

Contents

PART I ALGEBRA

Chapter 1 Numbers

1	The integers	5
2	Rules for addition	8
3	Rules for multiplication	14
4	Even and odd integers; divisibility	22
5	Rational numbers	26
6	Multiplicative inverses	42

Chapter 2 Linear Equations

1	Equations in two unknowns	53
2	Equations in three unknowns	57

Chapter 3 Real Numbers

1	Addition and multiplication	61
2	Real numbers: positivity	64
3	Powers and roots	70
4	Inequalities	75

Chapter 4 Quadratic Equations 83

Interlude On Logic and Mathematical Expressions

1	On reading books	93
2	Logic	94
3	Sets and elements	99
4	Notation	100

PART II INTUITIVE GEOMETRY**Chapter 5 Distance and Angles**

1	Distance	107
2	Angles	110
3	The Pythagoras theorem	120

Chapter 6 Isometries

1	Some standard mappings of the plane	133
2	Isometries	143
3	Composition of isometries	150
4	Inverse of isometries	155
5	Characterization of isometries	163
6	Congruences	166

Chapter 7 Area and Applications

1	Area of a disc of radius r	173
2	Circumference of a circle of radius r	180

PART III COORDINATE GEOMETRY**Chapter 8 Coordinates and Geometry**

1	Coordinate systems	191
2	Distance between points	197
3	Equation of a circle	203
4	Rational points on a circle	206

Chapter 9 Operations on Points

1	Dilations and reflections	213
2	Addition, subtraction, and the parallelogram law	218

Chapter 10 Segments, Rays, and Lines

1	Segments	229
2	Rays	231
3	Lines	236
4	Ordinary equation for a line	246

Chapter 11 Trigonometry

1	Radian measure	249
2	Sine and cosine	252
3	The graphs	264
4	The tangent	266

5	Addition formulas	272
6	Rotations	277
Chapter 12 Some Analytic Geometry		
1	The straight line again	281
2	The parabola	291
3	The ellipse	297
4	The hyperbola	300
5	Rotation of hyperbolas	305
PART IV MISCELLANEOUS		
Chapter 13 Functions		
1	Definition of a function	313
2	Polynomial functions	318
3	Graphs of functions	330
4	Exponential function	333
5	Logarithms	338
Chapter 14 Mappings		
1	Definition	345
2	Formalism of mappings	351
3	Permutations	359
Chapter 15 Complex Numbers		
1	The complex plane	375
2	Polar form	380
Chapter 16 Induction and Summations		
1	Induction	383
2	Summations	388
3	Geometric series	396
Chapter 17 Determinants		
1	Matrices	401
2	Determinants of order 2	406
3	Properties of 2×2 determinants	409
4	Determinants of order 3	414
5	Properties of 3×3 determinants	418
6	Cramer's Rule	424
	Index	429