

CONTENTS

FOREWORD	<i>iii</i>
1. NUMBER SYSTEMS	1
1.1 Introduction	1
1.2 Irrational Numbers	5
1.3 Real Numbers and their Decimal Expansions	8
1.4 Representing Real Numbers on the Number Line	15
1.5 Operations on Real Numbers	18
1.6 Laws of Exponents for Real Numbers	24
1.7 Summary	27
2. POLYNOMIALS	28
2.1 Introduction	28
2.2 Polynomials in One Variable	28
2.3 Zeroes of a Polynomial	32
2.4 Remainder Theorem	35
2.5 Factorisation of Polynomials	40
2.6 Algebraic Identities	44
2.7 Summary	50
3. COORDINATE GEOMETRY	51
3.1 Introduction	51
3.2 Cartesian System	54
3.3 Plotting a Point in the Plane if its Coordinates are given	61
3.4 Summary	65
4. LINEAR EQUATIONS IN TWO VARIABLES	66
4.1 Introduction	66
4.2 Linear Equations	66
4.3 Solution of a Linear Equation	68
4.4 Graph of a Linear Equation in Two Variables	70
4.5 Equations of Lines Parallel to x -axis and y -axis	75

4.6	Summary	77
5.	INTRODUCTION TO EUCLID'S GEOMETRY	78
5.1	Introduction	78
5.2	Euclid's Definitions, Axioms and Postulates	80
5.3	Equivalent Versions of Euclid's Fifth Postulate	86
5.4	Summary	88
6.	LINES AND ANGLES	89
6.1	Introduction	89
6.2	Basic Terms and Definitions	90
6.3	Intersecting Lines and Non-intersecting Lines	92
6.4	Pairs of Angles	92
6.5	Parallel Lines and a Transversal	98
6.6	Lines Parallel to the same Line	101
6.7	Angle Sum Property of a Triangle	105
6.8	Summary	108
7.	TRIANGLES	108
7.1	Introduction	109
7.2	Congruence of Triangles	109
7.3	Criteria for Congruence of Triangles	112
7.4	Some Properties of a Triangle	120
7.5	Some More Criteria for Congruence of Triangles	125
7.6	Inequalities in a Triangle	129
7.7	Summary	134
8.	QUADRILATERALS	135
8.1	Introduction	135
8.2	Angle Sum Property of a Quadrilateral	136
8.3	Types of Quadrilaterals	137
8.4	Properties of a Parallelogram	139
8.5	Another Condition for a Quadrilateral to be a Parallelogram	145
8.6	The Mid-point Theorem	148
8.7	Summary	151
9.	AREAS OF PARALLELOGRAMS AND TRIANGLES	152

9.1	Introduction	152
9.2	Figures on the same Base and Between the same Parallels	154
9.3	Parallelogramms on the same Base and between the same Parallels	156
9.4	Triangles on the same Base and between the same Parallels	160
9.5	Summary	167
10.	CIRCLES	168
10.1	Introduction	168
10.2	Circles and its Related Terms : A Review	169
10.3	Angle Subtended by a Chord at a Point	171
10.4	Perpendicular from the Centre to a Chord	173
10.5	Circle through Three Points	174
10.6	Equal Chords and their Distances from the Centre	176
10.7	Angle Subtended by an Arc of a Circle	179
10.8	Cyclic Quadrilaterals	182
10.9	Summary	187
11.	CONSTRUCTIONS	187
11.1	Introduction	188
11.2	Basic Constructions	189
11.3	Some Constructions of Triangles	191
11.4	Summary	196
12.	HERON'S FORMULA	197
12.1	Introduction	197
12.2	Area of a Triangle – by Heron's Formula	199
12.3	Application of Heron's Formula in finding Areas of Quadrilaterals	203
12.4	Summary	207
13.	SURFACE AREAS AND VOLUMES	208
13.1	Introduction	208
13.2	Surface Area of a Cuboid and a Cube	208
13.3	Surface Area of a Right Circular Cylinder	214
13.4	Surface Area of a Right Circular Cone	217
13.5	Surface Area of a Sphere	222

13.6	Volume of a Cuboid	226
13.7	Volume of a Cylinder	228
13.8	Volume of a Right Circular Cone	231
13.9	Volume of a Sphere	234
10.10	Summary	237
14.	STATISTICS	238
14.1	Introduction	238
14.2	Collection of Data	239
14.3	Presentation of Data	240
14.4	Geographical Representation of Data	247
14.5	Measures of Central Tendency	261
14.6	Summary	270
15.	PROBABILITY	271
15.1	Introduction	271
15.2	Probability – an Experimental Approach	272
15.3	Summary	285
APPENDIX – 1	PROOFS IN MATHEMATICS	286
A1.1	Introduction	286
A1.2	Mathematically Acceptable Statements	287
A1.3	Deductive Reasoning	290
A1.4	Theorems, Conjectures and Axioms	293
A1.5	What is a Mathematical Proof?	298
A1.6	Summary	305
APPENDIX – 2	INTRODUCTION TO MATHEMATICAL MODELLING	306
A2.1	Introduction	306
A2.2	Review of Word Problems	307
A2.3	Some Mathematical Models	311
A2.4	The Process of Modelling, its Advantages and Limitations	319
A2.5	Summary	322
ANSWERS/HINTS		325-350