

**COURSE TITLE**

Statistics and Probability

**LENGTH**

Full Year

**DEPARTMENT**

STEM Department

**SCHOOL**

Rutherford High School

**DATE**

September 10, 2018

# Statistics and Probability

## I. Introduction/Overview/Philosophy

Statistics and Probability is designed for the college bound student who has demonstrated success in Algebra 2 and wishes to continue to explore a large range of topics with an emphasis on “real world” applications such as games of chance, random population, and actuarial science.

Technology plays an important role in statistics and probability by making it possible to generate plots, regression functions, and correlation coefficients, and to simulate many possible outcomes in a short amount of time. Students will regularly apply the tools of technology including the graphing calculator and computer to solve problems. They will be challenged through critical thinking exercises and participate in various group and individual activities that will enhance their mathematical reasoning ability and communication skills. Students are expected to use the information and technology in various ways in real world applications.

## II. Objectives

### *Course Outline:*

1. Introductions to Statistics
  - a. Distinguish between a population and a sample, a parameter and a statistic, descriptive statistics and inferential statistics, qualitative data and quantitative data
  - b. Classify data with respect to the four levels of measurement
  - c. Collect data through observational study, performing an experiment, using a simulation, or using a survey
  - d. Design an experiment
  - e. Create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling
  - f. Identify a biased sample
2. Descriptive Statistics
  - a. Construct a frequency distribution including limits, midpoints, relative frequencies, cumulative frequencies, and boundaries
  - b. Construct frequency histograms, frequency polygons, relative frequency histograms, and ogives
  - c. Graph quantitative data sets using stem-and-leaf plots and dot plots
  - d. Graph and interpret paired data sets using scatter plots and time series charts
  - e. Graph qualitative data sets using pie charts and Pareto charts
  - f. Find the mean, median, and mode of a population and a sample
  - g. Find a weighted mean of a data set and the mean of a frequency distribution
  - h. Describe the shape of a distribution as symmetric, uniform, or skewed and how to compare the mean and median for each
  - i. Find the range of a data set
  - j. Find the variance and standard deviation of a population and a sample
  - k. find the variance and standard deviation of a population and a sample
  - l. Use the Empirical Rule and Chebychev’s Theorem to interpret standard deviation

- m. Approximate the sample standard deviation for grouped data
  - n. Find the quartiles and interquartile range of a data set
  - o. Draw a box-and-whisker plot
  - p. Interpret other fractiles such as percentiles
  - q. Find and interpret the standard score (z -score)
3. Discrete Probability Distributions
- a. Distinguish between discrete random variables and continuous random variables
  - b. Determine if a distribution is a probability distribution
  - c. Construct a discrete probability distribution and its graph and find the mean, variance, and standard deviation of a discrete probability distribution
  - d. Find the expected value of a discrete probability distribution
  - e. Determine if a probability experiment is a binomial experiment
  - f. Find binomial probabilities using the binomial probability formula, a binomial probability table, and technology
  - g. Construct a binomial distribution and its graph and find the mean, variance, and standard deviation of a binomial probability distribution
  - h. Find probabilities using the geometric distribution and the Poisson distribution
4. Normal Probability Distributions
- a. Interpret graphs of normal probability distributions
  - b. Find areas under the standard normal curve
  - c. Find probabilities for normally distributed variables
  - d. Find a z -score given the area under the normal curve
  - e. Transform a z -score to an x -value
  - f. Find a specific data value of a normal distribution given the probability
  - g. Find sampling distributions and verify their properties
  - h. Apply the Central Limit Theorem to find the probability of a sample mean
  - i. Decide when a normal distribution can approximate a binomial distribution
  - j. Find the continuity correction
  - k. Use a normal distribution to approximate binomial probabilities
5. Probability
- a. Identify the sample space of a probability experiment and how to identify simple events
  - b. Use the Fundamental Counting Principle to find the number of ways two or more events can occur
  - c. Distinguish among classical probability, empirical probability, and subjective probability
  - d. Find the probability of the complement of an event and how to find other probabilities using the Fundamental Counting Principle
  - e. Find conditional probabilities
  - f. Distinguish between independent and dependent events
  - g. Use the Multiplication Rule to find the probability of two events occurring in sequence
  - h. Determine if two events are mutually exclusive
  - i. Use the Addition Rule to find the probability of two events
  - j. Find the number of ways a group of objects can be arranged in order and the number of ways to choose several objects from a group without regard to order
  - k. Use counting principles to find probabilities
6. Confidence Intervals
- a. Find a point estimate and a margin of error
  - b. Construct and interpret confidence intervals for the population mean
  - c. Determine the minimum sample size required when estimating  $\mu$

- d. Interpret the t -distribution and use a t -distribution table
  - e. Construct confidence intervals when  $n < 30$ , the population is normally distributed, and the standard deviation is unknown
  - f. Find a point estimate for a population proportion
  - g. Construct a confidence interval for a population proportion
  - h. Determine the minimum sample size required when estimating a population proportion
  - i. Interpret the chi-square distribution and use a chi-square distribution table
  - j. Use the chi-square distribution to construct a confidence interval for the variance and standard deviation
7. Hypothesis Testing with One Sample
- a. State a null hypothesis and an alternative hypothesis
  - b. Identify type I and type II errors
  - c. Know whether to use a one-tailed or a two-tailed statistical test
  - d. Interpret a decision based on the results of a statistical test
  - e. Find P -values and use them to test a mean  $\mu$
  - f. Use p-values for a z -test
  - g. Find critical values and rejection regions in a normal distribution
  - h. Use rejection regions for a z -test
  - i. Find critical values in a t -distribution
  - j. Use the t -test to test a mean  $m$
  - k. Use technology to find p-values and use them with a t -test to test a mean  $\mu$
  - l. Use the z -test to test a population proportion  $p$
  - m. Find critical values for a chiSquare-test
  - n. Use the chiSquare -test to test a variance or a standard deviation
8. Hypothesis Testins with Two Samples
- a. Decide whether two samples are independent or dependent
  - b. Perform a two-sample test for the difference between two means  $\mu_1$  and  $\mu_2$  using large independent samples
  - c. Perform a test for the difference between two population means  $\mu_1$  and  $\mu_2$  using small independent samples
  - d. Perform a test to test the mean of the differences for a population of paired data
  - e. Perform a test for the difference between two population proportions  $p_1$  and  $p_2$
9. Correlations and Regression
- a. Construct a scatter plot
  - b. Perform a hypothesis test for a population correlation coefficient  $r$
  - c. Find the equation of a regression line,  $y = mx + b$
  - d. Predict y -values using a regression equation
  - e. find and interpret the coefficient of determination  $r^2$
  - f. find and interpret the standard error of estimate for a regression line
  - g. Construct and interpret a prediction interval for y,  $y - E < y < y + E$

***Student Outcomes:***

After successfully completing this course, the student will:

- Summarize, represent, and interpret data on a single count or measurement variable
- Understand and evaluate random processes underlying statistical experiments

- Make inferences and justify conclusions from sample surveys, experiments and observational studies
- Understand the independence and conditional probability and use them to interpret data
- Use the rules of probability to compute probabilities of compound events in a uniform probability model
- Summarize, represent, and interpret data on a single count or measurement variable
- Summarize, represent, and interpret data on two categorical and quantitative variables
- Interpret functions that arise in applications in terms of the context

## ***New Jersey Student Learning Standards***

### ***CAREER READY PRACTICES***

#### ***CRP1 Act as a responsible and contributing citizen and employee.***

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

#### ***CRP2 Apply appropriate academic and technical skills.***

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

#### ***CRP4 Communicate clearly and effectively and with reason.***

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

#### ***CRP6. Demonstrate creativity and innovation.***

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

#### ***CRP7. Employ valid and reliable research strategies.***

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

#### ***CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.***

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

***CRP11. Use technology to enhance productivity.***

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

***TECHNOLOGY***

**Standard 8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

***Strand A. Technology Operations and Concepts:*** Students demonstrate a sound understanding of technology concepts, systems and operations.

8.1.12.A.3- Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

8.1.12.A.4- Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.

8.1.12.A.5- Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.

***Strand C. Communication and Collaboration:*** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

8.1.12.C.1- Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

***Strand D. Digital Citizenship:*** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

8.1.12.D.5- Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

**Standard 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

***Strand B. Technology and Society:*** Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.

8.2.12.B.4- Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.

***Strand D. Abilities for a Technological World:*** The designed world is the product of a design process that provides the means to convert resources into products and systems.

8.2.12.D.6- Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.

**21ST CENTURY LIFE AND CAREERS****9.1 Personal Financial Literacy****Strand A: Income and Careers**

9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.

9.1.12.A.4 Identify a career goal and develop a plan and timetable for achieving it, including educational/training requirements, costs, and possible debt.

**Strand E: Becoming a Critical Consumer**

9.1.12.E.4 Evaluate how media, bias, purpose, and validity affect the prioritization of consumer decisions and spending.

9.1.12.E.8 Relate consumer fraud, including online scams and theft of employee time and goods, to laws that protect consumers.

**9.2 Career Awareness, Exploration, and Preparation****Strand C: Career Preparation**

9.2.12.C.1 Review career goals and determine steps necessary for attainment.

9.2.12.C.3 Identify transferable career skills and design alternate career plans.

9.2.12.C.4 Analyze how economic conditions and societal changes influence employment trends and future education.

**NEW JERSEY STUDENT LEARNING STANDARDS- MATH**

S-CP.A.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).

S-CP.A.2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S-CP.A.3. Understand the conditional probability of A given B as  $P(A \text{ and } B)/P(B)$ , and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

S-CP.A.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.

S-CP.A.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

S-CP.B.6. Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.

S-CP.B.7. Apply the Addition Rule,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.

S-CP.B.8. (+) Apply the general Multiplication Rule in a uniform probability model,  $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$ , and interpret the answer in terms of the model.

S-CP.B.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

S-IC.A.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S-IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

S-IC.B.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S-IC.B.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

S-IC.B.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S-IC.B.6. Evaluate reports based on data.

S-ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).

S-ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies).

Recognize possible associations and trends in the data.

S-ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

S-ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

S-ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

S-ID.C.9. Distinguish between correlation and causation.

S-MD.A.1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S-MD.A.2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S-MD.A.3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.

S-MD.A.4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

S-MD.B.5a. Find the expected payoff for a game of chance.

S-MD.B.5b. Evaluate and compare strategies on the basis of expected values.

S-MD.B.6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S-MD.B.7. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

### ***Mathematical Practices***

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

### **III. Proficiency Levels**

Statistics and Probability is available to students who have successfully completed Algebra 2 or its equivalent.

### **IV. Methods of Assessment**



**Student Assessment**

The teacher will provide a variety of assessments during the course of the year. The assessment may include but is not limited to: chapter and unit tests and quizzes, teacher observations, open-ended problems, cooperative work, and homework.

**Curriculum/Teacher Assessment**

The teacher will provide the subject area supervisor with suggestions for changes on an ongoing basis.

**V. Grouping**

Statistics and Probability is a heterogeneously grouped junior/senior level course.

**VI. Articulation/Scope & Sequence/Time Frame**

Course length is one year.

**VII. Resources*****Texts/Supplemental Reading/References***

1. *Elementary Statistics*, Prentice Hall, 2006.
2. StatCrunch Software

**VIII. Suggested Activities**

Appropriate activities are listed in the curriculum map.

**IX. Methodologies**

The following methods of instruction are suggested: teacher guided explorations, working in groups/working with a partner, working with manipulatives and discovery activities.

**X. Interdisciplinary Connections**

Connections are made to music during the study of harmonic sequences. Data analysis applications to science and business problems are frequent throughout the course. Connections are also made by means of formulas used in computer programming classes. Writing assignments and portfolios strengthen the connection between mathematics and language arts literacy and fine arts.

**XI. Differentiating Instruction for Students with Special Needs: Students with Disabilities, Students at Risk, English Language Learners, and Gifted & Talented Students**

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in

multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students.

Differentiating in this course includes but is not limited to:

*Differentiation for Support (ELL, Special Education, Students at Risk)*

- Peer mentoring on problems
- Differentiated teacher feedback on assignments
- Modeling out problems on whiteboard
- Visual aids as we project problems on whiteboard
- Study guides
- Tiered assignments
- Scaffolding of materials and assignments
- Re-teaching and review
- Guided note taking
- Exemplars of varied performance levels
- Multi-media approach to accommodating various learning styles

*Differentiation for Enrichment*

- Supplemental reading material for independent study
- Flexible grouping
- Tiered assignments
- Topic selection by interest
- Enhanced expectations for independent study
- Elevated questioning techniques using Webb's Depth of Knowledge matrix

## **XII. Professional Development**

The teacher will continue to improve expertise through participation in a variety of professional development opportunities.

## XII. Curriculum Map/Pacing Guide

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<p>Introductions to Statistics</p> <ul style="list-style-type: none"> <li>Distinguish between a population and a sample, a parameter and a statistic, descriptive statistics and inferential statistics, qualitative data and quantitative data</li> <li>Classify data with respect to the four levels of measurement</li> <li>Collect data through observational study, performing an experiment, using a simulation, or using a survey</li> <li>Design an experiment</li> <li>Create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling</li> <li>Identify a biased sample</li> </ul>	<p>2 weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>Guided notes</li> <li>Modified homework assignments</li> <li>Modified assessments</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>Illustrative Mathematics Activities</li> <li>Provide extension activities</li> <li>Adjusting the pace of lessons</li> </ul>	<p>S-IC.A.1, S-IC.B.3, S-ID.B.5, CRP1,24,6,7,8,11 8.1.12.A.3 9.1.12.A.3 9.1.12.A.4 9.2.12.C.3</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>Classify data with respect to the four levels of measurement</li> <li>Statistics Question of the Day</li> <li>Practice Exercises (1.1-1.3)</li> <li>Review Exercises (Chapter 1)</li> </ul> <p><i>Summative Assessment</i></p> <ul style="list-style-type: none"> <li>Classify data with respect to the four levels of measurement</li> <li>Sampling Lab</li> <li>Test (Chapter 1)</li> </ul>
<p>Descriptive Statistics</p> <ul style="list-style-type: none"> <li>Construct a frequency distribution including limits, midpoints, relative frequencies, cumulative frequencies, and boundaries</li> <li>Construct frequency histograms, frequency polygons, relative frequency histograms, and ogives</li> <li>Graph quantitative data sets using stem-and-leaf plots and dot plots</li> <li>Graph and interpret paired data sets using scatter plots and time series charts</li> </ul>	<p>6 weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>Use of assisted technology</li> <li>Use of prompts</li> <li>Khan Academy</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>Curriculum compacting</li> <li>Inquiry-based instruction</li> <li>Independent study</li> </ul>	<p>S-ID.A.1, S-IC.A.1, S-IC.A.3, S-IC.A.4 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.A.5 8.1.12.D.5 8.2.12.B.4 9.1.12.A.3 9.1.12.A.4</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>Classify data with respect to the four levels of measurement</li> <li>Statistics Question of the Day</li> <li>Practice Exercises (2.1-2.5)</li> <li>StatCrunch Mini Labs (Cereal /College-Worth_It)</li> <li>MiniQuiz (2.1)</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<ul style="list-style-type: none"> <li>• Graph qualitative data sets using pie charts and Pareto charts</li> <li>• Find the mean, median, and mode of a population and a sample</li> <li>• Find a weighted mean of a data set and the mean of a frequency distribution</li> <li>• Describe the shape of a distribution as symmetric, uniform, or skewed and how to compare the mean and median for each</li> <li>• Find the range of a data set</li> <li>• Find the variance and standard deviation of a population and a sample</li> <li>• Find the variance and standard deviation of a population and a sample</li> <li>• Use the Empirical Rule and Chebychev’s Theorem to interpret standard deviation</li> <li>• Approximate the sample standard deviation for grouped data</li> <li>• Find the quartiles and interquartile range of a data set</li> <li>• Draw a box-and-whisker plot</li> <li>• Interpret other fractiles such as percentiles</li> <li>• Find and interpret the standard score (z -score)</li> </ul>			<p>9.1.12.E.4 9.2.12.C.4</p>	<ul style="list-style-type: none"> <li>• Review Exercises (Chapter 2)</li> </ul> <p><i>Summative Assessment</i></p> <ul style="list-style-type: none"> <li>• Quiz (2.1-2.2)</li> <li>• Test (2.1-2.4)</li> <li>• Benchmark (Q1)</li> </ul>
<p>Discrete Probability Distributions</p> <ul style="list-style-type: none"> <li>• Distinguish between discrete random variables and continuous random variables</li> <li>• Determine if a distribution is a probability distribution</li> <li>• Construct a discrete probability distribution and its graph and find the mean, variance, and standard deviation of a discrete probability distribution</li> <li>• Find the expected value of a discrete probability</li> </ul>	<p>4 weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>• Rephrase questions, directions, and explanations</li> <li>• Modification of content and student products</li> <li>• Testing accommodations</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>• Real-world problems and</li> </ul>	<p>S-IC.A.1, S-ID.B.5, S-ID.B.6 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.A.5 8.1.12.C.1 8.1.12.D.5 8.2.12.B.4</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Statistics Question of the Day</li> <li>• Practice Exercises (4.1-4.3)</li> <li>• Review Exercises (Chapter 4)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Quiz (4.2)</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
distribution <ul style="list-style-type: none"> <li>Determine if a probability experiment is a binomial experiment</li> <li>Find binomial probabilities using the binomial probability formula, a binomial probability table, and technology</li> <li>Construct a binomial distribution and its graph and find the mean, variance, and standard deviation of a binomial probability distribution</li> <li>Find probabilities using the geometric distribution and the Poisson distribution</li> </ul>		scenarios <ul style="list-style-type: none"> <li>Khan Academy</li> <li>Critical/Analytical thinking tasks</li> </ul>	9.2.12.C.3 9.2.12.C.4 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.A.5 8.1.12.C.1 8.1.12.D.5 9.2.12.C.3 9.2.12.C.4	<ul style="list-style-type: none"> <li>Test (Chapter 4)</li> </ul>
Normal Probability Distributions <ul style="list-style-type: none"> <li>Interpret graphs of normal probability distributions</li> <li>Find areas under the standard normal curve</li> <li>Find probabilities for normally distributed variables</li> <li>Find a z -score given the area under the normal curve</li> <li>Transform a z -score to an x -value</li> <li>Find a specific data value of a normal distribution given the probability</li> <li>Find sampling distributions and verify their properties</li> <li>Apply the Central Limit Theorem to find the probability of a sample mean</li> <li>Decide when a normal distribution can approximate a binomial distribution</li> <li>Find the continuity correction</li> <li>Use a normal distribution to approximate binomial probabilities</li> </ul>	6 weeks	<i>For Support:</i> <ul style="list-style-type: none"> <li>Authentic assessments</li> <li>Pre-teaching of vocabulary and concepts</li> <li>Visual learning, including graphic organizers</li> </ul> <i>For Enhancement:</i> <ul style="list-style-type: none"> <li>Independent study</li> <li>Higher-order thinking skills</li> <li>Interest-based content</li> </ul>	S-IC.A.1, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6 CRP1,24,6,7,8,11 8.1.12.C.1 8.1.12.A.4 9.1.12.A.4 9.2.12.C.3	<i>Formative Assessment:</i> <ul style="list-style-type: none"> <li>Statistics Question of the Day</li> <li>Practice Exercises (5.1-5.5)</li> <li>Review Exercises (Chapter 5)</li> </ul> <i>Summative Assessment:</i> <ul style="list-style-type: none"> <li>Quiz (5.1-5.2)</li> <li>Test (5.1-5.3)</li> <li>Test (5.4-5.5)</li> <li>Benchmark (Q2)</li> </ul>
Probability <ul style="list-style-type: none"> <li>Identify the sample space of a probability</li> </ul>	4 weeks	<i>For Support:</i> <ul style="list-style-type: none"> <li>Use of visual and multi-</li> </ul>	S-IC.A.2, S-CP.A.1-5,	<i>Formative Assessment:</i> <ul style="list-style-type: none"> <li>Statistics Question of the</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<p>experiment and how to identify simple events</p> <ul style="list-style-type: none"> <li>• Use the Fundamental Counting Principle to find the number of ways two or more events can occur</li> <li>• Distinguish among classical probability, empirical probability, and subjective probability</li> <li>• Find the probability of the complement of an event and how to find other probabilities using the Fundamental Counting Principle</li> <li>• Find conditional probabilities</li> <li>• Distinguish between independent and dependent events</li> <li>• Use the Multiplication Rule to find the probability of two events occurring in sequence</li> <li>• Determine if two events are mutually exclusive</li> <li>• Use the Addition Rule to find the probability of two events</li> <li>• Find the number of ways a group of objects can be arranged in order and the number of ways to choose several objects from a group without regard to order</li> <li>• Use counting principles to find probabilities</li> </ul>		<p>sensory formats</p> <ul style="list-style-type: none"> <li>• Use of assisted technology</li> <li>• Use of prompts</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>• Adjusting the pace of lessons</li> <li>• Curriculum compacting</li> <li>• Inquiry-based instruction</li> </ul>	<p>S-CP.B.6-9, S-CP.B.6-9, S-MD.A.1-4, S-MD.A.1-4 S-MD.B.5a-b, S-MD.B.6-7 CRP1,24,6,7,8,11 8.1.12.C.1 8.1.12.D.5 9.2.12.C.3 9.2.12.C.4</p>	<p>Day</p> <ul style="list-style-type: none"> <li>• Practice Exercises (3.1-3.4)</li> <li>• Task (Titanic Stats)</li> <li>• Game Day</li> <li>• Review Exercises (Chapter 3)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Quiz (3.1-3.2)</li> <li>• Test (Chapter 3)</li> <li>• MoneyBall Inferences</li> </ul>
<p>Confidence Intervals</p> <ul style="list-style-type: none"> <li>• Find a point estimate and a margin of error</li> <li>• Construct and interpret confidence intervals for the population mean</li> <li>• Determine the minimum sample size required when estimating <math>\mu</math></li> <li>• Interpret the t</li> <li>• -distribution and use a t -distribution table</li> <li>• Construct confidence intervals when <math>n &lt; 30</math>, the population is normally distributed, and is the standard deviation is unknown</li> </ul>	<p>3 weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>• Khan Academy</li> <li>• Rephrase questions, directions, and explanations</li> <li>• Modification of content and student products</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>• Real-world problems and scenarios</li> <li>• Khan Academy</li> </ul>	<p>S-IC.B.3-6 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.A.3 8.1.12.C.1 8.1.12.D.6 8.2.12.D.6 9.2.12.C.1 9.2.12.C.3 9.1.12.E.8</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Statistics Question of the Day</li> <li>• Practice Exercises (6.1-6.4)</li> <li>• Review Exercises (Chapter 6)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Test (6.1-6.2)</li> <li>• Test (6.3-6.4)</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<ul style="list-style-type: none"> <li>• Find a point estimate for a population proportion</li> <li>• Construct a confidence interval for a population proportion</li> <li>• Determine the minimum sample size required when estimating a population proportion</li> <li>• Interpret the chi-square distribution and use a chi-square distribution table</li> <li>• Use the chi-square distribution to construct a confidence interval for the variance and standard deviation</li> </ul>		<ul style="list-style-type: none"> <li>• Critical/Analytical thinking tasks</li> </ul>		
<p>Hypothesis Testing with One Sample</p> <ul style="list-style-type: none"> <li>• State a null hypothesis and an alternative hypothesis</li> <li>• Identify type I and type II errors</li> <li>• Know whether to use a one-tailed or a two-tailed statistical test</li> <li>• Interpret a decision based on the results of a statistical test</li> <li>• Find P -values and use them to test a mean <math>\mu</math></li> <li>• Use p-values for a z -test</li> <li>• Find critical values and rejection regions in a normal distribution</li> <li>• Use rejection regions for a z -test</li> <li>• Find critical values in a t -distribution</li> <li>• Use the t -test to test a mean <math>m</math></li> <li>• Use technology to find p-values and use them with a t -test to test a mean <math>\mu</math></li> <li>• Use the z -test to test a population proportion <math>p</math></li> <li>• Find critical values for a chiSquare-test</li> <li>• Use the chiSquare -test to test a variance or a standard deviation</li> </ul>	<p>6 Weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>• Allow errors</li> <li>• Use of visual and multi-sensory formats</li> <li>• Use of assisted technology</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>• Inquiry-based instruction</li> <li>• Independent study</li> <li>• Higher-order thinking skills</li> </ul>	<p>S-ID.B.5-6, S-IC.A.1-2 CRP1,24,6,7,8,11 8.1.12.C.1 8.2.12.B.4 8.2.12.D.6 9.1.12.E.4 9.1.12.E.8 9.2.12.C.4</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Statistics Question of the Day</li> <li>• Practice Exercises (7..1-7.5)</li> <li>• Review Exercises (Chapter 7)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>• Test (7.2-7.3)</li> <li>• Benchmark Q3</li> </ul>

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
<p>Hypothesis Testing with Two Samples</p> <ul style="list-style-type: none"> <li>Decide whether two samples are independent or dependent</li> <li>Perform a two-sample test for the difference between two means <math>\mu_1</math> and <math>\mu_2</math> using large independent samples</li> <li>Perform a test for the difference between two population means <math>\mu_1</math> and <math>\mu_2</math> using small independent samples</li> <li>Perform a test to test the mean of the differences for a population of paired data</li> <li>Perform a test for the difference between two population proportions <math>p_1</math> and <math>p_2</math></li> </ul>	<p>5 Weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>Use of prompts</li> <li>Khan Academy</li> <li>Rephrase questions, directions, and explanations</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>Student-driven projects</li> <li>Real-world problems and scenarios</li> <li>Critical/Analytical thinking tasks</li> <li></li> </ul>	<p>S-IC.B.5-6, S-IC.C.7-9 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.A.5 8.1.12.C.1 9.1.12.E.4 9.1.12.E.8 9.2.12.C.4</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>Statistics Question of the Day</li> <li>Practice Exercises (8.1-8.4)</li> <li>Review Exercises (Chapter 8)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>Quiz (8.1-8.2)</li> <li>Test (8.1-8.4)</li> <li>Statistics Two-Hypothesis Test Project</li> <li>Benchmark Q4</li> </ul>
<p>Correlations and Regression</p> <ul style="list-style-type: none"> <li>Construct a scatter plot</li> <li>Perform a hypothesis test for a population correlation coefficient <math>r</math></li> <li>Find the equation of a regression line, <math>y = mx + b</math></li> <li>Predict <math>y</math> -values using a regression equation</li> <li>find and interpret the coefficient of determination <math>r^2</math></li> <li>find and interpret the standard error of estimate for a regression line</li> <li>Construct and interpret a prediction interval for <math>y</math>, <math>y-E &lt; y &lt; y+E</math></li> </ul>	<p>4 Weeks</p>	<p><i>For Support:</i></p> <ul style="list-style-type: none"> <li>Pre-teaching of vocabulary and concepts</li> <li>Visual learning, including graphic organizers</li> <li>Use of cognates to increase comprehension</li> <li>Teacher modeling</li> </ul> <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> <li>Inquiry-based instruction</li> <li>Independent study</li> <li>Higher-order thinking skills</li> </ul>	<p>S-ID.C.7-9, S-IC.B.3-4 CRP1,24,6,7,8,11 8.1.12.A.4 8.1.12.C.1 8.1.12.D.5 9.2.12.C.4</p>	<p><i>Formative Assessment:</i></p> <ul style="list-style-type: none"> <li>Statistics Question of the Day</li> <li>Practice Exercises (9.1-9.4)</li> <li>Review Exercises (Chapter 9)</li> </ul> <p><i>Summative Assessment:</i></p> <ul style="list-style-type: none"> <li>Quiz (9.1-9.2)</li> <li>Quiz (9.3-9.4)</li> <li>Test (9.1-9.4)</li> <li>Statistics Two-Hypothesis Test Project</li> <li>Benchmark Q4</li> </ul>