

Table of Contents

Letter to Parents	1
Suggestions on How to Use This Product	3
Chapter 1: Geometry Beginnings	5
Lesson 1—Inductive Reasoning in Egypt and Babylon	6
Lesson 2—Deductive Reasoning and the Greeks	12
Lesson 3—Self-Evident Truths	20
Lesson 4—Logic Chains	27
Lesson 5—Euclid: The Father of Geometry	34
Chapter 2: Lines and Angles	43
Lesson 6—Too Simple to Define	44
Lesson 7—Some Definitions and Postulates	51
Lesson 8—Line Segments	58
Lesson 9—Rays and Angles	65
Lesson 10—Measuring Angles	71
Lesson 11—Kinds of Angles	77
Lesson 12—Midpoints and Bisectors	81
Lesson 13—Properties of Equality	86
Chapter 3: Angle Pairs & Perpendicular Lines	91
Lesson 14—Formal (and Informal) Proofs	92
Lesson 15—Complementary Angle Pairs	98
Lesson 16—Supplementary Angle Pairs	104
Lesson 17—Adjacent Angles	109
Lesson 18—Vertical Angles	113
Lesson 19—Right Angles and Perpendicular Lines	119
Lesson 20—Drawing Perpendicular Lines through Points	124
Lesson 21—Measuring Distances	130
Chapter 4: Parallel Lines	135
Lesson 22—Lines That Never Meet	136
Lesson 23—Parallel Lines and Angles	142
Lesson 24—More on Parallel Lines	147
Lesson 25—Measuring the Earth	153
Lesson 26—Converse Statements	158
Lesson 27— Proving Lines are Parallel	165
Chapter 5: Triangles	171
Lesson 28—A Triangle and its Parts	172
Lesson 29—Kinds of Triangles	178
Lesson 30—Adding Up the Angles	184
Lesson 31—Exterior Angles	189
Lesson 32—Congruent Triangles	195
Lesson 33—Side-Angle-Side	200
Lesson 34—Angle-Side-Angle and Angle-Angle-Side	206

Lesson 35—Hypotenuse-Leg	211
Lesson 36—Side-Side-Side	215
Lesson 37—Overlapping Triangles	220
Chapter 6: Using Congruent Triangles	225
Lesson 38—Proving Corresponding Parts are Congruent	236
Lesson 39—Proving Bisectors	243
Lesson 40—Proving Lines Parallel or Perpendicular	248
Lesson 41—Altitudes and Medians of Triangles	254
Lesson 42—Base Angles of an Isosceles Triangle	261
Lesson 43—Proving That a Triangle is Isosceles	267
Chapter 7: Inequalities	273
Lesson 44—Inequalities: The Basics	274
Lesson 45—Triangle Side Inequality	281
Lesson 46—Exterior Angle Inequality Theorem	287
Lesson 47—Indirect Proofs	293
Lesson 48—More on Logic	300
Lesson 49—Unequal Sides, Unequal Angles	307
Chapter 8: Quadrilaterals	313
Lesson 50—A Four-Sided Polygon	314
Lesson 51—Trapezoids	321
Lesson 52—Parallelograms	327
Lesson 53—Congruent Sides and Bisecting Diagonals	333
Lesson 54—Proving that it's a Parallelogram: Part 1	340
Lesson 55—Proving that it's a Parallelogram: Part 2	347
Lesson 56—Rectangles, Rhombuses, and Squares	354
Lesson 57—The Big Picture	359
Chapter 9: Polygons	367
Lesson 58—Polygons with More Sides	368
Lesson 59—Adding Up the Angles of any Polygon	374
Lesson 60—Adding Up the Exterior Angles	380
Lesson 61—Regular Polygons	387
Lesson 62—Perimeter of a Polygon	394
Chapter 10: Similar Triangles	401
Lesson 63—Ratios	402
Lesson 64—Proportions	408
Lesson 65—Similar Figures	416
Lesson 66—Similar Figures in the Real World	423
Lesson 67—Splitting a Triangle... Not in the Middle	429
Lesson 68—Angle-Angle Similarity	436
Lesson 69—Side-Angle-Side and Side-Side-Side Similarity	443
Lesson 70—Using Similar Triangles	451
Lesson 71—Altitudes, Medians, and Perimeters	459
Chapter 11: Right Triangles & Trigonometry	467
Lesson 72—Proportions in a Right Triangle	468

TABLE OF CONTENTS

Lesson 73—The Pythagorean Theorem	474
Lesson 74—Irrational Lengths and Pythagorean Triples	481
Lesson 75—The Isosceles Right Triangle	489
Lesson 76—The 30-60 Right Triangle	496
Lesson 77—Trigonometry: The Basics	504
Lesson 78—The Tangent Ratio	511
Lesson 79—The Sine and Cosine Ratios	519
Lesson 80—Measuring the Solar System	526
Chapter 12: Circles	533
Lesson 81—Circles and Lines	534
Lesson 82—Theorems on Chords	541
Lesson 83—Theorems on Tangents	548
Lesson 84—Arcs and Angles	555
Lesson 85—More on Measuring Arcs	563
Lesson 86—Arcs and Chords	569
Lesson 87—Inscribed Angles	577
Lesson 88—Vertex Inside and Outside	585
Lesson 89—Segment Products Inside and Out	593
Chapter 13: Area	601
Lesson 90—Area of a Rectangle	602
Lesson 91—Area of a Triangle and Parallelogram	609
Lesson 92—Area of Other Quadrilaterals	616
Lesson 93—Area of Polygons with More Sides	623
Lesson 94—Area of a Circle, Etc.	631
Chapter 14: Solid Geometry	639
Lesson 95—Rectangular Solids	640
Lesson 96—Prisms	647
Lesson 97—Pyramids	654
Lesson 98—Cylinders and Cones	661
Lesson 99—Spheres	668
Lesson 100—Areas and Volumes of Similar Solids	675
Chapter 15: Coordinate Geometry	683
Lesson 101—Merging Geometry with Algebra	684
Lesson 102—Distance and Midpoint Formulas	691
Lesson 103—Slope of a Line	699
Lesson 104—Linear Equations	707
Lesson 105—Coordinate Proofs	714
Lesson 106—Circles and Coordinate Proofs	720
Chapter 16: Additional Topics	727
Lesson 107—Constructions	728
Lesson 108—More Constructions	735
Lesson 109—Transformations	742
Lesson 110—Non-Euclidean Geometries	749
Definitions, Theorems, and Postulates	757

Appendices	768
Appendix A—Reasoning and Logic	769
Appendix B—Basics of Geometric Figures	771
Appendix C—Angles	773
Appendix D—Proofs	775
Appendix E—Parallel Lines	777
Appendix F—Triangles	779
Appendix G—Methods for proving Congruent Triangles and Similar Triangles	781
Appendix H—Inequalities	783
Appendix I—Quadrilaterals	785
Appendix J—Polygons	787
Appendix K—Right Triangles and Trigonometry	789
Appendix L—Circles	791
Appendix M—Area	793
Appendix N—Solids	795
Appendix O—Coordinate Geometry	797
Index	799