

Probability and Statistics With Algebra For Semester One

Unit Name	Days
Unit 1: Introduction to Statistics	20
Unit 2: Descriptive Statistics	30
Unit 3: Conditional Probability and Multiplication Rule	30
Review for Algebra I Regents	5

Semester One

Unit	Essential Questions	CCLS	Assessments
<p>Unit 1: Introduction to Statistics (20 days)</p> <p>Topics Covered: *Distinguish between population and sample, parameter and statistic, and descriptive and inferential statistics *Recognize purpose and difference of sample surveys, experiments, and observational studies *Understand differences of qualitative and quantitative data *Classify data with respect to levels of measurement: nominal, ordinal, interval and ratio *Determine the steps in data collection *Apply the design of a statistical study *Use data from a sample survey *Use simulations to decide if differences between parameters are significant *Understand various sampling methods: random, simple random, stratified, cluster, and systematic *Identify a biased sample</p>	<p>How can the study of Statistics be used in real life scenarios?</p> <p>What are the benefits of interpreting data?</p> <p>How do we study data?</p>	<p>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>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>S-IC.B.4 - Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.</p> <p>S-IC.B.6 - Evaluate reports based on data.</p>	<ul style="list-style-type: none"> • M&M Project • Unit Test • Pre-Assessment on EngageNY Module 2 • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

Unit	Essential Questions	CCLS	Assessments
<p>Unit 2: Descriptive Statistics (30 days)</p> <p>Topics Covered: *Compare center and spread of two or more data sets *Use knowledge of functions to fit models to quantitative data *Summarize, represent, and interpret data on a single count or measurement variable *Interpret differences in shape, center, and spread including effects of outliers *Use shape, center, and spread of comparable data to decide on appropriate statistical measures and justify choice through statistical reasoning *Closely examine the story that data and computed statistics are trying to tell *Construct a frequency distribution including limits, midpoints, relative and cumulative frequencies and boundaries *Construct frequency histograms, polygons, and relative frequency histograms</p>	<p>How do we organize, display, and describe data?</p> <p>How can frequency tables help us to find trends in real life scenarios?</p> <p>How does mean, median, and mode describe data?</p> <p>How can percentiles be used when comparing an individual to the norm?</p> <p>How does exploratory data analysis help us to better understand our data?</p>	<p>S-ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p>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.</p> <p>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).</p>	<ul style="list-style-type: none"> • Unit Test • Pre-Assessment on EngageNY Module 2 • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

<p>*Graph and interpret quantitative data sets using a variety of graphs</p> <p>*Measures of central Tendency: Mean, Mode, Median and Range of Population and Sample Variance and Standard deviation of population and sample.</p> <p>*Understand how to interpret Fractiles (percentiles)</p> <p>*Find z-score</p>			
---	--	--	--

Unit	Essential Questions	CCLS	Assessments
<p>Unit 3: Conditional Probability and Multiplication Rule (30 Days)</p> <p>Topics Covered: *Know how to collect the data and analyze that data in order to make predictions based on the subject of probability of events *Describe Events and Sample Spaces *Understand what makes two events independent, dependent, or mutually exclusive *Summarize independent and conditional probability in the context and state how to use the data in everyday life *Construct and interpret two-way frequency tables of data and decide if events are independent and approximate conditional probabilities *Determine the appropriate tools, such as the tree diagram, to find the probability of an event *Apply the complement of an event to find probabilities</p>	<p>How can large numbers based on a pattern be efficiently calculated to form probabilities?</p> <p>How can you model a simulation to represent a real life situation?</p> <p>How does theoretical probability relate to empirical probability?</p> <p>How do mutually exclusive events affect probability calculations?</p>	<p>CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").</p> <p>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>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>CP.A.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.</p> <p>CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.</p> <p>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>	<ul style="list-style-type: none"> • Unit Test • Pre-Assessment on EngageNY Module 2 • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

<p>*Apply the Fundamental Counting Principle</p> <p>*Apply the Addition or Multiplication Rule to find probabilities in a model</p> <p>*Understand the difference between permutations and combinations to use them to compute probabilities of compound events</p>		<p>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>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>CP.B.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.</p>	
---	--	---	--

Probability and Statistics With Algebra For Semester Two

Unit Name	Days
Unit 1: Analyzing Two Variable Data	10
Unit 2: Collecting Data	10
Unit 3: Probability	10
Unit 4: Random Variables	10
Unit 5: Sample Distributions	7
Unit 6: Estimating A Parameter	7
Unit 7: Testing A Claim	7
Unit 8: Comparing Two Populations Or Treatments	7
Unit 9: Inference For Distributions And Relationships	7

Semester Two

Unit	Essential Questions	CCLS	Assessments
<p>Unit 1: Analyzing Two Variable Data (10 days)</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Relationships between two categorical variables • Relationships between two quantitative variables • Correlation • Calculating correlation • Regression lines • The least-squares regression line • Assessing a regression model • Fitting models to quadratic and 	<p>How do we analyze and display two variable data?</p> <p>What is a correlation?</p> <p>How do we model linear and nonlinear associations?</p>	<p>S.ID.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>S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.6b Informally assess the fit of a function by plotting and analyzing residuals. S.ID.6c Fit a linear function for a scatter plot that suggests a linear association. S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit. S.ID.9 Distinguish between correlation and causation.</p>	<ul style="list-style-type: none"> • Unit Test • Pre-Assessment on EngageNY Module 2 • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

exponential models			
--------------------	--	--	--

Unit	Essential Questions	CCLS	Assessments
<p>Unit 2: Collecting Data (10 days)</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Intro to data collection • Good and bad sampling • Simple random samples • Estimating a margin of error • Sampling and surveys • Observational studies and experiments • How to experiment well 	<p>How do we apply the statistical problem solving process?</p> <p>How do we make inferences and justify conclusions from surveys, observational studies, and experiments?</p>	<p>S-IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.★</p> <p>S-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?.</p> <p>S-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.★</p> <p>S-IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.★</p>	<ul style="list-style-type: none"> • Unit Test • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

<ul style="list-style-type: none">• Inference for experiments• Using studies wisely		<p>S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.★</p> <p>S-IC.6 Evaluate reports based on data.★</p>	
--	--	---	--

Unit	Essential Questions	CCLS	Assessments
<p>Unit 3: Probability (10 days)</p> <p>Topics Covered:</p> <ul style="list-style-type: none"> • Randomness, probability, and simulation • Basic probability rules • Two way tables and venn diagrams • Conditional probability and independence • Multiplication rule and tree diagrams • Multiplication rule for independent events • Counting principle and permutations • Combinations and probability 	<p>How do we apply randomness, probability, and simulation?</p> <p>How do we make inferences and justify conclusions from surveys, observational studies, and experiments?</p>	<p>S-IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.★</p> <p>S-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?.</p> <p>S-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.★</p> <p>S-IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.★</p> <p>S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.★</p> <p>S-IC.6 Evaluate reports based on data.</p>	<ul style="list-style-type: none"> • Unit Test • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA

Unit	Essential Questions	CCLS	Assessments
<p>Unit 4: Random Variables (10 days)</p>	<p>How do we analyze different types of random variables and binomial random variables?</p> <p>What is a standard normal distribution?</p> <p>How do we calculate normal distributions?</p>	<p>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 distributions.</p> <p>S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.★</p> <p>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.★</p> <p>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. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?★</p>	<ul style="list-style-type: none"> ● Unit Test ● Quizzes ● HW ● Do Now ● Questioning ● Exit Ticket ● CEA

Unit	Essential Questions	CCLS	Assessments
Unit 5: Sample Distributions (7 days)	<p>What is a sampling distribution?</p> <p>How do we determine statistical values of a sampling distribution?</p>	S-MD.7 Analyze decisions and strategies using probability concepts	<ul style="list-style-type: none"> • Unit Test • Quizzes • HW • Do Now • Questioning • Exit Ticket • CEA