Contents

	Preface to the fourth edition	*page* xi
	About this book and how to use it	xiii
	A word about spreadsheets – what are they?	xv
	The layout of spreadsheets in this book	xviii
	Calculations involving multiple sheets	xix
	Using our own functions	xxi
	Time	1
1	Calendars	2
2	The date of Easter	3
3	Converting the date to the day number	6
4	Julian dates	8
5	Converting the Julian date to the Greenwich calendar date	11
6	Finding the name of the day of the week	12
7	Converting hours, minutes and seconds to decimal hours	14
8	Converting decimal hours to hours, minutes and seconds	15
9	Converting the local time to universal time (UT)	16
10	Converting UT and Greenwich calendar date to local time and date	20
11	Sidereal time (ST)	22
12	Conversion of UT to Greenwich sidereal time (GST)	23
13	Conversion of GST to UT	24
14	Local sidereal time (LST)	27
15	Converting LST to GST	28
16	Ephemeris time (ET) and terrestrial time (TT)	30
	Coordinate systems	33
17	Horizon coordinates	34
18	Equatorial coordinates	35
19	Ecliptic coordinates	37
20	Galactic coordinates	38
21	Converting between decimal degrees and degrees, minutes and seconds	39
22	Converting between angles expressed in degrees and angles expressed in hours	41
23	Converting between one coordinate system and another	42

Downloaded from https://www.cambridge.org/core. Ecole Polytechnique Fédérale de Lausanne, on 24 Feb 2020 at 13:37:29, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/CBO9780511861161

24	Converting between right ascension and hour angle	43
25	Equatorial to horizon coordinate conversion	47
26	Horizon to equatorial coordinate conversion	49
27	Ecliptic to equatorial coordinate conversion	51
28	Equatorial to ecliptic coordinate conversion	55
29	Equatorial to galactic coordinate conversion	56
30	Galactic to equatorial coordinate conversion	58
31	Generalised coordinate transformations	60
32	The angle between two celestial objects	66
33	Rising and setting	67
34	Precession	71
35	Nutation	76
36	Aberration	78
37	Refraction	80
38	Geocentric parallax and the figure of the Earth	83
39	Calculating corrections for parallax	85
40	Heliographic coordinates	88
41	Carrington rotation numbers	94
42	Selenographic coordinates	95
43	Atmospheric extinction	99
	The Sun	101
44	Orbits	102
45	The apparent orbit of the Sun	103
46	Calculating the position of the Sun	103
47	Calculating orbits more precisely	107
48	Calculating the Sun's distance and angular size	110
49	Sunrise and sunset	112
50	Twilight	114
51	The equation of time	116
52	Solar elongations	118
	The planets, comets and binary stars	119
53	The planetary orbits	120
54	Calculating the coordinates of a planet	121
55	Finding the approximate positions of the planets	131
56	Perturbations in a planet's orbit	132
57	The distance, light-travel time and angular size of a planet	136
58	The phases of the planets	137
59	The position-angle of the bright limb	138
60	The apparent brightness of a planet	140
61	Comets	143
62	Parabolic orbits	151
63	Binary-star orbits	155

Downloaded from https://www.cambridge.org/core. Ecole Polytechnique Fédérale de Lausanne, on 24 Feb 2020 at 13:37:29, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/CBO9780511861161

The Moon and eclipses 161
64 The Moon's orbit 162
65 Calculating the Moon's position 164
66 The Moon's hourly motions 170
67 The phases of the Moon 171
68 The position-angle of the Moon's bright limb 175
69 The Moon's distance, angular size and horizontal parallax 176
70 Moonrise and moonset 178
71 Eclipses 181
72 The 'rules' of eclipses 183
73 Calculating a lunar eclipse 184
74 Calculating a solar eclipse 190
75 The Astronomical Calendar 194

Glossary of terms 197
Symbols and abbreviations 205
Bibliography 208
A useful website 209
Index 210

Downloaded from https://www.cambridge.org/core. Ecole Polytechnique Fédérale de Lausanne, on 24 Feb 2020 at 13:37:29, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/CBO9780511861161

Downloaded from https://www.cambridge.org/core. Ecole Polytechnique Fédérale de Lausanne, on 24 Feb 2020 at 13:37:29, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/CBO9780511861161