Probability and Statistics provides a curriculum focused on understanding key data analysis and probabilistic concepts, calculations, and relevance to real-world applications. Through a "Discovery-Confirmation-Practice"-based exploration of each concept, students are challenged to work toward a mastery of computational skills, deepen their understanding of key ideas and solution strategies, and extend their knowledge through a variety of problem-solving applications.

Course topics include types of data; common methods used to collect data; and the various representations of data, including histograms, bar graphs, box plots, and scatterplots. Students learn to work with data by analyzing and employing methods of prediction, specifically involving samples and populations, distributions, summary statistics, regression analysis, transformations, simulations, and inference.

Ideas involving probability — including sample space, empirical and theoretical probability, expected value, and independent and compound events — are covered as students explore the relationship between probability and data analysis. The basic connection between geometry and probability is also explored.

To assist students for whom language presents a barrier to learning or who are not reading at grade level, Probability and Statistics includes audio resources in English.

The content is based on the National Council of Teachers of Mathematics (NCTM) standards and is aligned with state standards.

Length: One Semester

UNIT 1: COLLECTING DATA

LESSON 1: WHAT IS STATISTICS?

Study: What Is Statistics?
Learn reasons for studying statistics, how statistics is used, and the differences between sample data and population parameters.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: What Is Statistics?
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20
LESSON 2: OBSERVATIONAL STUDIES

Study: Observational Studies
Learn about different sampling methods, biases in sampling, and how sampling methods and biases can affect conclusions drawn from studies.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Observational Studies
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 3: EXPERIMENTAL DESIGN

Study: Experimental Design
Learn about experimental design, including but not limited to treatments, randomization, techniques to address extraneous factors, and appropriate conclusions.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Experimental Design
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

Discuss: Applying Experimental Design Concepts to Real-World Studies
Join a three- to five-question discussion to practice methods learned in this unit.
Duration: 0 hr 20 min Scoring: 30 points

LESSON 4: CATEGORICAL DATA
Study: Categorical Data
Learn how to construct and interpret bar charts, pie graphs, and comparative bar charts.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: Categorical Data
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

LESSON 5: COLLECTING DATA WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.

Duration: 0 hr 40 min Scoring: 100 points

Review: Collecting Data
Prepare for the unit test by reviewing key concepts and skills.

Duration: 0 hr 30 min Scoring: 0 points

Test (CS): Collecting Data
Take a computer-scored test to assess what you have learned in this unit.

Duration: 0 hr 40 min Scoring: 50 points

Test (TS): Collecting Data
Take a teacher-scored test to assess what you have learned in this unit.

Duration: 0 hr 30 min Scoring: 50 points

LESSON 6: DIAGNOSTIC

Diagnostic: Collecting Data
Take a diagnostic unit test that will generate a study plan based on your responses.

Duration: 0 hr 40 min Scoring: 25 points

UNIT 2: NUMERICAL DATA SETS
LESSON 1: NUMERICAL DATA

Study: Numerical Data
Learn how to construct and interpret stem-and-leaf plots, histograms, and dot plots along with comparative stem-and-leaf and dot plots.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Numerical Data
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 2: MEASURES OF CENTER

Study: Measures of Center
Learn how to calculate and interpret measures of center, such as mean, median, and mode.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Measures of Center
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 3: MEASURES OF SPREAD

Study: Measures of Spread
Learn how to calculate and interpret variance, standard deviation, range, interquartile range, and outliers.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
LESSON 4: BOX PLOTS

Study: Box Plots
Learn how to calculate and interpret box plots, comparative box plots, and modified box plots.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min Scoring: 0 points

Quiz: Box Plots
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

LESSON 5: DESCRIBING DISTRIBUTIONS

Study: Describing Distributions
Learn how to describe distributions using measures of center, shape, and spread for single and comparative data sets.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min Scoring: 0 points

Quiz: Describing Distributions
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

Discuss: Displaying and Describing Real-World Data
Join a three- to five-question discussion to practice methods learned in this unit.

Duration: 0 hr 20 min Scoring: 30 points
LESSON 6: TRANSFORMING UNIVARIATE DATA

Study: Transforming Univariate Data
Learn how to calculate the effects of transformations on the center, shape, and spread.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Transforming Univariate Data
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min
Scoring: 20 points

LESSON 7: NUMERICAL DATA SETS WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.
Duration: 0 hr 40 min Scoring: 100 points

Review: Numerical Data Sets
Prepare for the unit test by reviewing key concepts and skills.
Duration: 0 hr 30 min
Scoring: 0 points

Test (CS): Numerical Data Sets
Take a computer-scored test to assess what you have learned in this unit.
Duration: 0
hr 40 min Scoring: 50 points

Test (TS): Numerical Data Sets
Take a teacher-scored test to assess what you have learned in this unit.
Duration: 0 hr
30 min Scoring: 50 points

LESSON 8: DIAGNOSTIC

Diagnostic: Numerical Data Sets
Take a diagnostic unit test that will generate a study plan based on your responses.
UNIT 3: BIVARIATE DATA

LESSON 1: SCATTERPLOTS

Study: Scatterplots
Learn how to construct and interpret scatterplots.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Scatterplots
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 2: CORRELATION COEFFICIENTS

Study: Correlation Coefficients
Learn how to calculate and interpret Pearson's sample correlation coefficient.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Correlation Coefficients
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 3: LINEAR REGRESSION

Study: Linear Regression
Learn how to calculate a linear regression equation, interpret the slope and intercept in context, and identify influential points (compared to large residuals).
Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min Scoring: 0 points

Quiz: Linear Regression
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

LESSON 4: ASSESSING LINEAR REGRESSION

Study: Assessing Linear Regression
Learn how to interpret correlation coefficients (r-values), coefficients of determination (r²-values), and residual plots.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min Scoring: 0 points

Quiz: Assessing Linear Regression
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min
Scoring: 20 points

LESSON 5: TRANSFORMING BIVARIATE DATA

Study: Transforming Bivariate Data
Learn how to transform data so that a linear regression equation can be used to model nonlinear relationships.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min Scoring: 0 points

Quiz: Transforming Bivariate Data
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min
LESSON 6: BIVARIATE DATA WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.
*Duration: 0 hr 40 min Scoring: 100 points*

Review: Bivariate Data
Prepare for the unit test by reviewing key concepts and skills.
*Duration: 0 hr 30 min Scoring: 0 points*

Test (CS): Bivariate Data
Take a computer-scored test to assess what you have learned in this unit.
*Duration: 0 hr 40 min Scoring: 50 points*

Test (TS): Bivariate Data
Take a teacher-scored test to assess what you have learned in this unit.
*Duration: 0 hr 30 min Scoring: 50 points*

LESSON 7: DIAGNOSTIC

Diagnostic: Bivariate Data
Take a diagnostic unit test that will generate a study plan based on your responses.
*Duration: 0 hr 40 min Scoring: 25 points*

UNIT 4: PROBABILITY

LESSON 1: RANDOM OUTCOMES, SAMPLE SPACE, AND EVENTS

Study: Random Outcomes, Sample Space, and Events
Learn how to anticipate all possible outcomes of a chance
experiment and list specific outcomes associated with defined events.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: Random Outcomes, Sample Space, and Events
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

LESSON 2: GENERAL PROBABILITY RULES

Study: General Probability Rules
Learn how to apply the general addition and complement rules for two events, and learn to use and read Venn diagrams when solving probability problems.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: General Probability Rules
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min
Scoring: 20 points

LESSON 3: CONDITIONAL PROBABILITY

Study: Conditional Probability
Learn how to identify and solve conditional probability problems using correct notation, formulas, and tables.

Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: Conditional Probability
Take a quiz to assess your understanding of the material.
LESSON 4: INDEPENDENCE

Study: Independence
Learn how to show if two events are independent, and solve probability problems for both independent and dependent events using the multiplication rule and tree diagrams.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Independence
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 5: BAYES'S THEOREM

Study: Bayes's Theorem
Learn how to identify and solve probability problems using Bayes's theorem.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Bayes's Theorem
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 6: SIMULATIONS

Study: Simulations
Learn how to simulate a random event using random number generators and rows of random digits and use results to estimate probabilities empirically.
Duration: 0 hr 40 min Scoring: 0 points
Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: Simulations
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min Scoring: 20 points

Discuss: Using Simulations to Explore Real-World Concerns
Join a three- to five-question discussion to practice methods learned in this unit.

Duration: 0 hr 20 min Scoring: 30 points

LESSON 7: PROBABILITY WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.

Duration: 0 hr 40 min Scoring: 100 points

Review: Probability
Prepare for the unit test by reviewing key concepts and skills.

Duration: 0 hr 30 min Scoring: 0 points

Test (CS): Probability
Take a computer-scored test to assess what you have learned in this unit.

Duration: 0 hr 40 min
Scoring: 50 points

Test (TS): Probability
Take a teacher-scored test to assess what you have learned in this unit.

Duration: 0 hr 30 min
Scoring: 50 points

LESSON 8: DIAGNOSTIC

Diagnostic: Probability
Take a diagnostic unit test that will generate a study plan based on your responses.

Duration: 0 hr 40 min Scoring: 25 points

UNIT 5: PROBABILITY DISTRIBUTIONS
LESSON 1: DISCRETE RANDOM VARIABLES

Study: Discrete Random Variables
Learn how to identify a discrete random variable and calculate its probability distribution, mean, and standard deviation.
*Duration: 0 hr 40 min Scoring: 0 points*

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
*Duration: 0 hr 25 min Scoring: 0 points*

Quiz: Discrete Random Variables
Take a quiz to assess your understanding of the material.
*Duration: 0 hr 20 min Scoring: 20 points*

LESSON 2: CONTINUOUS RANDOM VARIABLES

Study: Continuous Random Variables
Learn how to identify a continuous random variable and calculate its probability distribution.
*Duration: 0 hr 40 min Scoring: 0 points*

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
*Duration: 0 hr 25 min Scoring: 0 points*

Quiz: Continuous Random Variables
Take a quiz to assess your understanding of the material.
*Duration: 0 hr 20 min Scoring: 20 points*

LESSON 3: BINOMIAL PROBABILITY DISTRIBUTIONS

Study: Binomial Probability Distributions
Learn how to calculate binomial probability distributions, including mean and standard deviation.
*Duration: 0 hr 40 min Scoring: 0 points*

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min  Scoring: 0 points

**Quiz: Binomial Probability Distributions**
Take a quiz to assess your understanding of the material.
*Duration: 0 hr 20 min  Scoring: 20 points*

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**LESSON 4: GEOMETRIC PROBABILITY DISTRIBUTIONS**

**Study: Geometric Probability Distributions**
Learn how to identify and calculate geometric probability distributions.
*Duration: 0 hr 40 min  Scoring: 0 points*

**Checkup: Practice Problems**
Complete a set of practice problems to check your understanding of the lesson.
*Duration: 0 hr 25 min  Scoring: 0 points*

**Quiz: Geometric Probability Distributions**
Take a quiz to assess your understanding of the material.
*Duration: 0 hr 20 min  Scoring: 20 points*

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**LESSON 5: NORMAL DISTRIBUTIONS**

**Study: Normal Distributions**
Learn how to identify properties of a normal distribution and then apply these properties to determine probabilities with a table or graphing calculator.
*Duration: 0 hr 40 min  Scoring: 0 points*

**Checkup: Practice Problems**
Complete a set of practice problems to check your understanding of the lesson.
*Duration: 0 hr 25 min  Scoring: 0 points*

**Quiz: Normal Distributions**
Take a quiz to assess your understanding of the material.
*Duration: 0 hr 20 min  Scoring: 20 points*

**Discuss: Checking for Normal Probability Distributions**
Join a three- to five-question discussion to practice methods
LESSON 6: PROBABILITY DISTRIBUTIONS WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.
*Duration: 0 hr 40 min Scoring: 100 points*

Review: Probability Distributions
Prepare for the unit test by reviewing key concepts and skills.
*Duration: 0 hr 30 min
Scoring: 0 points*

Test (CS): Probability Distributions
Take a computer-scored test to assess what you have learned in this unit.
*Duration: 0 hr 40 min Scoring: 50 points*

Test (TS): Probability Distributions
Take a teacher-scored test to assess what you have learned in this unit.
*Duration: 0 hr 30 min Scoring: 50 points*

LESSON 7: DIAGNOSTIC

Diagnostic: Probability Distributions
Take a diagnostic unit test that will generate a study plan based on your responses.
*Duration: 0 hr 40 min Scoring: 25 points*

UNIT 6: SAMPLE DISTRIBUTIONS AND CONFIDENCE INTERVALS

LESSON 1: POINT ESTIMATES

Study: Point Estimates
Learn how to calculate point estimates from a single sample mean and a single sample proportion.
*Duration: 0 hr 40 min Scoring: 0 points*

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration:
0 hr 25 min Scoring: 0 points

Quiz: Point Estimates
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 2: SINGLE SAMPLE MEAN

Study: Single Sample Mean
Learn how to understand and apply the concepts and parameters of the central limit theorem to single sample mean distributions.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Single Sample Mean
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 3: SINGLE SAMPLE PROPORTION

Study: Single Sample Proportion
Learn how to understand and apply the concepts and parameters of the central limit theorem to single sample proportion distributions.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration:
0 hr 25 min Scoring: 0 points

Quiz: Single Sample Proportion
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min
Scoring: 20 points
LESSON 4: SINGLE SAMPLE MEANS AND CONFIDENCE INTERVALS

Study: Single Sample Means and Confidence Intervals
Learn how to use large sample data to calculate and interpret a confidence interval for a population mean.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Single Sample Means and Confidence Intervals
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 5: SINGLE SAMPLE PROPORTIONS AND CONFIDENCE INTERVALS

Study: Single Sample Proportions and Confidence Intervals
Learn how to use large sample data to calculate and interpret a confidence interval for a population proportion.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Duration: 0 hr 25 min Scoring: 0 points

Quiz: Single Sample Proportions and Confidence Intervals
Take a quiz to assess your understanding of the material.
Duration: 0 hr 20 min Scoring: 20 points

LESSON 6: EVALUATING PUBLISHED REPORTS

Study: Evaluating Published Reports
Learn how to evaluate the design of a study, the appropriateness of its analysis, and the validity of its conclusions.
Duration: 0 hr 40 min Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.
Quiz: Evaluating Published Reports
Take a quiz to assess your understanding of the material.

Duration: 0 hr 20 min  
Scoring: 20 points

Discuss: Analyzing Real-World Reports
Join a three- to five-question discussion to practice methods learned in this unit.

Duration: 0 hr 20 min  
Scoring: 30 points

LESSON 7: APPLICATIONS OF STATISTICAL TECHNIQUES

Study: Applications of Statistical Techniques
Learn how statistical techniques are used to analyze real-world observational studies and experimental designs.

Duration: 0 hr 40 min  
Scoring: 0 points

Checkup: Practice Problems
Complete a set of practice problems to check your understanding of the lesson.

Duration: 0 hr 25 min  
Scoring: 0 points

Quiz: Applications of Statistical Techniques
Take a quiz to assess your understanding of the material.

Duration: 0 hr  
20 min  
Scoring: 20 points

LESSON 8: SAMPLE DISTRIBUTIONS AND CONFIDENCE INTERVALS WRAP-UP

Practice: Assignment
Submit your work for a set of 20 practice problems.

Duration: 0 hr 40 min  
Scoring: 100 points

Review: Sample Distributions and Confidence Intervals
Prepare for the unit test by reviewing key concepts and skills.

Duration: 0 hr 30 min  
Scoring: 0 points

Test (CS): Sample Distributions and Confidence Intervals
Take a computer-scored test to assess what you have learned in this unit.
Duration: 0 hr 40 min Scoring: 50 points

Test (TS): Sample Distributions and Confidence Intervals
Take a teacher-scored test to assess what you have learned in this unit.
Duration: 0 hr 30 min Scoring: 50 points

LESSON 9: DIAGNOSTIC

Diagnostic: Sample Distributions and Confidence Intervals
Take a diagnostic unit test that will generate a study plan based on your responses.
Duration: 0 hr 40 min Scoring: 25 points

UNIT 7: PROBABILITY AND STATISTICS REVIEW AND EXAM

LESSON 1: PROBABILITY AND STATISTICS

Review: Probability and Statistics
Prepare for the course exam by reviewing key concepts covered in this course.
Duration: 1 hr Scoring: 0 points

Exam: Probability and Statistics
Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in this course.
Duration: 0 hr 50 min Scoring: 200 points