

- ⁷³The circle of asterisms, bound at the two poles, impelled by the provector (Pravaha) winds, revolves eternally: attached to that are the orbits of the planets, in their order.
- ⁷⁴The gods and demons behold the sun, after it is once risen, for half a year; the Fathers (Pitaras), who have their station in the moon, for a half-month (Paksha); and men upon the earth, during their own day.
- ⁷⁵The orbit (Kaksha) of one that is situated higher up is large; that of one situated lower down is small. Upon a great orbit the degrees are great; so also, upon a small one, they are small.
- ⁷⁶A planet situated upon a small circuit (Bhramana) traverses the circle of constellations (Bhagana) in a little time; one revolving on a large circle (mandala), in a long time.
- ⁷⁷The moon, upon a very small orbit, makes many revolutions: Saturn, moving upon a great orbit, makes, as compared with her, a much less number of revolutions.
- ⁷⁸Counting downward from Saturn, the fourth successively is regent of the day; and the third, in like manner, is declared to be the regent of the year.
- ⁷⁹Beckoning upward from the moon are found, in succession, the regents of the months; the regents of the hours (hora), also, occur in downward order from Saturn.
- ⁸⁰The orbit (Kaksha) of the asterisms. (Bha) is the circuit (Bhramana) of the sun multiplied by sixty: by so many yojanas does the circle of the asterisms revolve above all.
- ⁸¹If the stated number of revolutions of the moon in an Aeon (Kalpa) be multiplied by the moon's orbit, the result is to be known as the orbit of the ether: so far do the rays of the sun penetrate.
- ⁸²If this be divided by the number of revolutions of any planet in an Aeon (Kalpa), the result will be the orbit of that planet: divide this by the number of terrestrial days, and the result is the daily eastward motion of them all.
- ⁸³Multiply this number of yojanas of daily motion by the orbit of the moon and divide by a planet's own orbit; the result is, when divided by fifteen, its daily motion in minutes.
- ⁸⁴Any orbit, multiplied by the earth's diameter and divided by the earth's circumference, gives the diameter of that orbit; and this, being diminished by the earth's diameter and halved, gives the distance of the planet.
- ⁸⁵The orbit of the moon is three hundred and twenty-four thousand yojanas: that of Mercury's conjunction (Cighra) is one million and forty-three thousand, two hundred and nine:
- ⁸⁶That of Venus's conjunction (Cighra) is two million, six hundred and sixty-four thousand, six hundred and thirty-seven: next, that of the sun, Mercury, and Venus is four million, three hundred and thirty-one thousand, five hundred:
- ⁸⁷That of Mars, too, is eight million, one hundred and forty-six thousand, nine hundred and nine; that of the moon's apsis (Ucca) is thirty-eight million, three hundred and twenty-eight thousand, four hundred and eighty-four:
- ⁸⁸That of Jupiter, fifty-one million, three hundred and seventy-live thousand, seven hundred and sixty-four: of the moon's node, eighty million, five hundred and seventy-two thousand, eight hundred and sixty-four:
- ⁸⁹Next, of Saturn, one hundred and twenty-seven million, six hundred and sixty-eight thousand, two hundred and fifty-five: of the asterisms, two hundred and fifty-nine million, eight hundred and ninety thousand, and twelve:
- ⁹⁰The entire circumference of the sphere of the Brahma egg is eighteen quadrillion, seven hundred and twelve trillion, eighty billion, eight hundred and sixty-four million: within this is the pervasion of the sun's rays.

CHAPTER 13
OF THE ARMILLARY SPHERE, AND OTHER INSTRUMENTS

- ¹Then, having bathed in a secret and pure place, being pure, adorned, having worshipped with devotion the sun, the planets, the asterisms (Bha), and the elves (Guhyaka).
- ²Let the teacher, in order to the instruction of the pupil, himself beholding everything clearly, in accordance with the knowledge handed down by successive communication and learned from the mouth of the master (Guru).
- ³Prepare the wonder-working fabric of the terrestrial and stellar sphere (Bhubhagola). Having fashioned an earth-globe of wood, of the desired size.
- ⁴Fix a staff, passing through the midst of it and protruding at either side, for Meru; and likewise, a couple of sustaining hoops (Kaksha), and the equinoctial hoop;
- ⁵These are to be made" with graduated divisions (Angula) of degrees of the circle (Bhagana). Farther—by means of the several day-radii, as adapted to the scale established for those other circles.
- ⁶And by means of the degrees of declination and latitude (Vikshepa) marked off upon the latter, at their own respective distances in declination, according to the declination of Aries etc., three.
- ⁷Hoops are to be prepared and fastened: these answer also inversely for Cancer, etc. In the same manner, three for Libra etc., answering also inversely for Capricorn, etc.,
- ⁸And situated in the southern hemisphere, are to be made and fastened to the two hoop-supporters. Those likewise of the asterisms (Bha) situated in the southern and northern hemispheres, of Abhijit.
- ⁹Of the Seven Sages (Saptarshayas), of Agastya, of Brahma etc., are to be fixed. Just in the midst of all, the equinoctial (Vaishuvati) hoop is fixed.
- ¹⁰Above the points of intersection of that and the supporting hoops are the two solstices (Ayana) and the two equinoxes (Vishuvat). From the place of the equinox, with the exact number of degrees, as proportioned to the whole circle.
- ¹¹Fix, by oblique chords, the spaces (Kshetra) of Aries and the rest; and so likewise another hoop, running obliquely from solstice (Ayana) to solstice.
- ¹²And called the circle of declination (kranti): upon that the sun constantly revolves, giving light: the moon and the other planets also, by their own nodes, which are situated in the ecliptic (Apamandala).
- ¹³Being drawn away from it, are beheld at the limit of their removal in latitude (Vikshepa) from the corresponding point of declination. The orient ecliptic-point (Lagna) is that at the orient horizon; the Occident point (astamgachat) is similarly determined.
- ¹⁴The meridian ecliptic-point (Madhyama) is as calculated by the equivalents in right ascension (Lankodayas), for mid-heaven (Khamadhya) above. The sine which is between the meridian (Madhya) and the horizon (Kshitija) is styled the day-measure (Antya).
- ¹⁵And the sine of the sun's ascensional difference (Caradala) is to be recognized as the interval between the equator (Vishuvat) and the horizon. Having turned upward one's own place, the circle of the horizon is midway of the sphere.
- ¹⁶As covered with a casing (Vastra) and as left uncovered, it is the sphere surrounded by Lokaloka. By the application of water is made ascertainment of the revolution of time.
- ¹⁷One may construct a sphere-instrument combined with quicksilver: this is a mystery; if plainly described, it would be generally intelligible in the world.
- ¹⁸Therefore, let the supreme sphere be constructed according to the instruction of the preceptor (Guru). In each successive age (Yuga), this construction, having become lost, is, by the Sun's.
- ¹⁹Favor, again revealed to someone or other, at his pleasure. So also, one should construct instruments (Yantra) in order to the ascertainment of time.
- ²⁰Then quite alone, one should apply quicksilver to the wonder-causing instrument. By the gnomon (Ganku), staff (Yashti), are (Dhanus), wheel (Cakra), instruments for taking the shadow, of various kinds.
- ²¹According to the instruction of the preceptor (guru), is to be gained a knowledge of time by the diligent. By water-instruments, the vessel (Kapala), etc., by the peacock, man, monkey, and by stringed sand-receptacles, one may determine time accurately.
- ²²Quicksilver-boles, water, and cords, ropes (Sulba), and oil and water, mercury, and sand are used in these: these applications, too, are difficult.

²³A copper vessel, with a hole in the bottom, set in a basin of pure water, sinks sixty times in a day and night, and is an accurate hemispherical instrument.

²⁴So also, the man-instrument (Narayantra) is good in the daytime, and when the sun is clear. The best determination of time by means of determinations of the shadow has been explained.

²⁵He who thoroughly knows the system of the planets and asterisms, and the sphere, attains the world of the planets in the succession of births, his own possessor.

CHAPTER 14
ON THE DIFFERENT MODES OF RECKONING TIME

- ¹The modes of measuring time (mana) are nine, namely those of Brahma, of the gods, of the Fathers, of Prajapati, of Jupiter and solar (Saura), civil (Savana), lunar, and sidereal time.
- ²Of four modes, namely solar, lunar, sidereal, and civil time, practical use is made among men; by that of Jupiter is to be determined the year of the cycle of sixty years; of the rest, no use is ever made.
- ³By solar (Saura) time are determined the measure of the day and night, the Shadacitimukhas, the solstice (Ayana), the equinox (Vishuvat), and the propitious period of the sun's entrance into a sign (Sankranti).
- ⁴Beginning with Libra, the Shadacitimukha is at the end of the periods of eighty-six (Shadaciti) days, in succession: there are four of them, occurring in the signs of double character (Dvisvabhava);
- ⁵Namely, at the twenty-sixth degree of Sagittarius, at the twenty-second of Pisces, at the eighteenth degree of Gemini, and at the fourteenth of Virgo.
- ⁶From the latter point, the sixteen days of Virgo which remain are suitable for sacrifices: anything given to the Fathers (Pitaras) in them is inexhaustible.
- ⁷In the midst of the zodiac (Bhacakra) are the two equinoxes (Vishuvat), situated upon the same diameter (Samasutraga), and likewise the two solstices (Ayana); these four are well known.
- ⁸Between these are, in each case, two entrances (Sankranti); from the immediateness of the entrance are to be known the two feet of Vishnu.
- ⁹From the sun's entrance (Sankranti) into Capricorn, six months are his northern progress (Uttardiyana); so likewise, from the beginning of Cancer, six months are his southern progress (Dakshinayana).
- ¹⁰Thence also are reckoned the seasons (Ritu), the cool season (Sisira) and the rest, each prevailing through two signs. These twelve, commencing with Aries, are the months; of them is made up the year.
- ¹¹Multiply the number of minutes in the sun's measure (Maka) by sixty and divide by his daily motion: a time equal to half the result, in Nadis, is propitious before the sun's entrance: into a sign (Sankranti), and likewise after it.
- ¹²As the moon, setting out from the sun, moves from day to day eastward, that is the lunar method of reckoning time (mana): a lunar day (Tithi) is to be regarded as corresponding to twelve degrees of motion.
- ¹³The lunar day (Tithi), the Karana, the general ceremonies, marriage, shaving, and the performance of vows, fasting, and pilgrimages, are determined by lunar time.
- ¹⁴Of thirty lunar days is composed the lunar month, which is declared to be a day and a night of the Fathers: the end of the month and of the half-month (paksha) are at their mid-day and midnight respectively.
- ¹⁵The constant revolution, of the circle of asterisms (Bhacakra) is called a sidereal day. The months are to be known by the names of the asterisms (nakshatra), according to the conjunction (Yoga) at the end of a lunar period (Parvan).
- ¹⁶To the months Karttika etc., belong, as concerns' the conjunction (Samayoga), the asterisms Kritika etc., two by two: but three months, namely the last, the next to the last, and the fifth, have triple' asterisms.
- ¹⁷In Vaicakha etc., a conjunction (Yoga) in the dark half-month (Krishna), on the fifteenth lunar day (Tithi), determines in like manner the years Karttika etc. of Jupiter, from his heliacal setting (Asta) and rising (Udaya).
- ¹⁸From rising to rising of the sun, that is called civil (Savana) reckoning. By that are determined the civil days (Savana), and by these as the regulation of the time of sacrifice.
- ¹⁹Likewise, the removal of uncleanness from childbearing etc., and the regents of days, months, and years: the mean motion of the planets, too, is computed by civil time.
- ²⁰The mutually opposed day and night of the gods (Sura) and demons (Asura), which has been already explained, is time of the gods, being measured by the completion of the sun's revolution.
- ²¹The space of a Patriarchate (manvantara) is styled time of Prajapati: in it is no distinction of day from night. An Aeon (Kalpa) is called time of Brahma.
- ²²Thus, hath been told thee that supreme mystery, lofty and wonderful, that sacred knowledge (brahman), most exalted, pure, all guilt destroying.
- ²³And the highest knowledge of the heaven, the stars, and the planets hath been exhibited: he who knoweth it thoroughly obtained in the worlds of the sun etc. an everlasting place.
- ²⁴With these words, taking leave of Maya, and being suitably worshipped by him, the part of the sun ascended to heaven, and entered his own disk

²⁵So, then Maya, having personally learned from the sun that divine knowledge, regarded himself as having attained his desire, and as purified from sin.

²⁶Then, too, the sages (Rishi), learning that Maya had received from the sun this gift, drew near and surrounded him, and reverently asked the knowledge.

²⁷And he graciously bestowed upon them the grand system of the planets, of mysteries in the world the most wonderful, and equal to the Scripture (Brahman).