) Press  4 times.	1.) Press  , use your arrow to select Y-VARS 2.) Press  3 times.

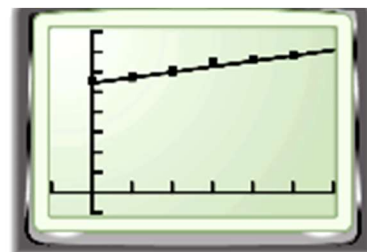
#### STEP 5: Equation of the Line of Best Fit

The  $a$ - and  $b$ -values  
given are for an equation of the form  $y = ax + b$ .  
Rounding these values gives the equation  
 $y = 1.36x + 27.2$ . Because  $r$  is close to 1, the  
data have a strong positive correlation.






#### STEP 6: Graph of Line of Best Fit

Press **GRAPH**



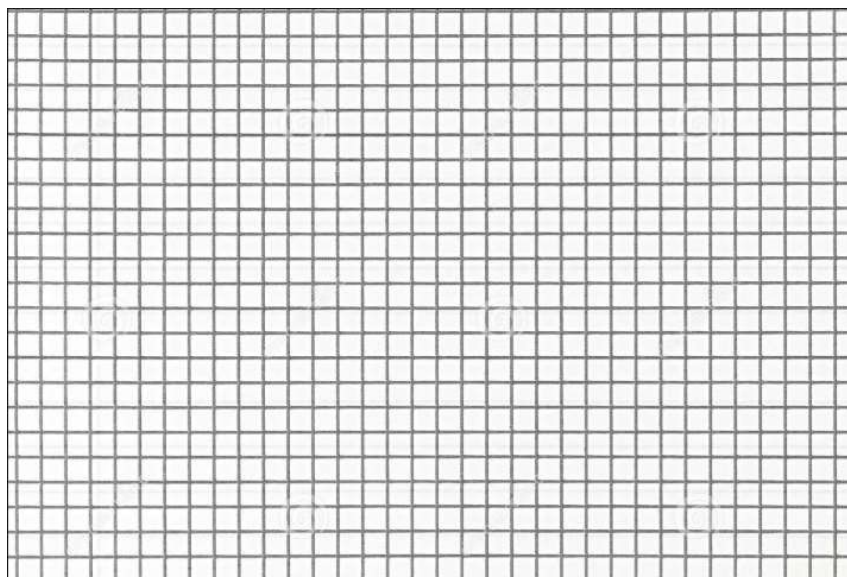
#### Step 5: Using the Linear Regression

To predict a $y$ – value	To predict an $x$ – value
<ul style="list-style-type: none"><li>Press  , the down arrow and type in the <math>x</math> – value provided. Then hit </li></ul> <p>Hint: If you get an error, your window probably isn't big enough!</p>	<ul style="list-style-type: none"><li>You will need to substitute the <math>y</math> – value into the equation and solve by hand.</li></ul>

23. The following table shows the total pay and hours worked for several employees at Mo's Bagels. *Round to the nearest hundredth if necessary.*

Hours Worked (x)	10	18	41	20	1	33	24	38	27	32
Pay (in dollars \$) (y)	55	103	328	110	5.50	239	144	304	148	152

- A) Graph a scatterplot of your data. Be sure label and scale your axis.



- B) Use your graphing calculator to find the equation of the line of best fit.

Equation: \_\_\_\_\_

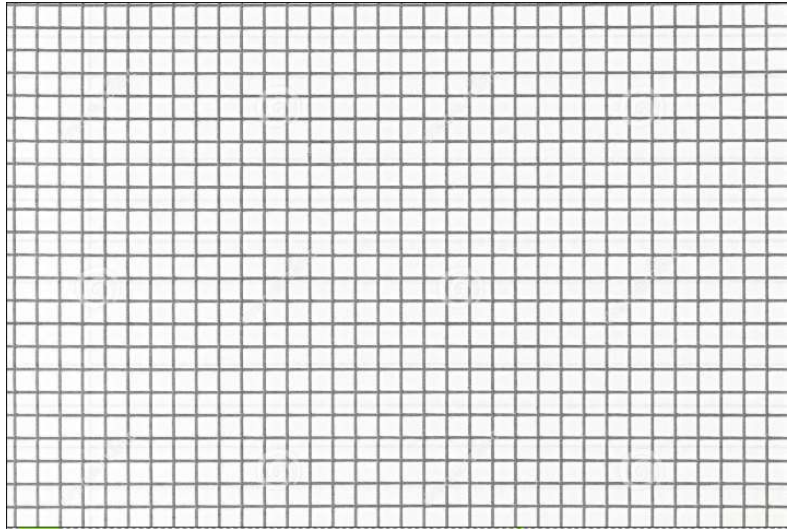
- C) Using your equation from part B, determine the total pay of an employee who works 50 hours.

- D) Use the equation from part B to find out the amount of hours an employee worked if his total pay was \$202.47.

24. Joey Chestnut currently holds the Nathan's hotdog eating competition record. The table below shows how many hotdogs Joey Chestnut consumed in minutes.

Time (minutes)	Number of Hot Dogs eaten
0	0
3	20
8	52
12	68

- A) Create a scatterplot of these data. Be sure to label your axis!



- B) Using your calculator, approximate the best-fitting line for the data.

- C) Using your model, how many hotdogs could Joey Chestnut eat if the competition lasted 60 minutes?

25. Jamie investigated hair and eye color.

	Light hair	Dark hair	TOTAL
Blue eyes	8	5	13
Other	7	10	17
TOTAL	15	15	30

- a) One of the people is chosen. Calculate the probability of choosing someone with blue eyes.
- b) One of the people is chosen. Calculate the probability of choosing someone with dark hair.
- b) One of the people is chosen. Calculate the probability of choosing someone with fair hair and no blue eyes.

26. Debbie counts the videos and DVDs she has and places them into categories.

	Videos	DVDs	TOTAL
Film	43	16	
Comedy		5	17
Sport	21		
TOTAL		24	100

- a) Complete the table above.
- b) One of the items is chosen. Calculate the probability of choosing a DVD.
- c) One of the items is chosen. Calculate the probability of choosing a comedy on video.
- d) A DVD is chosen. Calculate the probability of it being sport.
- e) A DVD is chosen. Calculate the probability of it not being comedy.

**Answers will be posted on Google Classroom!**