

# Hindu calendar

The **Hindu calendar**, **Panchanga** (Sanskrit: पञ्चाङ्ग) or **Panjika** is one of various lunisolar calendars that are traditionally used in the Indian subcontinent and Southeast Asia, with further regional variations for social and Hindu religious purposes. They adopt a similar underlying concept for timekeeping based on sidereal year for solar cycle and adjustment of lunar cycles in every three years, but differ in their relative emphasis to moon cycle or the sun cycle and the names of months and when they consider the New Year to start.<sup>[1]</sup> Of the various regional calendars, the most studied and known Hindu calendars are the Shalivahana Shaka (Based on the King Shalivahana, also the Indian national calendar) found in the Deccan region of Southern India and the Vikram Samvat (Bikrami) found in Nepal and the North and Central regions of India – both of which emphasize the lunar cycle. Their new year starts in spring. In regions such as Tamil Nadu and Kerala, the solar cycle is emphasized and this is called the Tamil calendar (Though Tamil Calendar uses month names like in Hindu Calendar) and Malayalam calendar and these have origins in the second half of the 1st millennium CE.<sup>[1][2]</sup> A Hindu calendar is sometimes referred to as Panchangam (पञ्चाङ्ग), which is known also known as Panjika in Eastern India.<sup>[3]</sup>

The ancient Hindu calendar conceptual design is also found in the Hebrew calendar, the Chinese calendar, and the Babylonian calendar, but different from the Gregorian calendar.<sup>[4]</sup> Unlike the Gregorian calendar which adds additional days to the month to adjust for the mismatch between twelve lunar cycles (354 lunar days)<sup>[5]</sup> and nearly 365 solar days, the Hindu calendar maintains the integrity of the lunar month, but inserts an extra full month by complex rules, once every 32–33 months, to ensure that the festivals and crop-related rituals fall in the appropriate season.<sup>[4][2]</sup>

The Hindu calendars have been in use in the Indian subcontinent since Vedic times, and remain in use by the Hindus all over the world, particularly to set Hindu festival dates. Early Buddhist communities of India adopted the ancient Vedic calendar, later Vikrami calendar and then local Buddhist calendars. Buddhist festivals continue to be scheduled according to a lunar system.<sup>[6]</sup> The Buddhist calendar and the traditional lunisolar calendars of Cambodia, Laos, Myanmar, Sri Lanka and Thailand are also based on an older version of the Hindu calendar. Similarly, the ancient Jain traditions have followed the same lunisolar system as the Hindu calendar for festivals, texts and inscriptions. However, the Buddhist and Jain timekeeping systems have attempted to use the Buddha and the Mahavira's lifetimes as their reference points.<sup>[7][8][9]</sup>



A page from the Hindu calendar  
1871-72

The Hindu calendar is also important to the practice of Hindu astrology and zodiac system as well as observing special appearance days of the Lord and fasting days such as Ekadashi.

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# Origins

## Time keeping

The Vedic culture developed a sophisticated time keeping methodology and calendars for Vedic rituals,<sup>[11]</sup> and timekeeping as well as the nature of solar and moon movements are mentioned in

[The current year] minus one,  
multiplied by twelve,  
multiplied by two,  
added to the elapsed [half months of current year],  
increased by two for every sixty [in the sun],  
is the quantity of half-months (syzygies).

— Rigveda Jyotisha-vedanga 4  
Translator: Kim Plofker<sup>[10]</sup>

Vedic texts.<sup>[12]</sup> For example, Kaushitaki Brahmana chapter 19.3 mentions the shift in the relative location of the sun towards north for 6 months, and south for 6 months.<sup>[13][14]</sup>

Time keeping was important to Vedic rituals, and Jyotisha was the Vedic era field of tracking and predicting the movements of astronomical bodies in order to keep time, in order to fix the day and time of these rituals.<sup>[15][16][17]</sup> This study is one of the six ancient Vedangas, or ancillary science connected with the Vedas – the scriptures of Vedic

Sanatan Sanskriti.<sup>[15][16]</sup>

<sup>[18]</sup>Yukio Ohashi states that this Vedanga field developed from actual astronomical studies in ancient Vedic Period.<sup>[19]</sup> The texts of Vedic Jyotisha sciences were translated into the Chinese language in the 2nd and 3rd centuries CE, and the Rigvedic passages on astronomy are found in the works of Zhu Jiangyan and Zhi Qian.<sup>[20]</sup> According to Subhash Kak, the beginning of the Hindu calendar was much earlier. He cites Greek historians describing Maurya kings referring to a calendar which originated in 6676 BCE known as Saptarsi calendar.<sup>[21]</sup>

The Vikrami calendar is named after king Vikramaditya and starts in 57 BCE.<sup>[22]</sup>

## Texts

Hindu scholars kept precise time by observing and calculating the cycles of Surya (the sun), moon and the planets. These calculations about the sun appear in various astronomical texts in Sanskrit, such as the 5th-century Aryabhatiya by Aryabhata, the 6th-century Romaka by Latadeva and Panca Siddhantika by Varahamihira, the 7th-century Khandakhadyaka by Brahmagupta and the 8th-century Sisyadhivrdhida by Lalla.<sup>[23]</sup> These texts present Surya and various planets and estimate the characteristics of the respective planetary motion.<sup>[23]</sup> Other texts such as Surya Siddhanta dated to have been completed sometime between the 5th century and 10th century present their chapters on various deified planets with stories behind them.<sup>[23]</sup>

The manuscripts of these texts exist in slightly different versions. They present Surya, planet-based calculations and Surya's relative motion to earth. These vary in their data, suggesting that the text were open and revised over their lives.<sup>[24][25][26]</sup> For example, the 1st millennium CE Hindu scholars calculated the sidereal length of a year as follows, from their astronomical studies, with slightly different results:<sup>[27]</sup>

Length of year in various Sanskrit texts

Hindu text	Estimated length of the <u>sidereal year</u> <sup>[27]</sup>
<u>Surya Siddhanta</u>	365 days, 6 hours, 12 minutes, 36.56 seconds
<u>Paulica Siddhanta</u>	365 days, 6 hours, 12 minutes, 36 seconds
<u>Paracara Siddhanta</u>	365 days, 6 hours, 12 minutes, 31.50 seconds
<u>Arya Siddhanta</u>	365 days, 6 hours, 12 minutes, 30.84 seconds
<u>Laghu Arya Siddhanta</u>	365 days, 6 hours, 12 minutes, 30 seconds
<u>Siddhanta Shiromani</u>	365 days, 6 hours, 12 minutes, 9 seconds

The Hindu texts used the lunar cycle for setting months and days, but the solar cycle to set the complete year. This system is similar to the Jewish and Babylonian ancient calendars, creating the same challenge of accounting for the mismatch between the nearly 354 lunar days in twelve months, versus over 365 solar days in a year.<sup>[4][28]</sup> They tracked the solar year by observing the entrance and departure of *Surya* (sun, at sunrise and sunset) in the constellation formed by stars in the sky, which they divided into 12 intervals of 30 degrees each.<sup>[29]</sup> Like other ancient human cultures, Hindus innovated a number of systems of which intercalary months became most used, that is adding another month every 32.5 months on average.<sup>[28]</sup> As their calendar keeping and astronomical observations became more sophisticated, the Hindu calendar became more sophisticated with complex rules and greater accuracy.<sup>[28][30][29]</sup>

According to Scott Montgomery, the *Siddhanta* tradition at the foundation of Hindu calendars predate the Christian era, once had 18 texts of which only 5 have survived into the modern era.<sup>[28]</sup> These texts provide specific information and formulae on motions of sun, moon and planets, to predict their future relative positions, equinoxes, rise and set, with corrections for prograde, retrograde motions, as well as parallax. These ancient scholars attempted to calculate their time to the accuracy of a *truti* (29.63 microseconds). In their pursuit of accurate tracking of relative movements of celestial bodies for their calendar, they had computed the mean diameter of the earth, which was very close to the actual 12,742 km (7,918 mi).<sup>[28][29]</sup>

Hindu calendars were refined during the Gupta era astronomy by Āryabhaṭa and Varāhamihira in the 5th to 6th century. These, in turn, were based in the astronomical tradition of *Vedāṅga Jyotiṣa*, which in the preceding centuries had been standardised in a number of (non-extant) works known as *Sūrya Siddhānta*. Regional diversification took place in the medieval period. The astronomical foundations were further developed in the medieval period, notably by Bhāskara II (12th century).

## Astrology

Later, the term *Jyotisha* evolved to include Hindu astrology. The astrological application of the Hindu calendar was a field that likely developed in the centuries after the arrival of Greek astrology with Alexander the Great,<sup>[19][31][32]</sup> because their zodiac signs are nearly identical.<sup>[16][33]</sup>

The ancient Hindu texts on Jyotisha only discuss timekeeping, and never mention astrology or prophecy.<sup>[34]</sup> These ancient texts predominantly cover astronomy, but at a rudimentary level.<sup>[17]</sup> Later medieval era texts such as the *Yavana-jataka* and the *Siddhanta* texts are more astrology-related.<sup>[35]</sup>

## Balinese Hindu calendar

Hinduism and Buddhism were the prominent religions of southeast Asia in the 1st millennium CE, prior to the Islamic conquest that started in the 14th century. The Hindus prevailed in Bali, Indonesia, and they have two types of Hindu calendar. One is a 210-day based Pawukon calendar which likely is a pre-Hindu system, and another is similar to lunisolar calendar system found in South India and it is called the Balinese saka calendar which uses Hindu methodology.<sup>[36]</sup> The names of month and festivals of Balinese Hindus, for the most part, are different, though the significance and legends have some overlap.<sup>[36]</sup>

## Astronomical basis

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The Hindu calendar is based on a geocentric model of the solar system. A large part of this calendar is defined based on the movement of the sun and the moon around the earth (saura māna and cāndra māna respectively). Furthermore, it includes synodic, sidereal, and tropical elements. Many variants of the Hindu

calendar have been created by including and excluding these elements (solar, lunar, lunisolar etc.) and are in use in different parts of India.

Elements of the Hindu calendar

	synodic elements	sidereal elements	tropical elements
saura māna		rāśi, sauramāsa, varṣa	uttarāyaṇa, dakṣiṇāyana, devayāna, piṭṛyāṇa, rtu
cāndra māna	tithi, pakṣa, candramāsa, varṣa		
nākṣatra māna		dina, ghaṭikā (aka nāḍī), vighaṭikā (aka vināḍī), prāṇa (aka asu)	
sāvana māna	dina		

## Year: Samvat

*Samvat* refers to era of the several Hindu calendar systems in Nepal and India, in a similar manner to the Christian era. There are several *samvat* found in historic Buddhist, Hindu and Jaina texts and epigraphy, of which three are most significant: Vikrama era, Old Shaka era and Shaka era of 78 AD.<sup>[37]</sup>

- **Vikram Samvat (Bikram Sambat):** A northern Indian almanac which started in 57 BCE, and is also called the *Vikrama Era*. It is related to the Bikrami calendar, and is apocryphally linked to Vikramaditya. The year starts from the month of Baishakh / Vaishakha. This system is common in epigraphic evidence from northern, western, central and eastern Indian subcontinent, particularly after the early centuries of the 1st millennium CE.<sup>[37]</sup>
- **Shaka Samvat:** There are two Shaka era systems in scholarly use, one is called *Old Shaka Era*, whose epoch is uncertain, probably sometime in the 1st millennium BCE because ancient Buddhist, Jaina and Hindu inscriptions and texts use it. However, the starting point of Old Shaka Era is a subject of dispute among scholars. The second system is called *Saka Era of 78 AD*, or simply *Saka Era*, a system that is common in epigraphic evidence from southern India.<sup>[37]</sup>
- **Saka era of Southeast Asia:** The Hindu calendar system in Indonesia is attributed to the legend of Hindus arriving with a sage Aji Saka in 1st-century Java, in March 78 CE.<sup>[40][41]</sup> Numerous ancient and medieval era texts and inscriptions found in Indonesian islands use this reference year.<sup>[42][43]</sup> In mainland southeast Asia, the earliest verifiable use of Hindu Saka methodology in inscriptions is marked *Saka 533* in Ankor Borei, which corresponds to 611 CE, while the Kedukan Bukit inscription in Sumatra, containing three dates in *Saka 604* (682 CE), is the earliest known use of the Shaka era in the Indonesian islands.<sup>[43]</sup> However, these inscriptions only set the floruit for the use of the Shaka era in these places, and the Hindu calendar likely existed in southeast Asia before these dates to be used in important monuments. Further, the



The Hindu calendar saka samvat system is found in Indonesian inscriptions, such as the Kedukan Bukit inscription (pictured above) dated to 604 Śaka, which is equivalent to 682 CE.<sup>[38][39]</sup>

Hindu calendar system remained popular among the Hindus through to the 15th century, and thereafter in Bali.<sup>[43]</sup>

- Indian national calendar (modern): combines many Hindu calendars into one official standardized one, but old ones remain in use.<sup>[44]</sup>

## Months

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### Solar month and seasons

The Hindu calendar divides the zodiac into twelve division called *rāśi*. The time taken by the Sun to transit through a *rāśi* is a solar month whose name is identical to the name of the *rāśi*. In practice, solar months are mostly referred as *rāśi* (not months).

The solar months are named differently in different regional calendars. While the Malayalam calendar broadly retains the phonetic Sanskrit names, the Bengali and Tamil calendars repurpose the Sanskrit *lunar month names* (Chaitra, Vaishaka etc.) as follows:

- The Tamil calendar replaces Mesha, Vrisha etc. with Chithirai, Vaigasi etc.
- The Bengali calendar is similar to the Tamil calendar except in that it starts the year with Boiśākh (instead of Choitrô), followed by Jyoisthô etc. The Assamese and Odia calendars too are structured the same way.

The solar months (*rāśi*) along with their equivalent names in the Bangali, Malayalam and Tamil calendar are given below:



Solar month names in different Hindu calendars

#	Vikrami (solar)	Assamese	Bengali	Malayalam	Odia	Tamil
1	Mina	চ'ত (Söt)	চৈত্র (Choitrô)	മീനം (Mīnaṁ)	ଚୈତ୍ର (Caitra)	பங்குனி (Paṅg
2	Mēsha	ব'হাগ (Böhag)	বৈশাখ (Boiśākh)	മേടം (Mēḍaṁ)	ବୈଶାଖ (Baiśākha)	சித்திரை (Sitti
3	Vrisha	জেঠ (Zeth)	জৈষ্ঠ (Jyoisthô)	ഇടവം (Idavaṁ)	ଜ୍ୟେଷ୍ଠ (Jyēṣṭha)	(Vaigās
4	Mithuna	আহাৰ (Ahar)	আষাঢ় (Āśādh)	മിഥുനം (Mithunaṁ)	ଆଷାଢ଼ (Āṣāḍha)	ஆணி (Āṇi)
5	Karka	শাওণ (Xaün)	শ্রাবণ (Śrābōṇ)	കർക്കാടകം (Karkkaṭakam)	ଶ୍ରାବଣ (Śrābaṇa)	ஆடி (Āḍi)
6	Singa	ভাদ (Bhado)	ভাদ্র (Bhādrô)	ചിങ്ങം (Ciṅṅaṁ)	ଭାଦ୍ର (Bhādraba) or ଭାଦ୍ର (Bhādra)	ஆவணி (Āva
7	Kanya	আহিন (Ahin)	আশ্বিন (Āśhshin)	കന്നി (Kanni)	ଆଶ୍ୱିନ (Āśvina)	(Puraṭṭi
8	Tula	কাতি (Kati)	কার্তিক (Kārtik)	തൂലാം (Tulāṁ)	କାର୍ତ୍ତିକ (Kārttika)	ஐப்பசி (Aippa
9	Vrischika	আঘোণ (Aghün)	অগ্রহায়ণ (Ôgrôhâyôn)	വൃശ്ചികം (Vṛścikam)	ମାର୍ଗଶିର (Mārgasīra)	கார்த்திகை (Kār
10	Dhanus	পোহ (Puh)	পৌষ (Poush)	ധനു (Dhanu)	ପୌଷ (Pauṣa)	மார்கழி (Mārg
11	Makara	মাঘ (Magh)	মাঘ (Māgh)	മകരം (Makaram)	ମାଘ (Māgha)	தை (Tai)
12	Kumbha	ফাগুন (Phagun)	ফাল্গুন (Phālgun)	കുംഭം (Kumbham)	ଫାଲ୍‌ଗୁନ (Phālguna) or ଫାଲ୍‌ଗୁଣ (Phaguṇa)	மாசி (Māsi)

The solar months (*rāśi*) along with the approximate correspondence to Hindu seasons and Gregorian months are:<sup>[29]</sup>

Rāśi	Sidereal signs	Gregorian months <sup>[30]</sup>	Ṛtu (season)
<div>Mīna</div> <div>Mesh</div>	<div></div> <div></div>	<div>Mid March–</div> <div>Mid May</div>	<div>Vasanta</div> <div>(Spring)</div>
<div>Vṛṣabha</div> <div>Mithuna</div>	<div></div> <div></div>	<div>Mid May–</div> <div>Mid July</div>	<div>Gṛīṣma</div> <div>(Summer)</div>
<div>Karkaṭa</div> <div>Siṃha</div>	<div></div> <div></div>	<div>Mid July–</div> <div>Mid Sep</div>	<div>Varṣā</div> <div>(Monsoon)</div>
<div>Kanyā</div> <div>Tulā</div>	<div></div> <div></div>	<div>Mid Sep–</div> <div>Mid Nov</div>	<div>Śarad</div> <div>(Autumn)</div>
<div>Vṛścika</div> <div>Dhanu</div>	<div></div> <div></div>	<div>Mid Nov–</div> <div>Mid Jan</div>	<div>Hemanta</div> <div>(Pre-Winter)</div>
<div>Makara</div> <div>Kumbha</div>	<div></div> <div></div>	<div>Mid Jan–</div> <div>Mid March</div>	<div>Śiśira</div> <div>(Winter)</div>



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The names of the solar months are also used in the Darian calendar for the planet Mars.

## Lunar months

Lunar months are defined based on lunar cycles, i.e. the regular occurrence of new moon and full moon and the intervening waxing and waning phases of the moon.

## Paksha

A lunar month contains two fortnights called *pakṣa* (पक्ष, literally "side").<sup>[2]</sup> One fortnight is the bright, waxing half where the moon size grows and it ends in the full moon. This is called "Gaura Paksha" or *Shukla Paksha*.<sup>[45]</sup> The other half is the darkening, waning fortnight which ends in the new moon. This is called "Vadhya Paksha" or *Krishna Paksha*.<sup>[2]</sup> The Hindu festivals typically are either on or the day after the full moon night or the darkest night (*amavasya*, अमावास्या), except for some associated with Krishna, Durga or Rama. The lunar months of the hot summer and the busy major cropping-related part of the monsoon season typically do not schedule major festivals.<sup>[46]</sup>

## Amanta and Purnimanta systems

Two traditions have been followed in the Indian subcontinent with respect to lunar months: the amanta tradition, which ends the lunar month on new moon day (similar to the Islamic calendar) and the purnimanta tradition, which ends it on full moon day.<sup>[47]</sup> As a consequence, in the amanta tradition, Shukla paksha precedes Krishna paksha in every lunar month, whereas in the purnimanta tradition, Krishna paksha precedes Shukla paksha in every lunar month. As a result, a Shukla paksha will always belong to the same month in both traditions, whereas a Krishna paksha will always be associated with different (but succeeding) months in each tradition.

Variations in the naming of lunar months

	Krishna Paksha	Shukla Paksha	Krishna Paksha
<b>Amanta</b>	Phalguna	Chaitra	
<b>Purnimanta</b>	Chaitra		Vaishaka



Map of regions in India using Hindu solar (orange), Lunar Amanta (blue), and Lunar Purnimanta (red) Calendars

The amanta (also known as Amavasyanta or Mukhyamana) tradition is followed by most Indian states that have a peninsular coastline (except Assam, West Bengal, Odisha, Tamil Nadu and Kerala, which use their own solar calendars). These states are Gujarat, Maharashtra, Goa, Karnataka, Andhra Pradesh and Telangana. Nepal and most Indian states north of the Vindhya mountains follow the purnimanta (or Gaunamana) tradition.

The purnimanta tradition was being followed in the Vedic era. It was replaced with the amanta tradition as the Hindu calendar system prior to the 1st century BCE, but the Purnimanta tradition was restored in 57 BCE by Vikramaditya, who wanted to return to the Vedic roots.<sup>[47]</sup> The presence of this system is one of the factors considered in dating ancient Indian manuscripts and epigraphical evidence that have survived into the modern era.<sup>[47][48]</sup>

The two traditions of Amanta and Purnimanta systems have led to alternate ways of dating any festival or event that occurs in a Krishna paksha in the historic Hindu, Buddhist or Jain literature, and contemporary regional literature or festival calendars. For example, the Hindu festival of Maha Shivaratri falls on the fourteenth lunar day of *Magha's* Krishna paksha in the Amanta system, while the same exact day is expressed as the fourteenth lunar day of *Phalguna's* Krishna paksha in the Purnimanta system.<sup>[49]</sup> Both lunisolar calendar systems are equivalent ways of referring to the same date, and they continue to be in use in different regions, though the Purnimanta system is now typically assumed as implied in modern Indology literature if not otherwise specified.<sup>[30][29]</sup>

## List of Lunar Months

The names of the Hindu months (<http://www.webexhibits.org/calendars/calendar-indian.html>) vary by region. Those Hindu calendars which are based on lunar cycle are generally phonetic variants of each other, while the solar cycle are generally variants of each other too, suggesting that the timekeeping knowledge travelled widely across the Indian subcontinent in ancient times.<sup>[1][29]</sup>

During each lunar month, the Sun transits into a sign of the zodiac (sankranti). The lunar month in which the Sun transits into Mesha is named Chaitra and designated as the first month of the lunar year.

A few major calendars are summarized below:

#	Vikrami (lunar) <sup>[30]</sup>	Sankranti	Hindi/ Marathi	Kannada	Kashmiri	Maithili	Meite (Manipuri)
1	<u>Chaitra</u>	Mēsha	चैत्र	ಚೈತ್ರ (Chaitra)	تَہَر [tsitʰɪr] or تَہَر [tsitʰɪr]	চৈতি (Chait)	ঢ়াংজ (Lar)
2	<u>Vaisākha</u>	Vrisha	वैशाख	ವೈಶಾಖ (Vaisākha)	وَبِيكْ [wahiakʰ] or بیساکھ [be:sa:kʰ]	বৈশাখ (Baishakh)	সজিবু (Sajibu)
3	<u>Jyesta</u>	Mithuna	ज्येष्ठ	ಜ್ಯೇಷ್ಠ (Jyesta)	زِيْئْ [ze:tʰ]	জেঠ (Jeth)	কলেন (Kalen)
4	<u>Āshāda</u>	Karka	आषाढ / आषाढ	ಆಷಾಢ (Āshāda)	ہار [ha:r]	असढ़ (Asadh)	ঐন (Een)
5	<u>Shraavana</u>	Singa	श्रावण	ಶ್ರಾವಣ (Shrāvana)	شَرَاوُن [ʃra:wun]	সাওন (Saon)	ঐংগ (Eengen)
6	<u>Bhādra</u>	Kanya	भाद्र / भाद्रपद	ಭಾದ್ರಪದ (Bhādrapada)	بَادِرِيْطْ [bə:dirpiatʰ] or بَادِرِيْطْ [bə:drɪatʰ] or بَادِرْ [bə:dir]	ভাদো (Bhado)	থৌৱা (Thouwar)
7	<u>Ashwina</u>	Tula	आश्विन	ಆಶ್ವಯುಜ (Āswayuja)	أَشِدْ [ə:ʃid]	আসিন (Aasin)	ল্যাংবান (Langban)
8	<u>Kartika</u>	Vrischika	कार्तिक	ಕಾರ್ತಿಕ (Kārtika)	كَارْتِكْ [ka:rtikʰ]	কাতিক (Katik)	মৈ (Me)

9	Mārgasirsa (Agrahayana)	Dhanus	मार्गशीर्ष	ಮಾರ್ಗಶಿರ (Mārgasira)	منجھڑ [mand̥ʒhor] or مونجہ بور [mond̥ʒiho:r] or مگر [magar]	अगहन (Agahan)	ಹೀಯಾಂ (Heeyan)
10	<u>Pausha</u>	Makara	पौष	ಪುಷ್ಯ (Pushya)	پوه [po:h] or پوه [pɔh]	पूज (Poos)	पोनु (Poinu)
11	<u>Māgha</u>	Kumbha	माघ	ಮಾಘ (Magha)	ماگ [ma:g]	माघ (Magh)	वकिचि (Wakchir)
12	<u>Phālguna</u>	Mina	फाल्गुण / फाल्गुन	ಫಾಲ್ಗುಣ (Phalguna)	پهاڱن [p'h'a:gun]	फागुन (Fagun)	फैरल (Fairel)

## Corrections between lunar and solar months

Twelve Hindu mas (māsa, lunar month) are equal to approximately 354 days, while the length of a sidereal (solar) year is about 365 days. This creates a difference of about eleven days, which is offset every  $(29.53/10.63) = 2.71$  years, or approximately every 32.5 months.<sup>[28]</sup> Purushottam Maas or Adhik Maas is an extra month that is inserted to keep the lunar and solar calendars aligned. The twelve months are subdivided into six lunar seasons timed with the agriculture cycles, blooming of natural flowers, fall of leaves, and weather. To account for the mismatch between lunar and solar calendar, the Hindu scholars adopted intercalary months, where a particular month just repeated. The choice of this month was not random, but timed to sync back the two calendars to the cycle of agriculture and nature.<sup>[28][29]</sup>



The astronomical basis of the Hindu lunar months. Also illustrates Adhika Masa (Year 2-Bhadrapada) repeats; the first time the Sun moves entirely within Simha Rashi thus rendering it an Adhika Masa

The repetition of a month created the problem of scheduling festivals, weddings and other social events without repetition and confusion. This was resolved by declaring one month as *Shudha* (pure, clean, regular, proper, also called *Deva* month) and the other *Mala* or *Adhika* (extra, unclean and inauspicious, also called *Asura masa*).<sup>[50]</sup>

The Hindu mathematicians who calculated the best way to adjust the two years, over long periods of a *yuga* (era, tables calculating 1000 of years), they determined that the best means to intercalate the months is to time the intercalary months on a 19-year cycle. This intercalation is generally adopted in the 3rd, 5th, 8th,

11th, 14th, 16th and 19th year of this cycle. Further, the complex rules rule out the repetition of Mārgasirsa (also called Agrahayana), Pausha and Maagha lunar months. The historic Hindu texts are not consistent on these rules, with competing ideas flourishing in the Hindu culture.<sup>[51]</sup>

## Rare corrections

The Hindu calendar makes further rare adjustments, over a cycle of centuries, where a certain month is considered *kshaya* month (dropped). This occurs because of the complexity of the relative lunar, solar and earth movements. Underhill (1991) describes this part of Hindu calendar theory: "when the sun is in perigee, and a lunar month being at its longest, if the new moon immediately precedes a samkranti, then the first of the two lunar months is deleted (called *nija* or *kshaya*)." This, for example, happened in the year 1 BCE, when there was no new moon between Makara samkranti and Kumbha samkranti, and the month of Pausha was dropped.<sup>[52]</sup>

## Day

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Just like months, the Hindu calendar has two measures of a day, one based on the lunar movement and the other on solar. The solar (*saura*) day or civil day, called *divasa* (दिवस), has been what most Hindus traditionally use, is easy and empirical to observe, with or without a clock, and it is defined as the period from one sunrise to another. The lunar day is called *tithi* (तिथि), and this is based on complicated measures of lunar movement. A lunar day or *tithi* may, for example, begin in the middle of an afternoon and end next afternoon.<sup>[53]</sup> Both these days do not directly correspond to a mathematical measure for a day such as equal 24 hours of a solar year, a fact that the Hindu calendar scholars knew, but the system of *divasa* was convenient for the general population. The *tithi* have been the basis for timing rituals and festivals, while *divasa* for everyday use. The Hindu calendars adjust the mismatch in *divasa* and *tithi*, using a methodology similar to the solar and lunar months.<sup>[54]</sup>

A *tithi* is technically defined in Vedic texts, states John E. Cort, as "the time required by the combined motions of the sun and moon to increase (in a bright fortnight) or decrease (in a dark fortnight) their relative distance by twelve degrees of the zodiac."<sup>[55]</sup> These motions are measured using a fixed map of celestial zodiac as reference, and given the elliptical orbits, a duration of a *tithi* varies between 21.5 and 26 hours, states Cort.<sup>[55]</sup> However, in the Indian tradition, the general population's practice has been to treat a *tithi* as a solar day between one sunrise to next.<sup>[55]</sup>

A lunar month has 30 *tithi*. The technical standard makes each *tithi* contain different number of hours, but helps the overall integrity of the calendar. Given the variation in the length of a solar day with seasons, and moon's relative movements, the start and end time for *tithi* varies over the seasons and over the years, and the *tithi* adjusted to sync with *divasa* periodically with intercalation.<sup>[56]</sup>

## Weekday/Vāsara

*Vāsara* refers to the weekdays in Sanskrit.<sup>[57]</sup> Also referred to as *Vara* and used as a suffix.<sup>[44]</sup> The correspondence between the names of the week in Hindu and other Indo-European calendars are exact. This alignment of names probably took place sometime during the 3rd century CE.<sup>[58][59]</sup> The weekday of a Hindu calendar has been symmetrically divided into 60 *ghatika*, each *ghatika* (24 minutes) is divided into 60 *pala*, each *pala* (24 seconds) is subdivided into 60 *vipala*, and so on.<sup>[58]</sup>

No.	<u>Sanskrit</u> <sup>[58][59]</sup>	Latin weekday	Celestial object	<u>Assamese</u>	<u>Bengali</u>
1	<u>Ravivāsara</u> रविवासर or <u>Aditya vāsara</u> आदित्य वासर	<u>Sunday/dies</u> <u>Solis</u>	<u>Ravi,</u> <u>Aditya =</u> <u>Sun</u>	<u>Dêûbār/Rôbibār</u> দেওবাৰ/ৰবিবাৰ	<u>Rôbibār</u> ৰবিবাৰ
2	<u>Somavāsara</u> सोमवासर or <u>Indu vāsara</u> इन्दु वासर	<u>Monday/dies</u> <u>Lunae</u>	<u>Soma</u> (deity), <u>Chandra</u> = <u>Moon</u>	<u>Xûmbār</u> সোমবাৰ	<u>Śombār</u> সোমবাৰ
3	<u>Maṅgalavāsara</u> मङ्गलवासर or <u>Bhaumavāsara</u> भौम वासर	<u>Tuesday/dies</u> <u>Martis</u>	<u>Maṅgala</u> = <u>Mars</u>	<u>Mônôlbār/Môṅgôlbār</u> মঙলবাৰ/মঙ্গলবাৰ	<u>Môṅgôlbār</u> মঙ্গলবাৰ
4	<u>Budhavāsara</u> बुधवासर or <u>Saumya vāsara</u> सौम्य वासर	<u>Wednesday/dies</u> <u>Mercurii</u>	<u>Budha =</u> <u>Mercury</u>	<u>Budhbār</u> বুধবাৰ	<u>Budhbār</u> বুধবাৰ
5	<u>Guruvāsara</u> गुरुवासर or <u>Brhaspati vāsara</u> बृहस्पतिवासर	<u>Thursday/dies</u> <u>Iovis/Jupiter</u>	<u>Deva-</u> <u>Guru</u> <u>Brhaspati</u> = <u>Jupiter</u>	<u>Brihōspôtibār</u> বৃহস্পতিবাৰ	<u>Brihōspôtibār</u> বৃহস্পতিবাৰ

6	<u>Śukravāsara</u> <u>शुक्रवासर</u>	<u>Friday/dies</u> <u>Veneris</u>	<u>Śukra =</u> <u>Venus</u>	<u>Xukurbār/Xukrôbār</u> <u>শুকুৰবাৰ/শুক্রবাৰ</u>	<u>Śukrôbār</u> <u>শুক্রবাৰ</u>
7	<u>Śanivāsara</u> <u>शनिवासर</u> Or <u>Śaniścaravāsara</u> <u>शनिश्चरवासर</u>	<u>Saturday/dies</u> <u>Saturnis</u>	<u>Śani =</u> <u>Saturn</u>	<u>Xônibār</u> <u>শনিবাৰ</u>	<u>Śônibār</u> <u>শনিবাৰ</u>

1. Punjabi Muslims use Urdu/Arabic words for Friday / Saturday etc.<sup>[60]</sup>

The term **-vāsara** is often realised as **vāra** or **vaar** in Sanskrit-derived and influenced languages. There are many variations of the names in the regional languages, mostly using alternate names of the celestial bodies involved.

## Five limbs of time

The complete Vedic calendars contain five *angas* or parts of information: lunar day (tithi), solar day (diwas), asterism (nakṣatra), planetary joining (yoga) and astronomical period (karanam). This structure gives the calendar the name *Panchangam*.<sup>[44]</sup> The first two are discussed above.

## Yoga

The Sanskrit word Yoga means "union, joining, attachment", but in astronomical context, this word means latitudinal and longitudinal information. The longitude of the sun and the longitude of the moon are added, and normalised to a value ranging between 0° to 360° (if greater than 360, one subtracts 360). This sum is divided into 27 parts. Each part will now equal 800' (where ' is the symbol of the arcminute which means 1/60 of a degree). These parts are called the *yogas*. They are labelled:

1. Viṣkambha
2. Prīti
3. Āyusmān
4. Saubhāgya



5. Śobhana
6. Atigaṇḍa
7. Sukarma
8. Dhrti
9. Śūla
10. Gaṇḍa
11. Vṛddhi
12. Dhruva
13. Vyāghatā
14. Harṣaṇa
15. Vajra
16. Siddhi
17. Vyatipāta
18. Variyas
19. Parigha
20. Śiva
21. Siddha
22. Sādhya
23. Śubha
24. Śukla
25. Brahma
26. Māhendra
27. Vaidhṛti

Again, minor variations may exist. The *yoga* that is active during sunrise of a day is the prevailing *yoga* for the day.

## Karaṇa

A **karaṇa** is half of a **tithi**. To be precise, a karaṇa is the time required for the angular distance between the sun and the moon to increase in steps of 6° starting from 0°. (Compare with the definition of a tithi.)

Since the tithis are 30 in number, and since 1 tithi = 2 karaṇas, therefore one would logically expect there to be 60 karaṇas. But there are only 11 such karaṇas which fill up those slots to accommodate for those 30 tithis. There are actually 4 "fixed" (sthira) karaṇas and 7 "repeating" (cara) karaṇas.

The 4

1. Śakuni (शकुनि)
2. Catuṣpāda (चतुष्पाद)
3. Nāga (नाग)
4. Kimṣtughna (किंस्तुघ्न)

The 7 "repeating" karaṇas are:<sup>[61]</sup>

1. Vava or Bava (बव)
2. Valava or Bālava (बालव)

3. Kaulava (कौलव)
4. Taitila or Taitula (तैतिल)
5. Gara or Garaja (गरज)
6. Vanija (वणिज)
7. Viṣṭi (Bhadra) (भद्रा)

- Now the first half of the 1st *tithi* (of Śukla Pakṣa) is always *Kiṃtughna karaṇa*. Hence this **karaṇa** is "fixed".
- Next, the 7-repeating karaṇas repeat eight times to cover the next 56 half-*tithis*. Thus these are the "repeating" (cara) karaṇas.
- The 3 remaining half-*tithis* take the remaining "fixed" karaṇas in order. Thus these are also "fixed" (sthira).
- Thus one gets 60 karaṇas from those 11 preset karaṇas.

The Vedic day begins at sunrise. The karaṇa at sunrise of a particular day shall be the prevailing karaṇa for the whole day. (citation needed )

## Nakshatra

Nakshatras are divisions of ecliptic, each 13° 20', starting from 0° Aries.

## Festival calendar: Solar and Lunar dates

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Many holidays in the Hindu, Buddhist and Jaina traditions are based on the lunar cycles in the lunisolar timekeeping with foundations in the Hindu calendar system. A few holidays, however, are based on the solar cycle, such as the Vaisakhi, Pongal and those associated with Sankranti.<sup>[62]</sup> The dates of the lunar cycle based festivals vary significantly on the Gregorian calendar and at times by several weeks. The solar cycle based ancient Hindu festivals almost always fall on the same Gregorian date every year and if they vary in an exceptional year, it is by one day.<sup>[63]</sup>

## Regional variants

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The Hindu Calendar Reform Committee, appointed in 1952, identified more than thirty well-developed calendars, in use across different parts of India.

Variants include the lunar emphasizing *Vikrama*, the *Shalivahana* calendars, as well as the solar emphasizing Tamil calendar and Malayalam calendar. The two calendars most widely used today are the *Vikrama* calendar, which is followed in western and northern India and Nepal, the *Shalivahana Shaka* calendar which is followed in the Deccan region of India (Comprising present day Indian states of Telangana, Andhra Pradesh, Karnataka, Maharashtra, and Goa).<sup>[64]</sup>

## Lunar

Calendars based on lunar cycle (lunar months in solar year, lunar phase for religious dates and new year):

- Vikram Samvat
  - Vikrami era – North and Central India (Lunar)

- Gujarati samvat – Gujarat, Rajasthan
- Sindhi samvat – Sindhis
- Shalivahana calendar (Shaka era) – Used in Deccan region states of Maharashtra, Goa, Karnataka, Andhra Pradesh, Telangana
- Saptarishi era calendar – Kashmiri Pandits
- Nepal Sambat – Nepal, Sikkim
- Meitei calendar – Manipur

## Solar

Calendars based on solar cycle (solar months in solar year, lunar phase for religious dates but new year which falls on solar date – South and Southeast Asian solar New Year):

- Assamese calendar – Assam
- Bengali calendar – West Bengal
- Odia calendar – Odisha
- Tirhuta Panchang – Maithilis
- Tripuri calendar – Tripura
- Malayalam calendar – Kerala
- Tamil calendar – Tamil Nadu
- Tulu calendar – Tulus
- Vikram Samvat
  - Punjabi calendar – Punjab, Haryana
  - Vikrami era – North and Central India (Solar)
  - Bikram Sambat – Nepal, Sikkim

## Other related calendars across India and Asia

- Indian national calendar – used by Indian Government (civil calendar based on solar months)
- Vira Nirvana Samvat (Lunar) – Jain
- Nanakshahi calendar (Solar) – Sikh
- Buddhist calendar (Lunar) – Buddhist
- Tibetan calendar (Lunar) – Tibet, Ladakh, Sikkim, Arunachal Pradesh
- Pawukon calendar – Bali
- Balinese saka calendar (Lunar) – Bali
- Cham calendar (Lunar) – Chams
- Chula Sakarat (Solar) – Myanmar
- Thai solar calendar – Thailand
- Thai lunar calendar – Thailand
- Khmer calendar (Solar) – Cambodia

## See also

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- Hinduism

- [Panjika](#)
- [Sankranti](#)
- [Ekadashi](#)
- [Panchangam](#)
- [Kollam era](#)
- [Hindu astrology](#)
- [Hindu units of time](#)
- [Malayalam calendar](#)
- [List of Hindu festivals](#)
- [Hindu units of measurement](#)
- [List of Hindu Empires and Dynasties](#)
- [Astronomical basis of the Hindu calendar](#)

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## External links

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- Ahargana - The Astronomy of the Hindu Calendar (<https://www.youtube.com/@ahargana>) Explains the various calendric elements of the Hindu calendar by means of astronomical simulations created using Stellarium.
- Converter: Gregorian and 1957 Normalized Indian Calendar (<https://web.archive.org/web/20170524154539/http://www.bsswebsite.me.uk/Daysanddates/indiandate.htm>), Shalivahana Hindu calendar, United Kingdom
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