

2018 AP Statistics Summer Institute

July 10-13, 2018

George Washington High School

Charleston, WV

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This AP Statistics workshop is an intensive four-day program that will provide an overview of statistical ideas and concepts and give valuable resources and instructional strategies for teaching AP Statistics. We will cover the four principal areas of the AP Curriculum: Exploratory Analysis, Data Collection, Probability, and Statistical Inference. Participants will be given instruction on content, classroom activities, teaching strategies, time management, uses of technology, review for the exam, cumulative projects, and exposure to previous AP questions. There will be a discussion of AP goals, resources, and equity issues, the course audit, and recommended textbooks. This workshop will be valuable not only to teachers planning to teach or already teaching AP Statistics, but also to Pre-AP teachers who through vertical teaming can help prepare and encourage students to take AP Statistics.

More specifically, the following topics will be covered in some detail:

- 1) **Exploratory Analysis:** graphical displays including dotplots, bar charts, histograms, stemplots, and boxplots; numerical summaries including median and mean, range, interquartile range, variance, and standard deviation; bivariate data including scatterplots, correlation, the least squares regression line, the coefficient of determination, and residuals; and categorical data including frequency tables and Simpson's paradox.
- 2) **Planning a Study:** simple random sampling, sampling error, sources of bias in surveys, and stratification to reduce variation; observational studies vs experiments; blinding, double-blinding, blocking; random sampling vs random assignment.
- 3) **Probability:** multistage probability calculations, discrete random variables and their probability distributions, simulation of probability distributions, and means and standard deviations for sums and differences of random variables; normal distribution; sampling distributions of sample means and sample proportions.
- 4) **Statistical Inference:** confidence intervals for means and proportions, difference of two means or proportions, slope; hypothesis tests including null and alternative hypotheses, P-values, one and two sided tests, Type I and Type II errors; tests for a proportion, for a mean, for a difference, and for a slope; chi-square test for goodness of fit and chi-square test for independence; the t-distribution and associated single sample and two sample t-procedures.

Much of the above will be presented and illustrated in the context of activity-based examples.

Day 1 agenda

Introductions

Experienced teachers – think of one thing to share with Newbies!

AP Central is invaluable – apcentral.collegeboard.com

Achieving Equity – Not an achievement gap, but rather an opportunity gap

AP Course Audit – good sample syllabi online

College Board AP Statistics Workshop Handbook

Brief History, Growth, Curriculum, and the Exam

Opening Activities

Summer assignment
Day 1 homework survey
Two waters
Distracted driving
Westvaco
The Pit and the Pendulum

Part I (Exploratory Data Analysis – Descriptive Statistics)

Bordering state activity
Old Faithful
Liberia – Canada histogram exercise
Penny activity on mean and standard deviation
2011B AP Exam Question #1, 2015 AP Exam Question #1
2016 AP Exam Question #1, 2017 AP Exam Question #4
Midges!
Barbie bungee drop activity
Monopoly
Valentine Day activity
2007B AP Exam Question #4, 2012 AP Exam Question #1, 2017 AP Exam Question #1

Day 2 agenda

Part II (Planning a Study - Producing Data)

Randomization: Lanarkshire milk experiment
Wording: Largest redwood
Gettysburg Address exercise
Jelly Blubber activity
Bruno Mars concert exercise
Six articles activity
2011 AP Question #3, 2011B AP Question #2, 2013 AP Question #2

Part III (Probability)

The professor, the prosecutor, and the blonde with the ponytail
Tennis Tournament probabilities
Shooting free throws
Steroid testing
Birthday paradox
Twelve days of Christmas
*2010 AP Question #4, 2011 AP Question #2,
2013 AP Question #3, 2017 AP Question #3, 2017 AP Question #6*
Phone Numbers
A Tacky Activity
The German Tank Problem
2009 AP Question #2

Day 3 agenda

Part IV (Statistical Inference)

Random Rectangles
Morbid Math
2009 AP Question #4, 2012 AP Question #3, 2013 AP Question #1, 2016 AP Question #5
Evidence to Reject?
Three-Point Shootout
Hiring Discrimination
The Spinning Coin
Geography activity
Globe Tossing activity
Significance of a Kiss activity
Pi-Day activity
*2009B AP Question #5, 2012 AP Question #4, 2012 AP Question #5,
2013 AP Question #5
2014 AP Question #5
2008 AP Exam Question #5, 2011B AP Exam Question #4*
Tootsie Pops
2011 AP Exam Question #5
Which Procedure?

Day 4 agenda

Review

Frog/Bunny flipping activity
Statistics Olympics

Grading Session

The dreaded #6s are really not bad!
2009, 2010, 2011, 2014, 2015, 2016 AP Exam Questions #6
2018 Free Response Questions
2012 Multiple Choice Questions

Wrap-up Final questions???

Graduate Credit: There will be short overnight reading assignments for all participants. In addition, those interested in graduate credit will have writing assignments based on each of the readings.