

Index

Page numbers in italics refer to figures or tables.

- Constellation names, 80–84
 Star names, 87–90
 Greek alphabet, 91
- 1^1 , 2^1 , etc. (catalogue designations),
 158
 2^6 (H.VI.2), 163
 3 Centauri, 193
 3C 273, 148, 188
 AAVSO chart, 189
 8-Burst Nebula, 193
 8 Lacertae, 227
 12 Monocerotis, 177
 16 Cygni, 207
 16 Vulpeculae, 212
 17 Comae Berenices, 186
 19 Piscium, 231
 20 Geminorum, 174
 27 Pegasi, 228
 29 Pegasi, 228
 30 Doradus, 93
 31 Cygni, 208
 34 Tauri, 93
 36 Andromedae, 229
 40 Eridani, 243
 41 Aquarii, 232
 47 Tucanae, 93
 51 Pegasi, 230
 55 Piscium, 230
 56 Andromedae, 228
 61 Cygni, 209–210
 75 Cygni, 208
 145 Canis Majoris, 180
- α , β , γ , δ ... (Greek letters), 91
 α (Alpha) Andromedae, 93
 α (Alpha) Aquilae, spectrum, 119
 α (Alpha) Canum Venaticorum, *see* Cor Caroli
 α (Alpha) Cassiopeiae, 226
 α (Alpha) Centauri, 91, 92, 115, 193
 duplicated in catalogue, 102
 α (Alpha) Crateris, 192
 α (Alpha) Delphini, 91
 α (Alpha) Geminorum, *see* Castor
 α (Alpha) Herculis, 199
 α (Alpha) Orionis, *see* Betelgeuse
 α (Alpha) Scorpii, *see* Antares
 β , β' (on Moon), 30
 β (for Burnham), 131
 β 1 (Burnham 1), 226
 β 536 (Burnham 536), 238
 orbit diagram, 238
 β (Beta) Andromedae, 228
 β (Beta) Cephei, 205
 β (Beta) Cygni, *see* Albireo
 β (Beta) Delphini, 91
 β (Beta) Lyrae, 211–212
 β (Beta) Monocerotis, 178
 β (Beta) Orionis, 244
 β (Beta) Persei, *see* Algol
 β (Beta) Serpentis, 199
 γ (Gamma) Andromedae, 236
 γ (Gamma) Arietis, 230–231
 γ (Gamma) Cassiopeiae, 91, 119
 γ (Gamma) Coronae Australis, 221
 orbit diagram, 220
 γ (Gamma) Delphini, 213

Index

- γ (Gamma) Leonis, 187
 γ (Gamma) Velorum, 91, 181
 γ (Gamma) Virginis, 188, 190
 orbit diagram, 190
 δ (Delta) Cephei, 133, 224
 δ (Delta) Corvi, 192
 δ (Delta) Pegasi, 93
 δ (Delta) Scuti variables, 133, 181
 δ (Delta) Serpentis, 200
 ϵ (Epsilon) Arietis, 240
 ϵ (Epsilon) Boötis, 198
 ϵ (Epsilon) Equulei, 215–216
 orbit diagram, 215
 ϵ (Epsilon) Eridani, 244
 ϵ^1, ϵ^2 (Epsilon-1, Epsilon-2) Lyrae, 209
 ϵ (Epsilon) Monocerotis, 177
 ζ (Zeta) Aquarii, 231
 ζ (Zeta) Cancri, 174
 orbit diagram, 175
 ζ (Zeta) Lyrae, 210
 ζ^1, ζ^2 (Zeta-1, Zeta-2) Ursae Majoris, 184
 η (Eta) Carinae, 148
 η (Eta) Cassiopeiae, 225
 θ^1, θ^2 (Theta-1, Theta-2) Orionis, *see* Trapezium
 θ^1, θ^2 (Theta-1, Theta-2) Tauri, 241
 ι (Iota) Cancri, 172
 ι (Iota) Cassiopeiae, 235
 ι (Iota) Ursae Majoris, 91
 λ, λ' (on Moon), 30
 μ (Mu) Canis Majoris, 178
 μ (Mu) Cephei, 206
 μ (Mu) Lupi, 203
 ν (Nu) Scorpii, 201–202
 ξ (Xi) Boötis, 199
 orbit diagram, 200
 ξ (Xi) Ursae Majoris, 185–186
 orbit diagram, 185
 omitted from HIP, 102
 o (Omicron) Ceti, *see* Mira
 o^1 (Omicron-1) Cygni, 208
 o (Omicron) Draconis, 206
 o^2 (Omicron-2) Eridani, 243
 π (Pi) Aquilae, 214
 π^2 (Pi-2) Canis Majoris, 163
 π^1, π^2 Gruis, 233
 π^1, π^2 Pegasi, 228
 ρ (Rho) Aquilae, 93
 σ (Sigma) Orionis, 242
 τ (Tau) Canis Majoris cluster, 180
 υ (Upsilon) Ceti, 245
 χ (Chi) Cygni, 209
 χ (Chi) Persei, 236
 ψ^1 (Psi-1) Piscium, 230
 ω (argument of perihelion/periastron),
 78, 125
 ω (Omega) Centauri, 145, 194
 ϖ (perihelion), 78
 Δ (for Dunlop), 131
 Σ (for Struve), 131
 Σ 262 (Struve 262), 235
 Σ 939 (Struve 939), 176
 orbit diagram, 126
 Σ 1110 (Struve 1110), 131
 Σ 1604 (Struve 1604), 191
 Σ 2398 (Struve 2398), 113, 206
 Σ 2470 (Struve 2470), 211
 Σ 2474 (Struve 2474), 211
 Ω (ascending node), 78, 125
 a (semi-major axis), 77, 125
 A (catalogue designation), *see* ADS
 AAVSO (American Association of Variable Star
 Observers), 132, 136, 252
 charts, using, 140–142
 Harvard designations, 137
 absolute magnitude, 117, 120
 absorption lines, 119
 active galaxies, 147
 ADS (Aitken's double stars), 131
 ADS 6175, 131
 Agathodaemon, 49, 50, 52
 AI Velorum, 181
 air, steadiness of, 12–14
 Aitken, R. G., 131
 albedo, 48
 albedo features, 49
 Albireo, 124, 212
 Winter, 180
 Alcor, 184
 Algeiba, 187
 Algol, 134
 light curve, 135
 Algorab, 192
 Allen, R. H., 90
 Almach, 236
 Alphonsus, 25, 26, 27
 Alpine Valley (Vallis Alpes), 24, 29
 Altair, spectrum, 119
 Alula Australis, *see* ξ Ursae Majoris
 Alvan Clark 11, 216
 Amalthea, 56

Index

- Amos, 247
 amplitude, 133
 Andromeda Galaxy, *see* M31
 of the South, 233
 animals, 21
 annular eclipses (of Sun), 37, 38, 40
 Antares, 202
 Antennae, 192–193
 anomaly, 78–79
 Anser, 86
 Antares, 124
 Antennae, 192–193
 Antinoüs, 86
 antitail, 68
 Antoniadi, E. M., 12, 47
 Apollo space program, 26, 30, 91
 Aquarids (Eta and Delta), 72
 Ara, 84
 Arabic, 87
 arc-minutes, decimal, to seconds, 248
 areographic (Martian) latitude and longitude,
 50, 51
 Argelander, F. W. A., 101, 137, 138
 Argo Navis, 86
 argument of perihelion, 78
 Ariel, 59
 Aristarchus, 26
 Aristotle, 180
 Arizona, University of, 66
 Arnett, Bill, 180
 ascending node, 78
 Asellus Borealis/Australis, 174
 ashen light, 48
 Association of Lunar and Planetary Observers
 (A.L.P.O.), 30
 Asterion, 85
 asterisms, 93, 144, 191, 207, 208, 213, 227,
 242, 245
 asteroid belt, 62
 asteroids, 62–67
 nomenclature, 64
 vs. novae and supernovae, 65, 136
 astrology, 86
 astrometry, 64
 astrometric binaries, 123
 Astronomical Data Center, 100–102, 161
 Astronomical League, 158
 Astro-Physics, 34
 astronomical unit (AU), 78, 115
 Atlas Case Corporation, 19
 atlases
 Moon, 29
 star, 93–100
 computerized, 97–99
 Auriga Clusters, 236–237
 Autostar and ETX (Meade), 94, 130, 160
 file formats, 66, 70
 satellite tracking, 75–77
 star names, 90
 averted vision, 6

 B (blue) magnitude, 118
 B_r, 119
 B–V, 118
 Baader Planetarium, 34
 Baily's Beads, 37
 Barnard 86, 219
 Barnard's Star, 90, 95, 96, 115, 201
 finding, 95–97
 barred spiral galaxies, 146–147
 Bay of Rainbows, *see* Sinus Iridum
 Bayer, J., 84, 85, 91–92, 236
 Bayer letters, 91–93, 137
 to SAO numbers, 103–111
 BD (*Bonner Durchmusterung*), 94, 101, 114
 Beatty, J. K., 42
 Beehive Cluster, 174
 Bečvář, A., 5, 90, 94
 belts
 of Jupiter, 53, 54 (map)
 of Saturn, 56
 Bessel, F. W., 209
 Betelgeuse, 134
 Bevis, J., 240
 Big Dipper, 145
 binary stars, 123
 eclipsing, 134–135, 172
 orbits, 125–127
 BL Lacertae objects, 148
 Black Eye Galaxy, 186
 black hole, 210–211
 blindsight, 149
 Blinking Planetary, 207
 blue clearing, 51
 Blue Snowball, 227
 Bode, J. E., 93
 Bogardus, 90
 BM Orionis, 134–135
 Bortle, J., 8
 Bortle dark-sky scale, 11
 Brahe, *see* Tycho Brahe
 British Astronomical Association (B.A.A.), 30

Index

- Brocchi, D. F., 172
 Brocchi's Cluster, *see* Coathanger
 brown dwarfs, 119, 121
 Burnham double stars, *see* β
 Burnham, R., 164, 189, 197, 224
 Burnham, S. W., 131, 238
- C (Caldwell) catalogue, 154, 155–157
 Caldwell 4, 205
 Caldwell 6, 197
 Caldwell 7, 172
 Caldwell 9, 157
 Caldwell 10, 223
 Caldwell 14, 236
 Caldwell 15, 207
 Caldwell 22, 227
 Caldwell 30, 228
 Caldwell 31, 157
 Caldwell 39, 173
 Caldwell 41, 241
 Caldwell 50, 177
 Caldwell 53, 190
 Caldwell 55, 217
 Caldwell 59, 192
 Caldwell 60, 192–193
 Caldwell 64, 180
 Caldwell 65, 232–233
 Caldwell 73, 246
 Caldwell 74, 193
 Caldwell 76, 203
 Caldwell 77, 193
 Caldwell 80, 194
 Caldwell-Moore, P., *see* Moore, Sir Patrick
 Callisto, 55–56
 Camelopardalis, 172
canali ("canals"), 51
 Canes Venatici
 Hevelius' map, 85
 Capen, C. F., 42
 carbon stars, 122, 184, 210, 231, 233, 235
 cases, for transporting telescopes, 18–19
 Casio "Forester" wristwatch, 23
 Cassini's Division, 57
 Castor, 131, 172
 orbit diagram, 126
 catalogues
 nebulae, clusters, and galaxies, 150–161
 online, 100, 161
 stars, 100–111
 double and multiple, 130–131
 variable, 138
- Cat's Eye Nebula, 197
 CCDSOFT, 99
 celestial sphere, area of, 115
 Celestron NexStar, 91, 93
 Centaurus, 84, 193
 Centaurus A, 193
 Central Bureau for Astronomical Telegrams
 (CBAT), 136
 Cepheids, 117, 133, 224
 Ceres, 63
 Cervus, 86
 Chaffee, R., 91, 181
 chains of stars, 177, 227
 Chara, 85
 Charon, 61
 Chiron, 61, 62
 Christmas Tree Cluster, 175–176
 chromosphere, 35, 36, 41
 Clark, A., 216
 clothing, for cold weather, 20
 Clover, 218
 Clown Face Nebula, 173
 clusters, 145, 148
 globular, 145, 148, 186, 194, 197–198, 202, 213,
 214, 216, 218, 219, 220, 245
 moving, 116, 145
 open (galactic), 186, 194–220 *passim*, 245
 CNGC, 160
 Coathanger, 98, 213
 CoD (*Córdoba Durchmusterung*), 101
 Collinder, P., 161
 Collinder 399, 213
 colongitude, Sun's, on Moon, 30
 color index, 118
 colors, of stars, 117–118, 124, 143, 178,
 192–246 *passim*
 Columba, 247
 coma, of comet, 68
 Coma Berenices star cluster, 145, 186
 Comet Hale–Bopp, 67, 69
 Comet Halley, 68, 69
 Comet Hyakutake, 68
 Comet LINEAR, 68
 Comet Shoemaker–Levy, 43
 Comet Tago–Sato–Kosaka, 71
 Comet West, 67
 comets, 67–72
 nomenclature, 68–69
 common proper motion (c.p.m.), 123
 conjunction, 45, 46
 constellations, 80–84, 85–86

Index

- "Coordinates Only," 160
 Copernicus, Nicolaus, 5, 79
 Coprates, 49, 52
 Cor Caroli, 124, 185
 corona, of Sun, 35, 36, 41
 Corona Australis, 208
 Corona Borealis, 208
 Coronado Filters, 35
 Corwin, H. G., 161
 Covington, Melody, 41
 Crab Nebula, *see* M1
 Crepe Ring, 57
 cross-indexing, 102
 SAO to Bayer/Flamsteed, 103–111
 Crux, 84
 CY Aquarii, 133, 231
 chart, 232
 Cygnus X-1, 210–211

 dark adaptation, 6, 149
 dark nebulae, 145, 219, 220
 Date, Julian, *see* Julian Date
 Dawes, Rev. W. R., 128
 Dawes limit, 127–128
 deep-sky objects, 144–164
 Deimos, 52, 62
 density, logarithmic (of filter), 33
 dew, 16–18
 dew caps, 16–17
 Di Cicco, D., 66
 dichotomy, 48
 diffraction, 127–128
 disks, 127
 Digitized Sky Survey (DSS), 99–100
 Dione, 58
 direct interpolation, 140
 discovering
 asteroids, 66–67
 comets, 70–72
 novae, 136–137
 variable stars, 135
 Dnoes, 91
 DO Cephei, *see* Krüger 60
 Dobbins, T., 26, 42
 Doppler shift, 148
 Dorado, 85, 86
 Double Cluster, 236
 Double Double, 209
 "the other," 211
 double stars, 123–131
 drawing
 lunar features, 31
 nebulae, 148–149
 planets, 42, 43, 54, 58
 Duffett-Smith, P., 79, 127
 Draper, H., 101
 Dreyer, J. L. E., 158, 160–161, 244
 Dumbbell Nebula, 213
 Dumont, M., 132
 Dunlop, J., 131
 dust tail, 68
 dwarf Cepheids, 133
 dwarf galaxies, 146, 194, 219, 233
 dwarf novae, *see* novae
 dwarfs
 brown, 119, 121
 red, 121, 172, 206, 224–226, 243
 white, 121–122, 243

 e (eccentricity), 77, 125
 E0...E7 (galaxy types), 147
 Eagle Nebula, 217
 early-type stars, 119
 east vs. west
 in telescope, 4
 on Jupiter, 55
 on Mars, 50
 on Moon, 30
 on Uranus, 59
 eccentricity, 77
 eclipses
 lunar (Moon), 31–33
 solar (Sun), 37–41
 annular, 40 (map)
 total, 39 (map)
 eclipsing binaries, 134–135, 172
 Edberg, S. J., 72
 Eight-Burst Nebula, 193
 elements, orbital, 77–79, 125–127
 elliptical galaxies, 146–147, 187, 190, 228,
 246
 elongation, greatest, 43, 46
 of Mercury, 45–46 (dates)
 of Venus, 47–48 (dates)
 emission lines, 119
 emission nebulae, 145, 180, 217, 218, 219,
 242–243
 in galaxy M33, 229
 Enceladus, 58
 Encke, J. F., 57
 Encke Division, 57
 Encke Minimum, 57

Index

- ephemeris, ephemerides, 63
 of artificial satellites, 73
 of asteroids, online, 65
 of comets, 69–70
 epicycles, 79
 epoch, 79
 converting, *see* precession
 Equuleus Pictoris, 86
 Es (for Espin), 131
 Eskimo Nebula, 173
 Espenak, F., 32, 39–41
 Espin, T. E., 131
 etiquette, at observing sites, 19–20
 ETX, *see* Autostar
 Europa, 55–56
 European Space Agency, 99, 101
 evolution, stellar, 120–122
- Fabricius, D., 242
 faculae, 37
 “faint fuzzies,” 149
 festoons (Jupiter), 53
 Feynman, R., 79
 field of view, measuring, 231
 file formats
 Autostar, 66, 70
 TLE, 75–76
 filters
 nebula, 149
 Sun, 33–35
 Flamsteed, J., 93
 Flamsteed numbers, 93
 to SAO numbers, 103–111
 flare stars, 134
 flares
 Iridium, 73, 74
 Martian, 51
 solar, 37
 foam (for cases), 19
 following vs. preceding, 55
 Fornax, 84
 Fornax Galaxy Cluster, 246
 Fornax System (dwarf galaxy), 146
- galaxies, 146–148
 active, 147, 241
 catalogues, 161
 colliding, 192–193
 classification, 146 (chart)
 distances, 117, 133
 dwarf, 146, 194, 219, 233
 elliptical, 146–147, 187, 190, 228, 246
 irregular, 146–147, 171
 satellite, 146
 Seyfert, 147, 241
 spiral, 146–147, 171, 172, 184, 186, 187, 191,
 227, 228, 229
 unusually bright, 241
 Galilean satellites, 55
 Galileo, 55, 217
 Ganymede, 55–56
 Garnet Star, 206–207
 GC (*General Catalogue*), 101
 GCVS (*General Catalogue of Variable Stars*), 138
 numbers, 138–140
 Gegenschein, 12
 Geminids, 72, 73
 genitive, Latin, 80
 geostationary satellites, 74
 Ghost Nebula, 217
 Ghost of Jupiter, 192
 Ghost of Neptune, 178
 globular clusters, 145, 148, 186, 194, 197–198,
 202, 213–220, 245
 Glyn Jones, K., 151
 Goodstein, D. and J., 79
 granulation, solar, 37
 gravitational contraction, 120
 Great Red Spot (GRS), 53, 54
 Great Rift, 146
 Greek alphabet, 91
 Grissom, V. I., 91
 GSC (*Guide Star Catalog*), 101, 141
 Gunther, J., 132
- h (for Sir John Herschel), 131
 h 146, 188
 h 2866, 218
 h 3752, 246
 h 3945, 180
 h Persei, 236
 H (for Sir William Herschel), 131, 158
 H.I.1, H.I.2, etc. (catalogue designations), 158
 H II regions, 146, 229
 H.VI.2 (2⁶), 163
 Harrington, P. S., 93, 144, 191
 Hartung, E. J., 162
 Harvard designations, 137
 Harvard University, 119
 HD (*Henry Draper Catalogue*), 101
 headlights, 19–20, 189
 helium flash, 121

Index

- Hercules
 globular clusters, 197–198
 missing patch in GSC, 101
 NELM map, 9
 Herschel, Caroline, 158
 Herschel, Sir John, 5, 131, 149, 162, 192, 218, 246
 catalogues, 160
 Herschel, Sir William, 13, 131, 178, 206, 219,
 226, 237
 catalogue, 158–160
 Herschel 400 list, 158
 Hertzsprung–Russell (HR) diagram, 120
 Hevelius, J., 84, 85, 183
 HIC, 102
 Hidden Galaxy, 228
 Himalia, 56
 Hind, J. R., 245
 Hind’s Crimson Star, 245
 Hind’s Variable Nebula, 134
 Hipparchos (Greek astronomer), 102, 112
 Hipparcos satellite, 94, 123, 227
 star catalogue (HIP), 99, 101–102, 141
 star distances, 116
 Hoffleit, D., 101
 Horseshoe asterism, *see* Webb’s Horseshoe
 Horseshoe Nebula, 218
 HR catalogue, 101
 HR diagram, 120
 Hubble *Guide Star Catalog* (GSC),
 101, 141
 Hubble Space Telescope (HST), 73, 217
 Hubble’s Law, 117
 Hubble’s Variable Nebula, 176
 Hyades, 85, 241
 hydrogen, in stars, 121–122
 hydrogen-alpha (H α) filters, 35
 hyperbolic orbit, 77–78
- i* (inclination), 78, 125
 Iapetus, 58–59
 IC (*Index Catalogue*), 158, 160–161
 IC 349, 239–240
 IC 405, 157
 IC 418, 244
 IC 1396, 207
 IC 2165, 178
 IC 3568, 183
 IC 4665, 201
 IC 5201, 233
 IDS (*Index . . . Double Stars*), 131
 Ikeya, K., 70
 inclination, 78, 125
 insects, 21
 International Astronomical Union (IAU),
 64–65, 68, 71, 85, 136
 International Dark-Sky Association
 (IDSA), 7
 International Occultation Timing Association
 (IOTA), 33
 International Space Station (ISS), 73, 75, 77
 Io, 55–56
 ion tail, 68
 Iridium satellites, 73, 74
 irregular galaxies, 146–147, 171
 irregular variables, 134
 Izar, 198
- Jakiel, R., 193, 220
 Jeffers, H. M., 131
 JMI, 19
 Julian Date (JD), 252, 253
 Jupiter, 43, 53–56, 54 (map)
 conj. w. Neptune, 217
- Karkoschka, 168, 177, 181
 Keeler, J., 57
 Keeler Gap, 57
 Kendrick Dew Remover System, 16
 Kepler, Johannes, 5, 77, 79, 162
 Keplerian elements, 77, 125
 Kepple, B. R., 164
 Kholopov, P. N., 138
 kiloparsecs (kpc), 116
 Kirkpatrick, J. D., 119
 Kitt, M. T., 31
 Kitt Peak National Observatory, 8
 Kozyrev, N., 26
 Kr (for Krüger), 131
 Kreimer, E., 149, 151, 219
 Krüger 60, 134, 224–225
 identification chart, 226
 orbit diagram, 225
 Kuiper belt, 62
 Kukarin, B. V., 138
- L* (mean longitude) 78
 La Superba, 184
 Lacaille, N. L. de, 84, 92
 Lacaille letters, 92–93, 137
 Lagoon Nebula, *see* M8
 late-type stars, 119
 Latin pronunciation, 5

Index

- latitude
 areographic (Mars), 50, 51
 selenographic (Moon), 30
 Leavitt, H., 133
 lenticular galaxies, 146
 Leo, NELM map, 9
 Leo Triplets (galaxies), 187
 Leonids, 72, 73
 Levy, D. H., 72, 132
 libration, 25–26, 30
 light bridges, 35
 light curves, 133, 135
 light pollution, 7–8
 light-years (ly), 115
 lightning, reflected, 14
 limb, of Moon, 25
 LINEAR, 66–68
 lines, spectral, 119
 Little Dipper, 237
 Little Gem, 217
 Loch im Himmel, 219
 Lockwood Valley, 18, 19
 Lodriguss, J., 13
 long-period variables, 133, 143, 205–206, 209, 242, 245
 longitude
 areographic (Mars), 50, 51
 in orbit computations, 78
 selenographic (Moon), 30
 Lowell, P., 13, 51
 Ludwig V, 184
 Luginbuhl, C. B., 164
 luminosity, 120
 Luna Incognita, 30
 lunar transient phenomena (LTPs), 26–27, 30
 LX200, 90, 93, 96, 100, 130, 138, 160, 161, 167
 ly (light-years), 115
 Lyrids, 72

 m' , m'' , 150
 M (mean anomaly), 78
 M (Messier) catalogue, 150–151, 152–154
 M1, 145, 240
 M2, 216
 M3, 186
 M4, 148, 202
 M6, 202
 M7, 202
 M8, 148, 219
 M11, 216
 M13, 145, 150, 197–198

 M15, 214
 M16, 217
 M17, 148, 218
 M19, 202
 M20, 145, 218
 M21, 218
 M22, 145, 162, 219
 M27, 213
 M31, 11, 115, 146, 151, 227
 Messier's drawing, 151
 M32, 146, 151, 227
 M33, 11, 146, 229
 M34, 236
 M35, 173
 M36, 236–237
 M37, 236–237
 M38, 236–237
 M40, 183
 M41, 180
 M42, 134–135, 148–149, 242–243
 M44, 11, 174
 M45, *see* Pleiades
 M46, 179
 M47, 151, 179
 M48, 151, 177–178
 M51, 146, 184
 M54, 146, 219
 M57, 148, 212
 M60, 187
 M62, 202
 M64, 186
 M65, 187
 M66, 187
 M71, 213
 M73, 144
 M77, 147, 241
 M78, 148, 241
 M79, 245
 M81, 171
 M82, 146, 171
 M91, 151
 M92, 197
 M101, 151
 M102, 151
 M103, 151, 223
 M104, 191
 M110, 146, 151, 227
 Maestlin, M., 237
 Magellanic Clouds, 85–86, 133, 146
 magnitude, 112–113
 absolute, 117

Index

- of non-stellar objects, 149–150
- per square arc-second/minute, 149–150
- U, B, V, R, and I, 118
- magnitude limit
 - naked-eye, 8–11
 - telescopic, 113–114
- main sequence, 120
- Mallas, J. H., 149, 151, 219
- Malus, 86
- maps
 - mirror-imaged, 3–4, 95–97, 142
 - naked-eye limiting magnitude (NELM), 9–10
 - solar eclipses, 39–40
 - See also individual objects*
- Mare . . . (on Moon), 29 (list of names)
- Mare . . . (on Mars), 52 (list of names)
- Mare Erythraeum, 50–52
- Mare Orientale, 25–26, 28, 29, 30
- maria, 29
- Mariner space probes, 47
- Marriott, C., 45
- Mars, 49–52, 50 (map)
 - named features, 51–52
- Martinez, P., 132
- mas (milliarcseconds), 116
- Massachusetts Institute of Technology (M.I.T.), 66
- Maury, Antonia, 119
- McMaster–Carr, 19
- McNeil, J., 178
- Meade Autostar and ETX, *see* Autostar
- Meade LX200, *see* LX200
- mean anomaly, 78
- mean longitude, 78
- Méchain, P., 151
- megaparsecs (Mpc), 116
- Melotte, P., 161
- Melotte 25, 241
- Mercury, 44–47
- Merope Nebula, 239–240
- Mesarthim, 230–231
- Messier, C., 150–151, 177–179, 183, 217, 236, 240
 - catalogue, 152–154
- Messier marathon, 154
- meteors, 72–73
- Mexican Jumping Star, 180
- Milky Way, 146
 - visibility, 11
- milliarcseconds (mas), 116
- Mimas, 58
- Minor Planet Center, 65
- minor planets, *see* asteroids
- Mira, 133, 242
 - light curve, 133
- Mira-type stars, 133, 143, 205–206, 209, 242, 245
- Mirak, 198
- mirror images, 3–4, 95–97
- Mizar, 184
- Modified Julian Date (MJD), 252
- month, sidereal/synodic, 23
- Monty Python, 64
- Moon, 23–33
 - drawing, 31
 - eclipses, 31–33
 - map, 25
 - named features, 29
 - phases, 23, 24
- Moore, Sir Patrick, 26, 29, 154–155
- mosquitoes, 20–21
- moving cluster, 116
- Mullaney, J., 168, 180, 208
- multiple stars, 123–131
 - See also* triple stars, quadruple stars
- Musca (ambiguous name), 86
- naked-eye limiting magnitude (NELM), 8–11, 9–10 (maps)
- NASA, 14, 41, 75–76, 100, 161
- Navi (γ Cassiopeiae), 91, 119
- NEB (North Equatorial Belt), 53, 54
- nebulae, 145
 - bright (emission), 145, 180, 217, 218, 219, 242–243
 - in galaxy M33, 229
 - dark, 145, 219, 220
 - observing, 148–149
 - planetary, 122, 145, 148, 161, 173, 178, 179, 183, 192, 199, 207, 209, 212, 213, 217, 227, 244, 246
 - reflection, 145, 148, 176, 218, 219, 241
 - variable, 134, 176
- Neptune, 60, 217
- NexStar, Celestron, 91, 93, 130, 167
- NGC (*New General Catalogue*), 158, 160–161
- NGC 253, 158, 160, 232–233
- NGC 281, 225
- NGC 604, 146
- NGC 663, 223
- NGC 752, 228
- NGC 869, 236
- NGC 884, 236
- NGC 1049, 146

Index

- NGC 1360, 246
 NGC 1399, 246
 NGC 1404, 246
 NGC 1435, 239
 NGC 1514, 237
 NGC 1535, 244
 NGC 1555, 134
 NGC 1647, 240
 NGC 1851, 246
 NGC 1999, 243
 NGC 2070, 148
 NGC 2071, 241
 NGC 2158, 173
 NGC 2237–2239, 177
 NGC 2244, 177
 NGC 2264, 175–176
 NGC 2301, 177
 NGC 2304, 163
 NGC 2362, 180
 NGC 2403, 172
 NGC 2423, 179
 NGC 2438, 179
 NGC 2440, 179
 NGC 2451, 181
 NGC 2467, 180
 NGC 3077, 171
 NGC 3132, 193
 NGC 3242, 148, 192
 NGC 3372, 148
 NGC 3628, 187
 NGC 4038, 192–193
 NGC 4039, 192–193
 NGC 4622, 147
 NGC 5128, 193
 NGC 5139, 194
 NGC 5195, 184
 NGC 6144, 202
 NGC 6210, 199
 NGC 6231, 203
 NGC 6520, 219
 NGC 6543, 197
 NGC 6723, 220
 NGC 6726, 220
 NGC 6729, 220
 NGC 6802, 213
 NGC 6818, 217
 NGC 6826, 207
 NGC 7000, 150
 NGC 7009, 217
 NGC 7023, 205
 NGC 7027, 209
 NGC 7331, 228
 NGC 7394, 227
 NGC 7510, 223
 NGC 7662, 227
 night vision, 6, 149
 Nix Olympica, 49, 50, 52
 Noctua, 86
 North, G., 31
 North America Nebula, 150
 Norton, A., 93
 novae, 135–136
 discovering, 136–137
 dwarf (recurrent), 135, 198, 201, 208
 Nubecula Major/Minor, 85–86
 O Σ , O Σ E (for Otto Struve), 131
 Oberon, 59
 occultations
 by asteroids, 64
 by Moon, 33
 Olympus Mons, 49, 50, 52
 O'Meara, S. J., 151, 186, 197, 214, 216, 229,
 236, 245
 Omega Nebula, 218
 Oort's cloud, 68
 open clusters, 186, 194–220 *passim*, 245
 opposition, 42, 45
 of Jupiter, dates, 53
 of Mars, dates, 49
 of Neptune, dates, 60
 of Pluto, dates, 60
 of Saturn, dates, 56
 of Uranus, dates, 59
 optical doubles, 123, 180, 206
 orbital elements, 77–79, 125–127
 orbits, 62–63
 of artificial satellites, 73–76
 of binary stars, 125–127
 Orion
 Bayer's map, 92
 NELM map, 10
 Orion Nebula, *see* M42
 Orionids, 72
 osculating elements, 79
 ovals (Jupiter), 53
 P (period), 125
 Pac-Man Nebula, 225
 Palomar Observatory Sky Survey (POSS),
 99–100, 101
 parabolic orbit, 77–78

Index

- parallax
 of stars, 115–116, 209
 viewing Moon, 30
 Parker, D., 13, 42
 parsecs (pc), 116
 Patriotic Triple, 208
 Pegasus, NELM map, 10
 Pegasus cluster, 214
 penumbra
 of shadow, 31
 of sunspot, 35
 Perfect Right Angle, 144, 245
 perihelion, 68, 77, 78
 Perryman, M. A. C., 94
 Perseids, 72
 perturbation, 62
 PGC (*Principal Galaxies*), 161
 phase angle, 30
 phases
 of Moon, 23, 24, 30
 of planets, 43, 45, 46, 48
 Phobos, 52, 62
 photographic observation, 143
 photometry, 64
 photosphere, 35, 36
 Piazzini's Flying Star, 209
 Pinwheel Galaxy, 229
 Piscis Volans, 86
 PK (Perek–Kohoutek), 161
 planetary nebulae, 122, 145, 148, 161, 173, 178,
 193, 197, 237
 planets, 42–61
 minor, *see* asteroids
 of other stars, 230, 244
 planitia, 52
 Pleiades, 85, 237, 239 (map)
 Pluto, 60–61, 62, 64, 200
 PN, PLN (*Planetary Nebulae*), 161
 Pogson, N., 112, 114
 Porrima, 188, 190
 position angle (p.a.), 124–126
 Praesepe, 174
 preceding vs. following, 55, 125
 precession, 1950 to 2000, 249–251
 Price, F. W., 42
 prominences, solar, 35, 36
 pronunciation
 constellations, 80–84
 Latin, 5
 lunar features, 29
 Mars features, 51–52
 star names, 87–90
See also individual names
 protostars, 120–121
 Proxima Centauri, 115
 Ptolemy, C., 79, 112, 202
 Ptolemy's Cluster, 202
 Pulcherrima, 198
 pulsating variables, 132–134
q (perihelion distance), 77
 Quadrans Muralis, 86
 Quadrantids, 72
 quadruple stars, 181, 201–202, 203, 209, 226,
 242–243
 quasars, 147–148, 188–189
 R, S, T... (variable-star designations), 137
 R Coronae Borealis, 134, 198
 R Crateris, 192
 R Leporis, 245
 R Monocerotis, 176
 R Sculptoris, 233
 radiant, 73
 Rappaport, B., 94
 Rasalgethi, 199
 Ratledge, D., 157, 190, 203
 Rayleigh limit, 127–128
 recurrent novae, 135, 198, 201, 208
 red dwarfs, 121, 172, 206, 224–226, 243
 red giants, 121
 redshift, 148
 reflection nebulae, 145, 148, 176, 218,
 219, 241
 Regor, 91, 181
 Remaklus, P., 94
 resolution limits, 127–128
 reticle, for measurement, 128–130
 Reticulum, 85
 Rhea, 58
 rhodopsin, 6
 Riccioli, G. B., 184
 Ridpath, I., 93
 Rigel, 244
 Ring Nebula, 148, 212
 Ring-Tail Galaxy, 192–193
 rings of Saturn, 57 (map), 57–58
 RNGC, 160
 Rosette Nebula, 177
 Rotanev, 91
 RR Lyrae, 133
 Rühl, A., 29

Index

- Rupes Recta, 24, 27, 29
 RY Sagittarii, 134
- S Monocerotis, 176
 S0, Sa . . . Sc, SBa . . . SBc (galaxy types), 147
 safety
 at remote sites, 22
 viewing planets in daytime, 43
 viewing Sun, 33–35
 Sagittarius Globular Cluster, 219
 Sanner, G. W., 164
 SAO (Smithsonian) star catalogue, 100–112
 SAO 33626, 207
 satellites
 of Earth, artificial, 14–16, 73–77
 of galaxies, 146
 of Jupiter, 55–56
 of Mars, 52
 of Neptune, 60
 of Pluto, 61
 of Saturn, 58–59
 of Uranus, 59
 weather, 14–16
 Saturn, 56–59
 rings, 57 (map)
 Saturn Nebula, 217
 Scaliger, J. J. and J. C., 252
 Schedar, 226
 Schröter, J. H., 48
 Schröter effect, 48
 Sculptor, 84
 Sculptor Galaxy, 232–233
 Sculptor System, 233
 SEB (South Equatorial Belt), 53, 54
 Secchi, P. A., 184
 seeing (steadiness), 12–14
 semi-major axis, 77
 semiregular variables, 134, 175, 192, 216
 separation, 124, 126
 Serpentarius, 83, 86
 Seyfert, C., 147
 Seyfert galaxies, 147
 shadow bands, 37, 41
 shadow transits, 55
 Sharpless 2-155, 157
 Sheehan, W., 26
 sidereal month, 23
 sidereal period, 44
 Sidus Ludovicianum, 184
 signs of the zodiac, 86
- SIMBAD, 100
 Sinnott, R. W., 94, 160, 168, 191, 210, 214, 218
 Sinus Iridum, 24, 29
 Sinus Meridiani, 51
 Sinus Sabaeus, 28, 51, 52
 site etiquette, 19–20
 site selection, 7–8, 11, 12, 18
 Skalnate Pleso Observatory, 94
 Skiff, B. A., 164, 168, 245
SkyMap, 97, 99
 Smith, W. B., 102
 Smithsonian Astrophysical Observatory, 100
 Smyth, Adm. W. H., 5, 86, 114, 131, 161–163
 software
 satellite tracking, 73
 sky maps, 97–99
 Software Bisque, 97
 solar flares, 37
 Sombrero Galaxy, 191
 South, J., 238
 Space Shuttle, 77
 Spacewatch, 66–67, 68
 spectra, of stars, 118, 119
 spectral classes, 119
 spectroscopic binaries, 123
 Spindle Galaxy, 190
 spiral galaxies, 146–147, 171, 172, 184, 186, 187, 191, 227, 228, 229
 Spock, 64
 sporadic meteors, 72
 SS Cygni, 135, 208
 AAVSO chart, 141
 star catalogues, *see* catalogues
 star clouds, 146
 star clusters, *see* clusters
 STAR numbers, 93
 star-hopping, 95–97
 Star Queen Nebula, 217
 Stargate, 191
Starry Night, 97–99
 stars
 carbon (unusually red), 122, 168, 184, 210, 231, 233, 235
 colors, 117–118, 124, 143, 178, 192–246 *passim*
 distances, 115–117
 double and multiple, 123–131
 evolution, 120
 names, 87–90
 number in sky, 114–115
 quadruple, 181, 201–202, 203, 209, 226, 242–243

Index

- Sun-like, 244
 temperature, 118–120
 triple, 174–175, 176, 178, 191, 207, 208, 215, 218, 235, 238–239, 243, 246
 equilateral, 210, 214
 variable, *see* variable stars
See also specific types and individual stars
 steadiness, atmospheric, 12–14
 Stearn, W. T., 5
 step method, 140–141
 steradians, 115
 Straight Wall, *see* Rupes Recta
 streetlights, 7–8
 Struve, F. G. W., 114, 176, 191, 198, 206, 211, 235
 Struve, O., 131
 Struve double stars, *see* Σ
 Sulentic, J. W., 160, 227
 Sun, 33–41
 eclipses, 37–41
 rotation period, 36
 visible features, 35–37
 Sun projection, 35
 sunspots, 35–37
 supergiants, 122
 supernova remnants, 145, 240
 supernovae, 121–122
 vs. asteroids, 65, 136
 vs. novae, 135–136
 surface brightness, 149–150
 Svalocin, 91
 Swan Nebula, 148, 218
 synodic month, 23
 synodic period, 44
 System I/II/III
 Jupiter, 55
 Saturn, 56
- T (time of perihelion or periastron) 78, 125
 T Cephei, 205–206
 T Coronae Borealis, 198
 T Lyrae, 210
 T Tauri, 121, 134, 142
 Tarantula Nebula, 148
 Teague, T., 128
 Tempel's Nebula, 239–240
 terminator, on Moon, 25, 30
 Tethys, 58
TheSky, 97–99, 100
 Thousand Oaks Optical, 34
 Tifft, W. G., 160, 227
 Tirion W., 93, 94
- Titan, 58–59
 Titania, 59
 TLE file format, 75–76
 Tolkien, 64
 TPoint, 99
 transient lunar phenomena (TLPs), 26–27, 30
 transits
 of Jupiter's satellites, 55
 of Jupiter's surface features, 53
 of Mercury, 47
 of Venus, 48
 transporting telescopes, 18–19
 Trapezium, 134–135, 242–243, 243 (map)
 Trifid Nebula, *see* M20
 triple stars, 174–175, 176, 178, 191, 207, 208, 215, 218, 235, 238–239, 243, 246
 equilateral, 210, 214
 Triton, 60
 Tucana, 85, 86
 turbulence, atmospheric, 12–14
 twilight, 7
 TX Piscium, 231
 Tycho Brahe, 5, 102
 Tycho satellite, 94, 102, 119
- U Camelopardalis, 235
 U Scorpii, 201
 UGC (*Uppsala General Catalogue*), 161
 umbra
 of shadow, 31
 of sunspot, 35
 Umbriel, 59
 Uranus, 59, 93, 229–230
 Ursa Major moving cluster, 145
 USNO (U.S. Naval Observatory) catalogue, 101
- V (visual) magnitude, 118
 V_T, 119
 V Aquilae, 134, 216
 V335, V336... (variable-star designations), 137
 V566 Ophiuchi, 96
 V1668 Cygni, AAVSO chart, 141
 Valdosta State University, 12
 Valles Marineris, 49, 50, 52
 Vallis Alpes, 24
 van den Bos, W. H., 131
 variable stars, 132–143, 198
 Cepheid, 117, 133, 224
 discovering, 135
 eclipsing, 134–135, 172

Index

- variable stars (*cont.*)
 - irregular, 134
 - semiregular, 134, 175, 192, 216
 - long-period (Mira-type), 133, 143, 205–206, 209, 242, 245
 - short-period, 181, 231–232
- Venator, N., 91
- Venus, 47–49
- Vesta, 64
- vignetting, 142
- vision
 - averted, 6
 - night, 6, 149
- W Ursae Majoris, 172
- W Virginis stars, 133
- Wagoner, J., 191
- WDS (*Washington Double Star Catalog*), 128, 131
 - ongoing revision, 206
- weather, 13–16
- Webb, Rev. T. W., 5, 114, 117, 162, 167, 192, 207
- Webb Society, 164
- Webb's Horseshoe, 144, 207–208
- west, *see* east vs. west
- Whirlpool Galaxy, 184
- White, E. H. II, 91
- white dwarfs, 121–122, 243
- Wild Duck Cluster, 216
- Wilkins, H. P., 26
- Winnecke, F. A., 131
- Winnecke 4, 183
- Winter Albireo, 180
- Wlasuk, P. T., 31
- Wnc (for Winnecke), 131
- Wolf–Rayet stars, 119
- wristwatch, astronomical, 23
- WWV, 33
- WZ Cassiopeiae, 224
- X Cancri, 175
- Xephem*, 99
- Y Canum Venaticorum, 184
- YBS (*Yale Bright Star Catalog*), 87, 90, 92, 101
- zodiac, 86
- zodiacal band, 10, 12
- zodiacal light, 10, 12
- zones
 - of Jupiter, 53, 54 (map)
 - of Saturn, 56