

Contents

List of tables	<i>page</i> ix
Preface	x
Acknowledgements	xii
1 The Solar System	1
1.1 A journey into our Galaxy	1
1.2 The Solar System: sizes and orbits	3
1.3 Planetary compositions	14
1.4 The Sun	23
1.5 The origin of the Solar System	27
1.6 Making measurements of distances, sizes and masses	32
2 The discovery of Uranus, Neptune and Pluto	37
2.1 The discovery of Uranus	37
2.2 The discovery of Neptune	42
2.3 The discovery of Pluto	56
2.4 Pluto surprises	68
2.5 Why no collisions with Neptune?	71
3 Pluto: a diminishing world	74
3.1 Pluto's size	74
3.2 Pluto's mass	82
3.3 Pluto's density and global composition	87
4 Pluto's family	93
4.1 Revolutions and rotations	93
4.2 Masses, sizes, densities and global compositions	101
4.3 The origin of Pluto and its satellites	105

viii CONTENTS

5	Surfaces, atmospheres and interiors of Pluto and Charon	112
5.1	Reflection and emission spectra	112
5.2	Surfaces	117
5.3	Atmospheres	128
5.4	Interiors	139
6	The Edgeworth-Kuiper belt	146
6.1	Why search for more trans-Neptunian objects?	146
6.2	The trickle and the flood	149
6.3	Kuiper belt objects	152
6.4	The origin and evolution of the E-K belt	162
6.5	Centaurs and short-period comets	166
7	Is Pluto a planet?	169
7.1	The role of classification in science	169
7.2	Planets before Pluto's discovery: antiquity to 1930	171
7.3	The classification of Pluto	174
8	The <i>New Horizons</i> mission to Pluto (and beyond)	183
8.1	The long path to <i>New Horizons</i>	183
8.2	Mission objectives	187
8.3	The spacecraft: instrumentation and journey	190
9	Pluto: gateway to beyond?	195
9.1	To stand on Pluto	195
9.2	Pluto: a launch platform?	203
	Glossary	207
	Further reading and other resources	213
	Some of the key papers in the scientific literature	213
	Books	222
	Magazines	224
	Internet links	224
	Index	226