Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 1: Exploring and Understanding Data

CONCEPT		CONCEPT		CONCEPT		CONCEPT
Data (Chapter 2)		**Displaying and Describing Categorical Data (Chapter 3)**		**Displaying and Describing Quantitative Variables (Chapters 4 and 5)**		**Normal Model (Chapter 6)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**		**VOCABULARY**
Context, Data, Data Table, Case, Population, Sample, Variable, Units, Categorical Variable, Quantitative Variable		Frequency Table, Distribution, Area Principle, Pie Chart, Contingency Table, Marginal Distribution, Conditional Distribution, Independence, Simpson's Paradox		Distribution, Histogram, Stem and Leaf Display, Dotplot, Shape, Center, Spread, Mode, Unimodal/Bimodal, Uniform, Symmetric, Tails, Skewed, Outliers, Median, Range, Quartile, Interquartile Range (IQR), Percentile, 5-Number Summary, Mean, Resistant, Variance, Standard Deviation, Boxplot, Outlier, Timeplot		Standardizing, Standardized Value, Shifting, Rescaling, Normal Model, Parameter, Statistic, Z-Score, Standard Normal Model, Nearly Normal Condition, 68-95-99.7 Rule, Normal Percentile, Normal Probability Plot

KNOW		KNOW		KNOW		KNOW
• What are data • The process of interpreting data tables • How to identify the who, what, when, where and why of data • The difference between a sample and a population		• Displays for categorical variable • Summarizing the distribution of a categorical variable with a frequency table • Bar charts and pie charts for categorical variables • The process for creating contingency tables • The process for creating conditional distributions		• Various displays for quantitative variables • How to identify shape, center and spread of a distribution • Basic properties of median, standard deviation, IQR and mean • How to construct stem and leaf, dotplot, boxplot and histogram • Compute mean, median, standard deviation and IQR • Outliers		• How to use standardization to compare values • How to calculate the z-score of an observation • Comparisons of values through z-scores • 68-95-99.7 Rule • Computations of normal probabilities
UNDERSTAND		**UNDERSTAND**		**UNDERSTAND**		**UNDERSTAND**
• Distinguishing factors between categorical and quantitative variables • The different types of data and what they are		• When a variable is categorical and what display is appropriate • How to examine the association between categorical variables by comparing conditional and marginal percentages • Interpretations of contingency tables • Interpretations of conditional distributions • How to describe the distribution of a categorical value		• Choosing an appropriate displays of quantitative variables • When to use mean vs median and standard deviation vs IQR • Median and IQR are resistant to outliers • The mean is pulled in the direction of skewness relative to the median • To not assume trends continue into the future		• Adding (subtracting) a constant or multiplying (dividing) by a constant changes center and/or spread of a variable • When a normal model is appropriate

LEARNING OUTCOME		LEARNING OUTCOME		LEARNING OUTCOME		LEARNING OUTCOME
• Learners will be able to classify real life variables as either quantitative or categorical.		• Learners will be able to describe and discuss patterns found in contingency tables, conditional distributions or statistical graphs involving categorical variables		• Learners will be able to describe differences among groups in terms of patterns and changes in their center, spread, shape and unusual features.		• Learners will be able to explain how extraordinary a standardized value may be by using a normal model.

Pa Core Standards:

VAR 1.A Identify questions to be answered, based on variation in one-variable data.
VAR 1.B Identify variables in a set of data.
VAR 1.C Classify types of variables.
UNC 1.A Represent categorical data using frequency or relative frequency tables.
UNC 1.B Describe categorical data represented in frequency or relative tables.
UNC 1.C Represent categorical data graphically.
UNC 1.D Describe categorical data represented graphically.
UNC 1.D Compare multiple sets of categorical data.
UNC 1.E Classify types of quantitative variables.
UNC 1.F Represent quantitative data graphically.
UNC 1.H Describe the characteristics of quantitative data distributions.
UNC 1.I Calculate measures of center and position for quantitative data.
UNC 1.J Calculate measures of variability for quantitative data.
UNC 1.K Explain the selection of a particular measure of center and/or variability for describing a set of quantitative data.
UNC 1.L Represent summary statistics for quantitative data graphically.
UNC 1.M Describe summary statistics of quantitative data represented graphically.
UNC 1.N Compare graphical representations for multiple sets of quantitative data.

UNC 1.0 Compare summary statistics for multiple sets of quantitative data.
VAR 2.A Compare a data distribution to the normal distribution model.
VAR 2.B Determine proportions and percentiles from a normal distribution.
VAR 2.C Compare measures of relative position in data sets.

Assessments: Summer Assignment (Chapters 1-5), Unit 1 Assessment

Pacing: 12 days (including assessment and in addition to summer assignment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series

Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 2: Exploring Relationships Between Variables

CONCEPT		CONCEPT		CONCEPT
Scatterplots, Association, and Correlation (Chapter 7)		**Linear Regression and Regression Wisdom (Chapters 8 and 9)**		**Re-expressing Data (Chapter 10)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**
Scatterplots, Association, Direction, Form, Strength, Outlier, Response Variable, Explanatory Variable, Correlation Coefficient, Lurking Variable		Model, Linear Model, Predicted Value, Residuals, Least Squares, Regression to the Mean, Regression Line of Best Fit, Slope, Intercept, R^2, Extrapolation, Leverage, Influential Point, Skills		Re-expression, Ladder of Powers
KNOW		**KNOW**		**KNOW**
• Roles of the variables (response vs explanatory) • Conditions for correlation • Correlations are between -1 and 1, and that each extreme represents a perfect linear association • Center or scale of variable does not affect correlation coefficient		• Process of finding a regression equation from the summary statistics for each variable and the correlation between the variables • Regression equation through use of a graphing calculator • How to use regression to predict a value of y for a given x.		• How to re-express data using technology • How to reverse common re-expressions • Be able to describe a regression model fit to re-expressed data in terms of the re-expressed variables

• How to use graphing calculator to create a scatterplot and compute correlation • Read a correlation table produced by a statistics program • Describe direction, form, strength of a scatter plot		• Computation of residuals • The danger of extrapolating data beyond the range of x-values • Points can be unusual by having a large residual or a high leverage • To look for lurking variables when considering the association between 2 variables • How to create and interpret a residual plot • How to identify high leverage and influential points		
UNDERSTAND		**UNDERSTAND**		**UNDERSTAND**
• How magnitudes of correlations reflect the strength of the linear association • Correlation has no units • Causation cannot be demonstrated by a scatterplot of correlation		• Response and explanatory variables in context • Linear equations summarize the relationship between 2 variables • When regression is appropriate by checking required conditions, and when slope of a regression makes sense • Slope and y-intercept in context • Linear models only model linear relationships • An influential point can change the slope and intercept of a regression line • Correlation does not equal causation		• The value of re-expressing data to improve symmetry, to make the scatter around the line more constant, or to make a scatter plot more linear

LEARNING OUTCOME		LEARNING OUTCOME		LEARNING OUTCOME
• Learners will be able to create a scatterplot and use it to describe the association between variables.		• Learners will be able to create a regression equation from data and use it to make predictions. • Learners will be able to assess the appropriateness of a linear model.		• Learners will be able to use the ladder of powers to determine an appropriate re-expression and then use the re-expressed model to make predictions.

Pa Core Standards:

UNC 1.S Represent bivariate quantitative data using scatterplots.
DAT 1.A Describe the characteristics of a scatter plot.
DAT 1.B Determine the correlation for a linear relationship.
DAT 1.C Interpret the correlation for a linear relationship.
DAT 1.D Calculate a predicted response value using a linear regression model.
DAT 1.E Represent differences between measured and predicted responses using residual plots.
DAT 1.F Describe the form of association of bivariate data using residual plots
DAT 1.G Estimate parameters for the least-squares regression line model.
DAT 1.H Interpret coefficients for the least-squares regression line model.
DAT 1.F Identify influential points in regression.
DAT 1.J Calculate a predicted response using a least-squares regression line for a transformed data set.

Assessments: Concept Assignments, Concept Quiz, Unit 2 Assessment

Pacing: 30 days (including assessment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series

Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 3: Gathering Data

CONCEPT		CONCEPT		CONCEPT
Understanding Randomness (Chapter 11)		**Sample Surveys (Chapter 12)**		**Experiments and Observational Studies (Chapter 13)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**
Random, Generating Random Numbers, Simulation, Simulation Component, Trial, Response Variable		Population, Sample, Sample Survey, Bias, Randomization, Sample Size, Census, Population Parameter, Statistic, Sample Statistic, Representative, Simple Random Sample (SRS), Sampling Frame, Sampling Variability, Stratified Random Sample, Cluster Sample, Multistage Sample, Systematic Sample, Pilot, Voluntary Response Bias, Convenience Sample, Undercoverage, Nonresponse Bias, Response Bias		Observational Study, Retrospective Study, Prospective Study, Experiment, Random Assignment, Factor, Response, Experimental Units, Level, Treatment, Principles of Experimental Design (Control, Randomize, Replicate, Block), Statistically Significant, Control Group, Blinding, Single-Blind, Double-Blind, Placebo, Placebo Effect, Blocking, Matching, Designs, Confounding

KNOW		KNOW		KNOW
• How to recognize random outcomes in a real-world situation • How to perform a simulation either by generating random numbers on a computer/calculator, or by using some other source of random values (spinner, dice, random number table...)		• Basic concepts and terminology of sampling • Population parameters in descriptions of populations and samples • How to draw a simple random sample from a master list of a population, using a computer or a table of random numbers.		• When an observational study would be appropriate • Retrospective vs prospective studies and the strengths/weaknesses of each • The four basic principles of sound experimental design and be able to explain them • The factors, treatments and response variable in a description of a designed experiment • Uses of graphical displays to compare responses for different treatment groups.
UNDERSTAND		**UNDERSTAND**		**UNDERSTAND**
• When a simulation might usefully model random behavior in the real world • How to describe a simulation so that others can repeat it		• The value of randomization as a defense against bias • The value of sampling to estimate population parameters from statistics calculated on representative samples drawn from the population • The size of the sample (not the fraction of the population) determines the precision of estimates		• The essential importance of randomization in assigning treatments to experimental units • The importance of replication to move from anecdotes to general conclusions • The value of blocking so that variability due to differences in attributes of the subjects can be removed • The importance of a control group and the need for a placebo treatment in some studies • The importance of blinding and double-blinding in studies on human subjects, and be able to

				identify blinding and the need for blinding in experiments ● The value of a placebo in experiments with human participants ● When outcomes are significant
LEARNING OUTCOME		**LEARNING OUTCOME**		**LEARNING OUTCOME**
● Learners will be able to discuss the results of a simulation and study and draw conclusions about the real world question being investigated.		● Learners will be able to report necessary information about a sample as part of an account of statistical analysis. ● Learners will be able to report possible sources of bias in sampling methods and recognize voluntary response and nonresponse as sources of bias in a sample survey.		● Learners will be able to design a completely randomized experiment to test the effect of a single factor and describe the experiment such that another researcher could replicate the study. ● Learners will be able to design a blocked experiment to test the effect of a single factor and describe the experiment such that another researcher could replicate the study.

Pa Core Standards:

VAR 1.F Identify questions suggested by patterns in data.
VAR 1.E Identify questions to be answered about data collection methods.
DAT 2.A Identify the type of a study.
DAT 2.B Identify appropriate generalizations and determinations based on observational studies.
DAT 2.C Identify a sampling method, given a description of a study.
DAT 2.D Explain why a particular sampling method is or is not appropriate for a given situation.
DAT 2.E Identify potential sources of bias in sampling methods.
VAR 3.A Identify the components of an experiment.
VAR 3.B Describe elements of a well-designed experiment.
VAR 3.C Compare experimental designs and methods.

VAR 3.D Explain why a particular experimental design is appropriate.
VAR 3.E Interpret the results of a well-designed experiment.

Assessments: Concept Quiz, Concept Assignments, Unit 3 Assessment

Pacing: 18 days (including assessment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series

Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 4: Randomness and Probability

CONCEPT		CONCEPT		CONCEPT		CONCEPT
From Randomness to Probability (Chapter 14)		**Probability Rules (Chapter 15)**		**Random Variables (Chapter 16)**		**Probability Models (Chapter 17)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**		**VOCABULARY**
Random Phenomenon, Trial, Outcome, Event, Sample Space, Law of Large Numbers, Independence (informally), Probability, Empirical Probability, Theoretical Probability, Personal Probability, The Probability Assignment Rule, Complement Rule, Disjoint (Mutually exclusive), Addition Rule, Legitimate Probability Assignment, Multiplication Rule, Independence Rule		General Addition Rule, Conditional Probability, General Multiplication Rule, Independence (used formally), Tree Diagram		Random Variable, Discrete Random Variable, Continuous Random Variable, Probability Model, Expected Value, Variance, Standard Deviation, Changing a Random Variable by a Constant, Adding or Subtracting Random Variables		Bernoulli Trials, if…, Geometric Probability Model, Binomial Probability Model, 10% Condition, Success/Failure Condition

KNOW	KNOW	KNOW	KNOW
• Random outcomes in a real-world situation • Relative frequency of a random event settles down to a value called the empirical probability and that this is guaranteed for independent events by the Law of Large Numbers • Basic definitions and rules of probability • When events are disjoint and when events are independent • How and when to apply the Addition Rule, the Multiplication Rule and the Complement Rule	• How and when to apply the General Addition Rule and the General Multiplication Rule • How to find probabilities for compound events as fractions of counts of occurrences in a two-way table • How to make and use a tree diagram to understand conditional probabilities and reverse conditioning	• Random Variables • How to find the mean (expected value) and the variance of a random variable • Proper notation for population parameters of mean and variability • How to determine the new mean and standard deviation after adding a constant, multiplying by a constant, or adding or subtracting two independent random variables	• How to tell if a situation involves Bernoulli trials • Appropriate conditions for using a Geometric, Binomial, or Normal Model. • How to find the expected value of a Geometric Model • Calculating Geometric probabilities • How to find the mean and standard deviation of a Binomial model • How to calculate Binomial probabilities, perhaps approximating with a Normal model
UNDERSTAND	**UNDERSTAND**	**UNDERSTAND**	**UNDERSTAND**
• Random phenomena are unpredictable in the short term but show long-run regularity • The difference between disjoint and independent events and that disjoint events cannot be independent	• Concept of conditional probability as redefining the who of concern, according to the information about the event that is given • Concept of independence	• Random variables must be independent in order to determine the variability of their sum or difference by adding variances	• Choosing Geometric or Binomial model for a random variable involving Bernoulli trials

• Facts about probability to determine whether an assignment of probabilities is legitimate						
LEARNING OUTCOME		**LEARNING OUTCOME**		**LEARNING OUTCOME**		**LEARNING OUTCOME**
• Learners will be able to make and use statements about probability in describing random phenomenon, including terms like sample space, disjoint events and independent events.		• Learners will be able to make a clear statement about a conditional probability that makes clear how the condition affects the probability		• Learners will be able to find the probability model for a discrete random variable. • Learners will be able to interpret the meaning of the expected value and standard deviation of a random variable in the proper context.		• Learners will be able to choose an appropriate model and interpret means, standard deviations, and probabilities in the Bernoulli trial context.

Pa Core Standards:

UNC 1.P Compare numerical and graphical representations for two categorical variables.
VAR 4.A Calculate probabilities for events and their complements.
VAR 4.B Interpret probabilities for events.
VAR 4.C Explain why two events are (or are not) mutually exclusive.
VAR 4.D Calculate conditional probabilities.
VAR 4.E Calculate probabilities for independent events and for the union of two events.
VAR 5.A Represent the probability distribution for a discrete random variable.
VAR 5.B Interpret a probability distribution.
VAR 5.C Calculate parameters for a discrete random variable.
VAR 5.D Interpret parameters for a discrete random variable.
VAR 5.E Calculate parameters for linear combinations of random variables.
VAR 5.F Describe the effects of linear transformations of parameters of random variables.
UNC 3.A Estimate probabilities of binomial random variables using data from a simulation.

UNC 3.B Calculate probabilities for a binomial distribution
UNC 3.C Calculate parameters for a binomial distribution.
UNC 3.D Interpret probabilities and parameters for a binomial distribution.
UNC 3.E Calculate probabilities for geometric random variables.
UNC 3.F Calculate parameters of a geometric distribution.
UND 3.G Interpret probabilities and parameters for a geometric distribution.

Assessments: Concept Quizzes, Concept Assignments, Unit 4 Assessment

Pacing: 22 days (including assessment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series

Pequea Valley School District
Math

Course: AP Statistics **Grade**: 10, 11, 12

Unit 5: Sampling Distribution Models

CONCEPT		CONCEPT		CONCEPT		CONCEPT
Sampling Distribution Models (Chapter 18)		**Confidence Intervals for Proportions (Chapter 19)**		**Testing Hypotheses About Proportions (Chapters 20 and 21)**		**Comparing Two Proportions (Chapter 22)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**		**VOCABULARY**
Sampling Distribution Model, Sampling Variability (Sampling Error), Sampling Distribution Model for a Proportion, Central Limit Theorem, Sampling Distribution Model for a Mean		Standard Error, Confidence Interval, One-proportion z-Interval, Margin of Error, Critical Value		Null Hypothesis, Alternative Hypothesis, Two-sided Alternative (Two-tailed Alternative), One-sided Alternative (One-tailed Alternative), P-value, One-proportion z-test, Alpha Level, Statistically Significant, Significance Level, Type I Error, Type II Error, Power, Effect Size		Variances of Independent Random Variables Add, Sampling Distribution of the Difference Between Two Proportions, Two-Proportion, Z-Interval, Pooling, Two-Proportion Z-Test

KNOW		KNOW		KNOW		KNOW
• Sampling Distribution Model for proportions and means. • Compute mean and standard deviation for sampling distribution models.		• How to examine your data for violations of conditions that would make inference about a population proportion unwise or invalid		• How to state the null and alternative hypotheses for a one-proportion z-test • Conditions that must be true for a one-proportion z-test to be appropriate • How to identify and use the alternative hypothesis when testing hypotheses • How to perform a one-proportion z-test and write a sentence interpreting the results • How to interpret the meaning of a P-value in nontechnical language, making clear that the probability claim is made about computed values under the assumption that the null model is true and not about the population parameter of interest • Identify and use the alternative hypothesis when testing hypotheses • How to complete a hypothesis test for a population proportion • How to interpret the meaning of a P-value in nontechnical language		• How to state the null and alternative hypotheses for testing the difference between two population proportions • How to examine your data for violations of conditions that would make inference about the difference between two population proportions unwise or invalid • How to find a confidence interval for the difference between two proportions • How to perform a significance test of the natural null hypothesis that two population proportions are equal • How to write a sentence describing what is said about the difference between two populations proportions by a confidence interval • How to write a sentence interpreting the results

				• Not to “accept” a null hypothesis if it cannot be rejected, but rather “fail to reject” the hypothesis • How to identify error as Type I or Type II		of a significance test of the null hypothesis that two population proportions are equal
UNDERSTAND		**UNDERSTAND**		**UNDERSTAND**		**UNDERSTAND**
• The variability of a statistic depends on the size of the sample. Statistics based on larger samples are less variable • The Central Limit Theorem gives the sampling distribution model of the mean for sufficiently large samples regardless of the underlying population		• Confidence intervals as a balance between the precision and the certainty of a statement about a model parameter • The margin of error of a confidence interval for a proportion changes with the sample size and the level of confidence		• How to choose between a one-sided and two-sided alternative hypothesis, and be able to explain your choice • Statistical significance does not measure the importance or magnitude of an effect and recognize when others misinterpret statistical significance as proof of practical importance • The close relationship between hypothesis tests and confidence intervals • The choice between one-sided and two-sided alternative hypothesis, and how to defend the choice of a one-sided alternative • The critical value for a test is related to the specified alpha level • The power of a test gives the probability that it correctly rejects a false null hypothesis		• The formula for the standard error of the difference between two independent sample proportions is based on the principle that when finding the sum or difference of two independent random variables, their variances add

				when a specified alternative is true • The power of a test depends in part on the same size • The P-value of a test does not give the probability that the null hypothesis is correct		
LEARNING OUTCOME		**LEARNING OUTCOME**		**LEARNING OUTCOME**		**LEARNING OUTCOME**
• Learners will be able to demonstrate a sampling distribution by simulation, use a sampling distribution model to make simple statements about the distribution of a proportion or mean under repeated sampling and interpret a sampling distribution model as describing the values taken by a statistic in all possible realizations of a sample or randomized experiment under the same conditions.		• Learners will be able to construct and interpret a one-proportion z-interval.		• Learners will be able to conduct a one-proportion z-test by stating hypotheses, checking appropriate conditions, computing the test statistic and p-value, drawing the correct conclusion, and interpreting the conclusion in context		• Learners will be able to construct and interpret (in context) confidence intervals for the difference between two proportions. • Learners will be able to conduct two-proportion z-tests for the difference between sample proportions by stating hypotheses, checking appropriate conditions, computing the test statistic and p-value, drawing the correct conclusion, and interpreting the conclusion in context

Pa Core Standards:

VAR 6.A Calculate the probability that a particular value lies in a given interval of a normal distribution.
VAR 6.B Determine the interval associated with a given area in a normal distribution.
VAR 6.C Determine the appropriateness of using the normal distribution to approximate probabilities for unknown distributions.
UNC 3.H Estimate sampling distributions using simulation.
UNC 3.I Explain why an estimator is or is not unbiased.
UNC 3.J Calculate estimates for a population parameter.
UNC 3.K Determine parameters of a sampling distribution for sample proportions.
UNC 3.L Determine whether a sampling distribution for a sample proportion can be described as approximately normal
UNC 3.M Interpret probabilities and parameters for a sampling distribution for a sample proportion.
UNC 3.N Determine parameters of a sampling distribution for a difference in sample proportions.
UNC 3.O Determine whether a sampling distribution for a difference of sample proportions can be described as approximately normal.
UNC 3.P Interpret probabilities and parameters for a sampling distribution for a difference in proportions.
UNC 4.A Identify an appropriate confidence interval procedure for a population proportion.
UNC 4.B Verify the conditions for calculating confidence intervals for a population proportion.
UNC 4.C Determine the margin of error for a given sample size and an estimate for the sample size that will result in a given margin of error for a population proportion.
UNC 4.D Calculate an appropriate confidence interval for a population proportion.
UNC 4.E Calculate an interval estimate based on a confidence interval for a population proportion.
UNC 4.F Interpret a confidence interval for a population proportion.
UNC 4.G Justify a claim based on a confidence interval for a population proportion.
UNC 4.H identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population proportion.
VAR 6.D Identify the null and alternative hypotheses for a population proportion.
VAR 6.E Identify an appropriate testing method for a population proportion.
VAR 6.F Verify the conditions for making statistical inferences when testing a population proportion.
VAR 6.G Calculate an appropriate test statistic and p-value for a population proportion
VAR 6.H Interpret the p-value of a significance test for a population proportion.
DAT 3.B Justify a claim about the population based on the results of a significance test for a population proportion.

UNC 5.A Identify Type I and Type II errors.
UNC 5.B Calculate the probability of a Type I and Type II errors.
UNC 5.C Identify factors that affect the probability of errors in significance testing.
UNC 5.D Interpret Type I and Type II errors.
UNC 4.I Identify an appropriate confidence interval procedure for a comparison of population proportions.
UNC 4.J Verify the conditions for calculating confidence intervals for a difference between population proportions.
UNC 4.K Calculate an appropriate confidence interval for a comparison of population proportions.
UNC 4.L Calculate an interval estimate based on a confidence interval for a difference of proportions.
UNC 4.M Interpret a confidence interval for a difference of proportions.
UNC 4.N Justify a claim based on a confidence interval for a difference of proportions.
VAR 6.H Identify the null and alternative hypotheses for a difference of two population proportions.
VAR 6.I Identify an appropriate testing method for the difference of two population proportions.
VAR 6.J Verify the conditions for making statistical inferences when testing a difference of two population proportions.
VAR 6.K Calculate an appropriate test statistic for the difference of two population proportions.
DAT 3.C Interpret the p-value of a significance test for a difference of population proportions.
DAT 3.D Justify a claim about the population based on the results of a significance test for a difference of population proportions.

Assessments: Concept Quizzes, Concept Assignments, Unit 5 Assessment

Pacing: 27 days (including assessment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series

Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 6: Learning About the World

CONCEPT		CONCEPT		CONCEPT
Inference About Means (Chapter 23)		**Comparing Means (Chapter 24)**		**Paired Samples and Blocks (Chapter 25)**
VOCABULARY		**VOCABULARY**		**VOCABULARY**
Student's t Distribution, Degrees of Freedom (df), One-Sample t-Interval for the Mean, One-Sample t-Test for the Mean		Two-sample t methods, Two-sample t-interval for the Mean Difference Between Means, Two-sample t-test for the Difference Between Means		Paired Data, Paired t-test, Paired-t Confidence Interval
KNOW		**KNOW**		**KNOW**
• Assumptions required for t-tests and t-based confidence intervals • How to examine your data for violations of conditions that would make inference about the population mean unwise or invalid		• Situations in which we want to do inference on the difference between the means of two independent groups • How to examine the data for violations of conditions that would make inference about the difference between the two population means unwise or invalid		• Whether a design that compares two groups is paired • How to find a paired confidence interval, recognizing that it is mechanically equivalent to doing a one-sample t-interval applied to the differences • How to perform a paired t-test, recognizing that it is mechanically

• Computations and interpretations of t-tests and t-based confidence intervals for the population mean using a statistics package or working from summary statistics for a sample • Do not "accept" a null hypothesis that cannot be rejected. Fail to reject it.				equivalent to a one-sample t-test applied to the differences
UNDERSTAND		**UNDERSTAND**		**UNDERSTAND**
• A confidence interval and a hypothesis test are essentially equivalent • The meaning of a confidence interval for a population mean and be able to explain it • A 95% confidence interval does not trap 95% of the sample values • The p-value of a test does not give the probability that the null hypothesis is correct		• How to interpret the results of a t-test for the difference between means. • The meaning of a confidence interval, in context, for the difference between means.		• How to interpret a paired t-test, recognizing that the hypothesis tested is about the mean of the differences between paired values rather than about the differences between the means of two independent groups • How to interpret a paired t-interval, recognizing that it gives an interval for the mean difference in the pairs
LEARNING OUTCOME		**LEARNING OUTCOME**		**LEARNING OUTCOME**
• Learners will be able to make inferences about population means by conducting hypothesis tests or building confidence intervals.		• Learners will be able to perform a two-sample t-test using a statistics package or calculator • Learners will be able to interpret a test of the null hypothesis that the means of two independent groups are equal.		• Learners will be able to perform hypotheses tests and build confidence intervals about the mean of differences for paired data, as well as interpreting the results of these analyses in context.

Pa Core Standards:

UNC 3.Q Determine parameters for a sampling distribution for sample means.

UNC 3.R Determine whether a sampling distribution of a sample mean can be described as approximately normal.

UNC 3.S Interpret probabilities and parameters for a sampling distribution for a sample mean.

UNC 3.T Determine parameters of a sampling distribution for a difference in sample means.

UNC 3.U Determine whether a sampling distribution of a difference in sample means can be described as approximately normal.

UNC 3.V Interpret probabilities and parameters for a sampling distribution for a difference in sample means.

UNC 1.J Identify questions suggested by probabilities of errors in statistical inference.

VAR 7.A Describe t-distributions.

UNC 4.O Identify an appropriate confidence interval procedure for a population mean, including the mean difference between values in matched pairs.

UNC 4.P Verify the conditions for calculating confidence intervals for a population mean, including the mean difference between values in matched pairs.

UNC 4.Q Determine the margin of error for a given sample size for a one-sample t-interval.

UNC 4.R Calculate an appropriate confidence interval for a population mean, including the mean difference between values in matched pairs.

UNC 4.S Interpret a confidence interval for a population mean, including the mean difference between values in matched pairs.

UNC 4.T Justify a claim based on a confidence interval for a population mean, including the mean difference between values in matched pairs.

UNC 4.U Identify the relationships between sample size, width of a confidence interval, confidence level, and margin of error for a population mean.

VAR 7.B Identify an appropriate testing method for a population mean with unknownσ, including the mean difference between values in matched pairs.

VAR 7.C Identify the null and alternative hypotheses for a population mean with unknown σ, including the mean difference between values in matched pairs.

VAR 7.D Verify the conditions for the test for a population mean, including the mean difference between values in matched pairs.

VAR 7.E Calculate an appropriate test statistic for a population mean, including the mean difference between values in matched pairs.

DAT 3.E Interpret the p-value of a significance test for a population mean, including the mean difference between values in matched pairs.
DAT 3.F justify a claim about the population based on the results of a significance test for a population mean.
UNC 4 Identify an appropriate confidence interval procedure for a difference of two population means.
UNC 4.W Verify the conditions to calculate confidence intervals for the difference of two population means.
UNC 4.X Determine the margin of error for the difference of two population means.
UNC 4.Y Calculate an appropriate confidence interval for a difference of two population means.
UNC 4.Z Interpret a confidence interval for a difference of population means
UNC 4.AA Justify a claim based on a confidence interval for a difference of population means.
UNC 4.AB Identify the effects of sample size on the width of a confidence interval for the difference of two means.
VAR 7.F Identify an appropriate selection of a testing method for a difference of two population means.
VAR 7.G Identify the null and alternative hypotheses for a difference of two population means.
VAR 7.H Verify the conditions for the significance test for the difference of two population means.
VAR 7. I Calculate an appropriate test statistic for a difference of two means.
DAT 3.G Interpret the p-value of a significance test for a difference of population means.
DAT 3.H Justify a claim about the population based on the results of a significance test for a difference of two population means in context.

Assessments: Concept Quizzes, Concept Assignments, Unit 6 Assessment

Pacing: 20 days (including assessment)

Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series, Released AP Exam Materials

Pequea Valley School District
Math

Course: AP Statistics Grade: 10, 11, 12

Unit 7: Inference When Variables Are Related

CONCEPT		CONCEPT
Comparing Counts (Chapter 26)		**Inferences for Regression (Chapter 27)**
VOCABULARY		**VOCABULARY**
Chi-square Model, Cell, Chi-square Statistic, Chi-square Test of Goodness-of-Fit, Chi-square Test of Homogeneity, Chi-square Test of Independence, Chi-square Component, Standardized Residual, Two-way Table, Contingency Table		Conditions for Interference in Regression (and checks for some of them), Residual Standard Deviation, t-test for the Regression Slope, Confidence Interval for the Regression Slope
KNOW		**KNOW**
• When a test of goodness-of-fit, a test of homogeneity, or a test of independence would be appropriate for a table of counts • How to display and interpret counts in a two-way table		• How to examine your data and a scatterplot of y vs x for violations of assumptions that would make inference for regression unwise or invalid • How to examine displays of the residuals from a regression to double-check that the conditions required for regression have been met (how to judge linearity and constant variance)

• How to use the chi-square tables to perform chi-square tests • How to compute a chi-square test using your statistics software or calculator • How to interpret chi-square as a test of goodness-of-fit, homogeneity, and/or independence in a few sentences		• How to test the standard hypothesis that the true regression slope is zero. • How to find the confidence interval for the slope of a regression based on the values reported in a standard regression output table
UNDERSTAND		**UNDERSTAND**
• The degrees of freedom for a chi-square test depend on the dimensions of the table and not on the sample size. This means increasing the sample size increases the ability of chi-square procedures to reject the null hypothesis • How to examine the standardized residuals to explain the nature of the deviations from the null hypothesis		• The "true" regression line does not fit the population data perfectly, but rather is an idealized summary of that data • How to summarize a regression in words • Interpretations of the P-value of the t-statistic for the slope to test the standard null hypothesis • How to interpret a confidence interval for the slope of a regression
LEARNING OUTCOME		**LEARNING OUTCOME**
• Learners will be able to determine when and which chi-square test is appropriate, perform the test, and interpret the results in context.		• Learners will be able to perform inference methods on regression models, including conducting hypothesis tests and building confidence intervals for the true slope. The results of these methods are able to be interpreted in context.

Pa Core Standards:

Assessments: Concept Quizzes, Concept Assignments, Unit 7 Assessment
Pacing: 13 days (including assessment)
Resources: Schoology, Stats Modeling the World AP Edition, Stats Modeling the World AP Test Prep Series, Released AP Exam Materials