Mathematical Modeling is an Alabama-specific course that builds on and reinforces the concepts introduced through the three required state courses *Geometry with Data Analysis*, *Algebra I with Probability*, and *Algebra II with Statistics*. It solidifies student understanding of geometric modeling, engages students in developing real-world financial literacy, and bolster's decision-making skills through exercises in probability and data analysis. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include three-dimensional solids; linear and exponential number sequences and functions; personal financial literacy through banking and property ownership; data collection and graphic representation via histograms, bar graphs, box plots, and scatterplots; analysis and employment of extending results involving probability distribution; and sampling and confidence intervals.

This course supports all students as they develop computational fluency and deepen conceptual understanding. Students begin each lesson by discovering new concepts through guided instruction, then confirm their understanding in an interactive, feedback-rich environment. Modeling activities equip students with tools for analyzing a variety of real-world scenarios and mathematical ideas. Journaling activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Performance tasks prepare students to synthesize their knowledge in novel, real-world scenarios and require that they make sense of multifaceted problems and persevere in solving them.

This course is built to Alabama state standards. Throughout the course, students are evaluated by a variety of assessments designed to prepare them for the content, form, and depth of state exams.

Length: One Semester

Unit 1: Three-Dimensional Solids

- Three Dimensions
- What Is a Polyhedron?
- Cylinders and Cones
- Platonic Solids
- Surface Area
- Volume
- Spheres
- Similar Solids
- Performance Task: Three-Dimensional Solids

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- Three-Dimensional Solids Wrap-Up

Unit 2: Sequences and Functions

- Arithmetic Sequences
- Geometric Sequences
- Understanding Number Sequences
- Exponential Functions
- Exponential and Linear Growth
- Sequences and Functions Wrap-Up

Unit 3: Checking and Savings

- Simple Interest
- Exponential Growth
- Compound Interest
- The Rule of 72
- Checking Accounts
- Balancing Your Checkbook
- Comparing Checking Accounts
- Savings Accounts
- Comparing Savings Accounts
- Checking and Savings Wrap-Up

Unit 4: Purchasing and Credit

- Sales Tax
- Coupons, Rebates, and Sales
- Marketing
- Credit Cards
- Calculating Credit Card Interest
- Tracking Payments and Purchases
- Comparing Credit Cards
- Credit Scores
- Bankruptcy
- Purchasing and Credit Wrap-Up

Unit 5: Car Ownership

- Car Leasing
- Car Renting and Sharing
- Car Dealers
- Payments
- Dealer Incentives
- Owning and Operating
- Equity and Depreciation
- Planning a Trip
- Total Trip Expenses
- Car Ownership Wrap-Up

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Unit 6: Home Ownership

- Selecting a House: Fairly Priced?
- Mortgages: Fixed Rate
- Mortgages: Variable Rate
- Multiple Mortgages and Refinancing
- Discounts
- Balloon Mortgages
- Additional Costs: Fees
- Additional Costs: Escrow
- Total Housing Payments
- Paying Off a Mortgage
- Home Ownership Wrap-Up

Unit 7: Semester 1 Exam

Unit 8: Introduction to Statistics

- What Is Statistics?
- Collecting Data
- Random Sampling
- Experimental Design
- Introduction to Statistics Wrap-Up

Unit 9: Describing Data Graphically

- Categorical Data
- Numerical Data
- Two-Way Frequency Tables
- Describing Data Graphically Wrap-Up

Unit 10: Measures of Center and Spread

- Measures of Center
- Measures of Spread
- Box Plots
- Project
- Measures of Center and Spread Wrap-Up

Unit 11: Modeling Data

- Linear Models in Data
- Correlation
- Regression Methods
- Assessing Data Models
- Nonlinear Models
- Transforming Bivariate Data
- Modeling Data Wrap-Up

Unit 12: Applications of Probability

- Using Two-Way Frequency Tables

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- Using Probability to Make Decisions
- Simulations
- Project
- Applications of Probability Wrap-Up

Unit 13: Discrete Probability Distributions

- Discrete Random Variables
- Binomial Probability
- Cumulative Binomial Probability Distributions
- Discrete Probability Distributions Wrap-Up

Unit 14: Sampling and Confidence Intervals

- Sample Means
- Sample Proportions
- Confidence Intervals: Sample Means
- Confidence Intervals: Sample Proportions
- Evaluating Statistical Studies
- Sampling and Confidence Intervals Wrap-Up

Unit 15: Semester 2 Exam

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