



West Deptford Township Schools
Probability and Statistics Curriculum

*West Deptford Township High School
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Standards	Transfer Goals	Concepts		Critical Knowledge and Skills
		Essential Questions	Understandings	
<p>MA.9-12.S-IC.A.1: Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</p> <p>MA.9-12.S-IC.B.3: Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.</p> <p>MA.9-12.S-IC.B.6: Evaluate reports based on data.</p>	<p>Statistics is a science of collecting, organizing, analyzing, and interpreting data in order to make decisions.</p> <p>CRP ***</p> <p>CRP1 CRP2 CRP4 CRP7 CRP12</p>	<p>What is Statistics?</p> <p>How do descriptive statistics and inferential statistics differ?</p>	<p>The study of statistics has to major branches: descriptive statistics and inferential statistics.</p> <p>Descriptive statistics is the branch of statistics that involves the organization, summarization, and display of data.</p> <p>Inferential statistics is the branch of statistics that involves using a sample to draw conclusions about a population.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> <input type="checkbox"/> Statistics <input type="checkbox"/> Data <input type="checkbox"/> Population <input type="checkbox"/> Sample <input type="checkbox"/> Parameter <input type="checkbox"/> Descriptive Statistics <input type="checkbox"/> Inferential Statistics <input type="checkbox"/> Variable <input type="checkbox"/> Qualitative <input type="checkbox"/> Quantitative Variable <input type="checkbox"/> Discrete Variable <input type="checkbox"/> Continuous Variable <input type="checkbox"/> Observational Study <input type="checkbox"/> Experiment <input type="checkbox"/> Simulation <input type="checkbox"/> Survey <input type="checkbox"/> Census <input type="checkbox"/> Sampling <input type="checkbox"/> Bias <input type="checkbox"/> Error <p>Skills:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Distinguish between a population and a sample <input type="checkbox"/> Distinguish between a parameter and statistic <input type="checkbox"/> Distinguish between descriptive statistics and inferential statistics <input type="checkbox"/> Distinguish between qualitative data and quantitative data <input type="checkbox"/> Classify quantitative variable as discrete or continuous <input type="checkbox"/> How to design a statistical study <input type="checkbox"/> How to collect data by doing an observational study, performing an experiment, using a simulation, or a survey <input type="checkbox"/> How to create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling and how to identify a biased sample

School Formative Assessment Plan (Other Evidence)	School Summative Assessment Plan
Homework Classwork Quizzes Project - Library Books: Students will conduct a statistical study in order to determine how many book in the library are "new books" (published in or after 2000). Students will need to identify the variable of interest, create random samples, determine the appropriate population, gather data using data collection techniques, construct descriptive statistics using the data collected, and interpret the sample data to draw an inference about the population.	Introduction to Statistics Unit Test: Students will be assessed on their ability to identify and use statistical vocabulary. This assessment will be composed of low-level demand tasks which consist of questions pertaining to vocabulary and high-level demand tasks which consist of analyzing statistical studies.
District / School Primary and Supplementary Resources	
Primary Resources	Supplementary Resources
Elementary Statistics: Picturing the World (4 th Edition) by Ron Larson and Betsy Farber	Additional outside Resources: <ul style="list-style-type: none"> • Statistics Through Applications (Second Edition) by Daren S. Starnes, Daniel S. Yates, and David S. Moore • Fundamentals of Statistics (Third Edition) by Michael Sullivan, III • Workshop Statistics: Discovering with Data and the Graphing Calculator (Second Edition) by Allan J. Rossman, Beth L. Chance, and J. Barr Von Oehsen • Activities and Projects for Introductory Statistics Courses (Second Edition) by Ron Millard and John C. Turner • NRICH enriching mathematics (https://nrich.maths.org) • IXL (https://www.ixl.com)

Technology Integration

TECH.8.1.12.A.3: Students use Google Classroom to collaborate, communicate, and solve problems.
 TECH.8.2.12.E.1: Students use online software to construct random samples.

Differentiated Instruction

Gifted Students (N.J.A.C.6A:8-3.1)

- Within each lesson, the Gifted Students are to be given the Extending Concepts Questions. These questions are to push the knowledge of each portion of the lesson. Extending Concepts Questions are located in the textbook at the end of each section's exercises.

English Language Learners (N.J.A.C.6A:15)

- Work with ELL Teacher to allow for all assignments to be completed with extra time.

At-Risk Students (N.J.A.C.6A:8-4.3c)

- Encourage student to seek extra help.
- Work with Guidance Counselor and/or I&RS team to create an intervention plan.

Special Education Students (N.J.A.C.6A:8-3.1)

- Allow for Extra Time (if needed)
- Hard Copy of Notes
- Chunking of Problems
- Preferential Seating
- Work with contact teacher to assist with additional accommodations noted in IEP/504 plans.

Interdisciplinary Connections****

Math	Science	ELA
	Students analyze a study pertaining to oral vs visual memorization. Students analyze Fisher's exact test, the hypothesis that a person can taste how a cup of tea was made.	Students summarize their findings to the Introduction to Statistics Unit Project – Library Study by writing a paper.
Fine Arts/ Performing Arts	World Language	Applied Technology/Business
		Students analyze a study completed by a Chinese company pertaining to the reliability of a helmet airbag. Students create random samples using online random generators and the phone book.
Social Studies	Health/Physical Education	Global Awareness
Students analyze a study determining children's reactions to be given a cookie and their ability to wait for an additional cookie.		

Learning Plan

Weeks 1 and 2: Section 1.1 An Overview of Statistics and Section 1.2 Data Classification

- Getting to Know You: A survey will be conducted in order to introduce the concepts of data, variables of interest, types of variables, descriptive statistics and inferential statistics.
- See No Evil, Hear No Evil Experiment: This experiment will be analyzed and then used to introduce the difference between a population and sample.
- Analyzing Studies Math Walk
- Parameter vs Statistic Card Sort
- Quiz

Week 3: Section 1.3 Experimental Design

- Phone Book Study: Multiple samples will be chosen using phone book ages using a Simple Random Sample, Stratified Sample, Cluster Sample, Systematic Sample, and Convenience Sample.
- Obtaining Samples Activity
- Analyzing Studies Videos: Studies will be analyzed to determine whether they are a Survey, Observational Study, Experiment, or Simulation

Week 4: Unit Assessment

- Introduction to Statistics Unit Review
- Introduction to Statistics Unit Test
- Introduction to Statistics Unit Project - Library Study: Statistical study conducted to estimate the number of books published after the year 2000 in the Media Center.

Unit 2 – Descriptive Statistics

Duration - 6 Weeks

Standards	Transfer Goals	Concepts		Critical Knowledge and Skills
		Essential Questions	Understandings	
<p>MA.9-12.S-ID.A.1: Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p>MA.9-12.S-ID.A.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.</p> <p>MA.9-12.S-ID.A.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p> <p>MA.9-12.S-ID.B.5: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.</p>	<p>Descriptive statistics consists of graphical and numeric methods to organize and summarize data.</p> <p>CRP ***</p> <p>CRP1 CRP2 CRP4 CRP7 CRP11 CRP12</p>	<p>What is descriptive statistics and how is it useful when studying data?</p> <p>How does descriptive statistics affect inferential statistics?</p>	<p>Descriptive statistics is the branch of statistics that involves the organization, summarization, and display of data.</p> <p>Descriptive statistics is useful when making inferences about the population.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> <input type="checkbox"/> Frequency Distribution <input type="checkbox"/> Histogram <input type="checkbox"/> Relative Frequency Polygon <input type="checkbox"/> Ogive <input type="checkbox"/> Stem-and-Leaf Plot <input type="checkbox"/> Dot Plot <input type="checkbox"/> Pie Chart <input type="checkbox"/> Bar Chart <input type="checkbox"/> Mean <input type="checkbox"/> Median <input type="checkbox"/> Mode <input type="checkbox"/> Distribution Shapes <input type="checkbox"/> Range <input type="checkbox"/> Standard Deviation <input type="checkbox"/> Variance <input type="checkbox"/> Empirical Rule <input type="checkbox"/> 5 Number Summary <input type="checkbox"/> Box Plot <input type="checkbox"/> Percentile <input type="checkbox"/> Z-Score <p>Skills:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Construct a frequency distribution including classes, frequencies, midpoints, relative frequencies, cumulative frequencies. <input type="checkbox"/> Construct histograms, relative frequency polygons, and ogives <input type="checkbox"/> How to graph quantitative data sets using exploratory data analysis tools of stem-and-leaf plots and dot plots <input type="checkbox"/> How to graph qualitative data sets using pie charts and Pareto charts <input type="checkbox"/> How to find the mean, median, and mode of a population and a sample

				<ul style="list-style-type: none"> <input type="checkbox"/> How to describe the shape of a distribution as symmetric, uniform, or skewed and how to compare the mean and median for each <input type="checkbox"/> How to find the range of a data set <input type="checkbox"/> How to find the variance and standard deviation of a population and a sample <input type="checkbox"/> How to use the Empirical Rule to interpret standard deviation <input type="checkbox"/> How to find the quartiles and interquartile range of a data set <input type="checkbox"/> How to draw a box plot <input type="checkbox"/> How to interpret other fractiles such as percentiles <input type="checkbox"/> How to find and interpret the standard score (z-score)
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School Formative Assessment Plan (Other Evidence)	School Summative Assessment Plan
<p>Homework Classwork Quizzes Project – Typical Student at WDHS: Students will create a statistical study in order to determine the “typical “student at WDHS. Students will need to determine the focus of their study and develop a questionnaire that results in obtaining values of two qualitative and two quantitative variables. They will then collect data from 40 students that represents the population at WDHS and organize their data using various techniques. Finally students will write an article to summarize their findings.</p>	<p>Descriptive Statistics Unit Test: Students will be assessed on their ability to use descriptive statistics techniques to analyze data. This assessment will be composed of low-level demand tasks which consist of questions pertaining to identifying descriptive statistics and high-level demand tasks which consist of analyzing data.</p>

District / School Primary and Supplementary Resources	
Primary Resources	Supplementary Resources
<p>Elementary Statistics: Picturing the World (4th Edition) by Ron Larson and Betsy Farber</p>	<p>Additional outside Resources:</p> <ul style="list-style-type: none"> • Statistics Through Applications (Second Edition) by Daren S. Starnes, Daniel S. Yates, and David S. Moore • Fundamentals of Statistics (Third Edition) by Michael Sullivan, III • Workshop Statistics: Discovering with Data and the Graphing Calculator (Second Edition) by Allan J. Rossman, Beth L. Chance, and J. Barr Von Oehsen • Activities and Projects for Introductory Statistics Courses (Second Edition) by Ron Millard and John C. Turner • NRICH enriching mathematics (https://nrich.maths.org) • IXL (https://www.ixl.com)

Technology Integration

TECH.8.1.12.A.3: Students use Google Classroom to collaborate, communicate, and solve problems.

TECH.8.1.12.A.4: Students use Google Sheets and Graphing Calculators to create pie charts, bar charts, histograms, frequency distributions, polygons, ogives, determine the measures of central tendency, variation, and position.

TECH.8.2.12.E.1: Students identify the efficiency of technology when creating descriptive statistics.

Differentiated Instruction

Gifted Students (N.J.A.C.6A:8-3.1)

- Within each lesson, the Gifted Students are to be given the Extending Concepts Questions. These questions are to push the knowledge of each portion of the lesson. Extending Concepts Questions are located in the textbook at the end of each section's exercises.

English Language Learners (N.J.A.C.6A:15)

- Work with ELL Teacher to allow for all assignments to be completed with extra time.

At-Risk Students (N.J.A.C.6A:8-4.3c)

- Encourage student to seek extra help.
- Work with Guidance Counselor and/or I&RS team to create an intervention plan.

Special Education Students (N.J.A.C.6A:8-3.1)

- Allow for Extra Time (if needed)
- Hard Copy of Notes
- Chunking of Problems
- Preferential Seating
- Work with contact teacher to assist with additional accommodations noted in IEP/504 plans.

Interdisciplinary Connections****

Math	Science	ELA
	Students use digital scales to measure and analyze weights of M&Ms bags.	Students summarize their findings to the Descriptive Statistics Unit Project – Typical Student at WDHS by writing a statistical article.

Fine Arts/ Performing Arts	World Language	Applied Technology/Business
		Students use Google Sheets to create and display descriptive statistics.
Social Studies	Health/Physical Education	Global Awareness
Students analyze a study pertaining to the population of NJ.	Students analyze a study pertaining to pulse rates.	Students create a study pertaining to the diversity of the students throughout WDHS.

Learning Plan

Week 1: Section 2.2 More Graphs and Displays

- M&M Data Analysis - Activity 1: Data is collected on the colors of each M&M in a bag and organized using a frequency table, relative frequency table, bar chart, and pie chart.
- M&M Data Analysis - Activity 2: Data is collected on the number of M&Ms in a bag and the weight of a bag and organized using dotplots and stem-and-leaf plots.
- Quiz

Weeks 2 and 3: Section 2.1 Frequency Distributions and Their Graphs

- M&M Data Analysis - Activity 3: Data is given for the weight of other bags and organized in a stem-and-leaf chart, frequency distribution, histogram, and relative frequency distribution.
- Introduction to Frequency Polygons - What Do You Notice Activity
- Introduction to Ogive (Cumulative Frequency Graphs) - What Do You Notice Activity
- Quiz

Weeks 4 and 5: Section 2.3 Measures of Central Tendency and Section 2.4 Measure of Variation

- Unit 2 Project - Typical Student: A research object and questions will be created. WDHS students will then be surveyed, the raw data will be organized, and then analyzed to draw conclusions about all students at WDHS.
- Do You Have Pets - The relationship between mean, median, mode, outliers, and shape will be explored through dotplots.
- Pulse Rates - Through this activity, range, variance, and standard deviation are introduced.
- Interpreting Standard Deviation - What Do You Notice Activity
- Comparing Distributions: Analyzing data using graphical representations, measures of center, and measures of variation.
- Quiz

Week 6: Section 2.5 Measures of Position and Unit Assessment

- Do You Know Your State: Estimates of the population of NJ will be analyzed using the 5 number summary, interquartile range and boxplot.
- Descriptive Statistics Unit Review
- Descriptive Statistics Unit Test

Unit 3 - Probability

Duration- 4 Weeks

Standards	Transfer Goals	Concepts		Critical Knowledge and Skills
		Essential Questions	Understandings	
<p>MA.9-12.S-CP.B.6: Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.</p> <p>MA.9-12.S-CP.B.7: Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.</p> <p>MA.9-12.S-CP.B.8: Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model.</p> <p>MA.9-12.S-CP.B.9: Use permutations and combinations to compute probabilities of compound events and solve problems.</p> <p>MA.9-12.S-CP.A.1: Describe</p>	<p>Probability is used to make predictions about events.</p>	<p>How can we determine the number of outcomes for an event?</p> <p>How can we determine the probability of an event occurring?</p>	<p>Probability is the chance an event occurs.</p> <p>The differences between the Counting Principals, Multiplication Rule, and Addition Rule.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> <input type="checkbox"/> Probability Experiment <input type="checkbox"/> Outcome <input type="checkbox"/> Sample Space <input type="checkbox"/> Event <input type="checkbox"/> Simple Event <input type="checkbox"/> Fundamental Counting Principal <input type="checkbox"/> Classical Probability <input type="checkbox"/> Empirical Probability <input type="checkbox"/> Subjective Probability <input type="checkbox"/> Complement of Event <input type="checkbox"/> Conditional Probability <input type="checkbox"/> Independent <input type="checkbox"/> Dependent <input type="checkbox"/> Multiplication Rule <input type="checkbox"/> Mutually Exclusive <input type="checkbox"/> Addition Rule <input type="checkbox"/> Permutation <input type="checkbox"/> Factorial <input type="checkbox"/> Combination <p>Skills:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Identify the Sample Space of a probability experiment and to identify simple events <input type="checkbox"/> Use the Fundamental Counting Principle to find the number of ways two or more events can occur <input type="checkbox"/> Distinguish among classical probability, empirical probability, and subjective probability <input type="checkbox"/> Find the probability of the complement of an event and how to find other probabilities using tree diagrams and the Fundamental Counting Principal

<p>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”).</p>				<ul style="list-style-type: none"> <input type="checkbox"/> Find conditional probabilities <input type="checkbox"/> Distinguish between independent and dependent events <input type="checkbox"/> Use the Multiplication Rule to find the probability of two events occurring in sequence <input type="checkbox"/> Determine if two events are mutually exclusive <input type="checkbox"/> Use the Additional Rule to find the probability of two events <input type="checkbox"/> Find the number of ways a group of objects can be arranged in order and the number of ways to choose several objects from a group without regard to order <input type="checkbox"/> Use the counting principals to find probabilities
<p>MA.9-12.S-CP.A.2: Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.</p>	<p style="text-align: center;">CRP ***</p>			
<p>MA.9-12.S-CP.A.3: Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.</p> <p>MA.9-12.S-CP.A.4: Construct and interpret two-way frequency tables of data when two categories are associated</p>	<p>CRP1 CRP2 CRP4 CRP8 CRP12</p>			

<p>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.</p> <p>MA.9-12.S-CP.A.5: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.</p>				
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School Formative Assessment Plan (Other Evidence)	School Summative Assessment Plan
<p>Homework Classwork Quizzes Performance Task – UNO: Games of UNO will be played and analyze using sample space, events, counting principals, conditional probability, the multiplication rule, the addition rule, mutual exclusivity, and dependence.</p>	<p>Probability Unit Test: Students will be required to create a tree diagram and determine specific outcomes for an event. They will then complete classical and empirical probability problems that require the use of basic probability, conditional probability, multiplication rule, and addition rule.</p>
District / School Primary and Supplementary Resources	
Primary Resources	Supplementary Resources
<p>Elementary Statistics: Picturing the World (4th Edition) by Ron Larson and Betsy Farber</p>	<p>Additional outside Resources:</p> <ul style="list-style-type: none"> • Statistics Through Applications (Second Edition) by Daren S. Starnes, Daniel S. Yates, and David S. Moore • Fundamentals of Statistics (Third Edition) by Michael Sullivan, III • Workshop Statistics: Discovering with Data and the Graphing Calculator (Second Edition) by Allan J. Rossman, Beth L. Chance, and J. Barr Von Oehsen • Activities and Projects for Introductory Statistics Courses (Second Edition) by Ron Millard and John C. Turner • NRICH enriching mathematics (https://nrich.maths.org) • IXL (https://www.ixl.com)

Technology Integration

TECH.8.1.12.A.3: Students use Google Classroom to collaborate, communicate, and solve problems.
 TECH.8.2.12.E.1: Students use graphing calculators to determine the permutation or combination of events.

Differentiated Instruction

Gifted Students (N.J.A.C.6A:8-3.1)

- Within each lesson, the Gifted Students are to be given the Extending Concepts Questions. These questions are to push the knowledge of each portion of the lesson. Extending Concepts Questions are located in the textbook at the end of each section's exercises.

English Language Learners (N.J.A.C.6A:15)

- Work with ELL Teacher to allow for all assignments to be completed with extra time.

At-Risk Students (N.J.A.C.6A:8-4.3c)

- Encourage student to seek extra help.
- Work with Guidance Counselor and/or I&RS team to create an intervention plan.

Special Education Students (N.J.A.C.6A:8-3.1)

- Allow for Extra Time (if needed)
- Hard Copy of Notes
- Chunking of Problems
- Preferential Seating
- Work with contact teacher to assist with additional accommodations noted in IEP/504 plans.

Interdisciplinary Connections****

Math	Science	ELA
	Students use probability to analyze genetics and blood types.	
Fine Arts/ Performing Arts	World Language	Applied Technology/Business
		Students use probability to analyze industry

		employment, stock prices, employee education levels for a company, job openings, employee wages, computers and internet access.
Social Studies	Health/Physical Education	Global Awareness
Students use probability to analyze the ages of American voters and opinions about race relations.	Students use probability to analyze a test that identifies athletes who use a banned substance, the starting lineup for a softball team, and the order downhill ski racers finish.	

Learning Plan

Week 1: Section 3.1 Basic Concepts of Probability and Counting and Section 3.4 Additional Topics in Probability and Counting

- Rock, Paper, Scissors: This probability experiment (game of chance) will be used to introduce the basic concepts of probability and counting.
- How Many: These real-world scenarios will be used to introduce permutations, combination, and factorial.
- Mega Millions Lottery: This scenario will be used to introduce how permutations and combinations can determine the probability of an event.
- Quiz

Week 2: Section 3.2 Conditional Probability and the Multiplication Rule

- Who is Cheating: This simulation will be used to introduce two-way frequency tables, multiplication rule, conditional probability, and independent vs dependent events.
- Applications of Conditional Probability and the Multiplication Rule

Week 3: Section 3.3 The Addition Rule

- Blackjack – This game of chance will be used to introduce the addition rule and mutually exclusive events.
- Addition Rule and Multiplication Rule Applications – Stations Activity
- Quiz

Week 4: Unit Assessment

- Probability Performance Task – UNO: The Game of UNO will be analyzed using the concepts of probability and counting.
- Probability Unit Review
- Probability Unit Test

Unit 4 - Probability Distributions

Duration - 4 Weeks

Standards	Transfer Goals	Concepts		Critical Knowledge and Skills
		Essential Questions	Understandings	
<p>MA.9-12.S-MD.B.5: Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.</p> <p>MA.9-12.S-MD.B.5a: Find the expected payoff for a game of chance.</p> <p>MA.9-12.S-MD.B.5b: Evaluate and compare strategies on the basis of expected values.</p> <p>MA.9-12.S-MD.A.1: Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.</p> <p>MA.9-12.S-MD.A.2: Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.</p> <p>MA.9-12.S-MD.A.3: Develop a probability distribution for a random variable defined for a sample space in which</p>	<p>Probability distribution is the probability of every possible event occurring.</p> <p>CRP ***</p> <p>CRP1 CRP2 CRP4 CRP8 CRP11 CRP12</p>	<p>How can we interpret a probability distribution?</p> <p>When should we use a discrete distribution versus a continuous distribution?</p>	<p>A probability distribution is every possible value the random variable can assume, together with its probability.</p> <p>Discrete probability distributions are for finite or countable possible outcomes.</p> <p>Continuous probability distributions are for infinite or uncountable possible outcomes, represented by the normal curve.</p>	<p>Knowledge</p> <ul style="list-style-type: none"> <input type="checkbox"/> Random Variable <input type="checkbox"/> Discrete <input type="checkbox"/> Continuous <input type="checkbox"/> Probability Distribution <input type="checkbox"/> Mean of a Random Variable <input type="checkbox"/> Standard Deviation of a Random Variable <input type="checkbox"/> Expected Value <input type="checkbox"/> Normal Distribution (Curve) <input type="checkbox"/> Standard Normal Curve <input type="checkbox"/> Z-Score <input type="checkbox"/> Sampling Distribution <p>Skills:</p> <ul style="list-style-type: none"> <input type="checkbox"/> How to distinguish between discrete random variables and continuous random variables <input type="checkbox"/> How to determine if a distribution is a probability distribution <input type="checkbox"/> How to construct a discrete probability distribution and its graph and find the mean, variance, and standard deviation <input type="checkbox"/> How to find the expected value <input type="checkbox"/> How to interpret graphs of normal probability distributions <input type="checkbox"/> How to interpret z-scores <input type="checkbox"/> How to find areas under the standard normal curve <input type="checkbox"/> How to find probabilities for normally distributed variables <input type="checkbox"/> How to find a z-score given the area under the normal curve <input type="checkbox"/> How to transform a z-score to an x-value <input type="checkbox"/> How to find a specific data value of a normal distribution given the probability

theoretical probabilities can be calculated; find the expected value.

MA.9-12.S-MD.A.4: Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

MA.9-12.S-ID.A.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.

School Formative Assessment Plan (Other Evidence)	School Summative Assessment Plan
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Homework
 Classwork
 Quizzes
 Probability and Statistics Cumulative Project - AHOY MATES: Students complete a statistical analysis on whether the claim " There are over 1000 chips in every bag" is a true statement from the Chips Ahoy company.

Probability Distributions Unit Test: Students will be assessed on their knowledge about discrete and continuous probability distribution.

District / School Primary and Supplementary Resources	
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Primary Resources	Supplementary Resources
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Elementary Statistics: Picturing the World (4th Edition) by Ron Larson and Betsy Farber

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- Activities and Projects for Introductory Statistics Courses (Second Edition) by Ron Millard and John C. Turner
- NRICM enriching mathematics (<https://nrich.maths.org>)
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Technology Integration

TECH.8.1.12.A.3: Students use Google Classroom to collaborate, communicate, and solve problems.
 TECH.8.2.12.E.1: Students use graphing calculators to determine the area under the normal distribution curve.

Differentiated Instruction

Gifted Students (N.J.A.C.6A:8-3.1)

- Within each lesson, the Gifted Students are to be given the Extending Concepts Questions. These questions are to push the knowledge of each portion of the lesson. Extending Concepts Questions are located in the textbook at the end of each section's exercises.

English Language Learners (N.J.A.C.6A:15)

- Work with ELL Teacher to allow for all assignments to be completed with extra time.

At-Risk Students (N.J.A.C.6A:8-4.3c)

- Encourage student to seek extra help.
- Work with Guidance Counselor and/or I&RS team to create an intervention plan.

Special Education Students (N.J.A.C.6A:8-3.1)

- Allow for Extra Time (if needed)
- Hard Copy of Notes
- Chunking of Problems
- Preferential Seating
- Work with contact teacher to assist with additional accommodations noted in IEP/504 plans.

Interdisciplinary Connections****

Math	Science	ELA
	Students use probability distributions to analyze hurricanes and fish lengths.	Students summarize their findings to the Probability and Statistics Cumulative Project - AHOY MATES by creating a google slides presentation.

Fine Arts/ Performing Arts	World Language	Applied Technology/Business
		Students use probability distributions to analyze employee overtime hours, computers per household, compute usage, and company's slogan.
Social Studies	Health/Physical Education	Global Awareness
	Students use probability distributions to analyze cholesterol levels, and heights.	

Learning Plan

Week 1: Section 4.1 Probability Distributions

- Introduction Activity - The Game of Greed: The game of greed will be used in order to gather data about how often the class is willing to take a risk. Using the results of the game, probability distribution vocabulary will be introduced.
- Mean, Variance, Standard Deviation, and Expected Value for Discrete Probability Distributions
- Paint Blemishes – Discrete Probability Distribution Review
- Quiz

Week 2: Section 5.1 Introduction to Normal Distributions and the Standard Normal Distribution and Section 5.2 Normal Distributions: Finding Probabilities

- Where Do I Stand: Through this activity, students will be introduced to the standardized value (z-score), the continuous probability distribution, the standard normal distribution, and finding probabilities using the normal distribution.
- Normal Distribution Applications
- Quiz

Week 3: Section 5.3 Normal Distributions: Finding Values and Unit Assessment

- Where Do I Stand Continued: Through this activity, students will be introduced to finding values using the normal distribution.
- Probability Distributions Unit Review
- Probability Distributions Unit Test

Week 4: Probability and Statistics Cumulative Project

- Probability and Statistics Cumulative Project - AHOY MATES: Students complete a statistical analysis on whether the claim "There are over 1000 chips in every bag" is a true statement from the Chips Ahoy company.