**Name** _____

# AP Statistics Summer Packet



THE RESULTS ARE PRETTY CONCLUSIVE, IT SEEMS THAT 75.8% OF THE 65.2% OF GPs WHO BOTHERED TO VOTE WERE 29.3% HAPPY WITH 14.2% OF THE PROPOSALS...AND THE REST WEREN'T SURE!

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## AP Statistics Summer Work 2022

Welcome to AP Statistics! This is one of the few courses in high school that contain clear connections to all other subject areas and we are pleased that you have chosen to learn more about it.

**What you need to know about this class:** This is probably unlike any course that you have taken. I would say that it is a combination of Math, English, and Science. Communication skills are essential, and there is much more reading and writing than what you are used to in a math class. AP Statistics is not an easy class. No Advance Placement class is easy. It is a very rewarding course and a very important one, in my opinion, but can be quite difficult at times. Since it is an AP course, it is considered to be college-level. The mathematics required for this course may not be as difficult as in other advanced math courses, but some of the concepts can be very confusing. You can expect to spend time studying outside of class, as well as in class. However, AP Statistics is special. It is a course that combines both mathematical and verbal skills. On the AP exam, you will be asked to write descriptive paragraphs and concluding sentences. You will have to explain the reasoning behind the method you use and your conclusions. In addition, there is a great deal of material that we are expected to cover by April's end, so you need to be committed to giving it your absolute best effort day in and day out.

**Purpose of this packet:** Not surprisingly, it can be difficult to cover all the required material for this course and still have time for a desired review period for the AP exam. I believe that completion of this packet might free up some time to cover the required curriculum, which is significant. It might allow us to spend extra time on the more difficult topics. In addition, this packet will hopefully provide you with a good introduction to what Statistics (the field and this course) is about so that you can make the decision about whether or not you want to remain signed up for the class.

### Required Materials to Complete Summer Work

- The textbook for this course is:
  Starnes, Yates, and Moore, *The Practice of Statistics (for AP),* 4th ed**,** 2010, Freeman
  ISBN-13- 9781429245593

- If you will not have your textbook until classes begin, then you need to get a copy of Chapter 1 which we have copied to a pdf file. This is posted on google classroom so that you can access it from your ipad or computer.

- Make sure you have a graphing calculator. We recommend the TI *n*spire CX or TI nspire CX CAS. We will be using a TI *n*spire in class to do demonstrations. However, the textbook explains how to do statistics on both the TI-*n*spire and the TI-84/TI 89, so as long as you have one of these calculators you will be fine. Students who will be taking Calculus in future courses should get the CAS version (TI nspire CX CAS).

Read the *Instruction* page carefully and complete your summer work before school starts. It is recommended that you work on this over the entire summer and not do it all at once at the beginning or end of summer. You will be tested on this material the first week of school.

## Instructions for Summer Work

☐ Read Chapter 1 in the textbook and complete the *Guided Reading Notes* as directed. Make sure your handwriting is organized and legible. This is very important on the AP test and will also be important in class.

☐ Complete the *Technology Corner* problems and *Section Exercises* as directed in the guided notes. Complete these on a separate page. Be sure to label your pages with Section numbers, page numbers and question numbers. Again, make sure your writing is organized and legible. Be sure to answer the questions completely and explain when required.

☐ Complete the *Ch. 1 AP Statistics Practice Test* on pages 78-81 from your textbook. You will have a Chapter 1 test within the first week of returning to school in the fall (most likely during the second class period) and the format of the test will be similar to this practice test.

Email if you have any questions over the summer about your assignment.

Meet me on the first day of school with:
    1) your ***completed*** Guided Reading Notes
    2) your Section exercises and technology corner problems
    3) your ***solutions*** to the CH. 1 AP Statistics Practice Test.

This summer work assignment will be your first graded assignment of the 2021-2022 school year. The test on this material will be your first assessment.

Email Mr. Olszewski "Mr. O" at:     tolszewski@archbishopcurley.org
E-mail  Ms. Jenkins at:             cjenkins@archbishopcurley.org

# Chapter 1: Exploring Data

# Vocabulary:

| | | |
|---|---|---|
| individual | association | median |
| variable | dotplot | quartiles |
| frequency table | stemplot | $Q_1$, $Q_3$ |
| relative frequency table | histogram | IQR |
| distribution | SOCS | five-number summary |
| pie chart | outlier | minimum |
| bar graph | symmetric | maximum |
| two-way table | | boxplot |
| marginal distributions | $x$ | resistant |
| conditional distributions | spread | standard deviation |
| side-by-side bar graph | variability | variance |

☐ Start a Vocabulary section for your notebook and define the above vocabulary terms from Chapter 1
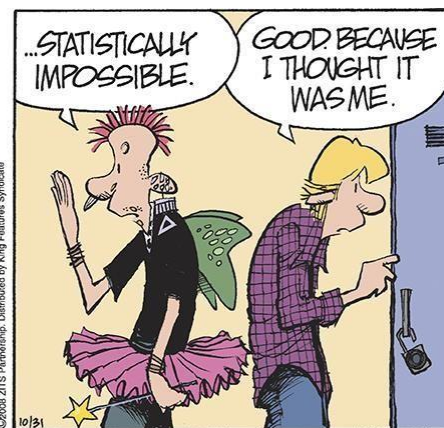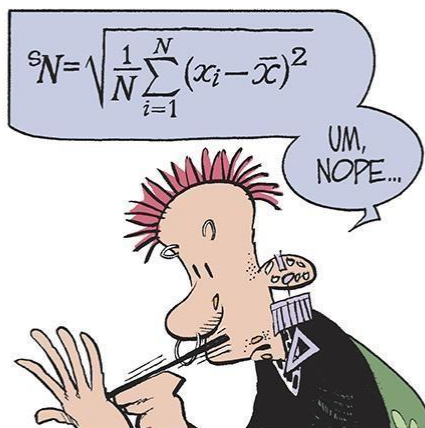
## READ:  Data Analysis: Making Sense of Data (pp.2-7)

1. Individuals are…

2. A variable is …

3. When you first meet a new data set, ask yourself:

   Who……

   What…

   Why, When, Where and How…

4. Explain the difference between a *categorical* variable and a *quantitative* variable.  Give an example of each.

5. Give an example of a categorical variable that has number values.

6. Define *distribution*:

   Give an example of a distribution:

6. **Answer the two questions for the *Check Your Understanding* on page 5*:***

7. Define *inference.*

## DO:   Intro Exercises, p 8, Q 1-6
*Complete the section exercises on separate paper.*

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### READ 1.1   Analyzing Categorical Data (pp.8-21)

1.  A *frequency* table displays…

2.  A *relative frequency table* displays…

3.  What type of data are *pie charts* and *bar graphs* used for?

4.  *Categories* in a bar graph are represented by _____
    the category  and the *bar heights* give

.   _____

5.  What is a *two-way table*?

6.  Define *marginal distribution*.

7.  **Answer the two questions for the *Check Your Understanding* on page 14.**

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8.  What is a *conditional distribution*? Give an example demonstrating how to calculate one set of conditional distributions in a two-way table.

9.  What is the purpose of using a *segmented bar graph*?

10. **Answer the questions for the *Check Your Understanding* on page 17.**

11  Explain what it meant by an *association* between two variables; Give an example.

. **DO:   Practice Exercises 1.1, p 22-26,  Q 10, 14, 18, 22, 26**
     *Complete the section exercises on separate paper.*

## READ:  1.2    Displaying Quantitative Data with Graphs (pp. 27-40)

1.  What is a *dotplot*? When would you use it?  Draw an example.

2.  **[VERY IMPORTANT CONCEPT!!]** When examining a distribution, you can describe the overall pattern by its

    **S_____    O_____    C_____    S_____**

3. **Describe Shape**

    a)  If a distribution is symmetric, what does it look like?

    b)  If a distribution is *skewed to the right*, what does it look like?

    c)  If a distribution is *skewed to the left*, what does it look like?

    d)  Describe and illustrate the following distributions:
        i)   Unimodal

        ii)  Bimodal

        iii) Multimodal

4. **Answer questions in *Check Your Understanding* on page 29.**

5. How are a *stemplot* and a *histogram* similar?

6. When is it beneficial to *split the stems* on a stemplot?

7. When is it best to use a *back-to-back stemplot*?

8. **Answer questions in *Check Your Understanding* on pages 31 and 34**

9.  List the three steps involved in making a histogram.

10. Why is it advantageous to use a relative frequency histogram instead of a frequency histogram?

**DO**: *Technology Corner (***page 38***) problem and sketch your graphs*.
(Use Appendix B- Section 1.2, for instructions for TI nspire)

12. **Answer *Check Your Understanding* questions on pages 39.**

13. **Answer *Check Your Understanding* questions on page 41.**

**DO: Practice Exercises 1.2 p 43-50, Q 39, 42, 45, 50, 59, 65**
*Complete the section exercises on separate paper.*

## READ:  1.3    Describing Quantitative Data with Numbers (pp.50-69)

### Describe Center

1.  Explain how to calculate by hand **and** find on the calculator the *mean,* $\bar{x}$ (Xbar).

2.  What is the meaning of  Σ  (sigma)?

3.  Explain the difference between $\bar{x}$ and    μ  (mu).

4.  Define *resistant measure.*

5.  Explain why the mean is not a resistant measure of center.

6.  What is the *median* of a distribution? Explain how to calculate by hand **and** find on the calculator.

7.  Explain why the median is a resistant measure of center?

## Describe Center (continued)

8. How does the shape of the distribution affect the mean and median?

9. **Answer *Check Your Understanding* questions on page 55.**

## Describe Spread and Outliers

10. What is the *range*?

11. Is the range a resistant measure of spread? Explain.

12. How do you find *first quartile* $Q_1$ and *third quartile* $Q_3$ by hand **and** find on the calculator.

## Describe Spread and Outliers (continued)

13. What is the *Interquartile Range* (IQR)?

14. Is the IQR and the quartiles a resistant measure of spread? Explain.

15. How is the IQR used to identify *outliers*?

16. What is the *five-number summary* of a distribution?

17. Explain how to use the five-number summary to make a *boxplot*.

18. **Answer *Check Your Understanding* questions on page 61.**

**DO**: *Technology Corner (*page 61) problem and sketch your graphs**.
(Use Appendix B- Section 1.3, for instructions for TI nspire)

## Describe Spread and Outliers (continued)

20. What does the *standard deviation (s or $s_x$)* measure?

    b) How do we calculate it by hand **and** find on the calculator?

21. What is the relationship between *variance ($s^2_x$ or $s^2$)* and *standard deviation ($s_x$ or s)*?
    Why do we prefer to use standard deviation and NOT variance?

22. What are the *4 properties* of the standard deviation explained on page 64?

23. **Answer *Check Your Understanding* questions on page 64.**

**DO**: *Technology Corner* **(page 65) problem and give the summary statistics**
(Use Appendix B- Section 1.3, for instructions for TI nspire)

25. How should one go about choosing measures of center and spread?

26. Describe the four steps to organizing a statistical problem:

State…

Plan…

Do…

Conclude…

**DO:   Practice Exercises 1.3 p 70-74, Q 80, 86, 92, 99**
*Complete the section exercises on separate paper.*

Part 2: Basic Algebra Prerequisites

***Here is a formula that is used often in AP Statistics:*** $z = \dfrac{x - \mu}{\sigma}$

*1.* If z = 2.5, x = 102, and μ = 100, what is σ ? Show your work. _____

*2.* If z = -3.35, x = 60, and σ = 4, what is x ? Show your work._____

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

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. Write a linear equation that relates years since 1990 to the average consumption of

    natural sweeteners. Define your variables.

    b. What is the slope and what is the y-intercept?

      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 context.

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

***You are expected to have a basic understanding of simple probability.***

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

**A. 1/6**          **B. 1/3**          **C. 1/4**          **D. ½**          **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. 1/8**          **B. 1/6**          **C. 1/4**          **D. ½**          **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 is squared, it will end with 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. _____