

## **AP Stats Summer Assignment**

You may access the book here:

[Chapter 4 PDF](#)

If you need the link electronically, see the electronic copy posted on the District's summer assignment page, or please email me at [votoole@jths.org](mailto:votoole@jths.org).

### **Assignment:**

Please read sections 4.1 and 4.2 from the book and fill out the guided notes below. These sections should be mostly review from what you have learned in Advanced Algebra. You do not need to do any of the homework problems at the end of the section. Read through the examples that are given in the chapter for a better understanding. Anything that is labeled as an activity, you may skip. We will do the activities together in class when school starts. While we will review the topics you are reading, you will be expected to have an understanding of what is in the reading on Day 1 of class. This packet is due on the first day.

I look forward to seeing you in August. Enjoy your summer! ☺ ~ Mrs. O'Toole

### **4.1 - Sampling and Surveys**

Read 209–211

### **Chapter 4 Notes**

What's the difference between a population and a sample? What is a census?

What is that icon in the top-right corner of the example on page 210? See the play button? Any examples that have the blue play icon (triangle inside a circle), you can go to the online website for our book and watch a video of the example for better understanding, if needed. These are extremely useful. To watch the videos, go to:

<https://www.macmillanlearning.com/catalog/studentresources/tps5e>

This website also shows videos on how to do homework problems throughout the year.

Read 211–213 (How to Sample Badly)

What's the problem with convenience samples?

What is bias?

What's a voluntary response sample? Is this a good method for obtaining a sample?

What is the purpose of the Check Your Understanding feature on page 213?

### **Random Sampling Methods**

Read 213–217

What is random sampling?

What's a simple random sample (SRS)? How can you choose a SRS?

What's the difference between sampling *with* replacement and sampling *without* replacement? How should you account for this difference when using a table of random digits or other random number generator?

Read 219–220

What is a stratified random sample? How is it different than a simple random sample?

When is it beneficial to use a stratified random sample? What is the benefit? How do you choose a variable to stratify by?

## **4.1 More about Sampling**

Read 221–222

What is a cluster sample? Why do we use a cluster sample? How is it different than a stratified sample? Are there any drawbacks?

Read 223–225

What is inference?

What is sampling variability? What is a margin of error? [SAT Alert!]

What is the benefit of increasing the sample size?

Read 225–227

What is a sampling frame?

What is undercoverage and what problems might undercoverage cause?

What is nonresponse and what problems might nonresponse cause? How is it different than voluntary response?

What is response bias and what problems might response bias cause?

## **4.2 Observational Studies and Experiments**

Read 234–236

What are some differences between an observational study and an experiment?

What's the difference between an explanatory variable and a response variable?

Page 237: Check Your Understanding

### **Designing Experiments**

Read 237–239

Briefly define the following terms:

- Treatment
  
- Experimental units
  
- Subjects
  
- Factor
  
- Level

What is the purpose of random assignment?

How do we randomize? What is a completely randomized design? Also, sketch the tree.

What is replication?

What does it mean to control other variables?

What is the purpose of a control group?

What is a single-blind experiment? A double-blind experiment? Why is blindness important?

What is the placebo effect?

**SUMMARY:** With random assignment, replication, and control of other variables, each treatment group should be nearly identical, and the effects of other variables should be about the same in each group. Now, if changes in the explanatory variable are associated with changes in the response variable, we can attribute the changes to the explanatory variable *or the chance variation in the random assignment*.

Page 249: Check Your Understanding

How can we determine if the evidence is *convincing*?

Read 249

What does it mean if the results of an experiment are statistically significant?

## **4.2 Blocking**

Read 251–255

What is the benefit of blocking?

In general, how can we determine which variables might be best for blocking?

What is the difference between blocking and stratifying?

What is a randomized block design? What is the difference between a block design and the completely randomized design? Sketch the tree of a randomized block design.

A popcorn lover wants to know if it is better to use the “popcorn button” on her microwave oven or use the amount of time recommended on the bag of popcorn. To measure how well each method works, she will count the number of unpopped kernels remaining after popping. She goes to the store and buys 10 bags each of 4 different varieties of microwave popcorn (movie butter, light butter, natural, and kettle corn), for a total of 40 bags. Explain why a randomized block design might be preferable to a completely randomized design for this experiment.

Outline a randomized block design for this experiment.

What is a matched pairs design?