

AP Statistics
Summer Assignment 2022
Mrs. Miller

Welcome to AP Statistics!

I am incredibly excited to have you in the upcoming 2022-2023 AP Statistics course. Congratulations on deciding to challenge yourself with a course unlike any other math class you have ever taken. This course is designed to expose you to a college level math curriculum with high expectations. With that comes an increased level of responsibility from the student, which will start this summer. This packet is designed to review statistics and probability skills you may have been exposed to in previous math courses. There is also a small sneak-peak into Chapters 1 and 2 of your textbook. This will allow us to jump right into some new material on the very first week of class. If you need any assistance with completion of the packet, please contact me via e-mail.

Due Date: 2nd class meeting

You will receive a grade for the completion of this packet in addition to a brief Quiz that will assess your ability to answer concepts reviewed in this packet.

I'm looking forward to working with you this upcoming school year.

Enjoy your summer!

Mrs. Miller

amanda_miller@charleston.k12.sc.us

Task 1: Exploring the context of statistics

Do cell phones cause brain cancer? This is a question that statistics can help answer. Statistics is the science of learning from data. So what are data? Data are usually numbers, but they are not “just numbers”. Data are numbers with a context. The number 10.5, for example, carries no information by itself. But if we hear that a family friend’s new baby weighed 10.5 pounds at birth, the number now has meaning and context. One of the things students find most surprising about their first statistics course is how much they work with WORDS and not just numbers like a typical math course. Students must therefore learn to READ for context and express answers (WRITE) in terms of context. What follows are actual questions from AP Statistics exams. Don’t worry, you don’t have to do any math yet(!). Just relax and read through the AP questions and then answer the questions that follow about the context of the questions.

Nine sales representatives, 6 men and 3 woman, at a small company wanted to attend a national convention. There were only enough travel funds to send 3 people. The manager selected 3 people to attend and stated that the people were selected at random. The 3 people selected were woman. There were concerns that no men were selected to attend the convention.

- a.) How many total sales representatives are considered in this problem?

- b.) Is the company small or large?

- c.) What do the nine sales representatives want to attend?

- d.) Why can only 3 people attend?

- e.) How did the manager select the 3 people?

- f.) What is the manager concerned about?

Task 2: Quantitative vs. Categorical Variables

This year you will be collecting, analyzing and interpreting two different types of data; quantitative and categorical. It is very important that you are able to distinguish between these two different types of data.

Quantitative variables: take numerical values and represent some type of measurement

Examples: age, height, weight

Categorical variables: take category or label values and place an individual into a group/category

Examples: gender, race

****It is important to note that although ALL quantitative variables will be numerical in nature (for example, someone's age will ALWAYS be described by a number), categorical variables may sometimes be numerical as well. For example, someone's zip code is a number. However, a zip code could classify someone into a particular category and would NOT be used as a form of measurement. Therefore, although a zip code is a number, it is classified as a categorical variable.****

Classify the following variables as either 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 medication
12. Jellybean flavors
13. Country of origin
14. Textbook ISBN number
15. Number of shoes owned

Task 3: Analyzing a single set of data

Do pets or friends help reduce stress? Some of the numbers you encounter in your statistics class will be familiar to you. You have worked with them before. Measures of the CENTER of the data like the mean, median and mode should be numbers in statistics you have worked with before.

Data Set 1: 5, 4, 13, 10, 6, 2, 5, 2, 7, 9, 3

Data Set 2: 105, 123, 107, 115, 100, 109

Mean: (also referred to as the average) add all the numbers and divide by how many there are

Ex. Data Set 1: $(5+4+13+10+6+2+5+2+7+9+3) \div 11 = 6$

Ex. Data Set 2: $(105+123+107+115+100+109) \div 6 = 109.833$

Median: the data value in the middle. If the data is odd it will be a specific data value. If the data is even you will need to average the two middle numbers. You must put the data in order from smallest to largest before you can find the median.

Ex. Data Set 1: 2,2,3,4,5, **5**, 6,7,8,10,13 The median for Data Set 1 is 5.

Ex. Data Set 2: 100,105,107,109,115,123 -> Average 107 and 109: $(107+109) \div 2 = 108$
The median for Data Set 2 is 108.

Mode: the data value that occurs most frequently. If every value occurs with equal frequency there is no mode. You can have one mode, no modes, or many modes.

Ex. Data Set 1: **2, 2**, 3,4, **5, 5**, 6,7,8,10,13 The mode for Data Set 1 is 2 and 5.

Ex. Data Set 2: 100,105,107,109,115,123 There is no mode for Data Set 2.

Data Sets are not usually given in AP Statistics in a straight forward way with no context. If and when data is given you may need to do some work to pull it out of a table or diagram. To examine the effects of pets and friends in stressful situations, researchers recruited 45 women who were dog lovers. Fifteen were assigned at random to each of three groups: to do a stressful task alone, with a good friend present or with their dogs present. The woman's average heart rate (bpm) was the measure of the effect of stress. The table on the next page represents the data.

Pet (P), Friend (F) and Alone (C)

Group	Rate	Group	Rate	Group	Rate	Group	Rate
P	69	P	69	C	85	C	75
F	100	C	87	C	85	C	63
P	70	P	64	P	59	P	70
C	80	C	92	P	80	F	88
C	87	C	88	P	69	F	82
P	76	F	91	C	73	F	87
F	83	F	101	C	85	F	92
F	102	C	78	C	71	P	72
P	86	P	98	F	90	P	65
F	80	P	85	F	98		
C	90	F	101	F	77		
C	99	F	97	P	70		

1.) Find the mean, median and mode of those who did the stressful task with a pet.

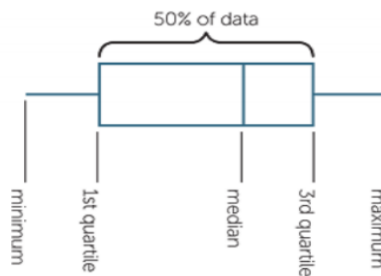
2.) Find the mean, median and mode of those who did the stressful task with a friend.

3.) Find the mean, median and mode of those who did the stressful task alone.

4.) Do pets or friends help reduce stress? Support your response.

Task 4: Analyzing a Boxplot display

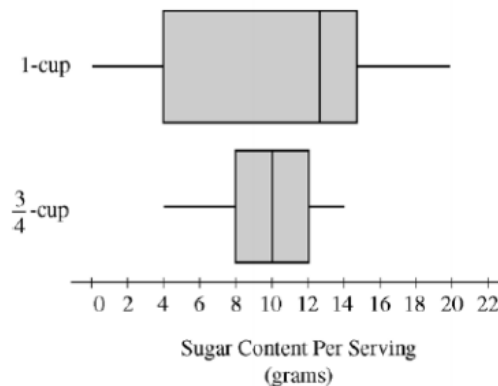
Is there too much sugar in cereal? In AP Statistics we will need to be able to read and create many graphs. Graphs are a way to display and organize data. There will be graphs that you have encountered in the past and new graphs to discover. One graph that you have likely encountered in the past is a BOXPLOT. Below is a diagram of a boxplot with an explanation of the values represented in the boxplot.



Below is a boxplot that recently appeared on an AP exam.



- 1.) Approximate the median salary for a person who works for Corporation B.
- 2.) Approximate the largest salary for a person who works for Corporation B.
- 3.) The Interquartile Range (IQR) is the 3rd quartile minus the 1st quartile. Approximate the IQR for Corporation B.

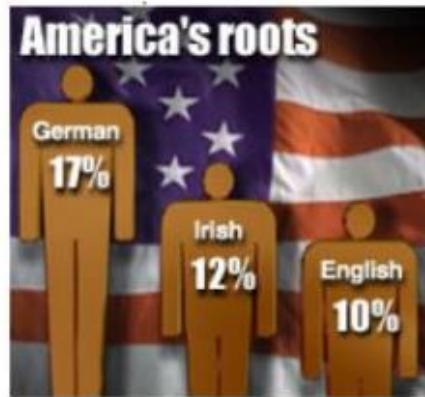


The Boxplots above represent a sample of cereals with a 1 cup serving size and a $\frac{3}{4}$ cup serving size.

- 1.) What is the approximate median sugar content for cereals with a 1 cup serving size?
- 2.) What is the approximate median sugar content for cereals with a $\frac{3}{4}$ cup serving size?
- 3.) In AP Statistics we will be asked to COMPARE distributions and we want to use QUANTIFIERS. So...which serving size has a HIGHER median sugar content? How much higher compared to the other cereal?
- 4.) The Interquartile Range is also the length of the BOX in a boxplot. What is the Interquartile Range (IQR) for cereals with a 1 cup serving size?
- 5.) What is the IQR for cereals with a $\frac{3}{4}$ cup serving size? How does this COMPARE to the 1 cup service size cereal?

Task 5: Misleading Statistics

In Statistics we organize and display data using graphs or visuals that are appealing to the reader. This year you will learn how to read, create and interpret many graphs that are both accurate and appealing. Let's start by taking a look at published graphs and charts from internet sites and news organizations. They assume you know how to interpret the data...or...do they count on you not understanding data displays? Hmmm????



1.) What percent of Americans do NOT trace their ancestry to European descent (German, Irish or English)?

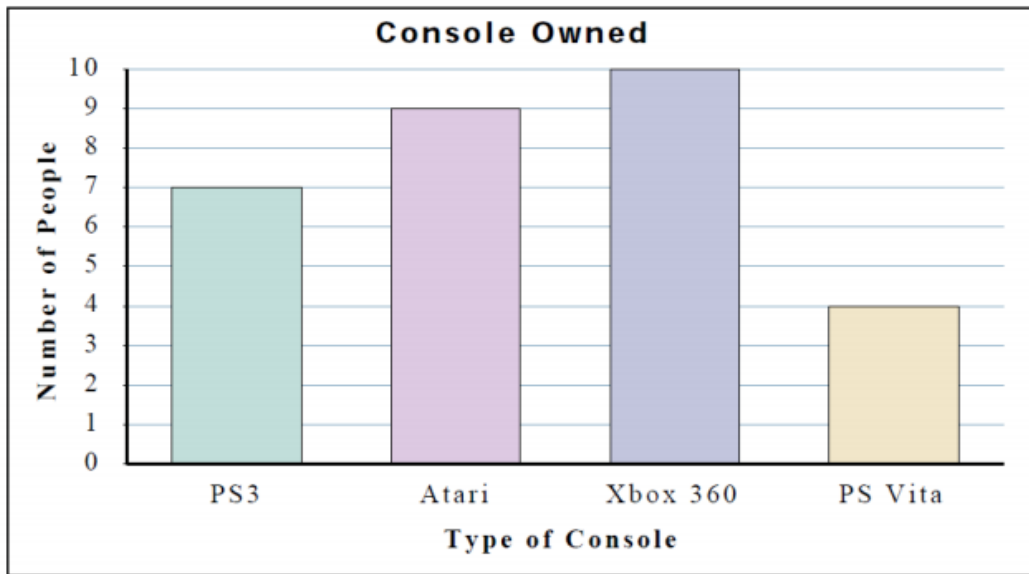
2.) USA Today stated, "More Americans trace their roots to Europe more than anywhere else in the world." is that a valid statement based on the graph?

3.) Does this picture give you the impression that gasoline prices are up? Explain how this visual may be misleading.



Task 6: An Accurate Display of Categorical Data

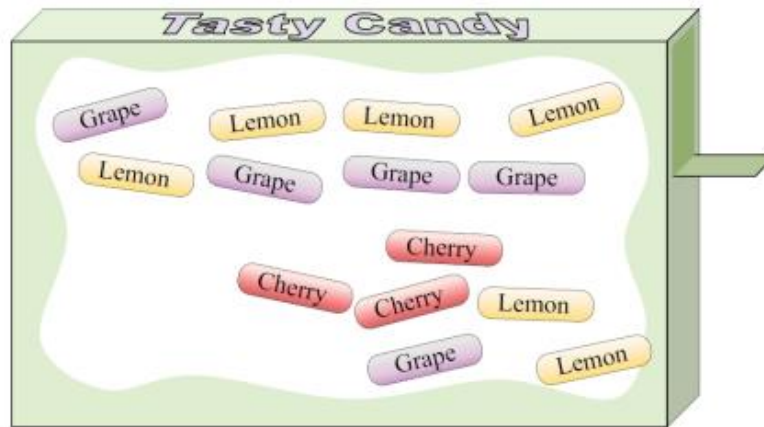
A survey was conducted of AP Statistics students who own a video game system. They were asked which video game system(s) they currently own. The data are displayed in the bar graph below.



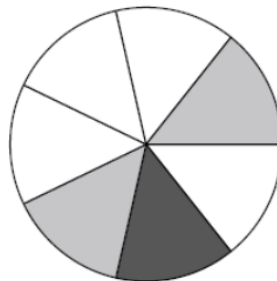
- 1.) How many people own a PS3?
- 2.) Write 2 sentences comparing the different categories in this display.
- 3.) A student suggested that we can find the total number of people surveyed by adding together the frequencies of each type of console. The teacher told them this would not work for this situation. How come?
- 4.) What percent or proportion of devices owned are a PS Vita?
- 5.) What percent or proportion of devices owned are an Xbox 360?
- 6.) Think about other types of data displays you've seen in your math career. What is another picture we could have created to display this information?

Task 7: Probability – The Study of Chance

One of the more challenging topics we will cover in AP Statistics is the concept of probability. Probability requires you to use some basic logic. The major issue students have with probability is that while some of the mathematics that govern it “make sense,” other parts require students to gain new perspective. The use of formulas helps us obtain the correct answer before we gain this intuition. The good news is, you probably already have some experience with probability from previous math classes. The following probabilities can be calculated using techniques you should already know.



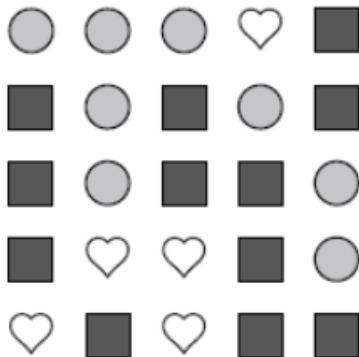
1. How many total pieces of candy are in the box?
2. What is the probability of selecting a cherry piece?
3. What is the probability of selecting a lemon piece?
4. What is the probability of selecting a grape piece?
5. You despise the flavor of grape. What is the probability you do not select a grape piece?



6. How many sections are on the spinner?
7. Are you equally likely to land on each section? How about each color?
8. What is the probability of spinning the spinner once and landing on a gray section?
9. What is the probability of spinning the spinner once and landing on a black section?
10. What is the probability of spinning the spinner once and landing on a white section?
11. What is the probability of spinning the spinner once and landing on a white or black section?



12. You roll the die above one time, what is the probability it lands on a 3?
13. If you were to roll the die one time, what is the probability is does NOT land on a 2?
14. If you were to roll the die one time, what is the probability it will land on an even number?
15. CHALLENGE: If you were to roll the die **two** times, what is the probability it will land on a 6 for both rolls?



16. How many different shapes are in the array shown above?
17. If you were to select one shape at random from the array, what is the probability it will be a circle?
18. If you were to select one shape at random from the array, what shape do you have the greatest probability of selecting?
19. Which shape has a 20% chance of being selected?