

## Discovering Algebra

### Chapter 0, Fractions and Fractals

Introduces fractals and recursion. (Recursive thinking is applied later to develop rate of change (slope).) Work with fractals incorporates review of operations with fractions and signed numbers. This chapter also introduces students to the graphing calculator and teaches them how to use the text.

### Chapter 1, Data Exploration

Explores data and representations of data and establishes the data-analytic approach. Students begin interpreting graphs and organizing and computing data with matrices.

### Chapter 2, Proportional Reasoning and Variation

Looks at ratio and proportion and sets the stage for rates and slopes. It includes dimensional analysis. The chapter continues by looking at linear equations for direct-variation relationships, then exploring inverse variation. Students explore how quantities vary, use rates to make predictions, and represent variation using graphs.

### Chapter 3, Linear Equations

Builds upon Chapter 2 by looking at linear equations that are not direct variation. It ties together recursion from Chapter 0, fitting data from Chapter 1, and rate of change and linear variation from Chapter 2, and also covers solving equations with symbolic manipulation. Order of operations are introduced/reviewed.

### Chapter 4, Fitting a Line to Data

Continues exploration of fitting a line to data. Students explore the formula for slope, as well as the intercept and point-slope forms for the equation of a line. Students learn to recognize equivalent equations in different forms, and write equations for real-world data.

### Chapter 5, Systems of Equations and Inequalities

Covers solving systems of equations and inequalities using graphing, substitution, elimination, and matrix methods.

### Chapter 6, Exponents and Exponential Models

Goes beyond linear equations and looks at exponential equations. It also covers the properties of exponents and scientific notation.

### Chapter 7, Functions

Introduces function notation, absolute-value functions, and quadratic functions.

### Chapter 8, Transformations

Looks at function transformations algebraically and geometrically and explores families of functions.

### Chapter 9, Quadratic Models

Continues exploration of quadratic functions in general, vertex, and factored form. Students learn to model real-world data with quadratic functions, and combine and factor polynomials.

### Chapter 10, Probability

Explores relative frequency graphs, probability outcomes and trials, random outcomes, counting techniques, multiple-stage experiments, and expected value.

### Chapter 11, Introduction to Geometry

Includes the midpoint formula, parallel and perpendicular lines, the Pythagorean Theorem and square roots, calculating distance between two points, and an introduction to trigonometry. Students also use algebra to describe geometric relationships.

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## Discovering Advanced Algebra

### Chapter 0, Problem Solving

Reviews topics of beginning algebra, and covers problem solving by using graphs and diagrams, representing problems algebraically, and organizing information.

### Chapter 1, Patterns and Recursion

Uses recursive formulas to model growth and explores them in tables, formulas, and graphs.

### Chapter 2, Describing Data

Presents methods of analyzing and describing one-variable data sets. Topics include measures of central tendency, standard deviation, and percentiles.

### Chapter 3, Linear Models and Systems

Explores lines first as mathematical objects that can model two-variable data, and then as graphical representations of linear equations. The recursive formulas for arithmetic growth from Chapter 1 are developed into explicit linear formulas. Students find lines of fit for data, learn the median-median line of fit, and evaluate quality of fit using residuals. Students solve systems graphically and using substitution and elimination.

### Chapter 4, Functions, Relations, and Transformations

Distinguishes between functions and relations, explores translations, and investigates different families of functions, including quadratic, absolute value, and circles and ellipses.

### Chapter 5, Exponential, Power, and Logarithmic Functions

Introduces exponential functions to model growth and decay, and explores real-world applications. Students learn about inverses and the logarithmic function, and study properties of exponents and logarithms.

### Chapter 6, Matrices and Linear Systems

Explores the value of matrices to organize data and solve systems and covers operations on matrices and inverse matrices. Real-world applications of linear systems and inequalities and linear programming are explored.

### Chapter 7, Quadratic and Other Polynomial Functions

Explores applications of quadratic models, various forms of quadratic functions, and solving quadratic functions. Methods of solving polynomial functions are covered, and complex numbers arise as nonreal solutions to polynomial functions.

### Chapter 8, Parametric Equations and Trigonometry

Covers ~~parametric equations~~ to model motion, trigonometric ratios and their properties, vectors, and projectile motion. *NO CODE?*

### Chapter 9, Conic Sections and Rational Functions

Extends earlier coverage of circles, ellipses, and parabolas to the context of conic sections. Students also explore the remaining conic sections and rational functions.

### Chapter 10, Trigonometric Functions

Presents sinusoidal models in real-world applications. Properties of trigonometric graphs are explored, and trigonometric identities are introduced.

### Chapter 11, Series

Covers summation notation, partial sums, and infinite series.

### Chapter 12, Probability

Explores experimental and theoretical probabilities, tree diagrams, Venn diagrams, expected value, permutations and combinations, Pascal's triangle, and binomial expansion.

### Chapter 13, Applications of Statistics

Explores probability distributions, normal distributions, z-values and confidence, the central limit theorem, bivariate data and correlation, the least squares line, and nonlinear regression.

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