

# **Summer Work Packet for MPH Math Classes**

**Students going into  
AP Statistics**

**Sept 2022**

**Name:** \_\_\_\_\_

→ **This assignment is meant to prepare you for the first quarter of AP Statistics, it is completely optional.**

→ **Your completion of this packet will benefit your knowledge of statistics but will not directly impact your grade.**

There are two parts to the packet:

1. Reading and Vocabulary: You will use a free online Statistical tutoring site that will give you information on variable and data displays. Then complete the vocabulary list.
2. Practice Problems: After reading all the material you should also be able to complete the questions on the remaining pages of this packet.

Complete problems in the space provided to the best of your ability. Be sure to show all work and construct all data displays neatly.

**If you have any questions, please**

**email Mrs. LaPointe at [klapointe@mphschool.org](mailto:klapointe@mphschool.org)**

# Part 1: Reading

Follow the steps below:

- Go to [www.stattrek.com](http://www.stattrek.com)
- Click on “AP Statistics” from the left side menu
- On the left side of the screen is a list of general topics. Under each general topic are a list of subtopics.

**You should read the following subtopics to complete the vocabulary list and questions:**

**General Topic:** Exploring Data

**Subtopics:** Variables  
Population Vs. Sample  
Central Tendency  
Variability  
Position

**General Topic:** Charts and Graphs

**Subtopics:** Charts and Graphs  
Patterns in data  
Dotplots  
Histograms  
Stemplots  
Boxplots  
Scatterplots  
Comparing Data Sets

## **AP Statistics Summer Assignment**

### Part 1: Vocabulary List

Please define each of the following terms from the information on the stattrek website. When asked provide a UNIQUE example or sketch of the word... One NOT given on the website and Not the one your friends use.

1. Categorical Variables

Example:

2. Quantitative Variables

Example:

3. Discrete Variables

4. Continuous

5. Univariate Data

6. Bivariate Data

7. Population

Example:

8. Sample

Example:

9. Median

10. Mean

Formula:

11. Outlier

12. Parameter

13. Statistics

14. Range

15. Standard Score (z-score)

Formula:

16. Center

17. Spread

18. Variance:

Formula:

19. Standard Deviation

Formula:

20. Symmetry

Sketch:

21. Unimodal

Sketch:

22. Bimodal

Sketch:

23. Skewness

Sketch Skewed left:

Sketch Skewed right:

24. Uniform

Sketch

25. Gaps

Sketch:

26. Outliers

Sketch:

27. Dot plots

28. Bar chart

29. Histogram

30. Difference between bar chart and histogram

31. Stemplots

32. Boxplots

33. Quartiles

34. Range

35. Interquartile Range

36. Four ways to describe data sets

37. Types of graphs that can be used for comparing data

## CATEGORICAL OR QUANTITATIVE

Determine if the variables listed below are *quantitative* or *categorical*.

1. Time it takes to get to school
2. Number of people under 18 living in a household
3. Hair color
4. Temperature of a cup of coffee
5. Teacher salaries
6. Gender
7. Smoking
8. Height
9. Amount of oil spilled
10. Age of Oscar winners
11. Type of Depression medication
12. Jellybean flavors
13. Country of origin
14. Type of meat
15. Number of shoes owned

## STATISTIC—WHAT IS THAT?

A statistic is a number calculated from data. Quantitative data has many different statistics that can be calculated. Determine the given statistics from the data below on the number of homeruns Mark McGuire hit in each season from 1982 – 2001.

|    |    |    |    |   |    |    |    |
|----|----|----|----|---|----|----|----|
| 70 | 52 | 22 | 49 | 3 | 32 | 58 | 39 |
| 39 | 65 | 42 | 29 | 9 | 32 | 9  | 33 |

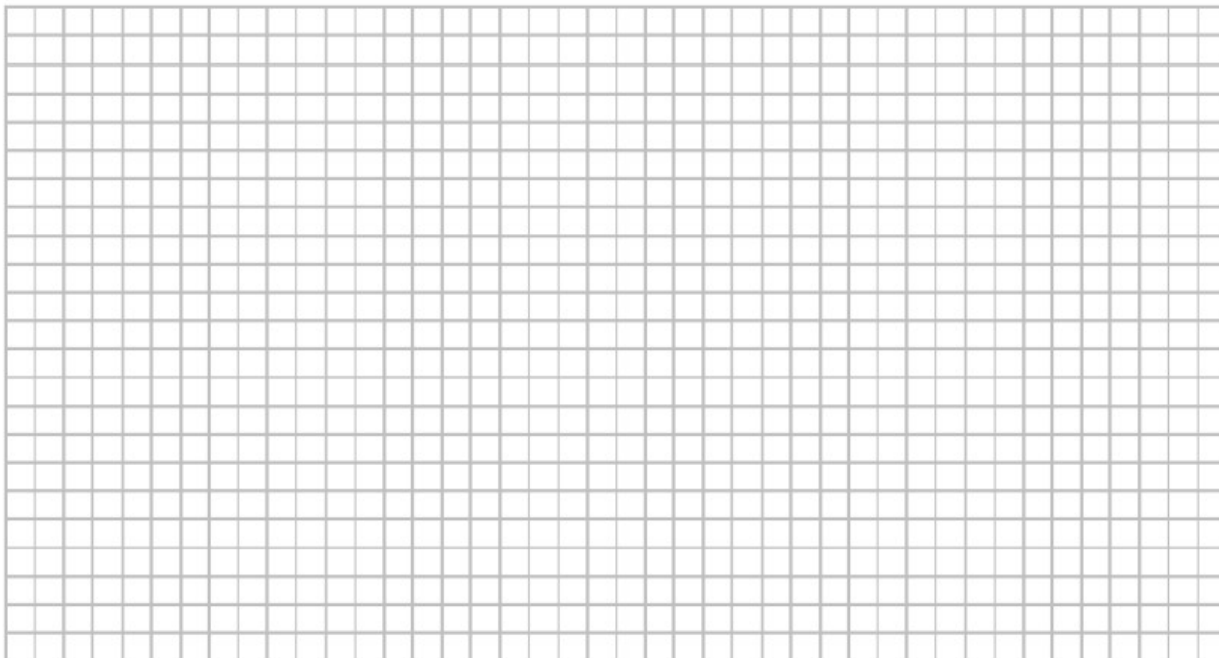
|         |  |
|---------|--|
| Mean    |  |
| Minimum |  |
| Maximum |  |
| Median  |  |
| Q1      |  |
| Q3      |  |
| Range   |  |
| IQR     |  |



## ACCIDENTAL DEATHS

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.

- Find the percent of accidental deaths from each of these causes, rounded to the nearest percent.
- What percent of accidental deaths were from “other” causes?
- NEATLY create a well-labeled **bar graph** of the distribution of causes of accidental deaths. Be sure to include an “other causes” bar.



- A pie chart is another graphical display used to show all the categories in a categorical variable relative to each other. Create a pie chart for the accidental death percentages. You may try using a software or internet source to make one and paste in the space below. (*Microsoft Excel works well*)

# IT'S A TWISTA

The data below gives the number of hurricanes that happened each year from 1944 through 2000 as reported by *Science* magazine.

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 2 | 1 | 4 | 3 | 7 | 2 | 3 | 3 | 2 | 5 | 2 | 2 | 4 | 2 | 2 | 6 | 0 | 2 | 5 | 1 | 3 | 1 | 0 |
| 3 | 2 | 1 | 0 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 3 | 0 | 1 | 3 | 2 | 1 | 2 | 1 |
| 1 | 0 | 5 | 6 | 1 | 3 | 5 | 3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

- a. Make a dotplot to display these data. Make sure you include appropriate labels, title, and scale. The graph paper should help ensure you space your markings (you may use x's or dots) consistently.



# SHOPPING SPREE!

A marketing consultant observed 50 consecutive shoppers at a supermarket. One variable of interest was how much each shopper spent in the store. Here are the data (round to the nearest dollar), arranged in increasing order:

|    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|
| 3  | 9  | 9  | 11 | 13 | 14 | 15 | 16 | 17 | 17 |
| 18 | 18 | 19 | 20 | 20 | 20 | 21 | 22 | 23 | 24 |
| 25 | 25 | 26 | 26 | 28 | 28 | 28 | 28 | 32 | 35 |
| 36 | 39 | 39 | 41 | 43 | 44 | 45 | 45 | 47 | 49 |
| 50 | 53 | 55 | 59 | 61 | 70 | 83 | 86 | 86 | 93 |

- a. Make a stemplot using tens of dollars as the stem and dollars as the leaves. Make sure you include appropriate labels, title and key.



# WHERE DO OLDER FOLKS LIVE?

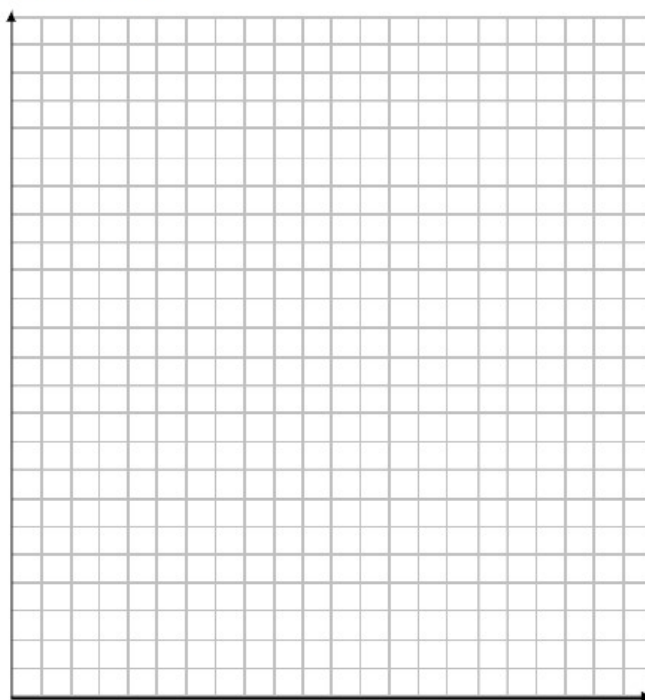
This table gives the percentage of residents aged 65 or older in each of the 50 states.

| State       | Percent | State          | Percent | State          | Percent |
|-------------|---------|----------------|---------|----------------|---------|
| Alabama     | 13.1    | Louisiana      | 11.5    | Ohio           | 13.4    |
| Alaska      | 5.5     | Maine          | 14.1    | Oklahoma       | 13.4    |
| Arizona     | 13.2    | Maryland       | 11.5    | Oregon         | 13.2    |
| Arkansas    | 14.3    | Massachusetts  | 14.0    | Pennsylvania   | 15.9    |
| California  | 11.1    | Michigan       | 12.5    | Rhode Island   | 15.6    |
| Colorado    | 10.1    | Minnesota      | 12.3    | South Carolina | 12.2    |
| Connecticut | 14.3    | Mississippi    | 12.2    | South Dakota   | 14.3    |
| Delaware    | 13.0    | Missouri       | 13.7    | Tennessee      | 12.5    |
| Florida     | 18.3    | Montana        | 13.3    | Texas          | 10.1    |
| Georgia     | 9.9     | Nebraska       | 13.8    | Utah           | 8.8     |
| Hawaii      | 13.3    | Nevada         | 11.5    | Vermont        | 12.3    |
| Idaho       | 11.3    | New Hampshire  | 12.0    | Virginia       | 11.3    |
| Illinois    | 12.4    | New Jersey     | 13.6    | Washington     | 11.5    |
| Indiana     | 12.5    | New Mexico     | 11.4    | West Virginia  | 15.2    |
| Iowa        | 15.1    | New York       | 13.3    | Wisconsin      | 13.2    |
| Kansas      | 13.5    | North Carolina | 12.5    | Wyoming        | 11.5    |
| Kentucky    | 12.5    | North Dakota   | 14.4    |                |         |

Histograms are a way to display groups of quantitative data into bins (the bars). These bins have the same width and scale and are touching because the number line is continuous. To make a histogram you must first decide on an appropriate bin width and count how many observations are in each bin. The bins for percentage of residents aged 65 or older have been started below for you.

- Finish the chart of Bin widths and then create a histogram using those bins on the grid below. Make sure you include appropriate labels, title and scale.

| Bin Widths | Frequency |
|------------|-----------|
| 4 to <6    | 1         |
| 6 to <8    |           |
| 8 to <10   |           |
|            |           |
|            |           |
|            |           |
|            |           |



# SSHA SCORES

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

- Put the data values in order for each gender. Compute numeral summaries for each gender.

| Women   |  |  | Men     |  |
|---------|--|--|---------|--|
| Mean    |  |  | Mean    |  |
| Minimum |  |  | Minimum |  |
| Q1      |  |  | Q1      |  |
| Median  |  |  | Median  |  |
| Q3      |  |  | Q3      |  |
| Maximum |  |  | Maximum |  |
| Range   |  |  | Range   |  |
| IQR     |  |  | IQR     |  |

- Using the minimum, Q1, Median, Q3, and Maximum from each gender, make parallel boxplots to compare the distributions.





**ALGEBRA PAGE!**

The prerequisite for AP Statistics is Algebra II. You will not find very much equation solving in this course, but some quick review of Algebra I and Algebra II content will be helpful.

To answer the following refer to the readings on [www.stat Trek.com](http://www.stat Trek.com) "Survey Sampling Methods".

The 7 types of sampling designs are:

- A. voluntary response      B. convenience      C. simple random      D. stratified  
E. cluster      F. multistage      G. systematic

1. The Maryland division of Weight Watchers is doing research to determine how many people on the Weight Watchers diet cheat at least once a week. They decide that anonymous surveys will give them an accurate representation but do not have time to get responses from ALL the Maryland Weight Watchers people.

*Read the scenarios below and determine which of the 7 sampling methods best describes it.*

- \_\_\_\_\_ I. Randomly select 10 members from each of the WW centers in the Maryland division.  
\_\_\_\_\_ II. Use an alphabetical listing of all Maryland division members. Randomly choose a starting person on the list. Then select every 20<sup>th</sup> person thereafter.  
\_\_\_\_\_ III. Randomly select 2 or 3 branches of the Maryland division and survey every member of that center.  
\_\_\_\_\_ IV. Send out the survey to every member of the Maryland division. Place drop boxes in each WW center. Anyone who returns a survey will be in the sample.  
\_\_\_\_\_ V. The Maryland regional office is in Baltimore so they survey members at the WW center in Baltimore.  
\_\_\_\_\_ VI. From a numbered list of all Maryland division members use a computer to randomly select 100 numbers and survey all members with those corresponding numbers.

2. What is the population of interest in the WW situation?

*Here is a formula that is used often in AP Statistics:  $z = \frac{x - \bar{x}}{s}$ . Use your algebra skills...*

1. If  $z = 2.5$ ,  $\bar{x} = 102$  and  $x = 100$ , what is  $s$ ? Show your work.

2. If  $z = -3.35$ ,  $\bar{x} = 60$ , and  $s = 4$ , what is  $x$ ? Show your work.

*It is expected that you have a thorough understanding of linear functions and scatterplots.*

1. 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 2005.

2. The following equation can be used to predict the average height of boys anywhere between birth and 15 years old:  $y = 2.79x + 25.64$ , where  $x$  is the age (in years) and  $y$  is the height (in inches).

a. What does the slope represent in this problem? Interpret it in the context of this problem/situation.

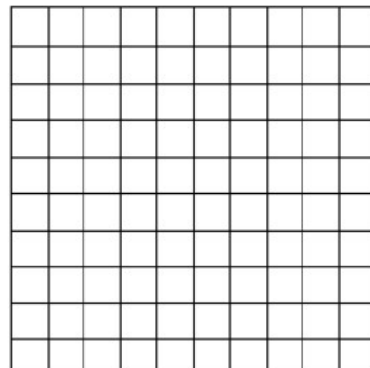
b. What does the y-intercept represent in this problem? Interpret it in context.

3. Hilary 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):

|               |    |    |    |    |    |    |
|---------------|----|----|----|----|----|----|
| <u>Women:</u> | 66 | 64 | 66 | 65 | 70 | 65 |
| <u>Men:</u>   | 72 | 68 | 70 | 68 | 74 | 69 |

A. Construct a scatterplot of the data.

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



*You are expected to have a basic understanding of simple probability. If you find these problems “less than intuitive”, there are numerous sites available online that provide basic probability explanations.*

1. A special lottery is to be held to select the student who will live in the only 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.  $\frac{1}{8}$       B.  $\frac{2}{9}$       C.  $\frac{2}{7}$       D.  $\frac{3}{8}$       E.  $\frac{1}{2}$

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? (Hint: What are the possible outcomes when you toss a coin twice?)

- A.  $\frac{1}{6}$
- B.  $\frac{1}{3}$
- C.  $\frac{1}{4}$
- D.  $\frac{1}{2}$
- E. 1

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

- A.  $\frac{1}{8}$
- B.  $\frac{1}{6}$
- C.  $\frac{1}{4}$
- D.  $\frac{1}{2}$
- E. 1

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:** \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_