

Contents

1	Definitions and examples	1
2	Maps and relations on sets	8
3	Elementary consequences of the definitions	18
4	Subgroups	30
5	Cosets and Lagrange's Theorem	38
6	Error-correcting codes	49
7	Normal subgroups and quotient groups	59
8	The Homomorphism Theorem	68
9	Permutations	77
10	The Orbit-Stabiliser Theorem	89
11	The Sylow Theorems	98
12	Applications of Sylow theory	106
13	Direct products	112
14	The classification of finite abelian groups	120
15	The Jordan-Hölder Theorem	128
16	Composition factors and chief factors	137
17	Soluble groups	146
18	Examples of soluble groups	155
19	Semidirect products and wreath products	163
20	Extensions	174
21	Central and cyclic extensions	183
22	Groups with at most 31 elements	192
23	The projective special linear groups	202

24	The Mathieu groups	213
25	The classification of finite simple groups	222
25.1	The classical groups	223
25.1.1	The projective special linear groups	223
25.1.2	The unitary groups	223
25.1.3	The symplectic groups	226
25.1.4	The orthogonal groups	228
25.2	Groups of Lie type	230
25.3	The sporadic groups	231
A	Prerequisites from number theory and linear algebra	234
A.1	Number theory	234
A.2	Linear algebra and determinants	235
B	Groups of order < 32	238
C	Solutions to exercises	243
	Bibliography	275
	Index	277