ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

Mathematics Department

AP STATISTICS

Board of Education

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Course Philosophy

Learning begins on the day a student is born. The student must gather information, process that information, and use it to make decisions. This most basic process is studied in depth in the discipline of statistics – in AP Statistics, students will study the discipline of gathering data, organizing that data, and interpreting that data within the structure of an understanding of the basics of probability and how they apply to randomly selected events.

The study of statistics becomes meaningful when students recognize that the concepts they are learning are a logical set of techniques that expand upon the basic process of collecting and interpreting information, enabling students to tackle problems of greater complexity that they could without such techniques. They will truly own these techniques after first having the opportunity to use them to analyze real-world data, and eventually formulating their own questions, producing and analyzing data that they collect themselves.

Course Description

AP Statistics is rigorous in its expectations and will fully prepare students for the Advanced Placement Statistics Examination of the College Board. The topics of a one semester college statistics course are covered in depth, including descriptive statistics, collection of data, the normal distribution, basics of probability, inference, confidence intervals, tests of significance and regression. Uses of the TI-83/84 graphing calculator and computer analysis of data are major requirements of the course and the AP examination. Students electing AP Statistics should have had a high level of success in past mathematics courses and are strongly encouraged to take the AP examination.

Statistics is a set of vitally important tools for interpreting the incredible quantity of information that a citizen of the 21st Century will face on a daily basis. An early exposure to the concepts in AP Statistics will help students build a solid foundation for the study of many disciplines at the college level, including the hard sciences, the soft sciences, and business. Additionally, these same concepts are useful in everyday living, as one carries out the responsibilities of citizenship, interprets the news of the day, and makes personal decisions of a wide variety.

Due to the pace and rigor of the course, students should have a background of success in mathematics and have demonstrated a solid work ethic. A student planning to take the course should have taken a minimum of Honors Geometry. A student who has taken PreCalculus may take the course with a teacher recommendation testifying to the student's work ethic and high level of performance. Due to the prerequisite of Geometry Honors or PreCalculus, the course is generally appropriate for Juniors and Seniors.

Integration of 21st Century Themes and Skills

Educational Technology

Standards: 8.1.12.A.2, 8.1.12.A.5

- **Technology Operations and Concepts:** Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
- **Technology Operations and Concepts:** Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.

Example: Students can electronically submit a slide presentation on a research topic of their choosing and present it to their peers and teachers. They must include at least 2 tables and 3 graphs in their presentation and use them to help explain their results.

Career Ready Practices

Standards: (CRP1, CRP2, CRP4, CRP7, CRP8, CRP11)

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.

Example: Students will demonstrate the responsibilities associated with being a member of a community when engaging collaboratively during sharing in pairs/trios, and participating in whole group discussions. Examples may include jigsaw and fishbowl activities, as well as group projects and assessments.

CRP2. Apply appropriate academic and technical skills.

Example: Students will demonstrate the skills learned in AP Statistics when engaging collaboratively during sharing in pairs/trios, and participating in whole group discussions. Examples may include jigsaw and fishbowl activities, as well as projects and formal assessments.

CRP4. Communicate clearly and effectively and with reason. Communication is a key factor in AP Statistics. Students are conscious that their words and techniques they use to convey their thoughts are crucial to audience understanding.

Example: Students will demonstrate clear and effective communication through written and oral assignments and assessments.

CRP7. Employ valid and reliable research strategies Students will learn the proper techniques to gather data without bias of any sort.

Example: Students will demonstrate reliable research strategies when creating questions and surveys to gather data. They will be assessed both informally and formally through projects, exit tickets, and formal assessments

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

Example: Students will demonstrate critical thinking as they determine the best methods to solve real-world statistical problems.

CRP11. Use technology to enhance productivity.

Example: Students will use technology to enhance productivity on a regular basis as they use graphing calculators and other statistical software to complete statistical analyses on various data sets and situations.

Robbinsville Ready 21st Century Skill Integration

The following skills will be embedded throughout the curriculum and instruction of this course.

Collaborative Team Member: Robbinsville students will learn more by working together than in isolation. As educational theorist Lev Vygotsky advocated, learning is a social process. Many workplaces today encourage employees to work in teams to solicit diverse perspectives, brainstorm new ideas and/or products, and solve problems. Further, collaboration fosters interpersonal relationships, self-management skills, cooperation, and a sense of collective responsibility. Collaborative team members are able to work with diverse groups of people who hold a variety of perspectives.

Effective Communicator: Robbinsville students must be able to clearly articulate their ideas orally, in writing, and across various media in order to successfully connect to the world around them. As the world becomes increasingly globalized, communication is more than just sharing one's ideas. Effective communicators are able to communicate their convictions, actively listen and analyze others' work to identify perspective and/or potential bias.

Emotionally Intelligent Learner: Robbinsville students who are emotionally intelligent learn to be empathetic, demonstrate integrity and ethical behavior, are kind, are self-aware, willing to change, and practice self-care. They are better able to cope with the demands of the 21st century digital society and workplace because they are reliable, responsible, form stable and healthy relationships, and seek to grow personally and professionally.

Emotionally intelligent people are able to manage their emotions, work effectively on teams and are leaders who can grow and help to develop others.

Informed and Involved Citizen: Robbinsville students need to be digital citizens who are civically and globally aware. The concept of what it means to be "literate" has evolved along with 21st century technological and cultural shifts. Our progressive vision of literacy entails having our students explore real world problems in the classroom. Informed and involved citizens are able to safely and accurately communicate with people all around the world and are financially, environmentally and informationally literate.

Innovative Thinker: Robbinsville students must encompass innovative thinking skills in order be successful lifelong learners in the 21st century world. As stated by Karl Fisch and Scott McLeod in the short film Shift Happens, "We are currently preparing students for jobs that don't yet exist . . . using technologies that haven't been invented . . . in order to solve problems we don't even know are problems yet." Innovative thinkers are able to think analytically, solve problems critically, creatively engage in curiosity and tinkering, and demonstrate originality.

Resilient and Self-Directed Learner: Robbinsville students need to take risks and ultimately make independent and informed decisions in an ever-changing world. Author of Life, the Truth, and Being Free, Steve Maraboli stated, "Life doesn't get easier or more forgiving, we get stronger and more resilient." Self-directed scholars of the 21st century are able to set goals, initiate resolutions by seeking creative approaches, and adjust their thinking in light of difficult situations. Resilient students are able to take risks without fear of failure and overcome setbacks by utilizing experiences to confront new challenges. Resilient and self directed scholars will consistently embrace opportunities to initiate solutions and overcome obstacles.

Interdisciplinary Connections

AP Statistic connects widely to the following Career & Technical Education (CTE) Content Area: 21st Century Life and Careers Standards:

9.3.12.BM-MGT.2 Access, evaluate and disseminate information for business decision making.
Students will access, evaluate, and disseminate information for decision making on a regular basis as they apply the skills learned in AP Statistics.

9.3.12.ED.2 Demonstrate effective oral, written and multimedia communication in multiple formats and contexts.
Students will present oral and multimedia projects to the class in a wide variety of contexts througout the course. They regularly communicate in writing as they practice AP Free Response quesitons each unit.

9.3.12.FN.1 Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.
Many mathematical applications of AP Statistics are geared towards finance, notably probability's applications to the stock market.

General Differentiated Instruction Strategies	
• Leveled texts • Chunking texts • Choice board • Socratic Seminar • Tiered Instruction • Small group instruction • Guided Reading • Sentence starters/frames • Writing scaffolds • Tangible items/pictures • Adjust length of assignment	• Repeat, reword directions • Brain breaks and movement breaks • Brief and concrete directions • Checklists for tasks • Graphic organizers • Assistive technology (spell check, voice to type) • Study guides • Tiered learning stations • Tiered questioning • Data-driven student partnerships • Extra time

Possible Additional Strategies for Special Education Students, At-Risk Students, and English Language Learners (ELLs)

Time/General	Processing	Comprehension	Recall
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/outline	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
Assistive Technology	**Assessments and Grading**	**Behavior/Attention**	**Organization**
• Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books	• Extended time • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

		• Frequent feedback	

Enrichment

The goal of Enrichment is to provide learners with the opportunity to participate in extension activities that are differentiated and enhance the curriculum. All enrichment decisions will be based upon individual student needs.

- Show a high degree of intellectual, creative and/or artistic ability and demonstrate this ability in multiple ways.
- Pose questions and exhibit sincere curiosity about principles and how things work.
- The ability to grasp concepts and make real world and cross-curricular connections.
- Generate theories and hypotheses and pursue methods of inquiry.
- Produce products that express insight, creativity, and excellence.
- Possess exceptional leadership skills.
- Evaluate vocabulary
- Elevate Text Complexity
- Inquiry based assignments and projects
- Independent student options
- Tiered/Multi-level activities
- Purposeful Learning Center
- Open-ended activities and projects
- Form and build on learning communities
- Providing pupils with experiences outside the 'regular' curriculum
- Altering the pace the student uses to cover regular curriculum in order to explore topics of interest in greater depth/breadth within their own grade level
- A higher quality of work than the norm for the given age group.
- The promotion of a higher level of thinking and making connections.
- The inclusion of additional subject areas and/or activities (cross-curricular).
- Using supplementary materials in addition to the normal range of resources.

Robbinsville Public Schools

Curriculum Map

AP Statistics

Relevant Standards	Standards Unpacked Skill / Concept / Process?	Enduring Understandings / Unit Goals	Essential Questions	Unit Title / Suggested Timeline
Unit #1: S-IC.3, 5, 6	3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. 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.	• Careful planning is essential to obtaining valid data. • Clarifying the question leads to the appropriate methodology. • The analysis is only as good as the data. • Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions.	• What is an experiment? • What is bias? How can it be identified? How can it be prevented? • To what extent is data biased? To what extent can data be purposely biased? • Does size matter? • Is all data "created equal"?	Designing Studies (Summer work plus 2 days)
Unit #2: S-ID.1, 2, 3, 5	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 of the data sets, accounting for possible effects of extreme data points (outliers).	• Interpretation of data is dependent upon the graphical displays and numerical summaries. • The *Who, What, Where, Why,* and *How* of the data are important information that must be depicted in each given data set. • The shape, center, and spread are important	• What is data? • How do we communicate and understand data? • Can you lie with statistics? How and to what extent? • How can data analysis be used to predict future happenings? • Does the data always lead to the truth? • Is all data "created equal"?	Exploring Data (Summer work plus 2 days)

	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.	characteristics of a distribution. ● The question to be answered determines the data to be collected and how best to collect it.		
Unit #3: S-ID.2, 3, 4	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 of the 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.	● The normal distribution is a fundamental component of statistical inference. ● Density curves are used to mimic probability. ● The normal distribution is used to model the spread of data.	● How does one assess normality? ● Why is the normal distribution essential to the study of statistics? ● How does the normal distribution apply to the real world? ● How do density curves relate to probability?	Modeling Distributions of Data 5 blocks
Unit #4: S-IC.2, 6 S-CP.(1-9)	IC.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? 6. Evaluate reports based on data. CP.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	● Probability models are useful tools for making decisions and predictions. ● The notion and behavior of a random variable is foundational to understanding probability distributions. ● Probability is based on relative frequencies. ● The Law of Large Numbers is an important concept when simulating probability experiments but should be interpreted carefully.	● What is the probability of understanding probability? ● How can we base decisions on chance? ● How can probability be used to simulate events and to predict future happenings? ● What are the benefits of simulating events as opposed to gathering real data? ● Is independence desirable?	Probability: What are the Chances? 6 blocks

	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 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. B. 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.			
Unit #5: S-IC.1, 2 S-MD.3, 4	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? S.MD.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	• Many discrete phenomena may be described and thus predicted by binomial and geometric models. • The normal distribution and central limit theorem are essential to analyzing samples of data. • Variation can be expected in the results of random samples and is affected by the design of the sample or experiment.	• How can modeling predict the future? • How does the normal distribution apply to the real world? • Does the Central Limit Theorem test one's limit? • Is all data "created equal"? • What is a sampling distribution?	Sampling Distributions 7 blocks

	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? B. Use probability to evaluate outcomes of decisions			
Unit #6: S-IC.1, 2, 5	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? 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.	• Statistical inference guides the selection of appropriate models. • Inference is based upon chance. • Confidence intervals are effective tools for estimation. • Tests of significance and confidence intervals drive decision making in our world. • Error analysis is a critical component of significance testing.	• How much evidence do you need before you are able to make a reasonable conjecture? • Is it reasonable to think that different people require different amounts of convincing? • How is statistical inference used to draw conclusions from data? • How is probability used to express the strength of our conclusions? • What is inference? • To what extent should decisions be made based on chance?	Estimating with Confidence 6 blocks
Unit #7: S-IC.1, 2, 5	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? 5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Significance tests determine the likelihood of a sample.	• To what extent are significance tests reliable? • How can one prepare for errors from significance tests? • Is all data "created equal"? • What makes an argument statistically convincing? • What is significant about significance?	Testing a Claim 6 blocks

	having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.			
Unit #8: S-IC.4, 5	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	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Inference is a tool for validating a claim about a population parameter. • Inference is a tool for estimating an unknown population parameter.	• What does it mean to be 95% confident ? • How do you determine if there is a statistical significance? • What does it mean to make an inference? • What is a confidence interval? • What makes an argument statistically convincing?	Comparing Two Populations or Groups 5 blocks
Unit #9: S-IC.4, 5	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	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Inference is a tool for validating a claim about a population parameter. • Inference is a tool for estimating an unknown population parameter.	• What does it mean to be 95% confident ? • How do you determine if there is a statistical significance? • What does it mean to make an inference? • What is a confidence interval? • What makes an argument statistically convincing?	Inference for Distributions of Categorical Data 5 blocks

	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			
Unit #10: S-ID.5, 6, 7, 8, 9	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, and describe how the variables are related. a. Fit a function to the data (including with the use of technology); 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 and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology. c. Fit a linear function for a scatter plot that suggests a linear association. 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.	• Standardized residuals can be examined to divulge more about the data. • Significance tests can determine the likelihood of a sample from a series of proportions. • Significance tests can determine whether two variables are independent. • Inference is a tool for validating a claim about a population parameter.	• How can we verify that two variables are independent? • How does one distinguish among the various tests of significance? • What does it mean to make an inference? • How can decisions be based on chance? • What makes an argument statistically convincing? • How do we make a declaration of independence statistically? • Is independence desirable?	Describing Relationships 5 blocks
Unit #11: S-ID.7, 8	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.	• Significance tests can determine the likelihood of a sample from a series of proportions.	• How can we test a series of proportions? • How can we test the slope of a correlation? • How do we use a model to make statistical inference?	More about Regression 5 blocks

		• Significance tests can determine the whether two variables are independent. • Significance tests can determine the likelihood of a bivariate sample's slope. • Regression is an instrument used to generalize relationships for bivariate data. • Inference is a tool for validating a claim about a population parameter.	• How can decisions be made based on chance? • Is all data "created equal"? • What makes an argument statistically convincing?	
Unit #12: S-MD. (1-7)	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	• Randomness and probability are the theoretical bases of statistical theory. • Probability models are useful tools for making decisions and predictions. • Probability is the basis of statistical inference. • The notion and behavior of a random variable is foundational to understanding probability distributions.	• What is randomness? • How can modeling predict the future? • To what extent does our world exhibit binomial and geometric phenomena? • When is probability a sure thing? • How can we base decisions on chance? • Is anything in nature truly random?	Random Variables 6 blocks

	would you expect to find in 100 randomly selected households? B. 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 fast food 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, using a random number generator). 7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).			
Unit #13: Preparting for the AP Exam and Final Exam MP.1 MP.2 MP.3 MP.5 MP.6	Mastery of all topics from AP Statistics is necessary for success on the AP Exam and Final Exam	Mastery of all topics from AP Statistics is necessary for success on the AP Exam 1. Students will complete practice tests in groups and individually 2. Students will review topics by unit 3. Students will do practice problems in which they must incorporate several topics at once and determine the best method for solving	What can I do to prepare for the AP Exam? How can I determine the best methods for solving a problem?	Review for AP Exam and Final Exam (8 blocks)
Unit #14: Post AP-Exam MP.4	Synthesizing all topics from AP Statistics	Topics learned throughout the course can be used in fun and creative ways in real-world situtions.	How can I apply what I learned in Statistics to the real world?	Post-AP Exam Labs, Projects, and Experiments Examples include:

MP.5		Students will complete hands-on labs, projects, and experiments to put their statistical knowledge to use. These will vary depending on the students' needs and interests each year.		● Are Double-Stuf Oreos really Double-stuffed? (Significance Testing) ● Murder-Mystery (applied cumulative review) ● Bears in Space (Regression) ● M&M Investigation (Various Significance Tests) (8 blocks)

Robbinsville Public Schools
Scope, Sequence, Pacing and Assessment
AP Statistics

Unit Title	Unit Understandings and Goals	Recommended Duration/ Pacing	Benchmark Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
Designing Studies	• Careful planning is essential to obtaining valid data. • Clarifying the question leads to the appropriate methodology. • The analysis is only as good as the data. • Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions.	Summer work (plus 2 blocks)	Summer Assignment Oral Questions/ Discussion Entrance Slips	Chapter Test Exit Slips Observations Partner practice Online practice game Unit Project	AP Test
Exploring Data	• Interpretation of data is dependent upon the graphical displays and numerical summaries. • The *Who, What, Where, Why,* and *How* of the data are important information that must be depicted in each given data set. • The shape, center, and spread are important characteristics of a distribution. • The question to be answered determines the data to be collected and how best to collect it.	Summer work (plus 2 blocks)	Summer Assignment Oral Questions/ Discussion Entrance Slips	Chapter Test Exit Slips Observations Partner practice Online practice game	AP Test
Modeling Distributions of Data	• The normal distribution is a fundamental component of statistical inference. • Density curves are used to mimic probability. • The normal distribution is used to model the spread of data.	6 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test

Probability: What are the Chances?	• Probability models are useful tools for making decisions and predictions. • The notion and behavior of a random variable is foundational to understanding probability distributions. • Probability is based on relative frequencies. • The Law of Large Numbers is an important concept when simulating probability experiments but should be interpreted carefully.	7 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test Cumulative Test (Units 1-4)
Sampling Distributions	• Many discrete phenomena may be described and thus predicted by binomial and geometric models. • The normal distribution and central limit theorem are essential to analyzing samples of data. • Variation can be expected in the results of random samples and is affected by the design of the sample or experiment.	8 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test
Estimating with Confidence	• Statistical inference guides the selection of appropriate models. • Inference is based upon chance. • Confidence intervals are effective tools for estimation. • Tests of significance and confidence intervals drive decision making in our world. • Error analysis is a critical component of significance testing.	7 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test Cumulative Test (units 1-6)

Testing a Claim	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Significance tests determine the likelihood of a sample.	7 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test
Comparing Two Populations or Groups	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Inference is a tool for validating a claim about a population parameter. • Inference is a tool for estimating an unknown population parameter.	6 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test
Inference for Distributions of Categorical Data	• Confidence intervals are effective tools for estimating the mean or proportion of a population. • Significance tests determine the likelihood of a sample. • The analysis is only as good as the data. • Inference is a tool for validating a claim about a population parameter. • Inference is a tool for estimating an unknown population parameter.	6 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game	AP Test Cumulative Test (units 1-9)

				Chapter Test	
Describing Relationships	• Standardized residuals can be examined to divulge more about the data. • Significance tests can determine the likelihood of a sample from a series of proportions. • Significance tests can determine whether two variables are independent. • Inference is a tool for validating a claim about a population parameter.	6 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test
More about Regression	• Significance tests can determine the likelihood of a sample from a series of proportions. • Significance tests can determine the whether two variables are independent. • Significance tests can determine the likelihood of a bivariate sample's slope. • Regression is an instrument used to generalize relationships for bivariate data. • Inference is a tool for validating a claim about a population parameter.	6 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game Chapter Test	AP Test
Random Variables	• Randomness and probability are the theoretical bases of statistical theory. • Probability models are useful tools for making decisions and predictions. • Probability is the basis of statistical inference. • The notion and behavior of a random variable is foundational to understanding probability distributions.	7 blocks	Oral Questions/ Discussion Entrance Slips Student Survey	Written Assignments Oral Presentations Observations Partner practice Exit Slips Quizzes Online Practice game	AP Test

				Chapter Test	
AP Exam and Final Exam Preparation	• Students will prepare for success on the AP Exam and Final Exam	approximately 8 blocks	Mock AP Exam	Mock AP Exam Practice Multiple Choice Questions Practice Free Response Questions	AP Exam Final Exam (units 1-12)
Post-AP Exam	• Students will apply the major concepts of the course to real life through labs, experiments, projects, and presentaions.	approximately 8 blocks		Partner Labs Group Experiment Independent Lab	

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Unit #1: Designing Studies

Enduring Understandings:	**Essential Questions:**
● Careful planning is essential to obtaining valid data. ● Clarifying the question leads to the appropriate methodology. ● The analysis is only as good as the data. ● Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions.	● What is an experiment? ● What is bias? How can it be identified? How can it be prevented? ● To what extent is data biased? To what extent can data be purposely biased? ● Does size matter? ● Is all data "created equal"?

Duration of Unit: Summer work plus 2 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S-IC.3	Why are different methods of data collection used in specific situations?	Introduction, Sampling and Surveys How to Sample Badly How to Sample Well: Random Samples Other Sampling Methods Inference for Sampling Sample Surveys: What Can Go Wrong?	Complete the summer assignment Class discussion in review of summer assignment Practice independently or with partner	*Technology: Choosing an SRS using an Applet or Calculator* Textbook, Chapter 1 Summer assignment answer packet Graphing Calculators	Class participation Homework/written assigments Student solutions to summer assignment problems Written test
S-IC.5	How can the data collected from an experiment be used to draw conclusions? Why are the three principals of experimental design crucial?	Observational Studies vs. Experiments The Language of Experiments How to Experiment Badly How to Experiment Well Three Principles of Experimental Design Experiments: What Can Go Wrong? Inference for Experiments Blocking, Matched Pairs Design			
S-IC.6	When and how can we draw conclusions from data?	Scope of Inference, the Challenges of Establishing Causation			

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Unit #2: Exploring Data

Enduring Understandings:	**Essential Questions:**
● Interpretation of data is dependent upon the graphical displays and numerical summaries. ● The *Who, What, Where, Why,* and *How* of the data are important information that must be depicted in each given data set. ● The shape, center, and spread are important characteristics of a distribution. ● The question to be answered determines the data to be collected and how best to collect it.	● What is data? ● How do we communicate and understand data? ● Can you lie with statistics? How and to what extent? ● How can data analysis be used to predict future happenings? ● Does the data always lead to the truth? Is all data "created equal"?

Duration of Unit: Summer work plus 2 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S-ID.1 S-ID.5	How is the appropriate type of graph determined? What do relative frequencies tell us, and how do we calculate them?	Bar Graphs & Pie Charts Graphs: Good & Bad Two-Way Tables & Marginal Distributions Conditional Distributions Organizing a Statistical Problem	Complete the summer assignment Class discussion in review of summer assignment Practice independently or with partner	*Technology: Choosing an SRS using an Applet or Calculator* Textbook, Chapter 1 Summer assignment answer packet Graphing Calculators	Class participation Homework/written assigments Student solutions to summer assignment problems Written test
S-ID.3	What does the shape of a graph tell you about the data?	Dotplots Describing Shape Comparing Distributions Stemplots Histograms Using Histograms Wisely			
S-ID.2 S-ID.3	How do means and medians compare? When is it appropriate to use each? When is it appropriate to use each measure of spread?	Measuring Center: The Mean Measuring Center: The Median Comparing the Mean & the Median Measuring Spread: The Interquartile Range Identifying Outliers The Five-Number Summary & Boxplots Measuring Spread: The Standard Deviation Choosing Measures of Center & Spread			

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Unit #3: Modeling Distributions of Data

Enduring Understandings:.	**Essential Questions:**
● The normal distribution is a fundamental component of statistical inference. ● Density curves are used to mimic probability. ● The normal distribution is used to model the spread of data.	● How does one assess normality? ● Why is the normal distribution essential to the study of statistics? ● How does the normal distribution apply to the real world? ● How do density curves relate to probability?

Duration of Unit: 6 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.ID.4 S.ID.3	How can you calculate percentiles and z-scores? How can you estimate the mean and median in density curves?	Measuring Position: Percentiles Cumulative Relative Frequency Graphs Measuring Position: z-Scores Transforming Data Density Curves	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.ID.2	How can you compare several Normal Distributions?	The 65-95-99.7 Rule The Standard Normal Distribution Normal Distribution Calculations Assessing Normality			

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Unit #4: Probability: What are the Chances?

Enduring Understandings:	**Essential Questions:**
● Probability models are useful tools for making decisions and predictions. ● The notion and behavior of a random variable is foundational to understanding probability distributions. ● Probability is based on relative frequencies. ● The Law of Large Numbers is an important concept when simulating probability experiments but should be interpreted carefully.	● What is the probability of understanding probability? ● How can we base decisions on chance? ● How can probability be used to simulate events and to predict future happenings? ● What are the benefits of simulating events as opposed to gathering real data? ● Is independence desirable?

Duration of Unit: 7 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.2 S.CP.1	What are the purposes of simulations? What are the mathematical differences between "and," "or,' and "not?"	The Idea of Probability Myths about Randomness Simulation	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.CP.4-7	How is a two-way table constructed and useful? How can we use the basic rules of probability to calculate probabilities of specific events?	Probability Models Basic Rules of Probability Two-Way Tables and Probability Venn Diagrams and Probability			
S.CP.2 S.CP.3 S.CP.8 S.CP.9	How can we use the basic rules of probability to calculate probabilites of compound events? What does it mean for two events to be independent?	Conditional Probability and Independence Tree Diagrams and the General Multiplication Rule Independence: A Special Multiplication Rule Calculating Conditional Probabilitites			

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Unit #5: Sampling Distributions

Enduring Understandings:	**Essential Questions:**
● The normal distribution and central limit theorem are essential to analyzing samples of data. ● Variation can be expected in the results of random samples and is affected by the design of the sample or experiment.	● How can modeling predict the future? ● How does the normal distribution apply to the real world? ● Does the Central Limit Theorem test one's limit? ● Is all data "created equal"?

Duration of Unit: 8 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.1	What is a sampling distribution? How do statistics vary?	Parameters and Statistics Sampling Variability Describing Sampling Distributions	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.MD.3	What is a sampling distribution? How is it useful in approximating a probability?	The Sampling Distribution of p-hat Using the Normal Approximation for p-hat			
S.IC.2 S.MD.4	How can we determine if events are rare?	The Sampling Distribution of x-bar: Mean and Standard Deviation The Central Limit Theorem			

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Unit #6: Estimating with Confidence

Enduring Understandings:	**Essential Questions:**
• Statistical inference guides the selection of appropriate models. • Inference is based upon chance. • Confidence intervals are effective tools for estimation. • Tests of significance and confidence intervals drive decision making in our world. • Error analysis is a critical component of significance testing.	• How much evidence do you need before you are able to make a reasonable conjecture? • Is it reasonable to think that different people require different amounts of convincing? • How is statistical inference used to draw conclusions from data? • How is probability used to express the strength of our conclusions? • What is inference? • To what extent should decisions be made based on chance?

Duration of Unit: 7 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.1	How can we use sample data to make predictions about a population?	The Idea of a Confidence Interval Interpreting Confidence Levels and Confidence Intervals Constructing a Confidence Interval Using Confidence Intervals Wisely	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.IC.2	Why are the conditions important to a confidence interval?	Conditions for Estimating p Constructing a Confidence Interval for p Putting It All Together: The Four-Step Process Choosing the Sample Size			
S.IC.5	How do you construct a confidence interval when sigma is unknown?	When σ is Known: The OneSample z Interval for a Population Mean Choosing the Sample Size When σ is Unknown: The t Distributions Constructing a Confidence Interval for μ Using t Procedures Wisely			

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Unit #7: Testing a Claim

Enduring Understandings:	**Essential Questions:**
● Confidence intervals are effective tools for estimating the mean or proportion of a population. ● Significance tests determine the likelihood of a sample. ● The analysis is only as good as the data. ● Significance tests determine the likelihood of a sample.	● To what extent are significance tests reliable? ● How can one prepare for errors from significance tests? ● Is all data "created equal"? ● What makes an argument statistically convincing? ● What is significant about significance?

Duration of Unit: 7 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.1	How can we use sample data to make inferences about a population?	The Reasoning of Significance Tests Stating Hypotheses Interpreting P-Values Statistical Significance Type I and Type II Errors Planning Studies: The Power of a Statistical Test	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.IC.2	Why are the conditions important to a significance test?	The Reasoning of Significance Tests Stating Hypotheses Interpreting P-Values Statistical Significance Type I and Type II Errors Planning Studies: The Power of a Statistical Test			
S.IC.5	How do you know when each significance test is appropriate?	Carrying Out a Significance Test for μ The One-Sample t Test Two-Sided Tests and Confidence Intervals Inference for Means: Paired Data Using Tests Wisely			

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Unit #8: Comparing Two Populations or Groups

Enduring Understandings:	**Essential Questions :**
● Confidence intervals are effective tools for estimating the mean or proportion of a population. ● Significance tests determine the likelihood of a sample. T ● he analysis is only as good as the data. ● Inference is a tool for validating a claim about a population parameter. ● Inference is a tool for estimating an unknown population parameter.	● What does it mean to be 95% confident ? ● How do you determine if there is a statistical significance? ● What does it mean to make an inference? ● What is a confidence interval? ● What makes an argument statistically convincing?

Duration of Unit: 6 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.4	How can you use data from two events to calculate confidence intervals and significance tests?	The Sampling Distribution of a Difference between Two Proportions Confidence Intervals for p1 – p2 Significance Tests for p1 – p2 Inference for Experiments	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.IC.5	What problems may arise as a result of not knowing sigma from either of two populations?	The Sampling Distribution of a Difference between Two Means The Two-Sample t-Statistic Confidence Intervals for μ1 - μ2 Significance Tests for μ - μ2 Using Two-Sample t Procedures Wisely			

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Unit #9: Inference for Distributions of Categorical Data

Enduring Understandings:	**Essential Questions:**
● Standardized residuals can be examined to divulge more about the data. ● Significance tests can determine the likelihood of a sample from a series of proportions. ● Significance tests can determine whether two variables are independent. ● Inference is a tool for validating a claim about a population parameter.	● How can we verify that two variables are independent? ● How does one distinguish among the various tests of significance? ● What does it mean to make an inference? ● How can decisions be based on chance? ● What makes an argument statistically convincing? ● How do we make a declaration of independence statistically? ● Is independence desirable?

Duration of Unit: 6 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.IC.4	How can we use two-way tables and data to analyze categorical data?	Comparing Observed and Expected Counts: The ChiSquare Statistic The Chi-Square Distributions and P-Values Carrying Out a Test Follow-Up Analysis	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.IC.5	How do we know when it's appropriate to use each different Chi-Squre Test?	Comparing Distributions of a Categorical Variable Expected Counts and the ChiSquare Statistic The Chi-Square Test for Homogeneity Follow-Up Analysis Comparing Several Proportions Relationships between Two Categorical Variables The Chi-Square Test for Association/Independence Using Chi-Square Tests Wisely			

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Unit #10: Describing Relationships

Enduring Understandings:	**Essential Questions:**
• Regression is an effective model for prediction. • There is a difference between causation and correlation. • Scatterplots and other graphs are used to illustrate solutions and solve problems. • The way that data is collected, organized, analyzed and displayed influences interpretation. • Data is analyzed to verify the truth.	• What does it mean to regress? • What is association? What is correlation? How are they connected? • Does association imply causation? • How can modeling data help us to understand patterns? • Can we use extrapolation to predict the future? • Is it possible to test for lack of correlation?

Duration of Unit: 6 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.ID.5, 6,8	What's different about a scatterplot from other graphs?	Explanatory & Response Variables Displaying Relationships: Scatterplots Interpreting Scatterplots Measuring Linear Association: Correlation Facts about Correlation	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.ID.6, 7, 9	What is the meaning of the least-squares regression line? How is it useful? What's different between correlation and causation?	Interpreting a Regression Line Prediction Residuals & the LeastSquares Regression Line Calculating the Equation of the Least-Squares Line How Well the Line Fits the Data: Residual Plots How Well the Line Fits the Data: The Role of r^2 in Regression Interpreting Computer Regression Output Correlation & Regression Wisdom			

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Unit #11: More About Regression

Enduring Understandings:	**Essential Questions:**
• Significance tests can determine the likelihood of a sample from a series of proportions. • Significance tests can determine the whether two variables are independent. • Significance tests can determine the likelihood of a bivariate sample's slope. • Regression is an instrument used to generalize relationships for bivariate data. • Inference is a tool for validating a claim about a population parameter.	• How can we test a series of proportions? • How can we test the slope of a correlation? • How do we use a model to make statistical inference? • How can decisions be made based on chance? • Is all data "created equal"? • What makes an argument statistically convincing?

Duration of Unit: 6 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.ID.7 S.ID.8	How do we interpret the slope and y-intercept of a least-squares regression line? What are a confidence interval and significance test for the slope used for?	The Sampling Distribution of b Conditions for Regression Inference Estimating the Parameters Constructing a Confidence Interval for the Slope Performing a Significance Test for the Slope	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.ID.8	Why is transforming data necessary? When is it useful to do so?	Transforming with Powers and Roots Transforming with Logarithms			

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Unit #12: Random Variables

Enduring Understandings:	**Essential Questions:**
• Randomness and probability are the theoretical bases of statistical theory. • Probability models are useful tools for making decisions and predictions. • Probability is the basis of statistical inference. • The notion and behavior of a random variable is foundational to understanding probability distributions.	• What is randomness? • How can modeling predict the future? • To what extent does our world exhibit binomial and geometric phenomena? • When is probability a sure thing? • How can we base decisions on chance? • Is anything in nature truly random?

Duration of Unit: 7 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
S.MD.2	How are expected values interpreted? What are the differences between discrete and continuous random variables?	Discrete Random Variables Mean (Expected value) of a Discrete Random Variable Standard Deviation (and Variance) of a Discrete Random Variable Continuous Random Variables	Direct instruction Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html	Written test / quiz Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments
S.MD.4	When does Loading... Loading...	Linear Transformations Combining Random Variables Combining Normal Random Variables			
S.MD.5	What defines a binomial random variable? What defines a geometric random variable?	Binomial and Geometric Random Variables Binomial Settings and Binomial Random Variables Binomial Probabilities Mean and Standard Deviation of a Binomial Distribution Binomial Distributions in Statistical Sampling			

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Unit #13: AP Exam Preparation

Enduring Understandings:	**Essential Questions:**
● A deep understanding of Statistics and its applications is cruicial to a successful AP Exam.	● What can I do to prepare for the AP Exam?

Duration of Unit: 8 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
MP.1 MP.5	How can I determine the best methods for solving a problem?	Review all topics from the curriculum	Direct instruction (review) Class discussion (question and answer) Discovery learning Cooperative learning Investigations Use of instructional media Computer tutorials Afterschool and Evening Review Sessions	Textbooks Graphing calculators www.apcentral.collegeboard.com www.statsmedic.com www.apstatsmonkey.com www.rossmanchance.com/applets/ digitalfirst.bfwpub.com/stats_applet/stats_applet_5_correg.html www.assistments.org Previous AP Exams AP Review Books Flashcards	Partner/group quizzes Practice Tests Cooperative activities (rubrics) Notebooks Class participation Homework / written assignments Oral presentations Special projects
MP.6	What is the best strategy for multiple choice problems?	Take practice tests			
MP.2 MP.3	How can I make sure I explain my work correctly and thoroughly on the free response section?	Complete previous years' free response problems			

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Unit #14: Post AP-Exam

Enduring Understandings:	**Essential Questions:**
● Statistics is all around us.	● Where is statistics found in the real world?

Duration of Unit: 8 blocks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
MP.4 MP.5	How can I apply what I learned in Statistics to the real world?	Complete several labs, projects, and experiments that use Statistics in real-world situations. Examples include: ● Are Double-Stuf Oreos really Double-stuffed?: Students gather data from regular and double-stuf oreos and perform hypothesis tests to make a decision ● AP Statistics Murder-Mystery: students synthesize their knowledge to solve a series of clues ● Bears in Space: Students create launchers and analyze the data from flying gummi bears to determine the best method(s) to launch gummi bears the farthest possible ● M&M color Investigation: Students compare regular and pretzel m&ms in a variety of ways to answer several questions about how the colors are distributed	Student-directed research Independent study/work time Group work	Online resources All worksheets/tests from the year Textbooks Graphing Calculators	Projects Labs Experiments

English Language Learner (ELL) Resources

- Learning style quiz for students- http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml
- "Word clouds" from text that you provide-http://www.wordle.net/
- Bilingual website for students, parents and educators: http://www.colorincolorado.org/
- Learn a language for FREE-www.Duolingo.com

- Time on task for students-http://www.online-stopwatch.com/
- Differentiation activities for students based on their Lexile-www.Mobymax.com
- WIDA-http://www.wida.us/
- Everything ESL - http://www.everythingESL.net
- ELL Tool Box Suggestion Sitehttp://www.wallwisher.com/wall/elltoolbox
- Hope4Education - http://www.hope4education.com
- Learning the Language http://blogs.edweek.org/edweek/learning-the-language/
- FLENJ (Foreign Language Educators of NJ) 'E-Verse' wiki: http://www.flenj.org/Publications/?page=135
- OELA - http://www.ed.gov/offices/OBEMLA
- New Jersey Department of Education- Bilingual Education information http://www.state.nj.us/education/bilingual/

Special Education Resources

- Animoto -Animoto provides tools for making videos by using animation to pull together a series of images and combining with audio. Animoto videos or presentations are easy to publish and share. https://animoto.com
- Bookbuilder -Use this site to create, share, publish, and read digital books that engage and support diverse learners according to their individual needs, interests, and skills. http://bookbuilder.cast.org/
- CAST -CAST is a non-profit research and development organization dedicated to Universal Design for Learning (UDL). UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. http://www.cast.org
- CoSketch -CoSketch is a multi-user online whiteboard designed to give you the ability to quickly visualize and share your ideas as images. http://www.cosketch.com/
- Crayon -The Crayon.net site offers an electronic template for students to create their own newspapers. The site allows you to bring multiple sources together, thus creating an individualized and customized newspaper. http://crayon.net/ Education Oasis -Education Oasis offers a collection of graphic organizers to help students organize and retain knowledge – cause and effect, character and story, compare and contrast, and more! http://www.educationoasis.com/printables/graphic-organizers/
- Edutopia -A comprehensive website and online community that increases knowledge, sharing, and adoption of what works in K-12 education. We emphasize core strategies: project-based learning, comprehensive assessment, integrated studies, social and emotional learning, educational leadership and teacher development, and technology integration. http://www.edutopia.org/
- Glogster -Glogster allows you to create "interactive posters" to communicate ideas. Students can embedded media links, sound, and video, and then share their posters with friends. http://edu.glogster.com/?ref=personal
- Interactives – Elements of a Story -This interactive breaks down the important elements of a story. Students go through the series of steps for constructing a story including: Setting, Characters, Sequence, Exposition, Conflict, Climax, and Resolution. http://www.learner.org/interactives/story/index.html
- National Writing Project (NWP) -Unique in breadth and scale, the NWP is a network of sites anchored at colleges and universities and serving teachers across disciplines and at all levels, early childhood through university. We provide professional development, develop resources, generate research, and act on knowledge to improve the teaching of writing and learning in schools and communities.

http://www.nwp.org

- Pacecar -Vocab Ahead offers videos that give an active demonstration of vocabulary with audio repeating the pronunciation, definition, various uses, and synonyms. Students can also go through flash cards which give a written definition and visual representation of the word. http://pacecar.missingmethod.com/