Statistics – Unit Plan

Unit	Data and Association
Time Frame	1-2 weeks
Essential Questions	• What is data? • Is there an association between two different variables
Priority Standards	**CC.2.4.HS.B.2** Summarize, represent, and interpret data on two categorical and quantitative variables.
Supporting Standards	
Skills to be Taught	1. State the 5 W's and H(Who, What, When, Where, Why, How) for a given scenario or set of data. 2. Understand the Think-Show-Tell concept for interpreting data in statistics. 3. Construct a visually and numerically accurate bar and pie chart. 4. Find the marginal and conditional distributions of a contingency table. 5. Determine if two variables are associated or independent based off the conditional distributions of a contingency table.
Calculator Skills	1. Input a data list into the list table of a calculator.
Assessments	Formative Unit Test RAFT – Chapter 3 (Highly recommended)
Resources	• *Stats in Your World* Chapters 2-3 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org

Statistics – Unit Plan

Unit	Working with Quantitative Data
Time Frame	2 – 3 weeks
Essential Questions	• How should I display quantitative data? • What can I interpret from quantitative data?
Priority Standards	**CC.2.4.HS.B.1** Summarize, represent, and interpret data on a single count or measurement variable. **CC.2.4.HS.B.2** Summarize, represent, and interpret data on two categorical and quantitative variables.
Supporting Standards	
Skills to be Taught	1. Create and interpret each of the following displays for a set of quantitative data: histogram, stem and leaf, dotplot, timeplot, and boxplot. 2. Describe the center (Mean/Median), spread (Std. Dev/IQR), and range for a distribution. 3. Evaluate a distribution using a 5-number summary (Min, Q1, Median, Q3, Max). 4. Determine if a data point is an outlier. 5. Determine the effects on center, shape, and spread when data is shifted or rescaled. 6. Find the z-score for a given data point and standard deviation for a set of data. 7. Create a normal model and determine when it is appropriate to use such a model. 8. Use the 68-95-99.7 rule to analyze a set of quantitative data. 9. Find the normal percentiles for a given set of z-scores and vice versa.
Calculator Skills	1. Make a histogram 2. Use 1VarStats to calculate the statistics for a set of quantitative data 3. Create a boxplot 4. Use normalcdf to find the percentiles for a given set of z-scores on a normal model
Summative Assessments	Quizzes – Chapters 4-6 Unit Test – Chapter 4-6 (Individual and team RAFT – One Raft from Chapters 4-6
Resources	• *Stats in Your World* Chapters 4-6 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org • Gallery of Data Visualization www.math.yorku.ca/SCS/Gallery

Statistics – Unit Plan

Unit	Comparing Variables
Time Frame	2 – 3 weeks
Essential Questions	• What type of model is best to display and analyze data? • How do I determine which model is best?
Priority Standards	**CC.2.4.HS.B.2** Summarize, represent, and interpret data on two categorical and quantitative variables. **CC.2.4.HS.B.3** Analyze linear models to make interpretations based on the data.
Supporting Standards	
Skills to be Taught	1. Determine the direction, form, and strength of a scatterplot. 2. Explain what the correlation of a scatterplot means in context. 3. Determine when it is appropriate to use correlation to evaluate a scatterplot. 4. Establish the concept that correlation does not equal causation. 5. Create a linear model using the least squares line for a scatterplot. 6. Calculate the residual for a data point and a given model. 7. Explain the concept of "regression towards the mean" for linear models and calculate how a change in one variable affects the other variable. 8. Explain the concept of a lurking variable and causation. 9. Create an exponential model for a set of data. 10. Create a power model for a set of data.
Calculator Skills	1. Create a scatterplot 2. Find the correlation of a linear model 3. Find the residuals for given data set 4. Create an exponential model 5. Create a power model
Summative Assessments	Quizzes – Chapters 7-9 Unit Test – Chapter 7-9 (Individual and team) RAFT – One Raft from Chapters 7-9
Resources	• *Stats in Your World* Chapters 7-9 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org • Data and Story Library lib.stat.cmu.edu/DASL • Illuminations illuminations.nctm.org

Statistics – Unit Plan

Unit	Gathering Data and Randomness
Time Frame	2 weeks
Essential Questions	• What techniques are appropriate for gathering data? • How can I gather data that is unbiased?
Priority Standards	**CC.2.4.HS.B.5** Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
Supporting Standards	
Skills to be Taught	1. Establish the three big ideas to create an effective survey. 2. Compare and contrast the different methods of sampling (Simple, stratified, cluster, multistage, systematic) 3. Understand the different types of bias that can affect sampling 4. Conduct a simulation to show the importance of randomness in a survey.
Calculator Skills	1. Generate a random number or list of random numbers.
Summative Assessments	Quizzes – Chapters 10, 12 Survey Project – Compare proper and bias questioning techniques
Resources	• *Stats in Your World* Chapters 10, 12 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org • JellyBlubbers Activity • Gallup Polling www.gallup.com

Statistics – Unit Plan

Unit	Probability
Time Frame	3 weeks
Essential Questions	• What is the likelihood of an event occurring? • How many different ways can an event occur?
Priority Standards	**CC.2.4.HS.B.6** Use the concepts of independence and conditional probability to interpret data. **CC.2.4.HS.B.7** Apply the rules of probability to compute probabilities of compound events in a uniform probability model.
Supporting Standards	
Skills to be Taught	1. Compare the Law of Large Numbers and the nonexistent Law of Averages 2. Find the probability of "or" and "and" events. 3. Determine the number of ways an event can occur using permutations and combinations 4. Explain what it means for events to be independent and/or disjoint. 5. Find the probability of the complement of an event. 6. Use a Venn diagram, table, or a tree diagram to help find the probability of an event. 7. Find the conditional probability of an event. 8. Create a probability model for an event. 9. Find the expected value, mean, and standard deviation for a probability model. 10. Use a Bernoulli Trial to find the probability of an event. 11. Explain why the 10% condition and Success/Failure Condtion are needed to properly assess a Binomial Probability model.
Calculator Skills	1. Use nCr and nPr to calculuate combinations and permutations. 2. Find the probability of an event using !, nCr, and nPr 3. Use binompdf to find the probability of a single event. 4. Use binomcdf to find several binomial probabilities at once.
Summative Assessments	Quizzes – Chapters 13-16 Unit Test – Probability RAFT – Ch. 13, 15, 16 (one for the unit)
Resources	• *Stats in Your World* Chapters 13-16 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org

Statistics – Unit Plan

Unit	Testing Data* (if time allows)
Time Frame	3-4 weeks*
Essential Questions	• How can I determine if my data is valid? • Is my data statistically significant?
Priority Standards	**CC.2.4.HS.B.4** Recognize and evaluate random processes underlying statistical experiments. **CC.2.4.HS.B.5** Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
Supporting Standards	
Skills to be Taught	1. Create a sampling distribution for a sample statistic. 2. Determine if a confidence interval is appropriate for a given sample and if so, create it. 3. Conduct a hypothesis test on a given sample. 4. Identify Type I and Type II errors in hypothesis testing. 5. Use alpha levels, critical values, and P-values to determine if a sample is statistically significant.
Calculator Skills	1. Calculate a confidence interval 2. Conduct a 1-Prop Z Test
Summative Assessments	
Resources	• *Stats in Your World* Chapters 13-16 • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org

Statistics – Unit Plan

Unit	Final Project
Time Frame	2-3 weeks
Essential Questions	• How can I demonstrate what I have learned in context?
Priority Standards	All PA Standards for Statistics
Supporting Standards	
Skills to be Taught	1. Understand the process used to conduct an observational study
Calculator Skills	All calculator skills in Statistics
Summative Assessments	Submission and Presentation of Final Project
Resources	• *Stats in Your World* • Teacher's Resource Guide • www.shodor.org • www.khanacademy.org