DeSoto County High School

Probability and Statistics

Curriculum Calendar

2011 - 2012

UNIT/ORGANIZING PRINCIPLE: Introduction to Statistics	**Pacing: 1st nine weeks, Day 1 - 15**
Essential Question: What are the types of data collection and sampling techniques?	**Big Idea : Data Collection**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Overview of Statistics Data Classification Experimental Design	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Compare the difference between surveys, experiments, and observational studies and what types of questions can and cannot be answered by a particular design. Apply the definition of random sample and basic types of sampling, including representative samples, stratified samples, censuses Identify sources of bias, including sampling and non sampling errors.	MA.912.S.1.2 Moderate MA.912.S.2.1 High MA.912.S.2.2 Moderate MA.912.S.2.3 Moderate	Definition of statistics Data sets Branches of statistics Types of data Levels of measurement Design of a study Data collection Experimental design Sampling techniques	Population Sample Parameter Statistic Inferential statistics Qualitative Quantitative Level of measurement Observational study Experiment Control group Placebo Simulation Survey Randomization Census Sampling Bias

UNIT/ORGANIZING PRINCIPLE: Descriptive Statistics				**Pacing: 1st nine weeks, Day 16 – 40**
Essential Question: How can data be described?				**Big Idea : Summarizing Data** (Descriptive Statistics)
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Frequency Distributions & Their Graphs Measures of central tendency Measures of variation Measures of position	Read and interpret data presented in various formats, and identify possible corrections. Formats to include: Bar graphs Line graphs Stem and leaf plots Circle graphs Histograms Box and whisker plots Scatter plots Cumulative frequency (ogive) graphs Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: Bar graphs Line graphs Stem and leaf plots Circle graphs Histograms Box and whisker plots Scatter plots Cumulative frequency (ogive) graphs Calculate and interpret measures of the	MA.912.S.3.1 Moderate MA.912.S.3.2 High MA.912.S.3.3	Frequency distributions Graphs of frequency distributions Graphing quantitative data sets Graphing qualitative data sets Graphing paired data sets Mean, median, and mode Weighted mean Mean of grouped data The shape of distributions Range Deviation, variance, and standard deviation Interpreting standard deviation Standard deviation of grouped data	Frequency distributions Midpoint Relative frequency Cumulative frequency Histogram Ogive Stem-and-leaf plot Dot plot Pie chart/circle graph Scatter plot Time series chart Mean Median Mode Outlier Weighted mean Symmetric Uniform Skewed Range Variance Standard deviation Empirical rule Chebychev's Theorem Quartiles Box-and-whisker plot

	center of a set of data, including mean, median, and weighted mean, and use these measures to make comparisons among sets of data.	Moderate	Quartiles Percentiles Fractiles	z-score
	Calculate and interpret measures of variance and standard deviation. Use these measures to make comparisons among sets of data.	MA.912.S.3.4 Moderate	z-score	
	Calculate and interpret the range and quartiles of a set of data.	MA.912.S.3.5 Moderate		
	Use empirical rules such as the 68-95-99.7 rule to estimate spread of distributions and to make comparisons among sets of data	MA.912.S.3.6 Moderate		
	Determine whether a data distribution is symmetric or skewed based on an appropriate graphical presentation of the data	MA.912.S.3.8 Low		
	Identify outliers in a set of data based on an appropriate graphical presentation of the data, and describe the effect of outliers on the mean, median, and range of the data	MA.912.S.3.9 Moderate		

UNIT/ORGANIZING PRINCIPLE: Probability				**Pacing: 2nd nine weeks, Day 41 - 60**
Essential Question: How are probabilities determine?				**Big Idea : Counting Principles, Determine Probabilities**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Basic concepts of probability and counting Conditional Probability	Use counting principles to determine size of finite sample spaces and probabilities of events in those spaces. Use formulas for permutations and combinations to count outcomes and determine probabilities of events Determine probabilities of complementary events, and calculate odds for and against the occurrence of events Determine probabilities of independent events Understand and use the concept of conditional probability, including: understanding how conditioning affects the probability of events and finding conditional probabilities from a two-way frequency table	MA.912.P.1.1 High MA.912.P.1.2 Moderate MA.912.P.2.1 Moderate MA.912.P.2.2 Moderate MA.912.P.2.3 High	Probability experiments The Fundamental Counting Principle Types of Probability Complementary Events Probability Applications Conditional probability Independent and Dependent events The Multiplication Rule Mutually Exclusive Events The Addition Rule Permutations Combinations Applications of counting principles	Experiment Outcome Sample space Event Fundamental Counting Principle Classical probability Empirical probability Subjective probability Complement Tree diagram Conditional probability Independent Dependent Mutually exclusive Multiplication rule Addition rule Permutation Factorial Combinations

UNIT/ORGANIZING PRINCIPLE: Discrete Probability Distributions				**Pacing: 2nd nine weeks, Day 61 – 75**
Essential Question: How are distributions used to find probabilities?				**Big Idea : Probability Distributions**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Probability Distributions Binomial Distributions	Determine probabilities of events from distributions, including: Discrete uniform Binomial Normal Exponential Determine the mean and variance of distributions, including: Discrete uniform Binomial Normal Exponential	MA.912.P.3.1 High MA.912.P.3.2 Moderate	Random Variables Discrete probability distributions Mean, variance, and standard deviation Expected value Binomial experiments Binomial probability formula Finding binomial probabilities Geometric Distribution Poisson Distribution	Discrete Continuous Discrete probability distribution Mean, Variance, and Standard Deviation of a discrete random variable and binomial distribution Expected value Binomial experiment Binomial probability Binomial probability distribution Geometric distribution Poisson distribution

UNIT/ORGANIZING PRINCIPLE: Normal Probability Distributions				**Pacing: 2nd nine weeks, Day 76 - 100**
Essential Question: How are distributions used to find probabilities?				**Big Idea : Probability Distributions, Analyzing Data**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Normal Distributions Standard Normal Distribution Sampling Distributions Central Limit Theorem Normal Approximations to Binomial Distributions	Determine probabilities of events from distributions, including: Discrete uniform Binomial Normal Exponential Determine the mean and variance of distributions, including: Discrete uniform Binomial Normal Exponential Apply the properties of the normal distribution Apply the Central Limit Theorem to determine the probability that a sample mean will be in a certain interval Use a simulation to approximate sampling distributions for the mean, using repeated sampling simulations from a given population	MA.912.P.3.1 High MA.912.P.3.2 Moderate MA.912.P.3.3 Moderate MA.912.P.3.4 High MA.912.S.4.2 High	Properties of a normal distribution Properties of the standard normal distribution Finding areas under the standard normal curve Finding z-scores Transforming a z-score to an x-value Finding a specific data value for a given probability Properties of sampling distributions of sample means Probability and the Central Limit Theorem Correction for continuity Approximating binomial probabilities	Continuous random variable Continuous probability distribution Normal distribution Normal curve Standard normal distribution z-score x-value sampling distribution standard error of the mean central limit theorem binomial distribution correction for continuity binomial probability

	Apply the Central Limit Theorem to solve problems.	MA.912.S.4.3 High		

UNIT/ORGANIZING PRINCIPLE: Confidence Intervals				**Pacing: 3rd nine weeks, Day 101 - 119**
Essential Question: How are general principles of inferential statistics applied?				**Big Idea : Analyzing Data, Interpreting Results**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Confidence intervals for the mean Confidence intervals for population proportions Confidence intervals for variance and standard deviation	Explain and interpret the concepts of confidence level and "margin of error" Approximate confidence intervals for means using simulations of the distribution of the sample mean Analyze the relationship between confidence level, margin of error, and sample size	MA.912.S.4.1 High MA.912.S.4.4 High MA.912.S.5.1 High	Estimating population parameters Finding a confidence interval for a population mean (large samples) Find a minimum sample size to estimate the population mean Constructing a confidence interval for the mean (small samples) – t-Distributions Point estimate for the population proportion Constructing a confidence interval for a population proportion Find a minimum sample size to estimate p Finding point estimates for standard deviation Finding critical values for chi-square	Point estimate Interval estimate Level of confidence Critical values Sampling error Margin of error Confidence interval t-distribution degrees of freedom chi-square distribution

UNIT/ORGANIZING PRINCIPLE: Hypothesis Testing with One Sample				**Pacing:3rd nine weeks, Day 120 – 142**
Essential Question: How are the general principles of inferential statistics applied?				**Big Idea : Interpreting Results**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Hypothesis Testing Hypothesis Testing for the Mean (large samples) Hypothesis Testing for the Mean (small samples) Hypothesis Testing for Proportions Hypothesis Testing for Variance and Standard Deviation	Apply the general principles of hypothesis testing Explain and identify the following: null hypothesis, alternative hypotheses, Type I error, and Type II error Explain the meaning of p-value and its role in hypothesis testing Perform hypothesis tests of means and proportions for large samples, using simulations to determine whether a sample mean (proportion) has a low likelihood of occurring Interpret the results of hypothesis tests of means and proportions, and make decisions based on p-values of test	MA.912.S.5.2 High MA.912.S.5.3 High MA.912.S.5.4 Moderate MA.912.S.5.5 High MA.912.S.5.6 High	Stating a Hypothesis Types of errors and Level of significance Making and interpreting a decision Steps for hypothesis testing Decision rule based on P-value Strategies for Hypothesis testing Using P-values for a z-Test for mean Finding critical values in a normal distribution Decision rule based on rejection region Using rejection regions for a z-test for a mean Finding critical values in a t-	Hypothesis test Level of significance p-value z-test rejection region critical values t-test x^2 test null hypothesis alternate hypothesis type I error type II error

			distribution Using t-test for a mean Using p-values with t-tests Using a z-test for a proportion Finding critical values for chi-square-test Chi-square test for a variance or standard deviation	

UNIT/ORGANIZING PRINCIPLE: Hypothesis Testing with Two Samples				**Pacing: 4th nine weeks, Day 143 - 161**
Essential Question: How are general principles of inferential statistics applied?				**Big Idea : Interpreting Results**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Testing the Difference Between Means (large independent samples) Testing the Difference Between Means (small independent samples) Testing the Difference Between Means (dependent samples) Testing the Difference Between Proportions	Apply the general principles of hypothesis testing Explain and identify the following: null hypothesis, alternative hypotheses, Type I error, and Type II error Explain the meaning of p-value and its role in hypothesis testing Perform hypothesis tests of means and proportions for large samples, using simulations to determine whether a sample mean (proportion) has a low likelihood of occurring Interpret the results of hypothesis tests of means and proportions, and make decisions based on p-values of test	MA.912.S.5.2 High MA.912.S.5.3 High MA.912.S.5.4 Moderate MA.912.S.5.5 High MA.912.S.5.6 High	Independent & Dependent Samples Two-Sample z-test for the difference between means Two-Sample t-test for the difference between means Two-Sample z-test for the difference between proportions	**Paired samples** **Matched samples** **Null hypothesis** **Alternate hypothesis** **Type I error** **Type II error** **z-test** **independent** **dependent** **sampling distribution** **t-test**

UNIT/ORGANIZING PRINCIPLE: Correlation and Regression	**Pacing: 3rd nine weeks, Day 162 – 180**
Essential Question: How can bivariate data be analyzed?	**<u>Big Idea</u> : Interpreting Results**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Correlation Linear Regression Measures of Regression and Prediction Intervals Multiple Regression	Calculate the correlation coefficient of a set of paired data, and interpret the coefficient as a measure of the strength and direction of the relationship between the variables. Find the equation of the least squares regression line for a set of data. Use a regression line equation to make predictions. Interpret the coefficient of determination, r^2, for a least-squares regression.	MA.912.S.3.7 Moderate MA.912.S.4.5 Low MA.912.S.5.8 Moderate MA.912.S.5.9 Moderate	Calculating a correlation coefficient Using a table to test a population correlation coefficient Using the t-test for the correlation coefficient Finding the equation of a regression line Predicting y-values using regression equations Finding the coefficient of determination Finding the standard error of estimate Constructing a prediction interval for y for a specified value of x Finding a multiple regression equation	Correlation Scatter plot Correlation coefficient t-test regression line total deviation explained deviation unexplained deviation coefficient of determination standard error of estimate bivariate normal distribution c-prediction interval multiple regression equation