Odysseyware®

CURRICULUM OVERVIEW

Probability and Statistics B

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Course Overview

Semester B of Probability and Statistics is designed to give 11th- and 12th-grade students a more in-depth look at statistics and its many applications, with an emphasis on inferential statistics. Students are also introduced to advanced counting techniques as well as probability and its applications.
The semester begins with the concept of sample space, basic probability, and the difference between theoretical and experimental probabilities. A more in-depth look at probability follows, with an emphasis on compound and conditional probabilities.

Students explore normal data distributions and its properties, followed by a look at the standard normal distributions and its usefulness as a probability model for making inferences about a population. The remainder of the semester is devoted to hypothesis testing using various significance tests such as 1- and 2-sample z-tests, 1- and 2-sample *t*-tests, significance tests involving proportions, and chi-square goodness of fit tests. Hypothesis testing is then put into practice through a variety of real-world of applications and projects.

Each of the five units in Semester B includes twelve lessons and one project. Each lesson has a minimum of thirteen formative assessment questions to enable students and their teacher to gauge student understanding. Summative assessments include three quizzes in each unit, a test for each unit, and a semester exam covering all five units. Each project uses concepts covered in the unit.

- **Unit 1**: Determine theoretical and experimental probabilities using probability rules and determine if two events are independent.
- **Unit 2**: Identify mutually exclusive and non-mutually exclusive events, determine binomial probabilities, and calculate expected value.
- **Unit 3**: Use permutations and combinations to calculate probabilities and apply the properties of normally distributed data.
- **Unit 4**: Understand the central limit theorem, determine confidence intervals, and use hypothesis testing to compare proportions and means, and to determine the relationship between categorical variables.
- **Unit 5**: Distinguish between parametric and non-parametric statistics and apply these concepts to examine topics including health science and market research.

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Unit 1: INTRODUCTION TO PROBABILITY

Assignments

1.	Course Overview	13.	Alternate Quiz: Independent Events*
2.	Sample Spaces	14.	Unions of Events
3.	The Probability Continuum	15.	Probability of an Event Not Occurring
4.	Theoretical Probability	16.	Conditional Probability Using Venn Diagrams
5.	Experimental Probability	17.	Conditional Probability Using a Formula
6.	Quiz: Probability	18.	Project: Conditional Probability
7.	Alternate Quiz: Probability*	19.	Quiz: Conditional Probability
8.	Independent Events	20.	Alternate Quiz: Conditional Probability*
9.	Two-Way Tables	21.	Unit Review
10.	Determining Independence Using Two-Way Tables	22.	Test: Introduction to Probability
11.	Probability of Multiple Events Occurring Simultaneously	23.	Alternate Test: Introduction to Probability*
12.	Quiz: Independent Events	24.	Glossary and Credits

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Unit 2: EXPLORING PROBABILITY

Assignments

1. Venn Diagrams
2. Probability of Non-Mutually Exclusive Events Using Venn Diagrams
3. Probability of Non-Mutually Exclusive Events Using a Formula
4. Mixed Probability Applications
5. Quiz: Venn Diagrams
6. Alternate Quiz: Venn Diagrams*
7. Binomial Probability Distributions
8. Geometric Probability Distributions
9. Expected Value
10. Constructing Probability Distributions
11. Quiz: Probability Distributions
12. Alternate Quiz: Probability Distributions*
13. Applications of Expected Value
14. Using Expected Value to Find the Mean of a Probability Distribution
15. Using the Probability Distribution to Find Expected Value
16. Probability Tree Diagrams
17. Project: Binomial Experiment
18. Quiz: Expected Value
19. Alternate Quiz: Expected Value*
20. Unit Review
21. Test: Exploring Probability
22. Alternate Test: Exploring Probability*
23. Glossary and Credits

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Unit 3: COUNTING METHODS AND PROBABILITY

Assignments

1. Fundamental Counting Principle
2. Permutations
3. Combinations
4. Comparing and Combining the Counting Methods
5. Quiz: Counting Methods
6. Alternate Quiz: Counting Methods*
7. Probability Using the Fundamental Counting Principle
8. Probability Using Permutations
9. Probability Using Combinations
10. Applications of Probabilities for Combinations and Permutations
11. Quiz: Probability Using Counting Methods
12. Alternate Quiz: Probability Using Counting Methods*
13. Probability of Repeated Events
14. Probability of an Event Not Occurring Given Multiple Opportunities
15. Probabilities Using a Normal Curve
16. Applications of Probabilities Using a Normal Curve
17. Project: Real-World Probabilities
18. Quiz: Repeated Events and Normal Curves
19. Alternate Quiz: Repeated Events and Normal Curves*
20. Unit Review
21. Test: Counting Methods and Probability
22. Alternate Test: Counting Methods and Probability*
23. Glossary and Credits

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Unit 4: FORMING AND TESTING HYPOTHESES

Assignments

1. Forming a Hypothesis
2. Calculating Proportion Using Z-Scores
3. Comparing Means with a T-Test
4. Hypothesis Testing
5. Quiz: Hypotheses and Testing
6. Alternate Quiz: Hypotheses and Testing*
7. Genetics and Probability
8. Comparing Means with a Z-Test
9. Introduction to Confidence Intervals
10. Determining Confidence Intervals
11. Quiz: Confidence Intervals
12. Alternate Quiz: Confidence Intervals*
13. Chi-Square Tests
14. Test of Proportion
15. Paired T-Test
16. Criticisms of Statistical Hypothesis Testing
17. Project: Experimental Design and Analysis
18. Quiz: Statistical Tests
19. Alternate Quiz: Statistical Tests*
20. Unit Review
21. Test: Forming and Testing Hypotheses
22. Alternate Test: Forming and Testing Hypotheses*
23. Glossary and Credits

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Unit 5: APPLICATIONS OF PROBABILITY AND HYPOTHESIS TESTING

Assignments

1. Recognizing Misleading Uses of Statistics
2. Dealing with Small Sample Sizes
3. Selective Reporting
4. Exercise and Cancer
5. Quiz: Real-World Limitations
6. Alternate Quiz: Real-World Limitations*
7. The Gender-Salary Gap
8. Marketing Research Statistics
9. Cell Phone Use While Driving
10. Ratios of Male/Female Births Over Time
11. Quiz: Research Statistics
12. Alternate Quiz: Research Statistics*
13. Nutrition Science
14. How Governments Use Statistics
15. Coaching Decisions
16. Random Walks
17. Project: Hypothesis Testing - A Drug Study
18. Quiz: Making Decisions Using Statistics
19. Alternate Quiz: Making Decisions Using Statistics*
20. Unit Review
21. Test: Applications of Probability and Hypothesis Testing
22. Alternate Test: Applications of Probability and * Hypothesis Testing
23. Glossary and Credits

Unit 6: SEMESTER REVIEW AND EXAM

Assignments

1. Semester Review
2. Semester Exam
3. Alternate Semester Exam*

(*) Indicates alternative assignment

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