

# GEOMETRY (2nd Edition)

## TABLE OF CONTENTS

### CHAPTER ONE—POINTS, LINES, & PLANES

TOPIC A: Concepts Relating to Points, Lines, and Planes	
PART 1: Basic Concepts and Definitions .....	1
PART 2: Concepts Involving Definitions .....	3
PART 3: Concept of a Postulate and Theorem .....	3
TOPIC B: Separation of Points and Collinear Points .....	4
TOPIC C: Lines and Line Segments .....	5
TOPIC D: Basic Concepts of Intersecting Lines and Angles	
PART 1: The Measure of Angles .....	6
PART 2: Identification of Angle Types and Relationships .....	7
PART 3: Complement of an Angle .....	8
PART 4: Supplement of an Angle .....	9
PART 5: Angle Complement and Supplement Word Problems .....	9
PART 6: Relationships Between Angles (True/False) .....	10
PART 7: Relationship Between Angles (Intersecting and Perpendicular Lines) .....	11
TOPIC E: Angle and Line Segment Relationships in Triangles .....	12
TOPIC F: Proofs Based on Triangles and Lines .....	15

### CHAPTER TWO—CONGRUENT TRIANGLES

TOPIC A: Identifying Congruent Angles and Sides .....	23
TOPIC B: Indicating the Reason Two Triangles are Congruent .....	24
TOPIC C: Congruent Triangle Proofs	
PART 1: Separate Triangles .....	27
PART 2: Combined Triangles .....	28
PART 3: Corresponding Parts of Congruent Triangles Congruent .....	33
PART 4: Overlapping Triangles .....	36
PART 5: Proofs Using Two Pairs of Congruent Triangles .....	38

### CHAPTER THREE—ISOSCELES & EQUILATERAL TRIANGLES

TOPIC A: General Problems (True/False) .....	41
TOPIC B: Finding the Value of a Side or Angle .....	41
TOPIC C: Perpendicular Bisectors .....	45
TOPIC D: Auxiliary Sets of Points .....	46
TOPIC E: Isosceles and Equilateral Triangle Proofs .....	46

### CHAPTER FOUR—REASONING

TOPIC A: Converse, Inverse, and Contrapositive .....	55
TOPIC B: Direct Reasoning .....	56
TOPIC C: Indirect Reasoning .....	56
TOPIC D: Laws of Reasoning, Negation, Conjunction, and Disjunction .....	57
TOPIC E: Proofs	
PART 1: Logic Proofs .....	63
PART 2: Indirect Reasoning Proofs .....	67

### CHAPTER FIVE—INEQUALITIES IN ONE TRIANGLE

TOPIC A: Inequality Postulates .....	69
TOPIC B: Relationships Between Interior and Exterior Angles of Triangles .....	69
TOPIC C: Qualitative Evaluation of the Dimensions of a Triangle .....	70
TOPIC D: Drawing Triangles to Specified Conditions .....	72
TOPIC E: Constraints on Three Sides of a Triangle .....	73
TOPIC F: Inequality Proofs	
PART 1: Supplying Missing Reasons .....	75
PART 2: Two-Column Proofs .....	76
PART 3: Emphasizing Interior and Exterior Angles .....	77
PART 4: Angle Inequalities .....	78
PART 5: Side Inequalities .....	79

## CHAPTER SIX—PARALLEL LINES

TOPIC A: Recognizing Angle Relationships (Two Lines Cut by a Transversal) .....	83
TOPIC B: Lines and Angles Associated with a Transversal .....	84
TOPIC C: Properties of Parallel Lines .....	86
TOPIC D: Parallel Line Proofs	
PART 1: Proving Lines are Parallel .....	98
PART 2: Proofs Using Parallel Lines .....	101

## CHAPTER SEVEN—ANGLE MEASURE OF A TRIANGLE

TOPIC A: Sum of Interior Angles .....	105
TOPIC B: Exterior Angle Measure .....	113

## CHAPTER EIGHT—QUADRILATERALS

TOPIC A: Parallelograms	
PART 1: Side and Angle Relationships .....	121
PART 2: Finding the Measure of Diagonals .....	122
PART 3: Finding the Measure of Sides .....	123
PART 4: Finding the Measure of Angles .....	123
PART 5: Congruency Proofs .....	125
TOPIC B: Proving that a Quadrilateral is a Parallelogram .....	127
TOPIC C: Midpoints on Triangles and Parallel Lines .....	129
PART 1: Finding the Value of Angles and Sides .....	130
PART 2: Perimeter .....	131
TOPIC D: Rhombus, Rectangles, and Squares	
PART 1: Rhombus .....	133
PART 2: Rectangles .....	135
PART 3: Squares .....	137
PART 4: Summary Properties of Parallelograms .....	138
TOPIC E: Trapezoids .....	141

## CHAPTER NINE—SIMILARITY

TOPIC A: Ratio and Proportion .....	145
TOPIC B: Similar Polygons .....	146
TOPIC C: Triangle Proportionality .....	148
TOPIC D: Indicating the Reason Two Triangles are Similar .....	152
TOPIC E: Similar Triangle Proofs .....	154
TOPIC F: Perimeters and Areas of Similar Polygons .....	158
TOPIC G: Altitude Drawn to the Hypotenuse in a Right Triangle .....	160
TOPIC H: Using Proportions in Similar Polygons .....	163

## CHAPTER TEN—THE RIGHT TRIANGLE

TOPIC A: The Pythagorean Theorem .....	167
TOPIC B: Right Triangles	
PART 1: The Isosceles Right Triangle ( $45^{\circ}$ - $45^{\circ}$ - $90^{\circ}$ ) .....	175
PART 2: The $30^{\circ}$ - $60^{\circ}$ - $90^{\circ}$ Triangle .....	178
TOPIC C: Converse of the Pythagorean Theorem .....	182

## CHAPTER ELEVEN—TRIGONOMETRY OF THE RIGHT TRIANGLE

TOPIC A: Expressing Trigonometric Ratios .....	183
TOPIC B: Finding the Values of Trigonometric Ratios .....	188
TOPIC C: Using Trigonometry to Solve Problems	
PART 1: Finding the Value of Sides and Angles .....	191
PART 2: Finding Area and Perimeter .....	196
PART 3: Word Problems .....	198

## CHAPTER TWELVE—AREA

TOPIC A: Area of a Triangle .....	201
TOPIC B: Area of an Equilateral Triangle .....	202
TOPIC C: Area of a Square .....	202

TOPIC D: Area of a Rectangle .....	204
TOPIC E: Area of a Parallelogram .....	207
TOPIC F: Area of a Rhombus .....	210
TOPIC G: Area of a Trapezoid .....	212
TOPIC H: Area of a Polygonal Region .....	215
TOPIC I: Area Proofs .....	217
<b>CHAPTER THIRTEEN—CIRCLES</b>	
TOPIC A: Fundamental Relationships .....	219
TOPIC B: Chords, Secants, and Tangents	
PART 1: Length of Segments .....	221
PART 2: Size of Angles and Arcs .....	234
TOPIC C: Length of an Arc or Segment .....	258
TOPIC D: Tangent Circles .....	259
TOPIC E: Circumference of a Circle .....	260
TOPIC F: Areas of Circles, Sectors, and Segments .....	261
TOPIC G: Ratios in Circles .....	267
TOPIC H: Proofs .....	268
<b>CHAPTER FOURTEEN—POLYGONS</b>	
TOPIC A: Diagonals in a Polygon .....	275
TOPIC B: Interior and Exterior Angles of Polygons	
PART 1: Sum of the Interior Angles .....	275
PART 2: Sum of the Exterior Angles .....	276
PART 3: Angles and Sides of Regular Polygons .....	277
TOPIC C: Regular Polygons and Circles	
PART 1: Regular Polygons (True/False) .....	278
PART 2: Central Angles .....	278
PART 3: Apothem and Area of Regular Polygons .....	278
PART 4: Equilateral Triangles .....	282
TOPIC D: Perimeter of Polygons .....	282
TOPIC E: Circumference of Circumscribed Circles .....	283
<b>CHAPTER FIFTEEN—COORDINATE GEOMETRY</b>	
TOPIC A: Plotting Points	
PART 1: Coordinate Definitions .....	285
PART 2: Quadrants .....	285
PART 3: Coordinates of a Point .....	285
TOPIC B: Finding Area and Perimeter by Using Coordinates .....	287
TOPIC C: Midpoint of a Segment	
PART 1: Finding the Midpoint of a Segment .....	289
PART 2: Finding the Endpoint (Given the Midpoint) .....	290
PART 3: Intersection of Diagonals in a Parallelogram .....	291
TOPIC D: Slope of a Line	
PART 1: Slope Definitions .....	291
PART 2: Finding the Slope of a Line .....	291
PART 3: Finding a Point (Given the Slope) .....	292
PART 4: Collinearity of Points .....	293
TOPIC E: Parallel and Perpendicular Lines .....	293
TOPIC F: Distance Between Two Points .....	295
TOPIC G: Equation of a Line	
PART 1: Determining Slope and Y-intercept .....	296
PART 2: Given Slope and Y-intercept .....	297
PART 3: Given Slope and a Point .....	298
PART 4: Given Two Points .....	298
PART 5: Parallel and Perpendicular Lines .....	298
TOPIC H: Graphs of Linear Equations .....	299

TOPIC I: Equation of a Circle	
PART 1: Determining the Equation of a Circle .....	300
PART 2: Determining the Center and Radius (Given the Equation of a Circle) .....	302
TOPIC J: Coordinate Proofs (Specific Coordinates) .....	302
TOPIC K: Proofs of Theorems (Variable Coordinates) .....	305

## **CHAPTER SIXTEEN—TRANSFORMATION GEOMETRY**

TOPIC A: Symmetry .....	307
TOPIC B: Translation .....	309
TOPIC C: Reflection	
PART 1: Reflection in a Line .....	311
PART 2: Reflection in the Origin .....	314
PART 3: Reflection in a Point .....	314
TOPIC D: Dilation .....	314
TOPIC E: Rotation .....	316
TOPIC F: Composition .....	319
TOPIC G: Identification and Graphing Problems .....	321

## **CHAPTER SEVENTEEN—LOCUS**

TOPIC A: Describing and Drawing a Locus (One Condition)	
PART 1: Describing the Locus of Points .....	325
PART 2: Drawing the Locus of Points .....	325
TOPIC B: Intersection of Loci .....	327
TOPIC C: Locus in Coordinate Geometry	
PART 1: Equation of the Locus of Points .....	329
PART 2: Intersection of Loci (on a Coordinate Plane) .....	331

## **CHAPTER EIGHTEEN—CONCURRENCY & CONSTRUCTIONS**

TOPIC A: Construction with a Straightedge and Compass .....	335
TOPIC B: Concurring Theorems .....	353
TOPIC C: Construction Involving Locus .....	354
TOPIC D: Construction Proofs .....	356

<b>APPENDIX—How to Add Math Grids &amp; Tables to an Exam</b> .....	361
---	-----