

## UNIT 1 Interpreting Categorical Data

**Interpreting Categorical Data** develops student understanding of two-way frequency tables, conditional probability and independence, and using data from a randomized experiment to compare two treatments.

**Topics include** two-way tables, graphical representations, comparison of proportions including absolute risk reduction and relative risk, characteristics and terminology of well-designed experiments, expected frequency, chi-square test of homogeneity, statistical significance.

- Lesson 1** Comparing the Risk
- Lesson 2** A Test of Significance
- Lesson 3** The Relationship Between Two Variables
- Lesson 4** Looking Back

## UNIT 2 Functions Modeling Change

**Functions Modeling Change** extends student understanding of linear, exponential, quadratic, power, circular, and logarithmic functions to model quantitative relationships and data patterns whose graphs are transformations of basic patterns.

**Topics include** linear, exponential, quadratic, power, circular, and base-10 logarithmic functions; mathematical modeling; translation, reflection, stretching, and compressing of graphs with connections to symbolic forms of corresponding function rules.

- Lesson 1** Function Models Revisited
- Lesson 2** Customizing Models by Translation and Reflection
- Lesson 3** Customizing Models by Stretching and Compressing
- Lesson 4** Looking Back

## UNIT 3 Counting Methods

**Counting Strategies** extends student ability to count systematically and solve enumeration problems using permutations and combinations.

**Topics include** systematic listing and counting, counting trees, the Multiplication Principle of Counting, Addition Principle of Counting, combinations, permutations, selections with repetition; the binomial theorem, Pascal's triangle, combinatorial reasoning; and the general multiplication rule for probability.

- Lesson 1** Systematic Counting
- Lesson 2** Order and Repetition
- Lesson 3** Counting Throughout Mathematics
- Lesson 4** Looking Back

## UNIT 4 Mathematics of Financial Decision-Making

**Mathematics of Financial Decision-Making** extends student facility with the use of linear, exponential, and logarithmic functions, expressions, and equations in representing and reasoning about quantitative relationships, especially those involving financial mathematical models.

**Topics include** forms of investment, simple and compound interest, future value of an increasing annuity, comparing investment options, continuous compounding and natural logarithms; amortization of loans and mortgages, present value of a decreasing annuity, and comparing auto loan and lease options.

**Lesson 1** Financial Decision-Making: Saving

**Lesson 2** Financial Decision-Making: Borrowing

**Lesson 3** Looking Back

## UNIT 5 Binomial Distributions and Statistical Inference

**Binomial Distributions and Statistical Inference** develops student understanding of the rules of probability; binomial distributions; expected value; testing a model; simulation; making inferences about the population based on a random sample; margin of error; and comparison of sample surveys, experiments, and observational studies and how randomization relates to each.

**Topics include** review of basic rules and vocabulary of probability (addition and multiplication rules, independent events, mutually exclusive events); binomial probability formula; expected value; statistical significance and  $P$ -value; design of sample surveys including random sampling and stratified random sampling; response bias; sample selection bias; sampling distribution; variability in sampling and sampling error; margin of error; and confidence interval.

**Lesson 1** Binomial Distributions

**Lesson 2** Sample Surveys

**Lesson 3** Margin of Error: From Sample to Population

**Lesson 4** Looking Back

## UNIT 6 Informatics

**Informatics** develops student understanding of the mathematical concepts and methods related to information processing, particularly on the Internet, focusing on the key issues of access, security, accuracy, and efficiency.

**Topics include** elementary set theory and logic; modular arithmetic and number theory; secret codes, symmetric-key and public-key cryptosystems; error-detecting codes (including ZIP, UPC, and ISBN) and error-correcting codes (including Hamming distance); and trees and Huffman coding.

**Lesson 1** Access: Set Theory, Logic, and Searching

**Lesson 2** Security: Cryptography

**Lesson 3** Accuracy: Error-Detecting and -Correcting Codes

**Lesson 4** Efficiency: Data Compression

**Lesson 5** Looking Back

## UNIT 7 Spatial Visualization and Representations

**Spatial Visualization and Representations** extends student ability to visualize and represent three-dimensional shapes using contour diagrams, cross sections, and relief maps; to use coordinate methods for representing and analyzing three-dimensional shapes and their properties; and to use graphical and algebraic reasoning to solve systems of linear equations and inequalities in three variables and linear programming problems.

**Topics include** using contours to represent three-dimensional surfaces and developing contour maps from data; sketching surfaces from sets of cross sections; three-dimensional rectangular coordinate system; sketching planes using traces, intercepts, and cross sections derived from algebraic representations; systems of linear equations and inequalities in three variables; and linear programming.

**Lesson 1** Representing Three-Dimensional Objects

**Lesson 2** A Three-Dimensional Coordinate System

**Lesson 3** Linear Programming: A Graphical Approach

**Lesson 4** Looking Back

## UNIT 8 Mathematics of Democratic Decision-Making

**Strategic Decision-Making** develops student understanding of the mathematical concepts and methods useful in making decisions in a democratic society, as related to voting and fair division.

**Topics include** preferential voting and associated vote-analysis methods such as majority, plurality, runoff, points-for-preferences (Borda method), pairwise-comparison (Condorcet method), and Arrow's theorem; weighted voting, including weight and power of a vote and the Banzhaf power index; and fair division techniques, including apportionment methods.

**Lesson 1** Social Choice and Voting

**Lesson 2** Fair Division

**Lesson 3** Looking Back