Odysseyware®

CURRICULUM OVERVIEW

Mathematical Models with Applications B

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Course Overview

Semester B of Mathematical Models is designed for high school math students after the completion of Mathematical Models Semester A. The semester looks at applying mathematical modeling concepts to architecture, engineering, fine art, photography, and music. Each of the five units includes between seven and fourteen lessons, and one project. Each lesson has a minimum of five formative assessment questions to enable students and their teacher to gauge student understanding. Each project uses concepts covered in the unit. Summative assessments include three quizzes in each unit, a test for each unit, and a semester exam covering all five units.

- **Unit 1:** Identify and apply appropriate algebraic processes and models to solve problems and analyze data in science contexts.
- **Unit 2:** Identify and apply appropriate algebraic and geometric processes and models to solve problems and analyze data in architecture and engineering contexts.
- **Unit 3:** Identify and apply appropriate algebraic and geometric processes and models to examine patterns and techniques in fine arts contexts.
- **Unit 4:** Identify and apply appropriate models and techniques to solve problems and analyze data in social sciences.
- **Unit 5:** Identify and apply appropriate probability models to solve problems and analyze data in various contexts.

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Unit 1: MATHEMATICAL APPLICATIONS IN SCIENCE

Assignments

1. Course Overview
2. Characteristics of Linear, Quadratic, and Exponential Functions
3. Direct Variation
4. Inverse Variation
5. Constant of Variation
6. Quiz: Functions and Variations
7. Alternate Quiz: Functions and Variations*
8. Hooke's Law
9. Newton's Second Law
10. Exponential Growth and Decay
11. Population Growth
12. Quiz: Using Direct and Indirect Variation and Exponential Growth
13. Alternate Quiz: Using Direct and Indirect Variation and Exponential Growth*
14. Boyle's Law
15. Radioactive Decay
16. Applications of Quadratic Functions
17. Quadratic Motion
18. Project: The Math of Motion
19. Quiz: Applications of Functions
20. Alternate Quiz: Applications of Functions*
21. Unit Review
22. Test: Mathematical Applications in Science
23. Alternate Test: Mathematical Applications in Science*
24. Glossary and Credits

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Unit 2: MATHEMATICAL APPLICATIONS IN ARCHITECTURE AND ENGINEERING

Assignments

1. Sides and Perimeter of Two-Dimensional Figures
2. Sides and Perimeter of Three-Dimensional Figures
3. Area and Surface Area of Similar Figures in Two Dimensions
4. Area and Surface Area of Similar Figures in Three Dimensions
5. Volumes of Similar Figures
6. Quiz: Two and Three Dimensions
7. Alternate Quiz: Two and Three Dimensions*
8. Translations, Reflections, and Rotations
9. Dilations and Tessellations
10. One-Point Perspective
11. Two-Point Perspective
12. Project: Rooms in Perspective
13. Quiz: Perspective
14. Alternate Quiz: Perspective*
15. Pythagorean Theorem
16. Special Right Triangles
17. Trigonometric Ratios
18. Inverse Trigonometric Ratios
19. Quiz: Trigonometry
20. Alternate Quiz: Trigonometry*
21. Unit Review
22. Test: Mathematical Applications in Architecture and Engineering
23. Alternate Test: Mathematical Applications in Architecture and Engineering*
24. Glossary and Credits

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Unit 3: MATHEMATICAL APPLICATIONS IN FINE ARTS

Assignments

1. Similarity
2. Transformations
3. Transformations with Tessellations
4. Symmetry
5. Quiz: Mathematical Patterns
6. Alternate Quiz: Mathematical Patterns*
7. Natural Perspective
8. Mathematical Perspective
9. Transformations in Music
10. Proportions in Music
11. Periodic Motion
12. Quiz: Mathematical Compositions
13. Alternate Quiz: Mathematical Compositions*
14. Scale Factors in Surface Areas of Two-Dimensional Objects
15. Scale Factors in Surface Areas of Three-Dimensional Objects
16. Scale Factors in Volumes of Three-Dimensional Objects
17. Periodicity in Art
18. Project: The Periodicity of Music
19. Quiz: Scale Factors
20. Alternate Quiz: Scale Factors*
21. Unit Review
22. Test: Mathematical Applications in Fine Arts
23. Alternate Test: Mathematical Applications in Fine Arts*
24. Glossary and Credits

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Unit 4: MATHEMATICAL APPLICATIONS IN STATISTICS

Assignments

1. Line Graphs
2. Interpreting Bar and Circle Graphs
3. Histograms
4. Scatterplots
5. Dot Plots
6. Quiz: Organizing Data
7. Alternate Quiz: Organizing Data*
8. Stem-and-Leaf Plots
9. Central Tendency
10. Variability
11. Box-and-Whisker Plots
12. Quiz: Describing Data
13. Alternate Quiz: Describing Data*
14. Surveys, Experiments, and Observational Studies
15. Population Mean and Population Proportion
16. Analyzing Graphs and Statistics
17. Functions and Data
18. Project: Surveying a Crowd
19. Quiz: Interpreting Data
20. Alternate Quiz: Interpreting Data*
21. Unit Review
22. Test: Mathematical Applications in Statistics
23. Alternate Test: Mathematical Applications in Statistics*
24. Glossary and Credits

Unit 5: MATHEMATICAL APPLICATIONS IN PROBABILITY			
Assignments			
1.	Simple Probability	9.	Combinations
2.	Compound Probability	10.	Project: A Game of Chance
3.	Theoretical vs. Experimental Probability	11.	Quiz: Counting Techniques
4.	Binomial Probability	12.	Alternate Quiz: Counting Techniques*
5.	Quiz: Probabilities	13.	Unit Review
6.	Alternate Quiz: Probabilities*	14.	Test: Mathematical Applications in Probability
7.	Fundamental Counting Principle	15.	Alternate Test: Mathematical Applications in Probability*
8.	Permutations	16.	Glossary and Credits

Unit 6: SEMESTER REVIEW AND EXAM			
Assignments			
1.	Semester Review	3.	Alternate Semester Exam*
2.	Semester Exam		

(*) Indicates alternative assignment