Groton Public Schools Curriculum Map

Course Title: Statistics & Probability Curriculum Area and Grade: Math Grade 11-12

Course Purpose:

The purpose of Statistics and Probability is to introduce students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. Students are exposed to three broad conceptual themes:

- 1. Exploring Data: Describing patterns and departures from patterns SEP
- 2. Sampling and Experimentation: Planning and conducting a study
- 3. Anticipating Patterns: Exploring random phenomena using probability and simulation SEP

Major Learning Goals and Understandings:

- To effectively apply the principles of algebra, statistics, and probability in varied contexts and for a variety of purposes.
- To apply effective analysis, synthesis, and evaluative processes that enable productive problem solving.
- To communicate information clearly and effectively using a variety of tools/media in varied contexts and for a variety of purposes.
- To working independently and collaboratively to solve problems and accomplish goals.
- To use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.
- To demonstrating innovation, flexibility and adaptability in thinking patterns, work habits, and working/learning conditions.
- To value and demonstrate personal responsibility, character, cultural understanding, and ethical behavior.

	Units/Theme/Chapter/Concept and # of Weeks				
	Quarter = 9 weeks, Semester=18 weeks, Trimester= 12	weeks,	Year=36 weeks usually spread over 40 weeks		
1.	1.Exploring Data (8 weeks)2.Modeling Distributions of Data (5 weeks)				
3.	Describing Relationships (7 weeks)	4.	Designing Studies (10 weeks)		
5.	Probability: What are the Chances? (8 weeks)	6.	Random Variables (2 weeks)		

Mapper/Author: Elfriede Stoebe-Janacek

		Unit 1: Exploring Data		
Grade: 11-12	Subject: Math	Course: Statistics & Probability	Length of Unit: (# of weeks)	
		CCSS in Connecticut	8	
Quantities		CCSS in Connecticut		
Reason quantitativ	vely and use units to solve problems.			
Interpreting Categoric	cal and Quantitative Data			
• Summarize, repre	sent, and interpret data on a single co	unt or measurement variable		
Making Inferences and	d Justifying Conclusions			
• Understand and ev	valuate random processes underlying	statistical experiments		
• Make inferences a	and justify conclusions from sample s	surveys, experiments, and observational s	studies	
 Conditional Probability & the Rules of Probability Understand independence and conditional probability and use them to interpret data 				
Using Probability to M	lake Decisions			
Calculate expected	d values and use them to solve proble	ems		
	Pr	iority and Supporting CCSS		
N-Q.2 Define appropriate quantities for the purpose of descriptive modeling.				
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-IC.1 Understand statistics as 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.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

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.

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.

S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

Standards for Mathematical Practices

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Part 2 - Standards				
Key (GLE) Cor	ntent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering		
The students will know: Individual Variable Categorical Quantitative Bar Graph Pie Chart Two-Way Table Marginal Distribution Conditional Distribution Conditional Distribution Dot Plot Stem Plot Stem Plot Shape Center Spread Outlier Symmetric Symmetric Skewed Histogram Mean Median Range IQR I.5 IQR Rule Box Plot Variance	 The student will be able to: Identify the individuals and variables in a set (of data. (Classify variables as categorical or (quantitative. Display categorical data with a bar graph. (Decide if it would be appropriate to make a pie (chart. (Identify what makes some graphs of (categorical data deceptive. (Calculate and display the marginal distribution (of a categorical variable from a two-way table. (Calculate and display the conditional (distribution of a categorical variable for a particular value of the other categorical variable in a two-way table. (Describe the association between two categorical variables by comparing appropriate conditional distributions. (Make and interpret dot plots and stem plots of quantitative data. (Describe the overall pattern (shape, center, and spread) of a distribution and identify any major departures from the pattern (outliers). (Identify Classify Display Calculate Describe Make Compare Interpret Choose 		

• Standard deviation	Identify the shape of a distribution from a
	graph as roughly symmetric or skewed.
	Compare distributions of quantitative data
	using dot plots or stem plots. (
	Make and interpret histograms of quantitative
	data. (
	Compare distributions of quantitative data
	using histograms (
	Calculate measures of center (mean, median).
	Calculate and interpret measures of spread
	((range, <i>IQR</i>). (
	Choose the most appropriate measure of
	center (and spread in a given setting. (
	• Identify outliers using the 1.5× <i>IQR</i> rule.(
	Make and interpret boxplots of quantitative
	(data. (
	Calculate and interpret measures of spread
	(standard deviation). (
	Choose the most appropriate measure of
	center and spread in a given setting. (
	Use appropriate graphs and numerical
	summaries to compare distributions of

Big Idea (BI) and Essential Questions (EQ)

• **BI** Effectively apply the principles of statistics in varied contexts and for a variety of purposes.

• EQ

How can we create visual displays of data and descriptive statistics to analyze patterns in one variable and use that information to make decisions?

Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit and jointly designed by them.

Bar Graph, Pie Chart, and Two Way Table Performance Task Bar Graph, Pie Chart, and Two Way Table Quiz Dot Plot, Stem Plot, and Histogram with Description (SOCS) Performance Task Dot Plot, Stem Plot, and Histogram with Description (SOCS) Quiz Measuring Center and Spread Performance Task Measuring Center and Spread Quiz Exploring Data Unit Assessment

Part 4 – Common/Assured Learning Experiences

Includes a description of what all students will have experienced in this unit district-wide, such as critical projects, readings, field trips, or experiments. Learning activities must: promote higher order thinking, use learning and technology, and respect learner differences.

Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.) Part 5-Teacher Notes

The Practice of Statistics Chapter 1

Statistics Through Applications Chapter 1

Unit 2: Modeling Distributions of Data					
Grade:	Subject:	Course:	Length of Unit:		
11-12	Math	Statistics & Probability	(# of weeks)		
			4		
Quantities		CCSS in Connecticut			
Reason quantitati	vely and use units to solve problems				
• Reason quantitut	very and use units to solve problems.				
Interpreting Categoria • Summarize, repre	cal and Quantitative Data esent, and interpret data on a single cou	unt or measurement variable			
Making Inferences and	d Justifying Conclusions				
• Understand and e	valuate random processes underlying	statistical experiments			
Make inferences a	and justify conclusions from sample su	urveys, experiments, and observational s	tudies		
Conditional Drahabilit	ty & the Dules of Drobability				
Understand indep	endence and conditional probability a	nd use them to interpret data			
	Pri	ority and Supporting CCSS			
N-Q.2 Define appropria	te quantities for the purpose of desc	criptive modeling.			
S-ID.2 Use statistics appr deviation) of two or more	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-IC.1 Understand stati	istics as a process for making inferen	nces about population parameters base	ed on a random sample from that population.		
S-IC.2 Decide if a specif	fied 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.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.					
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.					

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.

S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

Standards for Mathematical Practices

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- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Part 2 - Standards			
Key (GLE) Con	tent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering	
 The students will know: Percentile Cumulative Relative Frequency Graph Z-score Linear Transformation of Data 	 The student will be able to: Find and interpret the percentile of an [] individual value within a distribution of data. [] is the percentiles and individual values [] is the percentile of the percentiles and individual values [] is the percentile of th	 Find Estimate Describe Use Determine 	

• 68-95-99 7 Rule	• Find and interpret the standardized score (7-	
Normal Distribution	Elecore) of an individual value within a	
Normai Distribution	Sepsecie) of an individual value within a	
	<u>(sep)</u> distribution of data. (sep)	
	• Describe the effect of adding, subtracting,	
	step multiplying by, or dividing by a constant on	
	the shape, center, and spread of a distribution of	
	data. [SEP]	
	• Estimate the relative locations of the median	
	and mean on a density curve. [SEP]	
	• Use the 68–95–99.7 rule to estimate areas	
	(proportions of values) in a Normal	
	distribution 🔛	
	• Use Table A or technology to find (i) the	
	 Ose rable A of technology to find (f) the proportion of a values in a specified interval, or 	
	(ii) a - accura from a percentila in the stor dand	
	(ii) a z -score from a percentile in the standard	
	Normal distribution <u>(sep)</u>	
	• Use Table A or technology to find (i) the	
	proportion of values in a specified interval, or	
	(ii) the value that corresponds to a given	
	percentile in any Normal distribution.	
	• Determine if a distribution of data is	
	approximately Normal from graphical and	
	numerical evidence.	
	Big Idea (BI) and Essential Questions (EQ)	
• BI		
Effectively apply the princ	iples of statistics in varied contexts and for a variety of purposes.	

• EQ How does a particular value in a distribution compare with the other values in the distribution?

Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit and jointly designed by them.

Percentile and Z Score Performance Task Percentile and Z Score Quiz Transformation Performance Task Transformation Quiz Normal Distribution Performance Task Normal Distribution Quiz Modeling Distributions of Data Unit Assessment

Part 4 – Common/Assured Learning Experiences

Includes a description of what all students will have experienced in this unit district-wide, such as critical projects, readings, field trips, or experiments. Learning activities must: promote higher order thinking, use learning and technology, and respect learner differences.

Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.) Part 5-Teacher Notes

The Practice of Statistics Chapter 1

Statistics Through Applications Chapter 1

Unit 3: Describing Relationships					
Grade:	Subject:	Course:	Length of Unit:		
11-12	Math	Statistics & Probability	(# of weeks)		
		CCSS in Compositions	8		
Quantities		CCSS in Connecticut			
• Reason quantitativ	vely and use units to solve problems				
Seeing Structure in Ex	nressions				
• Interpret the struct	ture of expressions				
• Write expressions	in equivalent forms to solve problems	S			
Creating Equations	1 1				
 Create equations t 	hat describe numbers or relationships				
Interpreting Categoric	al and Quantitative Data				
• Summarize, repres	sent, and interpret data on a single cou	int or measurement variable			
Making Inferences and	l Justifying Conclusions				
• Understand and ev	valuate random processes underlying s	statistical experiments			
• Make inferences a	nd justify conclusions from sample su	rveys, experiments, and observational st	tudies		
Conditional Probabilit	y & the Rules of Probability				
Understand independent	endence and conditional probability an	nd use them to interpret data			
Using Probability to M	lake Decisions				
Calculate expected	• Calculate expected values and use them to solve problems				
	Pri	ority and Supporting CCSS			
N-Q.2 Define appropriate quantities for the purpose of descriptive modeling.					
A-SSE.1 Interpret expressions that represent a quantity in terms of its context.					
A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expressions					
A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.					

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-IC.1 Understand statistics as 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.

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Part 2 - Standards					
Key (GLE) Con	tent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering			
The students will know: Explanatory variable Response variable Scatterplot Direction Form Strength Outliers Correlation Association Causation Slope Y intercept Least Squares Equation Linear model Prediction Extrapolation Residual plot	 The student will be able to: Identify explanatory and response variables in (situations where one variable helps to explain (or influences the other. (Make a scatterplot to display the relationship (between two quantitative variables. (Describe the direction, form, and strength of a relationship displayed in a scatterplot and recognize outliers in a scatterplot. (Interpret the correlation. (Understand the basic properties of correlation, (including how the correlation is influenced by (outliers. (Use technology to calculate correlation. Explain why association does not imply (causation. (Interpret the slope and <i>y</i> intercept of a least-(squares regression line. (Use the least-squares regression line to predict (<i>y</i> for a given <i>x</i>. Explain the dangers of (extrapolation. (Calculate and interpret residuals. (Explain the concept of least squares. (Determine the equation of a least-squares (regression line using technology. (Identify Make Describe Interpret Understand Use Explain Calculate Determine Construct 			

٠	Construct and interpret residual plots to assess	
	(if a linear model is appropriate. (

Big Idea (BI) and Essential Questions (EQ)

BI Effectively apply the principles of statistics in varied contexts and for a variety of purposes.

• EQ

•

How do two quantitative variables relate to each other?

Part 3 – Common Unit Assessments

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Scatterplots and Correlation Performance Task Scatterplots and Correlation Quiz Least Squares Regression Performance Task Least Squares Regression Quiz Describing Relationships Unit Assessment – may be omitted due to midterm assessment time constraints

Part 4 – Common/Assured Learning Experiences

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Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.) Part 5-Teacher Notes

The Practice of Statistics Chapter 1

Statistics Through Applications Chapter 1

	Unit 4: Designing Studies				
Grade: 11-12	Subject: Math	Course: Statistics & Probability	Length of Unit: (# of weeks) 10		
		CCSS in Connecticut			
Quantities					
Reason quantitativ	vely and use units to solve problems.				
Seeing Structure in Ex	pressions				
• Interpret the struct	ture of expressions				
 Write expressions 	in equivalent forms to solve problem	S			
Creating Equations					
Create equations t	hat describe numbers or relationships				
Interpreting Categoric	al and Quantitative Data				
• Summarize, repre-	sent, and interpret data on a single cou	int or measurement variable			
Making Inferences and	d Justifying Conclusions				
Understand and ev	valuate random processes underlying s	statistical experiments			
• Make inferences a	and justify conclusions from sample su	rveys, experiments, and observational st	udies		
Conditional Probabilit	y & the Rules of Probability				
Understand indep	endence and conditional probability and	nd use them to interpret data			
Using Probability to M	Iake Decisions				
Calculate expected	Calculate expected values and use them to solve problems				
	Pri	ority and Supporting CCSS			
N-Q.2 Define appropriate quantities for the purpose of descriptive modeling.					
A-SSE.1 Interpret expressions that represent a quantity in terms of its context.					
A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expressions					
A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.					

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-IC.1 Understand statistics as 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.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

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.

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.

S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

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- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Part 2 - Standards					
Key (GLE) Con	tent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering			
 The students will know: Population Sample Voluntary response sample Convenience Sample Random Sampling Slips of paper Technology - RandInt (Table of Random Digits Simple Random Sample SRS Stratified Random Sample 	 The student will be able to: Identify the population and sample in a (statistical study. (Identify voluntary response samples and (convenience samples. Explain how these (sampling methods can lead to bias. Describe how to obtain a random sample using (slips of paper, technology, or a table of random digits. Distinguish a simple random sample from a (stratified random sample or cluster sample. Give the advantages and disadvantages of each sampling method. 	 Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering Identify Describe Distinguish Explain Interpret 			
 Systematic Random Sample Bias Cluster Sample Undercoverage Nonresponse Response Bias Wording of Question Order of Questions Inference Observational Study 	 Explain how under coverage, nonresponse, question wording, and other aspects of a sample survey can lead to bias. (Distinguish between an observational study and an experiment. (Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions. (Identify the experimental units, explanatory and response variables, and treatments. (Explain the purpose of comparison, random 				

Experiment	(assignment, control, and replication in an	
Confounding	experiment. (
Experimental Units	Describe a completely randomized design for	
Explanatory Variable	(an experiment, including how to randomly	
Response variable	assign treatments using slips of paper,	
Treatment	technology, or a table of random digits. (
Experimental design	Describe the placebo effect and the purpose of	
Comparison	blinding in an experiment. (
Random assignment	Interpret the meaning of statistically significant	
Control	in the context of an experiment (
Replication	Explain the purpose of blocking in an	
Completely randomized	experiment. (
design	Describe a randomized block design or a	
Blocking	matched pairs design for an experiment.	
Randomized block design	 Describe the scope of inference that is 	
Matched pairs design	appropriate in a statistical study. (
Placebo		
Blind		
Double blind		
Statistically significant		
	Big Idea (BI) and Essential Questions (EQ)	
• BI		
Effectively apply the principles of statistics in varied contexts and for a variety of purposes.		

• EQ

How are unbiased Surveys and Experiments conducted so that inference can be made about the population and cause and effect?

Part 3 – Common Unit Assessments

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Surveys and Sampling Performance Task Survey and Sampling Quiz Experiment Performance Task Experiments Quiz Designing Studies Unit Assessment

Part 4 – Common/Assured Learning Experiences

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Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.) Part 5-Teacher Notes

The Practice of Statistics Chapter 1

Statistics Through Applications Chapter 1

Unit 5: Probability: What are the Chances?			
Grade:	Subject:	Course:	Length of Unit:
12	Math	Math in Sports and Games	(# of weeks)
		CCSS in Connecticut	0
Quantities			
Reason quantitativ	vely and use units to solve problems.		
Seeing Structure in Ex	pressions		
• Interpret the struct	ture of expressions		
• Write expressions	in equivalent forms to solve problems	5	
Creating Equations			
• Create equations t	hat describe numbers or relationships		
Interpreting Categoric	al and Quantitative Data		
• Summarize, repres	sent, and interpret data on a single cou	int or measurement variable	
Making Inferences and	l Justifying Conclusions		
• Understand and ev	valuate random processes underlying s	statistical experiments	
• Make inferences a	and justify conclusions from sample su	rveys, experiments, and observational st	udies
Conditional Probabilit	y & the Rules of Probability		
Understand independence	endence and conditional probability a	nd use them to interpret data	
Using Probability to M	lake Decisions		
Calculate expected	d values and use them to solve problem	ns	
	Pri	ority and Supporting CCSS	
N-Q.2 Define appropria	te quantities for the purpose of desc	riptive modeling.	
A-SSE.1 Interpret expre	essions that represent a quantity in t	terms of its context.	
A-SSE.3 Choose and proc	A-SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expressions		
A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.			

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.

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	Part 2 - Standards	
Key (GLE) Cor	tent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering
 Probability Long Run Short Run Probability model Probability histogram Probability Rule Complement rule General addition rule Rule for mutually exclusive events Two way table Venn diagram Conditional probability General multiplication rule Tree diagram Independence Multiplication rule for independent events 	 The student will be able to: Interpret probability as a long-run relative (frequency (Use simulation to model chance behavior. (Determine a probability model for a chance (process. (Use basic probability rules, including the (complement rule and the addition rule for (mutually exclusive events. (Use a two-way table or Venn diagram to model a chance process and calculate probabilities involving two events. Use the general addition rule to calculate (probabilities. (Calculate and interpret conditional (probabilities. (Use the general multiplication rule to calculate (probabilities. (Use tree diagrams to model a chance process (and calculate probabilities involving two or (more events. (Determine whether two events are (independent. (When appropriate, use the multiplication rule (for independent events to compute 	 Interpret Use Determine Calculate

probabilities. (

Big Idea (BI) and Essential Questions (EQ)

BI Effectively apply the principles of probability in varied contexts and for a variety of purposes.

• EQ

•

How does randomness impact the statistical significance of a study?

Part 3 – Common Unit Assessments

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Randomness, Probability and Simulation Performance Task Randomness, Probability and Simulation Quiz Probability Rules Performance Task Probability Rules Quiz Conditional Probability Performance Task Conditional Probability Quiz Probability Unit Assessment

Part 4 – Common/Assured Learning Experiences

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Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.)

Part 5-Teacher Notes

Unit 6: Random Variables			
Grade: 11-12	Subject: Math	Course: Statistics and Probability	Length of Unit: (# of weeks)
11 12	TYTUUTT	Statistics and Froodonity	2
		CCSS in Connecticut	
Quantities			
Reason quantitativ	vely and use units to solve problems.		
Seeing Structure in Ex	pressions		
• Interpret the struct	ture of expressions		
Write expressions	in equivalent forms to solve problems	S	
Creating Equations			
Create equations t	that describe numbers or relationships		
Interpreting Categoric	cal and Quantitative Data		
• Summarize, repre	sent, and interpret data on a single cou	int or measurement variable	
Making Inferences and	d Justifying Conclusions		
• Understand and ev	valuate random processes underlying s	statistical experiments	
• Make inferences a	and justify conclusions from sample su	rveys, experiments, and observational st	udies
Conditional Probabilit	Conditional Probability & the Rules of Probability		
• Understand indep	endence and conditional probability a	nd use them to interpret data	
Using Probability to M	lake Decisions		
Calculate expected values and use them to solve problems			
	Pri	ority and Supporting CCSS	
N-Q.2 Define appropria	te quantities for the purpose of desc	criptive modeling.	
A-SSE.1 Interpret expre	essions that represent a quantity in t	terms of its context.	
A-SSE.3 Choose and proc	duce an equivalent form of an express	ion to reveal and explain properties of th	e quantity represented by the expressions
A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.			

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-IC.1 Understand statistics as 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.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

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.

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.

S-MD.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

Standards for Mathematical Practices

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

	Part 2 - Standards	
Key (GLE) Con	tent Knowledge and Concepts/Skills	Bloom's Taxonomy Levels Creating, Evaluating, Analyzing, Applying, Understanding, and Remembering
 Probability Discrete random variable Continuous random variable Expected value Standard deviation 	 The student will be able to: Compute probabilities using the probability (distribution of a discrete random variable. (Calculate and interpret the mean (expected (value) of a discrete random variable. (Calculate and interpret the standard deviation (of a discrete random variable. Compute probabilities using the probability (distribution of a continuous random variable. (Compute Calculate
 BI Effectively apply the princip EQ How does a discrete random 	Big Idea (BI) and Essential Questions bles of statistics in varied contexts and for a variety of purp a variable distribution compare to a continuous random var	(EQ) poses. iable distribution?

Part 3 – Common Unit Assessments

Includes description of what students must produce/perform as indicators of mastery of this unit. Either **literacy** (reading, writing, listening, speaking, viewing and presenting) or **numeracy skills** should be required in the task. Students should apply age-appropriate content-specific technologies and **technology applications**. Assessments must be common to teachers of this unit and jointly designed by them.

Discrete and Continuous Random Variable Performance Task Discrete and Continuous Random Variable Quiz

Part 4 – Common/Assured Learning Experiences

Includes a description of what all students will have experienced in this unit district-wide, such as critical projects, readings, field trips, or experiments. Learning activities must: promote higher order thinking, use learning and technology, and respect learner differences.

Access to Technology Access to Manipulative Teacher Formative Assessments (Quizzes, Classwork, Projects, etc.) Part 5-Teacher Notes