Contents

Downloading Sketchpad Documents	vii
Sketchpad Resources	viii
Addressing the Common Core State Standards for Mathematics	Х
Chapter 1: Lines and Angles	
Introducing Points, Segments, Rays, and Lines	3
Introducing Angles	7
Euclid's Proposition 1: An Equilateral Triangle	10
Daisy Designs	13
Duplicating a Line Segment	16
Duplicating an Angle	19
Angles Formed by Intersecting Lines	21
Properties of Parallel Lines	24
Constructing a Perpendicular Bisector	27
Different Slopes: The Slope of a Line	30
Equations of Lines	33
Distance from a Point to a Line	36
Angle Bisectors	38
Trisecting an Angle	40
Drawing a Box with Two-Point Perspective	43
Chapter 2: Transformations, Symmetry, and Tessellations	
Introducing Transformations	49
Properties of Reflection	53
Reflections in the Coordinate Plane	57
Translations in the Coordinate Plane	60
The Burning Tent Problem	63
The Feed and Water Problem	66
Planning a Path for a Laser	68
Reflections across Two Parallel Lines	71
Reflections across Two Intersecting Lines	74
Glide Reflections	78
Symmetry in Regular Polygons	81
Tessellating with Regular Polygons	84
A Tumbling-Block Design	87
Tessellating with Triangles	90

Tessellations Using Only Translations	93
Tessellations That Use Rotations	96
Chapter 3: Triangles	
Defining Triangles	101
Triangle Sum	105
Exterior Angles in a Triangle	107
Triangle Inequalities	109
Triangle Congruence	111
Properties of Isosceles Triangles	113
Constructing Isosceles Triangles	115
Medians in a Triangle	117
Perpendicular Bisectors in a Triangle	120
Altitudes in a Triangle	123
Angle Bisectors in a Triangle	126
The Euler Segment	128
Excircles of a Triangle	131
The Surfer and the Spotter	133
Morley's Theorem	135
Napoleon's Theorem	138
Chapter 4: Quadrilaterals	
Defining Special Quadrilaterals	143
Properties of Parallelograms	146
Constructing Parallelograms	149
Properties of Rectangles	152
Constructing Rectangles	155
Properties of Rhombuses	158
Constructing Rhombuses	161
Properties of Isosceles Trapezoids	164
Constructing Isosceles Trapezoids	167
Midsegments of a Trapezoid and a Triangle	170
Midpoint Quadrilaterals	173
Special Midpoint Quadrilaterals	177
Summarizing Properties of Quadrilaterals	179
Chapter 5: Polygons	
Exterior Angles in a Polygon	185
Star Polygons	188

Polygon Angle Measure Sums	190
Constructing Regular Polygons	193
Constructing Templates for the Platonic Solids	196
Chapter 6: Circles	
Introducing Circles	201
Chords in a Circle	204
Tangents to a Circle	207
Tangent Segments	209
Arcs and Angles	211
The Circumference/Diameter Ratio	214
The Cycloid	217
Chapter 7: Area	
Areas of Parallelograms and Triangles	223
A Triangle Area Problem	226
Triangle Area/Perimeter	228
A Square Within a Square	231
A Triangle Within a Triangle	234
A Rectangle with Maximum Area	236
The Area of a Trapezoid	239
Dividing Land	242
Areas of Regular Polygons and Circles	244
New Area Formulas	247
Pick's Theorem	249
Chapter 8: The Pythagorean Theorem	
Constructing Squares on a Triangle: The Pythagorean Theorem	255
Visual Demonstration of the Pythagorean Theorem	258
Dissection Demonstration of the Pythagorean Theorem	260
Pythagorean Triples	263
The Isosceles Right Triangle	267
The 30°-60° Right Triangle	270
The Square Root Spiral	273
Chapter 9: Similarity	
The Golden Rectangle	281
Similar Polygons	285
Similar Triangles—AA Similarity	288

	Similar Triangles—SSS, SAS, SSA	290
	The Geometric Mean	292
	Finding the Width of a River	295
	Finding the Height of a Tree	298
	Measuring Height with a Mirror	303
	Parallel Lines in a Triangle	306
	Dividing a Segment into Equal Parts	308
	Spacing Poles in Perspective	311
	Proportions with an Angle Bisector in a Triangle	314
	Modeling a Pantograph	316
	Proportions with Area	320
Chaptei	10: Trigonometry and Fractals	
	Trigonometric Ratios	325
	Modeling a Ladder Problem	329
	A Sine Wave Tracer	332
	Modeling Pendulum Motion	335
	Creating a Hat Fractal	337
	Creating a Sierpiński Gasket Fractal	340
Append	ix	
	Correlation to the High School Geometry Standards of the	
	Common Core State Standards for Mathematics	345