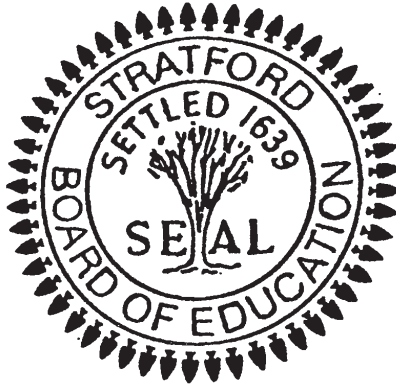


STRATFORD PUBLIC SCHOOLS

Stratford, Connecticut



“Tantum eruditi sunt liberi”
Only The Educated Are Free

Statistics Curriculum

Adopted by the Board of Education on June 25, 2012

Irene Cornish
Superintendent

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DISTRICT MISSION

The mission of the Stratford Public Schools is to develop a community of learners in which students acquire the knowledge, skills and confidence to meet the challenges of a changing and increasingly diverse 21st century society.

DISTRICT CORE VALUES

Students will acquire content knowledge, strengthen higher-order thinking, and develop character in order to address 21st century challenges.

BUNNELL HIGH SCHOOL BELIEFS

We believe teachers must work collaboratively in support of student learning and to model collaboration as a social skill with students. We believe that a rigorous curriculum for all students, an acceptance of diversity, and a culture that actively welcomes all learners will contribute to a more knowledgeable community and society. We believe in the value of a strong education as a means of preparing students for work and life in the remainder of the 21st century.

STRATFORD HIGH SCHOOL BELIEFS

- a safe, positive school climate that embraces diversity is essential to ensure respect and opportunity for each individual
- students should understand the world beyond their community in order to contribute to a global society
- parents and students must share responsibility and work in partnership with the school in order to improve academic performance and to develop lifelong learners
- students should use technology effectively to acquire, process, and deliver information

BUNNELL HIGH SCHOOL and STRATFORD HIGH SCHOOL

LEARNING EXPECTATIONS

All students will...

- use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks. (Academic)
- work independently and collaboratively to solve problems and accomplish goals. (Civic-Social)
- communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. (Academic)
- demonstrate innovation, flexibility and adaptability in thinking patterns, work habits and working/learning conditions. (Academic)
- effectively apply the analysis, synthesis and evaluation processes that enable productive problem solving. (Academic)
- value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. (Civic-Social)
- show competence in all core academic subjects and other fields of interest, including the ability to clearly and effectively communicate content information in multiple formats. (Academic)

STATISTICS UNIT PLANS #1-5
Stratford Public Schools
Statistics Unit #1

Unit Name: Chapter 1 Introduction to Statistics Est. # of Weeks: September (3 weeks) Synopsis: In this chapter the focus will be on: ➤ An overview of Statistics ➤ Data Classification ➤ Designing a statistical study	
STUDENT LEARNING GOALS	
Probability and Statistics ➤ Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.	Interdisciplinary Standards (Technology Integration) Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.
Key Vocabulary ➤ Data, statistics, population, sample, parameter, statistic, descriptive statistics, inferential statistics, qualitative data, quantitative data, nominal level of measurement, ordinal level of measurement, internal level of measurement, ratio level of measurement, survey, simulation, control group, confounding variable, placebo effect, blinding, randomization, replication, census, sampling, random sample, convenience sample.	
Enduring Understandings 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Model real data graphically using appropriate tools, technology and strategies. 4.2 Analyze data sets to form hypotheses and make predictions. a. Describe and analyze sets of data using statistical models.	Essential Questions How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions? ➤ What is the difference between descriptive and inferential statistics? ➤ What are the types of data and how are they classified? ➤ How is a study or experiment designed?
21st Century Skills and Expectations 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.	4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives / Grade Level Expectation

Students will:

- learn the definition of statistics
- distinguish between a population and a sample
- distinguish between a parameter and a statistic
- distinguish between descriptive statistics and inferential statistics
- distinguish between qualitative data and quantitative data
- classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio
- design a statistical study
- design an experiment
- create a sample using different types of statistical sampling.

ASSESSMENT PLAN

Summative Assessment(s)/Performance Based Assessments including 21st Century Learning

- Quiz After Section 1.2
- Chapter assessment
- PBA #1

Formative and Diagnostic Assessment(s)

- Common Formative Assessment based on Unit 1, Introduction to Statistics.
- Identify an experiment as either a census or a sampling.
- Make predictions based on both types of experiments.
- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review

LEARNING PLAN COMPONENTS

- Prentice Hall Mathematics – Elementary Statistics **Chapters 1 - 5**
- Differentiation of Special Needs Students

Stratford Public Schools
Statistics Unit #2

Unit Name: Chapter 2 Descriptive Statistics Est. # of Weeks: 6 weeks Synopsis: In this chapter the focus will be on: ➤ Frequency Distributions and Their Graphs ➤ Measures of Central Tendency ➤ Measures of Variation ➤ Measures of Position	
Probability and Statistics ➤ Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.	<p><u>Interdisciplinary Standards (Technology Integration)</u></p> <p>Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources.</p> <p>Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.</p> <p>Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.</p> <p>Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.</p> <p>Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.</p> <hr style="border-top: 1px dashed black;"/> <p>Key Vocabulary</p> ➤ center, variability, shape, frequency distribution, classes, lower class limit, upper class limit, class width, range, sigma, midpoint, relative frequency, cumulative frequency, frequency histogram, class boundaries, frequency polygon, relative frequency histogram, ogive, stem and leaf plot, exploratory data analysis, stem and leaf, dot plot, pie chart, Pareto chart, paired data sets, scatter plot, time series, time series chart, mean, median, mode, bimodal, outlier, gaps, weighted mean, symmetric, uniform, skewed left, skewed right, deviation, population variance, population standard deviation, sample variance, fractiles, quartiles, interquartile range, box and whisker plot, standard score.
Enduring Understandings 4.1 Collect, organize and display data using appropriate statistical and graphical methods. a. Model real data graphically using appropriate tools, technology and strategies. 4.2 Analyze data sets to form hypotheses and make predictions. a. Describe and analyze sets of data using statistical models.	Essential Questions How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions? ➤ What are the different types of ways you can represent a data set? ➤ How can you graph and interpret quantitative and qualitative data sets? ➤ How can you use the different measures of central tendency to interpret a data set? ➤ What is the difference between the Empirical Rule and Chebychev’s Theorem? ➤ How can you interpret data using quartiles?

<p><u>21st Century Skills and Expectations</u></p> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 	<ol style="list-style-type: none"> 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.
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<p>Learning Objectives / Grade Level Expectations <i>Students will:</i></p> <ul style="list-style-type: none"> ➤ construct a frequency distribution including limits, midpoints, relative frequencies, cumulative frequencies, and boundaries ➤ construct frequency histograms, frequency polygons, relative frequency histograms, and ogives ➤ graph and interpret quantitative and qualitative data sets ➤ graph and interpret paired data sets using scatter plots and time series charts ➤ find the mean, median, mode, and range of a data set ➤ find a weighted mean of a data set and the mean of a frequency distribution ➤ describe the shape of a frequency distribution ➤ find the variance and standard deviation of a population and of a sample ➤ use the Empirical Rule and Chebychev’s Theorem to interpret standard deviation ➤ approximate the sample standard deviation for grouped data ➤ find the quartiles of data set ➤ find the interquartile range of a data set ➤ represent a data set graphically using a box-and-whisker plot ➤ find and interpret the standard score

ASSESSMENT PLAN

<p>Summative Assessment(s)/Performance Based Assessments including 21st Century Learning</p> <ul style="list-style-type: none"> ➤ Quiz After Section 2.2 ➤ Quiz After Section 2.5 ➤ Chapter assessment ➤ PBA #2 	<p>Formative and Diagnostic Assessment(s)</p> <ul style="list-style-type: none"> ➤ Common Formative Assessment based on Unit 2, Descriptive Statistics. ➤ Find the range, mean, variance, and standard deviation of a set of numbers. ➤ Represent a group of data in more than way then decide which representation is more appropriate. ➤ Verbal assessments ➤ Informal assessments of class work ➤ Weekly quiz ➤ Homework review
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LEARNING PLAN COMPONENTS

<ul style="list-style-type: none"> ○ Prentice Hall Mathematics – Elementary Statistics Chapters 1 - 5 ○ Differentiation of Special Needs Students
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**Stratford Public Schools
Statistics Unit #3**

Unit Name: Chapter 3 Probability

Est. # of Weeks: 4 weeks

Synopsis: In this chapter the focus will be on:

- **Basic concepts of probability and counting**
- **Conditional Probability and the Multiplication Rule**
- **The Addition Rule**

STUDENT LEARNING GOALS

Probability and Statistics

- Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

Interdisciplinary Standards (Technology Integration)

Standard 1: Information Strategies

Students determine their need for information and apply strategies to select, locate, and access information resources.

Standard 2: Information Use

Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.

Standard 3: Information and Technology Application

Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.

Standard 4: Literacy and Literary Appreciation

Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.

Standard 5: Personal Management

Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.

Key Vocabulary

- probability experiment, outcome, sample space, event, tree diagram, simple event, classical probability, empirical probability, law of large numbers, subjective probability, complement of an event, conditional probability, independent, dependent, mutually exclusive, permutation, factorial, distinguishable permutations
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Enduring Understandings

4.1 Collect, organize and display data using appropriate statistical and graphical methods.

- a. Model real data graphically using appropriate tools, technology and strategies.

4.2 Analyze data sets to form hypotheses and make predictions.

- a. Describe and analyze sets of data using statistical models.

4.3 Understand and apply basic concepts of probability.

- a. Solve problems using the methods of discrete mathematics.
- b. Make statistical inferences through the use of probability.

Essential Questions

How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

- **How can you distinguish between different types of probabilities?**
- **What is the difference between dependent and independent events?**
- **How can you determine if two events are mutually exclusive?**
- **How can you use counting principles to find probabilities?**

21st Century Skills and Expectations

- 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks.**
- 2. Work independently and collaboratively to solve problems and accomplish goals.**

- 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions.**
- 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.**

<p>3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.</p>	<p>6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.</p>
<p>Learning Objectives / Grade Level Expectations <i>Students will:</i></p> <ul style="list-style-type: none"> ➤ identify the sample space of a probability experiment ➤ identify simple events ➤ use the Fundamental Counting Principle to find the number of ways two or more events can occur ➤ distinguish classical probability, empirical probability, and subjective probability ➤ find the probability of the complement of an event ➤ use a tree diagram to find more probabilities ➤ find the probability of an event given that another event has occurred ➤ distinguish between independent and dependent events ➤ use the Multiplication Rule to find the probability of two events occurring in sequence ➤ use the Multiplication Rule to find conditional probabilities ➤ determine if two events are mutually exclusive ➤ use the Addition Rule to find the probability of two events ➤ find the number of ways a group of objects can be arranged in order ➤ find the number of ways to choose several objects from a group without regard to order ➤ use counting principles to find probabilities 	
<p>ASSESSMENT PLAN</p>	
<p>Summative Assessment(s)/Performance Based Assessments including 21st Century Learning</p> <ul style="list-style-type: none"> ➤ Quiz After Section 3.2 ➤ Quiz After Section 3.4 ➤ Chapter assessment 	<p>Formative and Diagnostic Assessment(s)</p> <ul style="list-style-type: none"> ➤ Common Formative Assessment based on Unit 3, Probability. ➤ Calculate the number of permutations of distinct objects. ➤ Calculate the number of combinations of n objects taken r at a time. ➤ Verbal assessments ➤ Informal assessments of class work ➤ Weekly quiz ➤ Homework review
<p>LEARNING PLAN COMPONENTS</p>	
<ul style="list-style-type: none"> ○ Prentice Hall Mathematics – Elementary Statistics Chapters 1 - 5 ○ Differentiation of Special Needs Students 	

**Stratford Public Schools
Statistics Unit #4**

Unit Name: Chapter 4 Discrete Probability Distributions

Est. # of Weeks: 1 week

Synopsis: In this chapter the focus will be on:

- **Probability Distributions**

STUDENT LEARNING GOALS

Probability and Statistics

- Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies.

Interdisciplinary Standards (Technology Integration)

Standard 1: Information Strategies

Students determine their need for information and apply strategies to select, locate, and access information resources.

Standard 2: Information Use

Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests.

Standard 3: Information and Technology Application

Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information.

Standard 4: Literacy and Literary Appreciation

Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions.

Standard 5: Personal Management

Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.

Key Vocabulary

- random variable, discrete, continuous, discrete probability distribution, mean of a discrete random variable, variance, standard deviation, expected value

Enduring Understandings

4.1 Collect, organize and display data using appropriate statistical and graphical methods.

- a. Model real data graphically using appropriate tools, technology and strategies.

4.2 Analyze data sets to form hypotheses and make predictions.

- a. Describe and analyze sets of data using statistical models.

4.3 Understand and apply basic concepts of probability.

- a. Solve problems using the methods of discrete mathematics.
- b. Make statistical inferences through the use of probability.

Essential Questions

How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions?

- **What is the difference between discrete random variables and continuous random variables?**
- **How can determine the expected value of a discrete random variable?**

21st Century Skills and Expectations

1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks.
2. Work independently and collaboratively to solve problems and accomplish goals.
3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.

4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions.
5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving.
6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior.

Learning Objectives / Grade Level Expectations*Students will:*

- distinguish between discrete random variables and continuous random variables
- construct a discrete probability distribution
- determine if a distribution is a probability distribution
- find the mean, variance, and standard deviation of a discrete probability distribution
- find the expected value of a discrete probability distribution
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ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

- Quiz After Section 4.1

Formative and Diagnostic Assessment(s)

- Verbal assessments
- Informal assessments of class work
- Weekly quiz
- Homework review
- Chapter assessment
- Quizzes

LEARNING PLAN COMPONENTS

- Prentice Hall Mathematics – Elementary Statistics **Chapters 1 - 5**
- Differentiation of Special Needs Students

Stratford Public Schools
Statistics Unit #5

Unit Name: Chapter 5 Normal Probability Distributions		Est. # of Weeks: 5 weeks
Synopsis: In this chapter the focus will be on: <ul style="list-style-type: none"> ➤ Normal Distributions ➤ Finding Probabilities ➤ Sampling Distributions and the Central Limit Theorem 		
STUDENT LEARNING GOALS		
Probability and Statistics <ul style="list-style-type: none"> ➤ Data can be analyzed to make informed decisions using a variety of strategies, tools and technologies. 	<u>Interdisciplinary Standards (Technology Integration)</u> Standard 1: Information Strategies Students determine their need for information and apply strategies to select, locate, and access information resources. Standard 2: Information Use Students evaluate, analyze, and synthesize information and data to solve problems, conduct research, and pursue personal interests. Standard 3: Information and Technology Application Students use appropriate technologies to create written, visual, oral and multimedia products that communicate ideas and information. Standard 4: Literacy and Literary Appreciation Students extract meaning from fiction and non-fiction resources in a variety of formats. They demonstrate an enjoyment of reading, including an appreciation of literature and other creative expressions. Standard 5: Personal Management Students display evidence of ethical, legal, and social responsibility in regard to information resources and project and self-management.	
Key Vocabulary <ul style="list-style-type: none"> ➤ continuous random variable, normal distribution, normal curve, probability density function, standard normal distribution, sampling distribution, standard error of the mean 		
Enduring Understandings 4.1 Collect, organize and display data using appropriate statistical and graphical methods. <ul style="list-style-type: none"> a. Model real data graphically using appropriate tools, technology and strategies. 4.2 Analyze data sets to form hypotheses and make predictions. <ul style="list-style-type: none"> a. Describe and analyze sets of data using statistical models. 4.3 Understand and apply basic concepts of probability. <ul style="list-style-type: none"> a. Solve problems using the methods of discrete mathematics. b. Make statistical inferences through the use of probability. 	Essential Questions How can collecting, organizing and displaying data help us analyze information and make reasonable predictions and informed decisions? <ul style="list-style-type: none"> ➤ What are z-scores and how can we interpret them? ➤ How can you find probabilities for normally distributed variables? ➤ How can you interpret and apply the Central Limit Theorem? 	
<u>21st Century Skills and Expectations</u> <ol style="list-style-type: none"> 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. 2. Work independently and collaboratively to solve problems and accomplish goals. 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. 	<ol style="list-style-type: none"> 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. 6. Value and demonstrate personal responsibility, character, cultural understanding and ethical behavior. 	

Learning Objectives / Grade Level Expectations*Students will:*

- interpret graphs of normal probability distributions
- find areas under the standard normal curve
- find probabilities for normally distributed variables using a table and using technology
- find the z-score given the area under the normal curve
- transform a z-score to an x-value
- find a specific data value of a normal distribution given the probability
- find sampling distributions and verify their properties
- interpret the Central Limit Theorem
- apply the Central Limit Theorem to find the probability of a sample mean.

ASSESSMENT PLAN**Summative Assessment(s)/Performance Based Assessments including 21st Century Learning**

- Quiz After Section 5.2
- Quiz After Section 5.4
- Chapter assessment

Formative and Diagnostic Assessment(s)

- Common Formative Assessment based on Unit 5, Normal Probability Distributions.
- Sketch a graph based on data of a normally distributed curve.
- Find probabilities based on a normally distributed graph.
- Informal assessments of class work
- Weekly quiz
- Homework review

LEARNING PLAN COMPONENTS

- Prentice Hall Mathematics – Elementary Statistics **Chapters 1 - 5**
- Differentiation of Special Needs Students