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| **Original Adoption:** | August 2018 |
| **Created by:** | Statistics PLC |
| **Revised on:** | 12/4/18 |
| **Revised by:** | Phil Beachy, Greg Sager, Christian Kane |

| **Ocean County<br>Statistics<br>Curriculum** | |
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| **Content Area: Mathematics** | |
| **Course Title: Statistics** | **Grade Level: High School** |
| Introduction to Statistics | 10 Days |
| Summarizing and Graphing Data | 26 Days |
| Probability | 25 Days |
| Distributions | 34 Days |
| Confidence Intervals and Hypothesis Testing | 70 Days |
| Correlation and Regression | 15 Days |

## Introduction

**Effective mathematics education provides students with a balanced instructional program. In such a program, students become proficient in basic computational skills and procedures, develop conceptual understandings, and become skilled at problem solving. Standards-based mathematics instruction starts with basic material and increases in scope and content as the years progress.**

**The curriculum is aligned to the NJSLS for Mathematics. Activities outlined in this curriculum infuse the Standards for Mathematical Practice. In alignment to the content and practice standards, algebra students will extend their knowledge of mathematics as they learn to represent and compare complex numbers, polynomials, periodic models and inference making.**

**Students use functions to model real world applications and their knowledge of their properties to explain the world around them. They will summarize, represent and interpret data to make inferences and justify conclusions. Students will use numerical, graphical, and algebraic models to solve problems.**

| **Unit 1: Introduction to Statistics** | **Duration: 10 Days** |
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**Standards/Learning Targets**

**Focus Standards (Major Standards)**

S-ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots)
S-ID.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
S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets accounting for possible effects of extreme data points (outliers)

**Supporting and Additional Standards**

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

**Standards for Mathematical Practices**

| | | |
|---|---|---|
| MP.1 | Make sense of problems and persevere in solving them | • Find meaning in problems<br>• Look for entry points<br>• Analyze, conjecture and plan solution pathways<br>• Monitor and adjust<br>• Verify answers<br>• Ask themselves the question: “Does this make sense?” |
| MP.2 | Reason abstractly and quantitatively. | • Make sense of quantities and their relationships in problems<br>• Learn to contextualize and de-contextualize<br>• Create coherent representations of problems |

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| MP.3 | Construct viable arguments and critique the reasoning of others. | ● Understand and use information to construct arguments<br>● Make and explore the truth of conjectures<br>● Recognize and use counterexamples<br>● Justify conclusions and respond to arguments of others |
| MP.4 | Model with Mathematics. | ● Apply mathematics to problems in everyday life<br>● Make assumptions and approximations<br>● Identify quantities in a practical situation<br>● Interpret results in the context of the situation and reflect on whether the results make sense |
| MP.5 | Use appropriate tools strategically. | ● Consider the available tools when solving problems<br>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)<br>● Make sound decisions of which of these tools might be helpful |
| MP.6 | Attend to precision. | ● Communicate precisely to others<br>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes<br>● Calculate accurately and efficiently |
| MP.7 | Look for and make use of structure. | ● Discern patterns and structures<br>● Can step back for an overview and shift perspective<br>● See complicated things as single objects or as being composed of several objects |

**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy
RST.11-12.7. 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.

WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

- **TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate.**
- **8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.**
- **A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations**
- **E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.**
- **F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.**

**21st Century Themes/Careers: Through instruction in life and career skills, all students acquire the knowledge and skills needed to prepare for life as citizens and workers in the 21st century. For further clarification see NJ World Class Standards at www.NJ.gov/education/aps/cccs/career/**

**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

**CRP2. Apply appropriate academic and technical skills.**
**CRP4. Communicate clearly and effectively and with reason.**
**CRP6. Demonstrate creativity and innovation**
**CRP7. Employ valid and reliable research strategies.**
**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
**CRP11. Use technology to enhance productivity.**

## Evidence of Student Learning

**Performance Tasks/Use of Technology:**
www.mathxlforschool.com
www.desmos.com
www.kahoot.com
www.quizizz.com

**Other Assessments**

**Formative**

- Observation
- Homework
- Class Participation
- Whiteboards/communicators
- Think-Pair-Share
- Do-Now
- Notebook Checks
- Writing Prompts
- Exit Tickets
- Classroom Games
- Self-assessment

**Summative**

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

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| | **Benchmark**<br>● State Standardized Assessments<br>● Quarterly Benchmark Assessment<br><br>**Alternative**<br>● Portfolio Project<br>● Modified assignments |
| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>Methods of survey<br>Types of statistics<br>Designing<br>Experiments<br>Organizing Data | *Students will be able to..*<br>Identify types of statistics and data<br>Establish a process for planning and conducting a study<br>Calculate relative frequency<br>Construct bar graphs and dot plots<br>Distinguish between an experiment and an observational study.<br>Determine the processes of sampling<br>Create a procedure for conducting a designed experiment and then to block an experiment<br>Understand the need to blind or double blind an experiment |
| **Instructional Plan** | |
| **Suggested Activities** | **Resources** |
| **www.ixl.com**<br>**www.purplemath.com** | ● Graphing Calculator<br>● Microsoft Excel/PowerPoint |

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| **www.khanacademy.com**<br>**www.brightstorm.com**<br>**www.coolmath.com** | • Teacher-made tests, worksheets, warm-ups, and quizzes<br>• Computer software to support unit<br>• Smart board<br>• Document camera |

**Suggested Options for Differentiation**

*English Language Learners*

- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions
- Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words

*Special Education/504 Plans*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
- Provide clear and specific directions
- Provide class notes ahead of time to allow students to preview material and increase comprehension
- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects

- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Statistics Text
- www.Kutasoftware.com
- Text support material

**Teacher Notes:**

| **Unit 2: Summarizing and Graphing Data** | **Duration: 26 Days** |
|---|---|
| **Standards/Learning Targets** | |
| **Focus Standards (Major Standards)** | |
| S-ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots)<br>S-ID.2 Use statistcs 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<br>S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets accounting for possible effects of extreme data points (outliers)<br>S-ID.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 under the normal curve.<br>S-ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in teh context of the data (including joint, matginal and conditional relative frequencies). REcognize possible associations and trends in the data.<br>S-ID.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. | |
| **Supporting and Additional Standards** | |
| The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.<br>**Standards for Mathematical Practices** | |

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| MP.4 | Model with Mathematics. | ● Apply mathematics to problems in everyday life<br>● Make assumptions and approximations<br>● Identify quantities in a practical situation<br>● Interpret results in the context of the situation and reflect on whether the results make sense |
| MP.5 | Use appropriate tools strategically. | ● Consider the available tools when solving problems<br>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)<br>● Make sound decisions of which of these tools might be helpful |

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| MP.6 | Attend to precision. | ● Communicate precisely to others<br>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes<br>● Calculate accurately and efficiently |
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**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy

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- **8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.**
- **A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts,**

**systems and operations**

- **E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.**
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**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

**CRP2. Apply appropriate academic and technical skills.**
**CRP4. Communicate clearly and effectively and with reason.**
**CRP6. Demonstrate creativity and innovation**
**CRP7. Employ valid and reliable research strategies.**
**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
**CRP11. Use technology to enhance productivity.**

**Evidence of Student Learning**

| **Performance Tasks/Use of Technology:** | **Other Assessments** |
|---|---|
| www.mathxlforschool.com<br>www.desmos.com<br>www.kahoot.com<br>www.quizizz.com | **Formative**<br>● Observation<br>● Homework<br>● Class Participation<br>● Whiteboards/communicators<br>● Think-Pair-Share |

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| | • Do-Now<br>• Notebook Checks<br>• Writing Prompts<br>• Exit Tickets<br>• Classroom Games<br>• Self-assessment<br><br>**Summative**<br>• Chapter/Unit Test<br>• Quizzes<br>• Presentations<br>• Unit Projects<br><br>**Benchmark**<br>• State Standardized Assessments<br>• Quarterly Benchmark Assessment<br><br>**Alternative**<br>• Portfolio Project<br>• Modified assignments |
| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>Frequency tables and histogran<br>Stem and leaf plots<br>Normal vs skewed<br>Scatterplots<br>Mean, Median | *Students will be able to..*<br>Use comparative bar graphs and pie graphs to display data<br>Construct and analyze stem and leaf plots for tendencies and distribution<br>Create frequency, realtive frequency, and cumulative frequency histograms |

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| Mode, Midrange<br>Standard Deviation | Identify distribution of data based on histograms<br>Display bivariate data using scatter plots<br>Calculate the mean, median, mode, midreange, range, and standard deviation of data<br>Create and interpret boxplots<br>Understand and use the Empirical Rule |

| **Instructional Plan** | |
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| **Suggested Activities** | **Resources** |
| **www.ixl.com**<br>**www.purplemath.com**<br>**www.khanacademy.com**<br>**www.brightstorm.com**<br>**www.coolmath.com** | • Graphing Calculator<br>• Microsoft Excel/PowerPoint<br>• Teacher-made tests, worksheets, warm-ups, and quizzes<br>• Computer software to support unit<br>• Smart board<br>• Document camera |

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*Special Education/504 Plans*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension

- Assign peer tutor
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- Extension activities
- Opportunities for Critical Thinking
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- Technology Integration
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- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
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- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Statistics Text
- www.Kutasoftware.com
- Text support material

**Teacher Notes:**

| **Unit 3: Probability** | **Duration: 25 Days** |
|---|---|
| **Standards/Learning Targets** | |
| **Focus Standards (Major Standards)** | |
| S-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").<br>S-CP.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.<br>S-CP.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.<br>S-CP.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.<br>S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.<br>S-CP.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. 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.<br>S-CP.7 Apply the Addition Rule, P (A or B) = P (A) + P (B) – P (A and B), and<br>interpret the answer in terms of the model.<br>S-CP.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.<br>S-CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.<br>S-MD.1 Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the<br>corresponding probability distribution using the same graphical displays as for data distributio<br>S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.<br>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.
S-MD.4 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
S-MD.5 Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. Find the expected payoff for a game of chance. Evaluate and compare strategies on the basis of expected values.
S-MD.6 Use probabilities to make fair decisions
S-MD.7 Analyze decisions and strategies using probability concepts

**Supporting and Additional Standards**

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| MP.3 | Construct viable arguments and critique the reasoning of others. | ● Understand and use information to construct arguments<br>● Make and explore the truth of conjectures |

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| | | ● Recognize and use counterexamples<br>● Justify conclusions and respond to arguments of others |
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**Other Assessments**

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- Exit Tickets
- Classroom Games
- Self-assessment

**Summative**
- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

**Benchmark**
- State Standardized Assessments

| | |
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| | • Quarterly Benchmark Assessment<br><br>**Alternative**<br>• Portfolio Project<br>• Modified assignments |
| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>Compound Probability<br>Conditional Probability<br>Law of Large Numbers<br>Expected Value<br>Probability Distribution<br>Binomial Probability<br>Central Limit Theory | *Students will be able to..*<br>Create sample space of a chance experiment.<br>Use Venn Diagrams to represent outcomes.<br>Identify mutually exclusive events.<br>Distinguish between experimental and theoretical probabilities.<br>Calculate probabilities for compound events and conditional events.<br>Establish rules for Independence of events.<br>Calculate means of discrete random variables.<br>Identify properties of a z-curve.<br>Use z-scores to find probabilities and percentiles. |
| **Instructional Plan** | |
| **Suggested Activities** | **Resources** |
| **www.ixl.com**<br>**www.purplemath.com**<br>**www.khanacademy.com**<br>**www.brightstorm.com**<br>**www.coolmath.com** | • Graphing Calculator<br>• Microsoft Excel/PowerPoint<br>• Teacher-made tests, worksheets, warm-ups, and quizzes<br>• Computer software to support unit<br>• Smart board<br>• Document camera |

| Suggested Options for Differentiation |
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| *English Language Learners*<br>● Provide clear and specific directions<br>● Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing<br>● Provide class notes ahead of time to allow students to preview material and increase comprehension<br>● Provide extended time<br>● Simplify written and verbal instructions<br>● Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words<br><br>*Special Education/504 Plans*<br>● Utilize graphic organizers to help provide a purpose for reading and increase comprehension<br>● Assign peer tutor<br>● Provide clear and specific directions<br>● Provide class notes ahead of time to allow students to preview material and increase comprehension<br>● Provide extended time<br>● Simplify written and verbal instructions<br><br>*Gifted and Talented*<br>● Extension activities<br>● Opportunities for Critical Thinking<br>● Problem Solving/Design Challenges<br>● Technology Integration<br>● Student Choice Activities<br>● Student Driven Activities<br>● Group Projects<br>● Tiered Activities<br><br>*Students at Risk of School Failure*<br>● Extended Time |

- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
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- Technology Integration
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**Core Instructional and Supplemental Materials**

- Statistics Text
- www.Kutasoftware.com
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**Teacher Notes:**

| **Unit 4: Distributions** | **Duration: 34 Days** |
|---|---|

**Standards/Learning Targets**

**Focus Standards (Major Standards)**

S-MD.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 distribution
S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
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.
S-MD.4 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.
S-MD.5 Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
Find the expected payoff for a game of chance. Evaluate and compare strategies on the basis of expected values.
S-MD.6 Use probabilities to make fair decisions

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**Standards for Mathematical Practices**

| | | |
|---|---|---|
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| | | ● Analyze, conjecture and plan solution pathways<br>● Monitor and adjust<br>● Verify answers<br>● Ask themselves the question: "Does this make sense?" |
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| | | careful about specifying units of measure and labeling axes<br>● Calculate accurately and efficiently |
| MP.7 | Look for and make use of structure. | ● Discern patterns and structures<br>● Can step back for an overview and shift perspective<br>● See complicated things as single objects or as being composed of several objects |

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NJSLSA.W8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

- **TECHNOLOGY STANDARDS and APPLY explicit standards as appropriate.**

- **8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.**
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**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

**CRP2. Apply appropriate academic and technical skills.**
**CRP4. Communicate clearly and effectively and with reason.**
**CRP6. Demonstrate creativity and innovation**
**CRP7. Employ valid and reliable research strategies.**
**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
**CRP11. Use technology to enhance productivity.**

**Evidence of Student Learning**

| **Performance Tasks/Use of Technology:** | **Other Assessments** |
|---|---|
| www.mathxlforschool.com<br>www.desmos.com<br>www.kahoot.com<br>www.quizizz.com | **Formative**<br>● Observation<br>● Homework<br>● Class Participation<br>● Whiteboards/communicators<br>● Think-Pair-Share<br>● Do-Now<br>● Notebook Checks |

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| | • Writing Prompts<br>• Exit Tickets<br>• Classroom Games<br>• Self-assessment<br><br>**Summative**<br>• Chapter/Unit Test<br>• Quizzes<br>• Presentations<br>• Unit Projects<br><br>**Benchmark**<br>• State Standardized Assessments<br>• Quarterly Benchmark Assessment<br><br>**Alternative**<br>• Portfolio Project<br>• Modified assignments |
| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>The meaning of the expected value and standard deviation of a binomial distribution<br>The results of the calculated values for both a binomial and normal distribution<br>Identify an unusual z-score<br>The area under the curve being the probability that event can occur | *Students will be able to..*<br>Calculate means of discrete random variables.<br>Identify properties of a z-curve.<br>Use z-scores to find probabilities and percentiles<br>Calculate the expected value and standard deviation for a binomial distribution<br><br>Calculate the value of a binomial distribution |

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|---|---|
| | Correctly use a normal distribution as an approximation of a binomial distribution<br>Calculate the area under a normal curve |
| **Instructional Plan** | |
| **Suggested Activities** | **Resources** |
| **www.ixl.com**<br>**www.purplemath.com**<br>**www.khanacademy.com**<br>**www.brightstorm.com**<br>**www.coolmath.com** | • Graphing Calculator<br>• Microsoft Excel/PowerPoint<br>• Teacher-made tests, worksheets, warm-ups, and quizzes<br>• Computer software to support unit<br>• Smart board<br>• Document camera |
| **Suggested Options for Differentiation** | |
| *English Language Learners*<br>• Provide clear and specific directions<br>• Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing<br>• Provide class notes ahead of time to allow students to preview material and increase comprehension<br>• Provide extended time<br>• Simplify written and verbal instructions<br>• Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words<br><br>*Special Education/504 Plans*<br>• Utilize graphic organizers to help provide a purpose for reading and increase comprehension<br>• Assign peer tutor<br>• Provide clear and specific directions<br>• Provide class notes ahead of time to allow students to preview material and increase comprehension | |

- Provide extended time
- Simplify written and verbal instructions

*Gifted and Talented*

- Extension activities
- Opportunities for Critical Thinking
- Problem Solving/Design Challenges
- Technology Integration
- Student Choice Activities
- Student Driven Activities
- Group Projects
- Tiered Activities

*Students at Risk of School Failure*

- Extended Time
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives
- Modified Assignments
- Preferential Seating
- Visual Cues/Modeling
- Technology Integration
- Assistive Technology

**Core Instructional and Supplemental Materials**

- Statistics Text

- www.Kutasoftware.com
- Text support material

**Teacher Notes:**

| **Unit 5: Creating and Analyzing Inferential Statistics** | **Duration: 70 Days** |
|---|---|

**Standards/Learning Targets**

**Focus Standards (Major Standards)**

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

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

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

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

S-IC-5 Use data from a randomized experiment to compare two treatments; justify significant differences between parameters through the use of simulation models for random assignment

S-IC-6 Evaluate reports based on data

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

S-ID-2 Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets

S-ID-3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points

S-ID-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

S-ID-5 Summarize categorical data for two categories in two way frequency tables. Interpret relative frequencies in the context of the data. Recognize possible associations and trends in the data

**Supporting and Additional Standards**

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

**Standards for Mathematical Practices**

| | | |
|---|---|---|
| MP.1 | Make sense of problems and persevere in solving them | • Find meaning in problems<br>• Look for entry points<br>• Analyze, conjecture and plan solution pathways<br>• Monitor and adjust<br>• Verify answers |

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|---|---|---|
| | | ● Ask themselves the question: "Does this make sense?" |
| MP.2 | Reason abstractly and quantitatively. | ● Make sense of quantities and their relationships in problems<br>● Learn to contextualize and de-contextualize<br>● Create coherent representations of problems |
| MP.3 | Construct viable arguments and critique the reasoning of others. | ● Understand and use information to construct arguments<br>● Make and explore the truth of conjectures<br>● Recognize and use counterexamples<br>● Justify conclusions and respond to arguments of others |
| MP.4 | Model with Mathematics. | ● Apply mathematics to problems in everyday life<br>● Make assumptions and approximations<br>● Identify quantities in a practical situation<br>● Interpret results in the context of the situation and reflect on whether the results make sense |
| MP.5 | Use appropriate tools strategically. | ● Consider the available tools when solving problems<br>● Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)<br>● Make sound decisions of which of these tools might be helpful |
| MP.6 | Attend to precision. | ● Communicate precisely to others<br>● Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes<br>● Calculate accurately and efficiently |
| MP.7 | Look for and make use of structure. | ● Discern patterns and structures |

- Can step back for an overview and shift perspective
- See complicated things as single objects or as being composed of several objects

**Primary Interdisciplinary Connections:** Infused within the unit are connections to the NJSLS for Mathematics, Language Arts Literacy

RST.11-12.7. 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.

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**MUST LIST STANDARDS OUT SPECIFICALLY AND ADD THE CAREER READY PRACTICES THAT ARE RELEVANT**

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**CRP4. Communicate clearly and effectively and with reason.**
**CRP6. Demonstrate creativity and innovation**
**CRP7. Employ valid and reliable research strategies.**
**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
**CRP11. Use technology to enhance productivity.**

| **Evidence of Student Learning** | |
|---|---|
| **Performance Tasks/Use of Technology:**<br>www.mathxlforschool.com<br>www.desmos.com<br>www.kahoot.com<br>www.quizizz.com | **Other Assessments**<br>**Formative**<br>● Observation<br>● Homework<br>● Class Participation<br>● Whiteboards/communicators<br>● Think-Pair-Share<br>● Do-Now<br>● Notebook Checks<br>● Writing Prompts<br>● Exit Tickets<br>● Classroom Games<br>● Self-assessment |

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| | **Summative**<br>● Chapter/Unit Test<br>● Quizzes<br>● Presentations<br>● Unit Projects<br><br>**Benchmark**<br>● State Standardized Assessments<br>● Quarterly Benchmark Assessment<br><br>**Alternative**<br>● Portfolio Project<br>● Modified assignments |
| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>Interval for one mean<br>Interval for sample proportion<br>Confidence level<br>Sample size<br>Interval for difference of 2 means or proportions<br>Null and alternate hypotheses<br>Words/context of hypothesis testing<br>Errors in Hypothesis testing | *Students will be able to..*<br>Calculate a point estimate from a sample.<br>Use formula to create a confidence interval for a sample mean.<br>Understand the relationship between the interval and a normal curve.<br>Interpret the interval in words in context of the problem.<br>Find confidence interval for one sample proportion.<br>Understand the relationship between sample size and width of confidence interval.<br>Work backwards to find sample size needed for a given study.<br>Calculate and interpret intervals for the difference of t two sample means or proportions.<br>Determine the null and alternate hypotheses for a given scenario. |

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| | Understand difference between one tailed and two tailed test and draw curve.<br>Identify and interpret Type I and Type II errors in context of problem.<br>Follow procedure and conduct hypothesis test on one sample mean.<br>Understand and use p-value approach as well as critical value approach.<br>Analyze results of test in context of the problem.<br>Perform hypothesis tests on one sample proportion.<br>Establish and interpret the power of the test<br>Identify and label two groups to be tested.<br>Create appropriate null and alternate hypotheses.<br>Conduct two sample t-tests for pooled or non-pooled data.<br>Distinguish between independent and dependent samples.<br>Perform matched pair t-test and interpret results.<br>Construct confidence interval for matched pair results.<br>Understand the cautions and limitations of hypothesis t testing. |
| **Instructional Plan** | |
| **Suggested Activities** | **Resources** |
| **www.ixl.com**<br>**www.purplemath.com**<br>**www.khanacademy.com**<br>**www.brightstorm.com**<br>**www.coolmath.com** | • Graphing Calculator<br>• Microsoft Excel/PowerPoint<br>• Teacher-made tests, worksheets, warm-ups, and quizzes<br>• Computer software to support unit<br>• Smart board<br>• Document camera |
| **Suggested Options for Differentiation** | |

*English Language Learners*

- Provide clear and specific directions
- Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing
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*Special Education/504 Plans*

- Utilize graphic organizers to help provide a purpose for reading and increase comprehension
- Assign peer tutor
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**Core Instructional and Supplemental Materials**

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**Teacher Notes:**

| **Unit 6: Correlation and Regression** | **Duration: 15 Days** |
|---|---|
| **Standards/Learning Targets** | |

| Focus Standards (Major Standards) |
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| S-ID.6 Represent data on two quantitative variables on a scatter plot and describe how the variables are related.<br>Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or chooses a function suggested by the context. Emphasize linear, quadratic, and exponential models.<br>Informally assess the fit of a model function by plotting and analyzing residuals.<br>Fit a linear function for scatter plots that suggest a linear association.<br>S-ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.<br>S-ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.<br>S-ID.9 Distinguish between correlation and causation. |
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- Exit Tickets
- Classroom Games
- Self-assessment

**Summative**

- Chapter/Unit Test
- Quizzes
- Presentations
- Unit Projects

| | |
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| **Knowledge and Skills** | |
| **Content** | **Skills** |
| *Students will know…*<br>Test for association<br>Expected versus observed<br>Chi Square test statistic | *Students will be able to..*<br>Calculate residuals for linear data.<br>Find and interpret the correlation coefficient and coefficient of determination.<br>Conduct a linear regression hypothesis test on the slope of a regression line and interpret results in context. |
| **Instructional Plan** | |
| **Suggested Activities** | **Resources** |
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- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
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