



AP Statistics Scope & Sequence

Grading Period	Unit Title	Learning Targets
Throughout the School Year		<ul style="list-style-type: none"> *Apply mathematics to problems in everyday life *Use a problem-solving model that incorporates analyzing information, formulating a plan, determining a solution, justifying the solution and evaluating the reasonableness of the solution *Select tools to solve problems *Communicate mathematical ideas, reasoning and their implications using multiple representations *Create and use representations to organize, record and communicate mathematical ideas *Analyze mathematical relationships to connect and communicate mathematical ideas *Display, explain and justify mathematical ideas and arguments
First Grading Period	Designing Studies	<p>Sample Surveys: General Concepts</p> <ul style="list-style-type: none"> -- sample vs. population (census) -- inference -- sampling variability -- Why is randomness important? <p>Sample Surveys: How to Sample Well</p> <ul style="list-style-type: none"> -- Valid sampling methods - be able to describe proper implementation (random digit table or calculator) and the advantages of each <ul style="list-style-type: none"> -- Simple Random Sample -- Stratified Random Sample -- Clustered Random Sample -- Systematic Random Sample <p>Sample Surveys: How to Sample Badly</p> <ul style="list-style-type: none"> -- bias - identify sources of bias; completely describe how a survey might be biased <ul style="list-style-type: none"> -- convenience sample

		<ul style="list-style-type: none"> -- voluntary response sample -- undercoverage -- nonresponse bias -- response bias <p>Experiments: Studies vs. Experiments</p> <ul style="list-style-type: none"> -- observational study vs. experiment -- scope and nature of the conclusions that can be made from a study description <p>Experiments: Terminology</p> <ul style="list-style-type: none"> -- experimental units -- explanatory and response variables -- treatments and levels -- confounding - be able to properly describe a confounding variable in context -- blinding - single and double blind -- placebos -- statistically significant <p>Experiments: Well-Designed Experiments</p> <ul style="list-style-type: none"> -- Comparison, random assignment, control, replication -- Describe random assignment of treatments using a random digit table or technology -- Describe a completely randomized experiment (diagram optional) <p>Experiments: Blocking</p> <ul style="list-style-type: none"> -- Explain the purpose of blocking -- Describe a randomized block experiment -- Describe a matched pair experiment
	Exploring Data	<p>Categorical Variables:</p> <ul style="list-style-type: none"> -- Calculate and display (bar graph) the marginal distributions and conditional distributions from a two-way table -- Describe the association between two categorical variables by comparing appropriate conditional distributions or by creating a segmented bar graph <p>Quantitative Variables: Graphs</p> <ul style="list-style-type: none"> -- Create and interpret frequency tables, histograms, dotplots and stemplots

		<ul style="list-style-type: none"> -- Apply the Area Principle to making graphs -- Describe a distribution from a histogram, dotplot, stemplot -- Compare two distributions using comparison words <p>Quantitative Variables: Statistics</p> <ul style="list-style-type: none"> -- Calculate measures of center (median and mean); explain how they are similar and different -- Calculate measures of spread (range, IQR, standard deviation); explain the advantages and disadvantages of each -- Draw and interpret boxplots, including finding outliers
	Modeling Distributions of Data	<p>Describing Locations in Distributions</p> <ul style="list-style-type: none"> -- Find and interpret percentiles; estimate percentiles from an ogive -- Understand the effects of applying (+ - x /) a constant to all measurements in a data set -- Understand z-scores and use them to compare performances <p>The Normal Distribution Part One</p> <ul style="list-style-type: none"> -- Approximate the mean and median of a density curve -- Know the characteristics of the Normal model -- Apply the 68-95-99.7 Rule <p>The Normal Distribution Part Two</p> <ul style="list-style-type: none"> -- Use z-scores and the Normal Model to solve problems involving percentiles -- Determine if a distribution of data is nearly Normal from graphical and numerical evidence <p>The Normal Distribution Part Two</p> <ul style="list-style-type: none"> -- Use z-scores and the Normal Model to solve problems involving percentiles -- Determine if a distribution of data is nearly Normal from graphical and numerical evidence
Second Grading Period	Describing Relationships	<p>Correlation</p> <ul style="list-style-type: none"> -- Use technology to make a scatterplot and calculate r (correlation coefficient) -- Understand r (correlation coefficient) -- Use a scatterplot and the correlation coefficient to describe the

		<p>association between two quantitative variables (interpret the correlation coefficient) - strength, form and direction</p> <ul style="list-style-type: none"> -- Describe examples of lurking variables; the difference between association and causation <p>Using the LSRL</p> <ul style="list-style-type: none"> -- Interpret the slope and y-intercept -- Use the LSRL to predict values -- Understand the dangers of extrapolation -- Use technology to write the LSRL <p>Writing the LSRL</p> <ul style="list-style-type: none"> -- Interpret computer output -- Use a graphing calculator (see 3B) -- Use the summary statistics for x and y and formulas (know that (\bar{x}, \bar{y}) is on every LSRL) <p>Correlation and Regression Wisdom</p> <ul style="list-style-type: none"> -- Interpret the slope of the standardized data in terms of standard deviations -- Understand the effects of outliers on the LSRL and r
	<p>Probability</p>	<p>Probability and Simulations</p> <ul style="list-style-type: none"> -- Understand the nature of probability and the law of large numbers -- Describe a method for using a table of random digits to estimate probabilities <p>Basic Probability Rules</p> <ul style="list-style-type: none"> -- Use and understand probability terminology (sample space, event) -- Use and understand the Basic Probability Rules <p>Addition Rule</p> <ul style="list-style-type: none"> -- Use two-way tables and Venn diagrams to find probabilities -- Understand how mutually exclusive events affect the Addition Rule <p>Conditional Probability (The Multiplication Rule)</p> <ul style="list-style-type: none"> -- Use two-way tables, Venn diagrams, and tree diagrams to find conditional probabilities -- Understand how independent events affect the Multiplication

		<p>Rule</p> <ul style="list-style-type: none"> -- Use conditional probability to determine whether two events are independent <p>Transforming and Combining Random Variables</p> <ul style="list-style-type: none"> -- Understand the effects of adding or multiplying each value of a random variable by a constant -- Understand the effects of combining (add or subtract) two random variables on the mean, variance and standard deviation -- Understand that the combination (add or subtract) of two Normal models is a Normal model <p>Binomial and Geometric Probability</p> <ul style="list-style-type: none"> -- Determine whether a probability situation is binomial (BINS, including the 10% Condition) or geometric (first success) -- Calculate binomial and geometric probabilities -- Calculate the mean of a geometric random variable; describe the shape of a geometric probability distribution <p>Using the Normal Model to Approximate Binomial Probabilities</p> <ul style="list-style-type: none"> -- Calculate the mean and standard deviation of a binomial distribution -- Use the Large Counts Condition to determine whether the Normal model can be used to approximate a binomial distribution -- Calculate binomial probabilities using the Normal model
<p>Third Grading Period</p>	<p>Sampling Distribution</p>	<p>Sampling Distributions</p> <ul style="list-style-type: none"> -- Distinguish between a statistic and a parameter -- Distinguish between the sample, the population, and the sampling distribution -- Use the sampling distribution of a statistic to evaluate a claim about a parameter -- Understand the concepts of bias and variability as they apply to sample statistics <p>Sampling Distribution of the Sample Proportion (\hat{p})</p> <ul style="list-style-type: none"> -- Find the mean (check for randomness) -- Find the standard deviation (check 10% Condition) -- Determine if the sampling distribution is nearly normal (check np and $n(1-p)$) -- Calculate probabilities involving \hat{p}

		<p>Sampling Distribution of the Sample Mean (\bar{x})</p> <ul style="list-style-type: none"> -- Find the mean (check for randomness) -- Find the standard deviation (check 10% Condition) -- Determine if the sampling distribution is nearly normal (check shape of population and sample size) -- Calculate probabilities involving \bar{x}
	Estimating with Confidence	<p>Confidence Intervals - General Information</p> <ul style="list-style-type: none"> -- Understand and find a point estimate, margin of error and critical value -- Understand the interplay between sample size, confidence level and length of confidence interval <p>Confidence Intervals - Proportions</p> <ul style="list-style-type: none"> -- Construct a confidence interval for a proportion using the four step process (including checking conditions and determining the critical value) -- Interpret a confidence interval and confidence level in context <p>Confidence Intervals - Means</p> <ul style="list-style-type: none"> -- Understand the need for the t-distributions and the characteristics of the t-distributions -- Construct a confidence interval for a mean using the four step process (including checking conditions and determining the critical value) -- Interpret a confidence interval and confidence level in context <p>Confidence Intervals - Determining Sample Size</p> <ul style="list-style-type: none"> -- Determine the sample size needed for a given confidence level and margin of error for both means and proportions
	Testing a Claim	<p>Significance Tests - General Information Part One</p> <ul style="list-style-type: none"> -- State the null and alternative hypotheses -- Understand the logic of a significance test including p-value and alpha level -- Identify Type I and Type II Errors with their consequences in context <p>Significance Tests - Proportions</p> <ul style="list-style-type: none"> -- Perform a significance test for a proportion using the four step

		<p>process (including checking conditions)</p> <ul style="list-style-type: none"> -- Interpret the p-value in the context of the problem <p>Significance Tests - General Information Part Two</p> <ul style="list-style-type: none"> -- Understand the connection between significance tests and confidence intervals -- Two-sided significance tests -- Understand the interplay between sample size, alpha level, power and Type I and Type II errors -- Understand the concept of power <p>Significance Tests - Means</p> <ul style="list-style-type: none"> -- Perform a significance test for a mean using the four step process (including checking conditions) -- Interpret the p-value in the context of the problem -- Inference for paired data (matched pairs studies)
Fourth Grading Period	Comparing Two Populations or Groups	<p>Comparing Two Groups - Proportions</p> <ul style="list-style-type: none"> -- Describe the sampling distribution of the difference of two proportions -- Construct a confidence interval for the difference between two proportions -- Perform a significance test for the difference between two proportions <p>Comparing Two Groups - Means</p> <ul style="list-style-type: none"> -- Describe the sampling distribution of the difference of two means -- Construct a confidence interval for the difference between two means -- Perform a significance test for the difference between two means
	Inference for Distributions of Categorical Data	<p>Chi-Square Tests for Goodness of Fit</p> <ul style="list-style-type: none"> -- Understand the characteristics of the chi-square distribution -- Perform a chi-square test for Goodness of Fit <p>Chi-Square Tests for Homogeneity and for Independence</p> <ul style="list-style-type: none"> -- Find expected values for a two-way table -- Perform a chi-square test for Homogeneity -- Perform a chi-square test for Independence

	More about Regression	<p>Inference for Linear Regression</p> <ul style="list-style-type: none">-- Check the conditions for inference for regression-- Construct a confidence interval for the slope of the regression line from computer output-- Perform a significance test for the slope of the regression line from computer output <p>Transforming to Achieve Linearity</p> <ul style="list-style-type: none">-- Use residual plots to determine if a linear model is appropriate-- Use a calculator to transform the x-values, the y-values or both to create a linear relationship-- Write the transformed line of best fit and use it to make predictions
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