PARK RIDGE SCHOOL DISTRICT

Park Ridge, New Jersey

Statistics Curriculum Guide

Approved by Park Ridge Board of Education – August 27, 2012

Grades 9-12 Mathematics Writing Committee

All high school mathematics teachers participated in the high school mathematics curriculum revision process, thereby affording opportunities for teachers to add their knowledge and professional experiences to the process.   Teachers on the mathematics writing committee based the curriculum on teacher input and recommendations collected from collaboration efforts.   The curriculum writing committee members will act as a resource to their department colleagues.   Opportunities to discuss the curriculum implementation, teaching strategies, resources, as well as reflections and concerns will be provided during the 2011-12 school year.

I am grateful to the mathematics curriculum committee members for the many hours and expertise they devoted to writing this curriculum guide.   The committee members are commended for their efforts and interest in providing the Park Ridge School District with a thorough high school mathematics curriculum that aligns with the Common Core State Standards for Mathematics.

According to the 2010 Common Core State Standards Initiative, "The Common Core State Mathematical Standards are designed to provide a clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers."

Dr. Cathy Timpone
Director of Curriculum & Instruction

High School Mathematics Curriculum Writing Committee:

Lynne Lupfer revised:
Mathematics Prep, Geometry Honors, Algebra II Honors,
Pre-Calculus, Pre-Calculus Honors, SAT Prep Math curriculum guides

Rachel Berger revised:
Pre-Algebra, Algebra II, Algebra II Honors curriculum guides

Erin Havel revised:
Algebra I, Algebra I Honors curriculum guides

Roseanne Wates revised:
Geometry, Statistics curriculum guides

Dana Caine revised:
Statistics curriculum guide

Anna Marie Schoenkopf revised:
Life Skills Math curriculum guide

Debbie Strammiello revised:
Life Skills Math curriculum guides

Debra Aach, Mathematics Supervisor

Administration:

Troy Lederman, Principal, Park Ridge High School
Dr. Cathy Timpone, Director of Curriculum and Instruction
Dr. Robert Gamper, Superintendent

Board Approved August 27, 2012

PARK RIDGE SCHOOL DISTRICT
Park Ridge, NJ

MATH DEPARTMENT, 2011-2012

COURSE TITLE/GRADE & SUBJECT: STATISTICS/GRADES 11 AND 12/MATHEMATICS   **COURSE # 2592**
PREREQUISITE: ALGEBRA II
TIME ALLOCATION:36-40 WEEKS
TEXTS:
    Yates, Moore, Starnes. 2008. *The Practice of Statistics, Third Edition;* New York, NY; WH Freeman and Company (Statistics)
    Bock,Velleman, Deveaux. 2010, *Stats Modeling the World;* Addison-Wesley (AP)

COURSE PHILOSOPHY (grades 7-12): Statistics is a non-calculus based statistics course that teaches the rigor and value of statistics as a mathematical and highly useful subject. Students are encouraged to read current events and bring in real life applications to discuss and enhance the course. The goal is to have students see the practicality of statistics and to critically view the world through mathematics. Technology is a necessity in today's statistics. TI-83, 84 calculator and Microsoft Excel are utilized.

OVERARCHNG ENDURING UNDERSTANDINGS (grade 7-12): Exploring data while looking for patterns and departures from patterns will allow students to be able to analyze data in a variety of ways. Producing data using samples and experiments will help students to collect a fair and unbiased data set. Knowing how to use the rules of probability using the foundations of inference will allow students to determine the outcome of simulation, experiment, or game of chance. Knowing inferential statistics and confidence levels will allow students to make reliable conclusions.

OVERARCHING ESSENTIAL QUESTIONS (grades 7-12): How can the shape of data be displayed? What are the properties of univariate data? What are the properties of bivariate data? How can we carry out a study or experiment and evaluate the results? What distinguishs exclusive from mutually exclusive events? How can you use statistical inference to analyze data and test hypotheses?

TABLE OF CONTENTS (UNITS OF STUDY):
Unit 1: Exploring Data
Unit 2: Sampling and Experimentation
Unit 3: Anticipating Patterns
Unit 4: Statistical Inference

UNIT ONE: Exploring Data

UNIT SUMMARY:
1. Goal: Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.
2. Sequencing: The course logically begins with univariate data and progresses into bivariate data. It fits into the goals of the course because it is the introduction to data analysis.
3. Rationale: Students need to be able to analyze data graphically, computationally, and analytically in order to better understand real life statistics and technology in the modern world.

21ST CENTURY THEMES:

☒ Global Awareness
☒ Technology
☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy
☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
Concepts that reinforce other courses and 21st century themes: Data analysis in the form of Gallup polls, media, internet, newspapers, etc.

STANDARDS

S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9
Summarize, represent, and interpret data on a single count or measurement variable (S-ID)
1. Represent data with plots on the real number line (dot plots,histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context ofthe data sets, accounting for possible effects of extreme data points (outliers).
4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
Summarize, represent, and interpret data on two categorical and quantitative variables
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.

6. Represent data on two quantitative variables on a scatter plot, anddescribe how the variables are related.
   a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose*
    a function suggested by the context. Emphasize linear, quadratic, and exponential models.
   b. Informally assess the fit of a function by plotting and analyzing residuals.
   c. Fit a linear function for a scatter plot that suggests a linear association. Interpret linear models
7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

RST.11.1-8,10
1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
4.Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

UNIT ESSENTIAL QUESTIONS:	UNIT ENDURING UNDERSTANDINGS:
▪ How can the shape of data be displayed? ▪ How do we use the properties of univariate and bivariate data to analyze a statistical situation?	▪ Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
10-12 Weeks	• Types of data: variables, cases, context, categorical, quantitative, observational, study, sample, population, individuals, units • Distributions of one variable: stem and leaf, histogram, box plot, dot plot, frequency tables • Summary statistics: mean, median, five-number summary, range, standard deviation, variation, mode, inter-quartile range, quartiles, percentiles, z-score, explanatory and response variables, influential points, lurking variables, Simpson's paradox • Distributions of two variables: scatter plots, time plots • Describing distributions: center, outliers, spread, shape, skewness • Modeling data: least squares regression line, correlation, residuals, causation S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9 RST.11.1-8,10	• Summarize, represent, and interpret univariate data • Summarize, represent, and interpret bivariate data. • Interpret linear models using least squares regression and correlation S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9 RST.11.1-8,10	**Formative and Summative Assessments**: Quizzes, Tests, Experiments, Projects, Exploratory Activities, Book Assignments, Class Discussions, Student Participation suggested assignments: o Constructing graphical Displays of Univariate Data o Constructing a Living BoxPlot o The Game of Greed o Everything I Ever Needed to Learn about Statistics I Learned From a Bag of m&m's o Statistics project on Linear Regression o Chirping Frequency and Temperature for the Striped Ground Cricket o Tie-the-Knot Lab o Bridges o Growth and Decay m&m Lab o Time for the Movies o The Practice of Statistics Teacher Resource Book S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9 RST.11.1-8,10

TEACHER RESOURCES	TEACHER NOTES/REFLECTIONS

▪ Textbook resources
▪ Smart board
▪ Computer access for students, including Microsoft Excel
▪ TI-83 or 84
▪ ELMO
▪ Internet Access
 	
suggested websites:
    www.whfreeman.com/tps3e
    www.stattrek.com
    www.gallup.com
    www.aw.com/bock
    www.cdc.gov/nchs/
    http://lib.stat.cmu.edu/DASL/
    www.eeps.com/zoo/index.html
    www.fedstats.gov/
    ww.bls.gov/
    www.seattlecentral.edu/qelp/index.html
  www.usno.navy.mil/USNO/astronomical-applications/data-services	

UNIT TWO: Sampling and Experimentation

UNIT SUMMARY:
4. Goal: Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis.
5. Sequencing: Students will first do different types of samplling and then conduct a fair experiment.
6. Rationale: Students will learn how to take a fair sample, conduct a fair experiment, and analyze its results appropriately. The purpose of this is for students to develop an understanding of how and why samples and experiments are used to predict outcomes.

21ST CENTURY THEMES:

☒ Global Awareness
☒ Technology
☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy
☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
Concepts that reinforce other courses and 21st century themes: Data will be collected from other content areas and analyzed according to statistical procedures.

STANDARDS

S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9; S-IC.1,2,3,4,5,6
Summarize, represent, and interpret data on a single count or measurement variable (S-ID)
1. Represent data with plots on the real number line (dot plots,histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context ofthe data sets, accounting for possible effects of extreme data points (outliers).
4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
Summarize, represent, and interpret data on two categorical and quantitative variables
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.

6. Represent data on two quantitative variables on a scatter plot, anddescribe how the variables are related.
   a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.*
   b. Informally assess the fit of a function by plotting and analyzing residuals.
   c. Fit a linear function for a scatter plot that suggests a linear association. Interpret linear models
7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

Making Inferences and Justifying Conclusions S-IC
Understand and evaluate random processes underlying statistical experiments (S-IC)
1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*
Make inferences and justify conclusions from sample surveys,experiments, and observational studies
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
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.
5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
6. Evaluate reports based on data.

RST.11.7,8,9,10
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

9.1.12.A.1Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

UNIT ESSENTIAL QUESTION:	UNIT ENDURING UNDERSTANDINGS:
▪ How can we carry out a study or experiment and evaluate the results?	▪ Collecting random data from surveys/experiments makes it possible to draw valid conclusions about the whole population, taking variability into account.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
3-4 Weeks	- Population vs. sample - Bias - Randomization - Principles of experimental design – control, randomization, replication - Types of Sampling – SRS, random digits, probability sample, convenience sampling, stratified random sample - Experiments – units, treatments, response, control groups, blinding, placebo, designing experiments - Observational studies - Simulations - wait time simulation, designing, let statements, interpretation of results, designing simulations	- Understand and evaluate random processes of surveys and experiments - Make inferences and justify conclusions from surveys and experiments	**Formative and Summative Assessments**: Quizzes, Tests, Experiments, Projects, Exploratory Activities, Book Assignments, Class Discussions, Student Participation Suggested assignments: - Gallup Poll - Simulation experiments chosen by students - Random sampling - Capture/Recapture - German Tank Problem - Soda Pop Challenge - The Practice of Statistics Teacher Resource Book
	S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9; S-IC.1,2,3,4,5,6 RST.11.7,8,9,10	S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9; S-IC.1,2,3,4,5,6 RST.11.7,8,9,10	S-ID.1,2,3,4; S-ID.5.6.a,b,c; S-ID.7,8,9; S-IC.1,2,3,4,5,6 RST.11.7,8,9,10

TEACHER RESOURCES	TEACHER NOTES/REFLECTIONS

▪ Textbook resources
▪ Smart board
▪ Computer access for students, including Microsoft Excel
▪ TI-83 or 84
▪ ELMO
▪ Internet Access
 	
suggested websites:
    www.whfreeman.com/tps3e
    www.stattrek.com
    www.gallup.com
    www.aw.com/bock
    www.cdc.gov/nchs/
    http://lib.stat.cmu.edu/DASL/
    www.eeps.com/zoo/index.html
    www.fedstats.gov/
    ww.bls.gov/
    www.seattlecentral.edu/qelp/index.html
  www.usno.navy.mil/USNO/astronomical-applications/data-services	

UNIT THREE: Probability

UNIT SUMMARY:
7. Goal: Students should be able to use probability as a tool for anticipating what the distribution of data should look like under a given model.
8. Sequencing: Students will follow the order of probability as: Basic Probability, Rules of Probability, Conditional Probability, Binomial Probability, and Geometric Probability
9. Rationale: Students will learn a logical progression and applications of probability in the real world.

21ST CENTURY THEMES:

☒ Global Awareness
☒ Technology
☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy
☒ Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
Concepts that reinforce other courses and 21st century themes:
Data (current events, business, politics, journalism, etc.)

STANDARDS

S-CP.1,2,3,4,5,6,7,8,9; S-MD.1,2,3,4,5a,b,6,7
Conditional Probability and the Rules of Probability S-CP
Understand independence and conditional probability and use them to interpret data
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").
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.
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.

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. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* Use the rules of probability to compute probabilities of compound events in a uniform probability model

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.

7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

8. (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

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

Using Probability to Make Decisions S-MD

Calculate expected values and use them to solve problems

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.

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

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. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*

4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?* Use probability to evaluate outcomes of decisions

5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
   a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fastfood restaurant.*
   b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*

6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, usinga random number generator).

7. (+) Analyze decisions and strategies using probability concepts (e.g.,product testing,

RST.11.9

9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.

UNIT ESSENTIAL QUESTION:	UNIT ENDURING UNDERSTANDINGS:
▪ What is probability and how is it applied? ▪ What distinguishes exclusive from mutually exclusive events?	▪ A probability model can be used to describe possible outcomes. Interpreting these probabilities relies on an understanding of

	independent and conditional probability.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
8-10 Weeks	• Random • Probability – event, outcome, sample space, disjoint, mutually exclusive, addition rule, independence, multiplication rule, expected value, conditional, Venn diagrams, finite • Random variables – discrete, continuous • Distributions – sampling, continuous, discrete, uniform, means, variances, binomial, geometric • Central Limit Theorem • Law of Large Numbers • Simulations • Bias and variability	• Understand independence and conditional probability • Use probability to interpret data • Use the rules of probability to compute probabilities of compound events in a uniform probability model	**Formative and Summative Assessments**: Quizzes, Tests, Experiments, Projects, Exploratory Activities, Book Assignments, Class Discussions, Student Participation Suggested assessments: o Simulations o Birthday Problem o Cents and Central Limit Theorem o What are the Odds? o Streaky Behavior Activity o Sundaes on Friday o Pass the Pigs o The Practice of Statistics Teacher Resource Book
	S-CP.1,2,3,4,5,6,7,8,9; S-MD.1,2,3,4,5a,b,6,7 RST.11.9	S-CP.1,2,3,4,5,6,7,8,9; S-MD.1,2,3,4,5a,b,6,7 RST.11.9	S-CP.1,2,3,4,5,6,7,8,9; S-MD.1,2,3,4,5a,b,6.7 RST.11.9

TEACHER RESOURCES	TEACHER NOTES/REFLECTIONS

- Textbook resources   - Smart board   - Computer access for students, including Microsoft Excel   - TI-83 or 84   - ELMO   - Internet Access   suggested websites:
    www.whfreeman.com/tps3e
    www.stattrek.com
    www.gallup.com
    www.aw.com/bock
    www.cdc.gov/nchs/
    http://lib.stat.cmu.edu/DASL/
    www.eeps.com/zoo/index.html
    www.fedstats.gov/
    ww.bls.gov/
    www.seattlecentral.edu/qelp/index.html
  www.usno.navy.mil/USNO/astronomical-applications/data-services	

UNIT SUMMARY:
　　10. Goal: Statistical inference guides the selection of appropriate models.
　　11. Sequencing: Students will first study confidence intervals and then the different types of hypothesis testing
　　12. Rationale: Students have gained a background in the practice of statistics and can now apply it to their own or existing hypotheses.

21ST CENTURY THEMES:

　　☒　Global Awareness
　　☒　Technology
　　☒　Financial, Economic, Business and Entrepreneurial Literacy
　　☒　Civic Literacy
　　☒　Health Literacy

PRIMARY INTERDISCIPLINARY CONNECTIONS:
　　Concepts that reinforce other courses and 21st century themes:
　　Data collection (current events, business, politics, journalism, etc.)

STANDARDS

S-ID.1,2,3,4,5,6a,b,c,7,8,9
S-IC.1,2,3,4,5,6
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6. Represent data on two quantitative variables on a scatter plot, anddescribe how the variables are related.
　　a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose*

a function suggested by the context. Emphasize linear, quadratic, and exponential models.
   b. Informally assess the fit of a function by plotting and analyzing residuals.
   c. Fit a linear function for a scatter plot that suggests a linear association. Interpret linear models
7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*
Make inferences and justify conclusions from sample surveys,experiments, and observational studies
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
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.
5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
6. Evaluate reports based on data.

RST.11.1-8,10
1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
4.Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*.
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

9.1.12.A.1Apply critical thinking and problem-solving strategies during structured learning experiences.
9.1.12.B.1 Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
9.1.12.C.5Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

UNIT ESSENTIAL QUESTION:	UNIT ENDURING UNDERSTANDINGS:
▪ How can you use statistical inference to analyze data and test hypotheses?	▪ Decisions or predictions are often based on data. Statistics provides the tools for testing hypotheses.

TIME ALLOTMENT	CONTENT	SKILLS	ASSESSMENT
10-12 Weeks	• Confidence intervals – margin of error, sample size • Standard error • Tests of significant – student t, paired t test, two sample t, goodness of fit, z -test, regression, p-test, chi-squared test • Hypothesis – null, alternative, rejecting, failing to reject, alpha level, type I error, type II error • P-values ,Significance, Matched pairs tests, Robustness and power • Two-way tables	• Calculate expected values and use them to solve problems • Make inferences and justify conclusions • Test hypotheses and use the appropriate test to interpret conclusions • Evaluating and using computer output to perform tests • Determining which test is appropriate	**Formative and Summative Assessments**: Quizzes, Tests, Experiments, Projects, Exploratory Activities, Book Assignments, Class Discussions, Student Participation Suggested assessments/assignments: o Statistics Olympics o How many red cards in an unfair deck? o Globe Toss o I'm 95% Confident You'll Be Mine o Globe Toss o Bean Bull's Eye:Matched Pairs Activity o What Did that Say?

			o How Fair is you Dice? o The Practice of Statistics Teacher Resource Book
	S-ID.1,2,3,4,5,6a,b,c,7,8,9 S-IC.1,2,3,4,5,6 RST.11.1-10	S-ID.1,2,3,4,5,6a,b,c,7,8,9 S-IC.1,2,3,4,5,6 RST.11.1-10	S-ID.1,2,3,4,5,6a,b,c,7,8,9 S-IC.1,2,3,4,5,6 RST.11.1-10

TEACHER RESOURCES	TEACHER NOTES/REFLECTIONS: *** Final 5 Weeks: Final Project and Presentations (Formative and Summative for Entire Course)
▪ Textbook resources ▪ Smart board ▪ Computer access for students, including Microsoft Excel ▪ TI-83 or 84 ▪ ELMO ▪ Internet Access suggested websites: 　www.whfreeman.com/tps3e 　www.stattrek.com 　www.gallup.com 　www.aw.com/bock 　www.cdc.gov/nchs/ 　http://lib.stat.cmu.edu/DASL/ 　www.eeps.com/zoo/index.html 　www.fedstats.gov/ 　ww.bls.gov/ 　www.seattlecentral.edu/qelp/index.html 　www.usno.navy.mil/USNO/astronomical-applications/data-services	