PROBABILITY AND STATISTICS SYLLABUS

FIRST MARKING PERIOD

UNIT 1 INTRODUCTION TO STATISTICS (Test Ch 1)

1.1 An Overview of Statistics
NJSLS.S-IC.A.1, NJSLS.S-IC.A.2, NJSLS.S-IC.B.3

1.2 Data Classification
NJSLS.S-IC.A.1, NJSLS.S-IC.A.2, NJSLS.S-IC.B.3

1.3 Data Collection and Experimental Design
NJSLS.S-IC.A.1, NJSLS.S-IC.A.2, NJSLS.S-IC.B.3

UNIT 2 DESCRIPTIVE STATISTICS USING GRAPHS (Test Ch 2.1-2.2)

2.1 Frequency Distributions and Their Graphs
NJSLS.S-ID.A.1

2.2 More Graphs and Displays
NJSLS.S-ID.A.1, NJSLS.S-ID.B.6, NJSLS.S-ID.B.6c

UNIT 3 DESCRIPTIVE STATISTICS USING NUMBERS (Test Ch 2.3-2.5)

2.3 Measure of Central Tendency
NJSLS.S-ID.A.2, NJSLS.S-ID.A.3,

2.4 Measures of Variation
NJSLS.S-ID.A.2, NJSLS.S-ID.A.3, NJSLS.S-ID.A.4

2.5 Measures of Position
NJSLS.S-ID.A.2, NJSLS.S-ID.A.3, NJSLS.S-ID.A.4

SECOND MARKING PERIOD

UNIT 4 CORRELATION AND REGRESSION (Test Ch 9.1-9.2)

9.1 Correlation
NJSLS.S-ID.B.6, NJSLS.S-ID.B.6a, NJSLS.S-ID.B.6c, NJSLS.S-ID.C.7, NJSLS.S-ID.C.8, NJSLS.S-ID.C.9

9.2 Linear Regression
NJSLS.S-ID.B.6, NJSLS.S-ID.B.6a, NJSLS.S-ID.B.6c, NJSLS.S-ID.C.7, NJSLS.S-ID.C.8, NJSLS.S-ID.C.9

UNIT 5 PROBABILITY (Test Ch 3)

3.1 Basic Concepts of Probability and Counting
NJSLS.S-CP.A.1

3.2 Conditional Probability and the Multiplication Rule
NJSLS.S-CP.A.1, NJSLS.S-CP.A.2, NJSLS.S-CP.A.3, NJSLS.S-CP.A.4, NJSLS.S-CP.A.5, NJSLS.S-CP.B.6

3.3 The Addition Rule
NJSLS.S-CP.A.1, NJSLS.S-CP.B.7

3.4 Additional Topics in Probability and Counting
NJSLS.S-CP.B.8, NJSLS.S-CP.B.9

UNIT 6 DISCRETE PROBABILTY DISTRIBUTIONS (Test Ch 4.1-4.2)

4.1 Probability Distributions
NJSLS.S-MD.A.2,
NJSLS.S-MD.A.3,
NJSLS.S- MD.A.4,
NJSLS.S-MD.B.5,
NJSLS.S- MD.B.5a

4.2 Binomial Distributions
NJSLS.S-MD.A.3,
NJSLS.S- MD.A.4

THIRD MARKING PERIOD

UNIT 7 NORMAL PROBABILITY DISTRIBUTIONS (Test Ch 5.1-5.2)

5.1 Introduction to Normal Distributions and the Standard Normal Distribution
NJSLS.S-ID.A.4, NJSLS.S-IC.A.2

5.2 Normal Distributions: Finding Probabilities
NJSLS.S-ID.A.4, NJSLS.S-IC.A.2

UNIT 8 APPLICATIONS OF NORMAL PROBABILITY DISTRIBUTIONS (Test Ch 5.3-5.4)

5.3 Normal Distributions: Finding Values
NJSLS.S-ID.A.4, NJSLS.S-IC.A.2

5.4 Sampling Distributions and the Central Limit Theorem
NJSLS.S-ID.A.4

UNIT 9 CONFIDENCE INTERVALS (Test Ch 6)

6.1 Confidence Intervals for the Mean (σ Known)
NJSLS.S-IC.A.1, NJSLS.S-IC.B.4

6.2 Confidence Intervals for the Mean (σ Unknown)
NJSLS.S-IC.A.1, NJSLS.S-IC.B.4

6.3 Confidence Intervals for Population Proportions
NJSLS.S-IC.A.1, NJSLS.S-IC.B.4

6.4 Confidence Intervals for Variance and Standard Deviation
NJSLS.S-IC.A.1, NJSLS.S-IC.B.4

FOURTH MARKING PERIOD

UNIT 10 HYPOTHESIS TESTING WITH ONE SAMPLE (Test Ch 7)

7.1 Introduction to Hypothesis Testing
NJSLS.S-IC.A.1, NJSLS.S-MD.B.7

7.2 Hypothesis Testing for the Mean (σ Known)
NJSLS.S-IC.A.1, NJSLS.S-ID.A.4, NJSLS.S-MD.B.7

7.3 Hypothesis Testing for the Mean (σ Unknown)
NJSLS.S-IC.A.1, NJSLS.S-ID.A.4, NJSLS.S-MD.B.7

7.4 Hypothesis Testing For Proportions
NJSLS.S-IC.A.1, NJSLS.S-ID.A.4,
NJSLS.S-MD.B.7

7.5 Hypothesis Testing for Variance and Standard Deviation
NJSLS.S-IC.A.1, NJSLS.S-MD.B.7

FINAL EXAM (CCC Departmental Exam)

FINAL PROJECT (Written Report)

Resources

Textbook: Elementary Statistics 6th Edition, **Larson and Farber**

Additional Resources: Pearson Web-based videos and supplements

Assessment Information

Marking Period 1	Marking Period 2	Marking Period 3	Marking Period 4
Major (MAJ): Summative: 50%	Major (MAJ): Summative: 50%	Major (MAJ): Summative: 50%	Major (MAJ): Summative: 50%
Minor (MIN): Formative: 30%	Minor (MIN): Formative: 30%	Minor (MIN): Formative: 30%	Minor (MIN): Formative: 30%
Class Participation (CP): 10%	Class Participation (CP): 10%	Class Participation (CP): 10%	Class Participation (CP): 10%
Homework (HW): 10%	Homework (HW): 10%	Homework (HW): 10%	Homework (HW): 10%

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics/Introduction to Statistics** **Grade Level(s):** **11-12**	**Unit Summary**: **Section 1.1** Students will learn about Statistics. They will learn the definition of statistics, how to distinguish between a population and a sample, how to distinguish between parameter and a statistic, and how to distinguish between descriptive and inferential statistics. **Section 1.2** Students will learn how to distinguish between quantitative and qualitative data and how to classify data with respect to the four levels of measurement. **Section 1.3** Students will learn how to design a statistical study, how to distinguish between an observational study and an experiment, how to collect data, how to design an experiment, and how to create a sample.
Essential Question(s): • What is statistics? • What is a population? • What is a sample? • What is a parameter vs. a statistic? • What is descriptive vs. inferential statistics? • What is the difference between qualitative and quantitative data? • How do you classify data based on the level of measurement? • How do you design a statistical study? • What's the difference between an observational study and an experiment? • How do you collect data? • How do you design an experiment? • How do you collect a sample?	**Enduring Understanding(s):** In this unit, students will define: data, statistics, population, sample, parameter, statistic, descriptive statistics, inferential statistics, quantitative data, qualitative data, nominal data, ordinal data, interval data, ratio data, observational study, experiment, treatment, treatment group, control group, experimental units, placebo, simulation, survey, confounding variable, placebo effect, blinding, randomization, completely randomized design, blocks, randomized block design, matched pairs design, sample size, replication, census, sampling, sampling error, random sample, SRS, stratified sampling, cluster sample, systematic sample, convenience sample. In this unit, students will learn how to: • Determine which part of a study represents descriptive statistics • Describe what conclusions can be drawn using inferential statistics • Classify data sets as a population or sample Identify a parameter versus a statistic • Identify qualitative versus quantitative data • Identify whether a data set is nominal or ordinal • Identify whether a data set is interval or ratio level • Determine whether a study is an observational or experimental study • Evaluate and improve upon experimental designs • Use randomization to select a sample • Use appropriate sampling techniques • Discuss potential sampling bias

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**CCS**
1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	1. NJSLS-S-IC.A.1
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.	2. NJSLS-S-IC.A.2
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	3. NJSLS-S-IC.B.3

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain their reasoning for why a data set is representative of a population or a sample.
Students will explain their reasoning for why data is qualitative or quantitative.
Students will explain their reasoning for why a study is an experiment or an observational study.
Students will discuss potential bias in sampling techniques.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 1.1

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 1-43 odd

Section 1.2

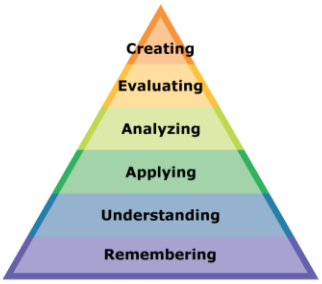
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 1-31 odd

Section 1.3

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 1-21 odd Day 2: 23-37 odd

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics / 2.1 Descriptive Statistics: Frequency Distribution and Their Graphs, 2.2 Descriptive Statistics: More Graphs and Displays** **Grade Level(s):** **11 - 12**	**Unit Summary**: **Section 2.1** In this unit, students will learn about frequency distributions and their graphs. From a data set, they will construct a frequency distribution, a frequency histogram, and a cumulative frequency graph. **Section 2.2** Students will understand and construct stem-and-leaf plots, dot plots, pie charts, Pareto charts, scatter plots, and time series charts. Students will also find the line of best fit for scatter plots.
Essential Question(s): • What is a frequency distribution? • What is a frequency histogram? • How do I construct a cumulative frequency graph? • What is a stem-and-leaf plot? • How do I construct a dot plot? • How do I interpret a pie chart? • What is a Pareto chart? • How do I construct a scatter plot? • What is the line of best fit? • What is a time series chart?	**Enduring Understanding(s):** In this unit, students will interpret and construct the following graphs: frequency histogram, cumulative frequency graph, stem-and-leaf plots, dot plots, pie charts, Pareto charts, scatter plots, line of best fit, time series charts. Students will learn how to: • Construct and interpret frequency histograms and cumulative frequency graphs • Construct and interpret stem-and-leaf plots • Construct and interpret dot plots • Construct and interpret pie charts • Construct and interpret Pareto charts • Construct and interpret scatter plots, finding the line of best fit • Construct and interpret time series charts • Determine the pros and cons of each graph

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	**1.** NJSLS-S-ID.A.1
2. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	**2.** NJSLS-S-ID.B.6
3. Fit a linear function for a scatter plot that suggests a linear association.	**3.** NJSLS-S-ID.B.6c

Inter-Disciplinary Connections:

Politics, Engineering, Science, Medicine, Sports, Psychology

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain the pros and cons of a frequency histogram.
Students will explain the pros and cons of a stem-and-leaf plot.
Students will explain the pros and cons of a dot plot.
Students will explain the pros and cons of a pie chart.
Students will explain the results from a scatter plot using a linear model.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 2.1

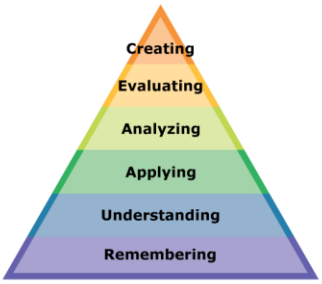
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 2.1 Day 1: 1-22 Day 2: 23 – 33 odds Day 3: 35 – 39 odds, 46, 47

Section 2.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 2.2 Day 1: 1 - 12, 31, 32 Day 2: 13 - 22, 34 Day 3: 23 - 30, 33 Day 4: 35 - 40

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics / 2.3 Descriptive Statistics: Measures of Central Tendency, 2.4 Descriptive Statistics: Measures of Variation, 2.5 Descriptive Statistics: Measures of Position** **Grade Level(s):** **11 - 12**	**Unit Summary**: **Section 2.3** In this unit, students will learn about measures of central tendency. Students will understand mean, median, and mode. They will also analyze the shape of the distribution. **Section 2.4** Students will understand range, variance, and standard deviation. They will also understand the empirical rule referring to the bell-shaped distribution. **Section 2.5** Students will understand the five-number summary, analyzing quartiles and interquartile range and box-and-whisker plots. Also, students will understand the standard score (z-score).
Essential Question(s): • What are the measures of central tendency? • What is the shape of the data distribution? • What is an outlier? • What is the range of the data? • What is variance? • What is standard deviation? • How do I find the five-number summary? • How do I construct a box-and-whisker plot? • What is the z-score?	**Enduring Understanding(s):** In this unit, students will define and identify: mean, median, mode, bimodal, outlier, weighted mean, symmetric, uniform, skewed left, skewed right, range, variation, standard deviation, quartiles, interquartile range, five-number summary, z-score. Students will learn how to: • Analyze test scores, temperature over 2 weeks, and other similar data using measures of central tendencies (mean, median, mode) • Determine if the data is skewed left, right, or is symmetric • Construct five-number summaries and box-and-whisker plots for similar data as above • Find the variation and standard deviation for similar data above • Find the z-score for similar data as above.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. 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.	**1.** NJSLS-S-ID.A.2
2. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	**2.** NJSLS-S-ID.A.3
3. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	**3.** NJSLS-S-ID.A.4

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain shape of the data distribution.

Students will explain how the standard deviation paired with the mean can more accurately describe a data distribution.

Students will explain what the empirical rule means.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 2.3

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 2.3 Day 1: 1 – 12, 17 – 33 odd Day 2: 35 – 51 odd Day 3: 53 – 59 odd, 61

Section 2.4

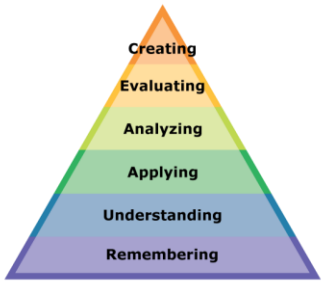
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 2.4 Day 1: 1 - 20 Day 2: 21 – 24, 25 – 31 odd Day 3: 33 – 40, 41 – 47 odd

Section 2.5

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 2.5 Day 1: 1 - 20 Day 2: 21 – 27 odd Day 3: 39 – 50

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.
Projects, Performance Tasks, Homework, Classwork

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics / 3.1 Probability: Basic Concepts of Probability and Counting, 3.2 Probability: Conditional Probability and the Multiplication Rule, 3.3 Probability: The Addition Rule, 3.4 Probability: Additional Topics in Probability and Counting**	**Unit Summary**: **Section 3.1** In this unit, students will learn about basic concepts of probability and counting. Students will understand sample spaces and probabilities involving flipping coins, selecting cards or marbles, and guessing passwords. **Section 3.2** Students will learn conditional probability and the multiplication rule. Students will understand the effects on the probability of independent and dependent events. **Section 3.3** Students will learn the addition rule. Students will understand the effects on probability if events are mutually exclusive. **Section 3.4** Students will learn about permutations and combinations.
Grade Level(s): **11 - 12**	
Essential Question(s): • What is the probability of a simple event? • What is a sample space? • How do I make a tree diagram? • What is the fundamental counting principle? • What is the law of large numbers? • What is the range of probabilities rule? • What is the compliment of an event? • What is conditional probability? • What is the difference between independent and dependent events?	**Enduring Understanding(s):** In this unit, students will define: probability, experiment, outcome, sample space, event, tree diagram, simple event, fundamental counting principle, law of large numbers, range of probabilities rule, complement of an event, conditional probability, independent events, dependent events, mutually exclusive, permutations, and combinations. Students will learn how to: • Create sample spaces for flipping a coin 3 times, drawing marbles from a bag, and rolling 2 dice • Use the counting principle to find the total different 5 card hands can be dealt, or how many passwords can be created given parameters • Use conditional probability involving cards, coins, and a chart full of data • Use the addition principle with dice, cards, and a chart of data • Use permutations and combinations involving cards, finishing places in races, and selecting people for teams

• What does a mutually exclusive event mean? • What is the difference between permutations and combinations?	

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
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").	**1.** NJSLS-S-CP.A.1
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.	**2.** NJSLS-S-CP.A.2
3. Understand the conditional probability of *A* given *B* as *P*(*A* 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*.	**3.** NJSLS-S-CP.A.3
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.	**4.** NJSLS-S-CP.A.4
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	**5.** NJSLS-S-CP.A.5
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.	**6.** NJSLS-S-CP.B.6
7. Apply the Addition Rule, (*A* or *B*) = (*A*) + (*B*) – (*A* and *B*), and interpret the answer in terms of the model.	**7.** NJSLS-S-CP.B.7
8. Apply the general Multiplication Rule in a uniform probability model, (*A* and *B*) = (*A*)(*B*|*A*) = *P*(*B*)*P*(*A*|*B*), and interpret the answer in terms of the model.	**8.** NJSLS-S-CP.B.8
9. Use permutations and combinations to compute probabilities of compound events and solve problems.	**9.** NJSLS-S-CP.B.9

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain how to create a sample space.

Students will compare the probabilities of 2 different events, explaining the differences.

Students will explain the difference between a permutation and a combination.

Students will explain the difference between independent and dependent events.

Students will explain how overlapping events differ from mutually exclusive events.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 3.1

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 3.1 Day 1: 1 – 28 Day 2: 29 - 52 Day 3: 53 – 75 odd

Section 3.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 3.2 Day 1: 1- 19 Day 2: 21 – 33 odd

Section 3.3

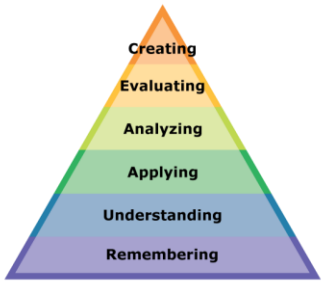
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 3.3 Day 1: 1 - 18 Day 2: 19 - 27

Section 3.4

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 3.4 Day 1: 1 – 6, 7 – 13 odd, 15 - 22 Day 2: 23 – 31 odd, 39 - 55 odd

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Probability and Statistics/ Probability Distributions Ch 4.1, Binomial Distributions Ch 4.2</td><td rowspan="2">Unit Summary:
Section 4.1
Students will learn how to distinguish between discrete random variables and continuous random variables. Students will learn how to construct and graph a discrete probability distribution. Students will learn how to determine whether a distribution is a probability distribution. Students will learn how to find the mean, variance and standard deviation of a discrete probability distribution. Students will learn how to find the expected value of a discrete probability distribution.
Section 4.2
Students will learn how to determine whether a probability experiment is a binomial experiment. Students will learn how to find binomial probabilities using the binomial probability formula and technology. Students will learn how to construct and graph a binomial distribution. Students will learn how to find the mean, variance and standard deviation of a binomial probability distribution.</td></tr>
<tr><td>Grade Level(s):
11-12</td></tr>
<tr><td>Essential Question(s):
How to you distinguish between discrete random variables and continuous random variables?
How do you construct and graph a discrete probability distribution?
How do you determine whether a distribution is a probability distribution?
How do you find the mean, variance and standard deviation of a discrete probability distribution?
How do you find the expected value of a discrete probability distribution?
How do you determine</td><td>Enduring Understanding(s):
In this unit, students will define: random variable, discrete, continuous, discrete probability distribution, expected value, binomial experiment.

In this unit, students will learn how to:
Identify discrete and continuous random variables
Construct and graph a discrete probability distribution
Determine a missing probability from a discrete probability distribution
Identify a probability distribution
Find the mean, variance and standard deviation of a discrete probability distribution
Find expected value
Identify and understand binomial experiments
Find binomial probabilities using the binomial formula
Find binomial probabilities using technology
Construct and graph binomial distributions
Find and interpret mean, variance and standard deviation of a binomial probability distribution</td></tr>
</table>

whether a probability experiment is a binomial experiment? • **How do you find binomial probabilities using the binomial formula?** • **How do you find binomial probabilities using technology?** • **How do you construct and graph a binomial distribution?** • **How do you find the mean, variance and standard deviation of a binomial probability distribution?**	

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**NJCCCS or CCS**
1. Calculate the expected value of a random variable; interpret it as the mean of a random variable. 2. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. 3. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. 4. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. 5. Find the expected payoff for a game of chance.	1. NJSLS-S -MD.A.2 2. NJSLS-S-MD.A.3 3. NJSLS-S- MD.A.4 4. NJSLS-S-MD.B.5 5. NJSLS-S- MD.B.5a

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain why a random variable is discrete or continuous.

Students will explain why a distribution is not a probability distribution.

Students will interpret the mean, variance and standard deviation of a discrete probability distribution.

Students will explain why an experiment is not a binomial experiment.

Students will interpret the mean, variance and standard deviation of a binomial probability distribution.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 4.1

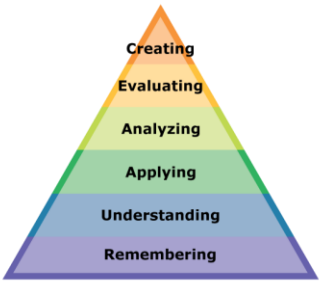
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 4.1 Day 1: 9 – 27 odd Day 2: 29 – 32, 37, 38

Section 4.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 4.2 Day 1: 11 – 14, 23 – 31 odd Day 2: 15 - 22 Chapter Review: 4.1 (1 – 10), 4.2 (11 – 20)

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Probability and Statistics/ 5.1 Introduction to Normal Distributions and Standard Normal Distribution, 5.2 Normal Distribution: Finding Probabilities</td><td rowspan="2">Unit Summary:
Section 5.1
Students will learn how to interpret graphs of normal probability distributions. They will learn how to find the area under the standard normal curve.
Section 5.2
Students will learn how to find probabilities for normally distributed variables using a table and using technology..</td></tr>
<tr><td>Grade Level(s):
11-12</td></tr>
<tr><td>Essential Question(s):
How do you interpret graphs of normal probability distributions?
How do you find areas under the standard normal curve?
How do you find probabilities for normally distributed variables using a table and using technology?</td><td>Enduring Understanding(s):
In this unit, students will define: continuous probability distribution, normal distribution, inflection points, probability density function, standard normal distribution, z-score.
In this unit, students will learn how to:
Interpret a graph with reference to a normally distribution
Estimate the mean and standard deviation given a graph of a normally distributed variable
Find the area under the standard normal curve by hand and using technology
Compute and interpret z-scores
Find the probability using the standard normal distribution when a z-score is given
Find the probability using the standard normal distribution when a z-score must be computed
Find the percent of data above, below or between given values given that the variable is normally distributed..</td></tr>
</table>

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**NJCCCS or CCS**
1. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. 2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.	**1.** NJSLS-S-ID.A.4 **2.** NJSLS-S-IC.A.2

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain why a variable appears to be normally distributed.

Compare and discuss differences between an observed sample and an expected claim.

Explain why a value is unusual in the context of the standard normal distribution.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 5.1

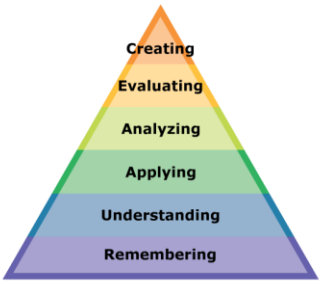
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 5.1 Day 1: 1-16 Day 2: 17-36 Day 3: 37-45 odd, 47-56

Section 5.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 5.2 Day 1: 1-6, 7, 11, 15, 19

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics/5.3 Normal Distribution: Finding Values,5.4 Sampling Distributions and The Central Limit Theorem** **Grade Level(s):** **11-12**	**Unit Summary**: **Section 5.3** Students will learn how to find a z score given the area under the normal curve. They will learn how to transform a z-score to an x-value. They will learn how to find a specific data value of a normal distribution given the probability. **Section 5.4** Students will learn how to find sampling distributions and verify their properties. Students will learn how to interpret the Central Limit Theorem. Students will learn how to apply the Central Limit Theorem to find the probability of a sample mean.
Essential Question(s): • **How do you find a z-score given the area under the normal curve?** • **How do you transform a z-score to an x-value?** • **How do you find a specific data value of a normal distribution given the probability?** • **How do you find sampling distributions and verify their properties?** • **How do you interpret the Central Limit Theorem?** • **How do you apply the Central Limit Theorem to find the probability of a sample mean?**	**Enduring Understanding(s):** In this unit, students will define: sampling distribution, sampling distribution of sample means. In this unit, students will learn how to: • Using the standard normal table, find z-scores that correspond to a given cumulative area or percentile. • Find the value that corresponds to a given percentile or probability for a normally distributed variable • Verify properties of a sampling distribution. • Find probabilities using the Central Limit Theorem.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**NJCCCS or CCS**
1. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	1. NJSLS-S-ID.A.4

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will explain why a normal distribution cannot be used to approximate a binomial probability.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 5.3

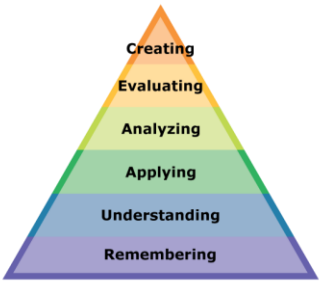
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 5.3 Day 1: 1-16, 17-29 odd, 31-37 odd

Section 5.4

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 5.4 Day 1: 19 – 37 odd

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

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Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr><td>Course/Unit Title:
Probability and Statistics/ Confidence Intervals Ch 6</td><td rowspan="2">Unit Summary:
Chapter 6
Students will learn how to make a meaningful estimate for mean, population proportions, variance, and standard deviations by specifying an interval of values. Students will learn how to make statements regarding the confidence of that intervals with regards to the population parameter.
Section 6.1
Students will learn how to find a point estimate and a margin of error for the mean when the standard deviation for the population is known. They will learn how to construct and interpret confidence intervals. They will learn how to determine the minimum sample size required when estimating a population mean.
Section 6.2
Students will learn how to interpret the t-distribution and use the t-distribution table. They will learn how to construct and interpret confidence intervals for a population mean when the standard deviation of the population is unknown.
Section 6.3
Students will learn how to find a point estimate for a population proportion. They will learn how to construct and interpret confidence intervals for a population proportion. They will learn how to determine the minimum sample size required when estimating a population proportion.
Section 6.4
Students will learn how to interpret the chi-square distribution and use a chi-square table. They will learn how to construct and interpret confidence intervals for a population variance and standard deviation.</td></tr>
<tr><td>Grade Level(s):
11-12</td></tr>
<tr><td>Essential Question(s):
How do you find a point estimate and a margin of error?
How do you construct and interpret confidence intervals for population mean when standard deviation is known?
How do you determine the minimum sample size required when estimating a population mean?</td><td>Enduring Understanding(s):
In this unit, students will define: point estimate, unbiased estimator, interval estimate, level of confidence, critical values, sampling error, margin of error, confidence interval, t-distribution, degrees of freedom, population proportion, chi-square distribution.
In this unit, students will learn how to:
Find the margin of error for the mean when standard deviation is known
Find the critical value necessary to construct confidence intervals for the mean when standard deviation known</td></tr>
</table>

• How do you interpret the t-distribution? • How do you use the t-distribution table? • How do you construct and interpret a confidence interval for a population mean when standard deviation is unknown? • How do you find a point estimate for a population proportion? • How do you construct and interpret confidence intervals for a population proportion? • How do you determine the minimum sample size required when estimating a population proportion? • How do you interpret the chi-square distribution and use the chi-square table? • How do you construct and interpret confidence intervals for a population variance and standard deviation?	• Construct confidence intervals for a population mean with standard deviation known • Interpret confidence intervals for a population mean with standard deviation known • Find the margin of error and the sample mean given a confidence interval • Determine the minimum sample size needed when estimating the mean • Find the margin of error for the mean when standard deviation is unknown • Find the critical value necessary to construct confidence intervals for the mean when standard deviation unknown • Construct confidence intervals for a population mean with standard deviation unknown • Interpret confidence intervals for a population mean with standard deviation unknown • Find the point estimate for the population proportion • Find the margin of error and the sample proportion given a confidence interval • Construct confidence intervals for a population proportion • Interpret confidence intervals for a population proportion • Find the chi-square critical values for a given confidence level and sample size • Construct confidence intervals for a population variance • Interpret confidence intervals for a population standard deviation

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**NJCCCS or CCS**
1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. 2. 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.	**1.** NJSLS-S-IC.A.1 **2.** NJSLS-S-IC.B.4

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will interpret confidence intervals for mean (population standard deviation known).

Students will interpret confidence intervals for mean (population standard deviation unknown).

Students will interpret confidence intervals for proportions.

Students will interpret confidence intervals for variance and standard deviation.

Students will explain when to use the t-distribution versus the normal distribution.

Students will explain how a confidence intervals reacts when sample size and confidence level are varied.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 6.1

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 6.1 Day 1: 1-15 odd, 17-20 Day 2: 21-33 odd, 35-41 odd, 45, 47, 49, 55

Section 6.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 6.2 Day 1: 1-16, 17-29 odd

Section 6.3

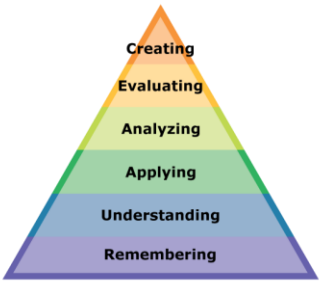
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 6.3 Day 1: 1-10, 11-19 odd, 21-25 odd

Section 6.4

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 6.4 Day 1: 1-12, 13-23 odd Chapter Review: 1-37 odd

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

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Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics/Sections 7.1 – 7.5: Hypothesis Testing with One Sample**	**Unit Summary**: **Section 7.1** Students will learn how to state a null and an alternative hypothesis. Students will learn how to identify a Type I and a Type II error. Students will learn how to know whether to use a one-tailed or a two-tailed statistical test. Students will learn how to interpret a decision based on the results of a statistical test. **Section 7.2** Students will learn how to find and interpret P-values. Students will learn how to use P-values for a z-test for a mean when the population standard deviation is known. Students will find critical values and rejection regions in the standard normal distribution. Students will learn how to use rejection regions for a z-test for a mean when σ is known. **Section 7.3** Students will learn how to find critical values for a t-distribution. Students will learn how to use the t-test to test a mean when σ is not known. Students will learn how to use technology to find P-values and use them with a t-test to test a mean when σ is not known. **Section 7.4** Students will learn how to use the z-test to test a population proportion. **Section 7.5** Students will learn how to find critical values for a chi-square test. Students will learn how to use the chi-square test to test a variance or a standard deviation.
Grade Level(s): **11-12**	
Essential Question(s): • How to you state a null and alternative hypothesis? • How do you identify Type I and Type II errors and interpret the level of significance? • How do you know whether to use a one-tailed or a two-tailed test and find a P-value? • How do you make and interpret a decision based on the results of a statistical test?	**Enduring Understanding(s):** In this unit, students will define: hypothesis test, null hypothesis, alternative hypothesis, Type I error, Type II error, level of significance, test statistic, standardized test statistic, P-value, left-tailed, right-tailed, two-tailed, rejection region, critical value, In this unit, students will learn how to: • State null and alternative hypotheses • Determine whether a test is one-tailed or two-tailed. • Describe Type I and Type II errors. • Interpret a decision in context of the alternative hypothesis. • Find critical values and rejection regions for a z-test for a mean with σ known. • Perform a hypothesis test for a mean when σ is known. • Find critical values for a t-distribution. • Perform a hypothesis tests for a mean when σ is unknown.

• How do you write a claim for a hypothesis test? • How do you find and interpret P-values? • How do you use P-values for a z-test for a mean when σ is known? • How do you find critical values and rejection regions in the standard normal distribution? • How do you use rejection regions for a z-test for a mean when σ is known? • How do you find critical values in a t-distribution? • How do you use the t-test to test a mean when σ is unknown? • How do you use technology to find P-values and use them with a t-test to test a mean when σ is unknown? • How do you use the z-test to test a population proportion? • How do you find critical values for a chi-square test? • How do you use the chi-square test to test a variance or a standard deviation?	• Perform a hypothesis test for a proportion. • Find critical values for a chi-square test. • Perform a hypothesis test for a variance. • Perform a hypothesis test for a standard deviation.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**CCS**
1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. **2.** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. **3.** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	1. NJSLS-S-IC.A.1 2. NJSLS-S-ID.A.4 3. NJSLS-S-MD.B.7

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

Elementary Statistics – Picturing the World - Ron Larson and Betsy Farber

Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will describe Type I and Type II errors in context of the hypotheses.

Students will interpret a decision in terms of the alternative hypothesis.

Students will explain why a test for a mean has a z or a t distribution.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 7.1

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 11, 13,15, 21 – 47 odd

Section 7.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 31 – 36 Day 2: 37 – 42

Section 7.3

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 15 – 22 Day 2: 23 - 28

Section 7.4

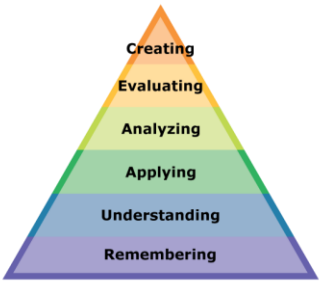
	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 9 – 16 with critical regions Day 2: 9 – 16 with P-values

Section 7.5

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Day 1: 17 – 24 critical regions Day 2: 17 – 27 P-values

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self assessments, learning/response logs, discussions and practice presentations.

Accommodations/Modifications:

As per student IEP or 504 Plan

Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learnings Standards for Mathematics listed under each chapter in the Statistics and Probability curriculum/syllabus at the conclusion of an instructional time period.

Accommodations/Modifications:

As per student IEP or 504 Plan

Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects, Performance Tasks, Homework, Classwork**

Accommodations/Modifications:

As per student IEP or 504 Plan

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Course Name: Probability and Statistics

Course Number: 034800

PART I: Unit Rationale

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: **Probability and Statistics/ Correlation Ch 9.1, Linear Regression Ch 9.2** **Grade Level(s):** **11-12**	**Unit Summary**: **Section 9.1** Students will learn the definition of correlation. Students will learn how to describe the relationship between two variables when data are presented as ordered pairs. Students will learn the definition of the correlation coefficient and learn how to calculate the coefficient by hand and using technology. Students will learn how to interpret the correlation coefficient in the context of a modelling scenario. Students will learn the difference between correlation and causation. Student will learn what questions to consider when evaluating the correlation and causation relationship. **Section 9.2** Students will learn how to find the regression equation for a set of ordered pairs by hand and using technology. Students will learn the definition of a residual and learn how to calculate a residual. Students will learn how to use the regression equation to predict a y-value given an x-value. Students will learn how to interpret those prediction values in the context of the problem.
Essential Question(s): • **What is correlation?** • **What are independent and dependent variables?** • **What are the types of correlation?** • **How do you calculate the correlation coefficient?** • **How do you distinguish between correlation and causation?** • **How do you find the equation of a regression line?** • **How do you predict y-values using a regression equation?**	**Enduring Understanding(s):** In this unit, students will define: correlation, positive correlation, negative correlation, no correlation, independent or explanatory variable, dependent or response variable, correlation coefficient, regression line, residuals, line of best fit. In this unit, students will learn how to: • Determine if there is a correlation between ordered pairs • Identify the type of correlation • Calculate the correlation coefficient by hand and using calculator • Interpret the correlation coefficient for type and strength of linear correlation • Evaluate whether correlation means causation • Calculate the slope and y-intercept for a regression line by hand and using a calculator • Write the regression line equation • Interpret the slope of the regression line and its connection to the correlation • Calculate a residual • Predict a y-value using a regression equation and a given x-value

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

The standards for mathematical practices will be utilized throughout the chapter.

Learning Target	**NJCCCS or CCS**
1. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. 2. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. 3. Fit a linear function for a scatter plot that suggests a linear association. 4. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. 5. Compute (using technology) and interpret the correlation coefficient of a linear fit. 6. Distinguish between correlation and causation.	**1.** NJSLS-S-ID.B.6 **2.** NJSLS-S-ID.B.6a **3.** NJSLS-S-ID.B.6c **4.** NJSLS-S-ID.C.7 **5.** NJSLS-S-ID.C.8 **6.** NJSLS-S-ID.C.9

Inter-Disciplinary Connections:

Mathematical modeling will be used as all problems are real world applications.

Students will engage with the following text:

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Resources: A variety of technology tools per teacher discretion.

Students will write:

Students will interpret and explain the correlation in context of the data.

Students will interpret and explain the correlation coefficient in context of the data.

Students will explain why they believe a causal relationship exists or does not.

Students will interpret and explain the meaning of a predicted value given a regression line.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Section 9.1

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 9.1 Day 1: 1-20, Day 2: 21-30 odd

Section 9.2

	Regular
Standards for Mathematical Practice	MP 1- Make sense of problems and persevere in solving them MP 2- Reason abstractly and quantitatively MP 3- Construct viable arguments and critique MP 4- Model with mathematics MP 5- Use appropriate tools strategically MP 6- Attend to precision MP 7- Look for and make use of structure MP 8- Look for and express regularity in repeated reasoning.
Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)	Ch 9.2 Day 1: 1-16 Day 2: 17-20 Chapter Review: 9.1 (1-4), 9.2 (9-12)

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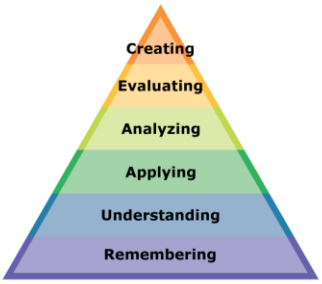

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