AoPS Introduction to Algebra – AoPS Sections to Brilliant Lessons

Chapter 1: Follow the Rules

AoPS Section	Brilliant Lessons
1.1 Numbers	Growing and Shrinking; A Pair at Every Distance; Absolute Value
1.2 Order of Operations	Order of Operations; When Does Order Matter; Exponent Rules
1.3 When Does Order Matter?	When Does Order Matter; Grouping and Order; Order of Operations
1.4 Distribution and Factoring	Distributing and Grouping; Factoring; Rearranging Expressions
1.5 Equations	Solving an Equation; Balancing with Constants; Balancing with Variables
1.6 Exponents	Exponent Review; Exponent Properties; Exponent Rules
1.7 Fractional Exponents	Fractional Exponents; Roots and Exponents; Rewriting Exponents
1.8 Radicals	Radicals and Roots; Simplifying Radicals; Radical Expressions
1.9 Summary Review Problems Challenge Problems	Order of Operations; Distributing and Grouping; Solving an Equation

Chapter 2: x Marks the Spot

AoPS Section	Brilliant Lessons
2.1 Expressions	Building Expressions; Expressions and Patterns; Comparing Expressions
2.2 Arithmetic with Expressions	Arithmetic with Expressions; Combining Like Terms; Distribution and Combination
2.3 Distribution, Subtraction, and Factoring	Distributing and Grouping; Factoring; Rearranging Expressions
2.4 Equations With Fractions	Solving Equations With Fractions; Balancing with Fractions; Clearing Denominators
2.5 Summary Review Problems Challenge Problems	Building Expressions; Distributing and Grouping; Solving Equations With Fractions

Chapter 3: One Variable Linear Equations

AoPS Section	Brilliant Lessons
3.1 One Step Equations	Solving an Equation; Balancing with Constants; Inverse Operations
3.2 Multi Step Equations	Solving Multi Step Equations; Rearranging Equations; Isolating the Variable
3.3 Equations With Fractions	Solving Equations With Fractions; Balancing with Fractions; Clearing Denominators

AoPS Section	Brilliant Lessons
3.4 Absolute Value Equations	Absolute Value and Distance; Absolute Value Equations; Which Is Greater
3.5 Summary Review Problems Challenge Problems	Solving an Equation; Solving Multi Step Equations; Absolute Value Equations

Chapter 4: More Variables

AoPS Section	Brilliant Lessons
4.1 Evaluating Multi Variable Expressions	Balancing with Variables; Building Expressions; Distributing
4.2 Still More Arithmetic	Finding Unknowns; Solving an Equation; Apply: Rules of Thumb
4.3 Distribution and Factoring	Factoring; Completing the Square; Difference of Squares
4.4 Summary Review Problems Challenge Problems	Building Expressions; Rearranging Expressions; Balancing with Variables

Chapter 5: Multi Variable Linear Equations

AoPS Section	Brilliant Lessons
5.1 Systems of Equations	Systems of Equations; Two Equations Two Unknowns; Intersection Points
5.2 Substitution	Substitution Method; Solving With Substitution; Using Formulas
5.3 Elimination	Elimination Method; Combining Equations; Linear Combinations
5.4 Word Problems	Translating Word Problems; Using Variables; Comparing Offers
5.5 Summary Review Problems Challenge Problems	Systems of Equations; Substitution Method; Elimination Method

Chapter 6: Ratios and Percents

AoPS Section	Brilliant Lessons
6.1 Basic Ratio Problems	Computing Unit Rates; Finding Batches; Finding Unit Cost
6.2 More Challenging Ratio Problems	Computing Unit Rates; Finding Batches; Finding Unit Cost
6.3 Conversion Factors	Setting Up Ratios; Scaling Up; Scaling Down
6.4 Percent	Calculating Percentages; Percent Discount; Working with Percentages
6.5 Percentage Problems	Calculating Percentages; Percent Discount; Working with Percentages
6.6 Summary Review Problems Challenge Problems	Setting Up Ratios; Scaling Up; Scaling Down

Chapter 7: Proportion

AoPS Section	Brilliant Lessons
7.1 Direct Proportion	Graphing Relationships; Constant of Proportionality; Writing Equations
7.2 Inverse Proportion	Graphing Relationships; Graphing Comparisons; Using Graphs
7.3 Proportion Word Problems	Using Unit Prices; Comparing Offers; Controlling Costs
7.4 Summary Review Problems Challenge Problems	Graphing Relationships; Constant of Proportionality; Comparing Offers

Chapter 8: Graphing Lines

AoPS Section	Brilliant Lessons
8.1 Coordinates	Plotting Points; Plotting Equivalent Ratios; Coordinates in the Plane
8.2 Graphs of Equations	Graphing from an Equation; Graphing Relationships; Graphing Lines
8.3 Slope	Slope Interpretation Tasks; Slope as Rate; Steepness and Direction
8.4 Slope Intercept	Graphing from an Equation; Writing Equations; Graphing Comparisons
8.5 Slope and Intercepts	Graphing Lines; Comparing Lines; Slope and Intercept Interpretation
8.6 Comparing Lines	Comparing Lines; Graphing Comparisons; Interpreting Graphs
8.7 Summary Review Problems Challenge Problems	Plotting Points; Graphing Relationships; Comparing Lines

Chapter 9: Introduction to Inequalities

AoPS Section	Brilliant Lessons
9.1 The Basics	Inequalities on a Number Line; Which Is Greater; Interpreting Inequalities
9.2 Which Is Greater?	Which Is Greater; Absolute Value and Distance; Comparing Quantities
9.3 Linear Inequalities	Solving Inequalities; Linear Inequalities; Graphing Inequalities
9.4 Graphing Inequalities	Graphing Inequalities; Regions on the Line; Inequalities on a Number Line
9.5 Optimization	Optimization with Constraints; Regions and Inequalities; Applications of Inequalities
9.6 Summary Review Problems Challenge Problems	Linear Inequalities; Graphing Inequalities; Optimization with Constraints

Chapter 10: Quadratic Equations – Part 1

AoPS Section	Brilliant Lessons
10.1 Getting Started With Quadratics	Quadratic Patterns; Quadratic Functions; Factoring Quadratics
10.2 Factoring Quadratics I	Factoring Quadratics; Factoring Using Patterns; Factoring Practice
10.3 Factoring Quadratics II	Factoring Quadratics; Factoring Challenge; Factoring by Grouping
10.4 Sums and Products of Roots of a Quadratic	Roots and Coefficients; Sums and Products; Quadratic Roots
10.5 ★ Extensions and Applications	Quadratic Applications; Roots and Graphs; Modeling With Quadratics
10.6 Summary Review Problems Challenge Problems	Factoring Quadratics; Quadratic Patterns; Quadratic Applications

Chapter 11: Special Factorizations

AoPS Section	Brilliant Lessons
11.1 Squares of Binomials	Squares of Binomials; Recognizing Patterns; Expansion and Factoring
11.2 Difference of Squares	Difference of Squares; Factoring Patterns; Quadratic Identities
11.3 Sum and Difference of Cubes	Sum and Difference of Cubes; Factoring Higher Powers; Polynomial Patterns
11.4 Rationalizing Denominators	Rationalizing Denominators; Radical Expressions; Simplifying Fractions
11.5 Simon's Favorite Factoring Trick	Factoring Challenge; Special Factoring Tricks; Rearranging Expressions
11.6 Summary Review Problems Challenge Problems	Squares of Binomials; Difference of Squares; Sum and Difference of Cubes

Chapter 12: Complex Numbers

AoPS Section	Brilliant Lessons
12.1 Numbers, Numbers, and More Numbers!	
12.2 Arithmetic With Complex Numbers	
12.3 Summary Review Problems Challenge Problems	

Chapter 13: Quadratic Equations – Part 2

AoPS Section	Brilliant Lessons
13.1 Completing the Square	Completing the Square; Quadratic Transformations; Vertex Form

AoPS Section	Brilliant Lessons
13.2 Quadratic Formula	Quadratic Formula; Deriving the Formula; Using the Quadratic Formula
13.3 Applications	Quadratic Applications; Modeling With Quadratics; Roots and Graphs
13.4 Summary Review Problems Challenge Problems	Completing the Square; Quadratic Formula; Quadratic Applications

Chapter 14: Graphing Quadratics

AoPS Section	Brilliant Lessons
14.1 Parabolas	Graphing Parabolas; Vertex and Axis; Quadratic Graph Features
14.2 Quadratic Transformations	Quadratic Transformations; Shifting Graphs; Stretching and Compressing
14.3 Summary Review Problems Challenge Problems	Graphing Parabolas; Quadratic Transformations; Comparing Quadratic Graphs

Chapter 15: More Inequalities

AoPS Section	Brilliant Lessons
15.1 Quadratic Inequalities	Quadratic Inequalities; Regions and Parabolas; Graphing Inequality Solutions
15.2 More Optimization	Optimization with Constraints; Quadratics in Optimization; Regions and Inequalities
15.3 Summary Review Problems Challenge Problems	Quadratic Inequalities; Optimization with Constraints; Graphing Inequality Solutions

Chapter 16: Functions

AoPS Section	Brilliant Lessons
16.1 Function Basics	Function Machines; Input and Output; Function Rules
16.2 Function Notation	Function Notation; Evaluating Functions; Input Output Rules
16.3 Combining Functions	Combining Functions; Function Operations; Building New Functions
16.4 Summary Review Problems Challenge Problems	Function Machines; Function Notation; Combining Functions

Chapter 17: Graphing Functions

AoPS Section	Brilliant Lessons
17.1 Graphs and Tables	Comparing Functions; Tables and Graphs; Interpreting Graphs

AoPS Section	Brilliant Lessons
17.2 Features of Graphs	Features of Graphs; Maxima and Minima; Intercepts and Intervals
17.3 Transformations of Graphs	Transformations of Functions; Shifting and Scaling; Coordinate Transformations
17.4 Summary Review Problems Challenge Problems	Comparing Functions; Features of Graphs; Transformations of Functions

Chapter 18: Polynomials

AoPS Section	Brilliant Lessons
18.1 Polynomial Basics	Polynomial Vocabulary; Combining Like Terms; Polynomial Degree
18.2 Polynomial Arithmetic	Polynomial Addition and Subtraction; Multiplying Polynomials; Distributing and Grouping
18.3 Factoring Polynomials	Factoring Polynomials; Factoring by Grouping; Factoring Patterns
18.4 Summary Review Problems Challenge Problems	Polynomial Addition and Subtraction; Multiplying Polynomials; Factoring Polynomials

Chapter 19: Exponents and Logarithms

AoPS Section	Brilliant Lessons
19.1 Exponential Functions	Exponential Functions; Growth and Decay; Rewriting Exponents
19.2 Show Me the Money	Show Me the Money; Interest Calculations; Compound Growth
19.3 Interest interesting Problems	Compound Interest; Interest Calculations; Exponential Growth
19.4 What is a Logarithm?	What is a Logarithm; Logarithms and Exponents; Inverse Relationships
19.5 Summary Review Problems Challenge Problems	Exponential Functions; Show Me the Money; What is a Logarithm

Chapter 20: Special Functions

AoPS Section	Brilliant Lessons
20.1 Radicals	Radical Functions; Radical Expressions; Graphing Radicals
20.2 Absolute Value	Absolute Value Functions; Absolute Value and Distance; Graphing Absolute Value
20.3 Floor and Ceiling	Step Functions; Floor and Ceiling Functions; Piecewise Behavior
20.4 Rational Functions	Rational Functions; Graphing Rational Functions; Asymptotes and Behavior

AoPS Section	Brilliant Lessons
20.5 Piecewise Defined Functions	Piecewise Defined Functions; Interpreting Piecewise Graphs; Modeling With Piecewise Functions
20.6 Summary Review Problems Challenge Problems	Absolute Value Functions; Radical Functions; Piecewise Defined Functions

Chapter 21: Sequences & Series

AoPS Section	Brilliant Lessons
21.1 Arithmetic Sequences	Exponential Patterns; Repeated Change; Sequences and Patterns
21.2 Arithmetic Series	Sequences and Sums; Series and Patterns; Summing Patterns
21.3 Geometric Sequences	Exponential Growth; Geometric Sequences; Repeated Multiplication
21.4 Geometric Series	Series and Growth; Geometric Series; Summing Infinite Series (intro level)
21.5 ⋆ Telescoping	Telescoping Patterns; Series and Cancellation; Special Series Tricks
21.6 Summary Review Problems Challenge Problems	Sequences and Patterns; Sequences and Sums; Geometric Sequences

Chapter 22: Special Manipulations

AoPS Section	Brilliant Lessons
22.1 Raising Equations to Powers	
22.2 Self similarity	
22.3 Symmetry	
22.4 Summary Review Problems Challenge Problems	