THE VEDA AND THE CONCEPT OF 360 DEGREES OF ANGLES OF A CIRCLE

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INTRODUCTION
It is well known that each circle has 360° of angles. But why 360°? Why not 400° or 500° to make calculations easier? What is the basic concept behind this computation of 360° of angles for a circle? Who first, when and in what text, developed this concept? When we analyse and go in-depth into these details, we will astonish to know the mighty knowledge and the wisdom of the Rishies of our Motherland, Bharat.

THE VEDA
We all know well, the Veda are the oldest scriptures in the whole world. In Hinduism, Veda are worshipped as Anadi and Sanatana. That means Veda are eternal. Veda, as we know, are full of knowledge and wisdom. Veda, the Sanskrit word derived from the root, ‘Vid’ which means, ‘to know, to learn’. Hence, a thorough study of Veda will not only guide us spiritually, but give us the most modern scientific knowledge also.

ṚG VEDA
Ṛg Veda Samhitā 1st Mandalam 164th Sūktam (Hymn) 48th Mantram (verse) reveals

Dvādaśa pradhāyaḥ cakram ekam trini nabhyāni ka u tacciketa |
Tasmīntākam triṣṭātā na śāṅkavoṛpitāḥ shashtiḥma
calācalāsah ||

Meaning: Dvādaśa – 12; Pradhāyaḥ – the arcs of a wheel; cakram ekam – one wheel; trini – three; nabhyāni – hubs or centre part of the wheel; Trisāta shashtiḥma – 360; Śāṅkava – spokes of the wheel; Calācalāsah – movable and immovable. The arcs are twelve, the wheel is one and three are the axes. Who indeed knows it? Within it are collected three hundred and sixty spokes, which are as it were movable and immovable.

ṚG VEDIC DESCRIPTION OF ECLIPTIC AS ONE WHEEL

WITH 12 ARCS & 360 SPOKES

[Diagram of the ecliptic as one wheel with 12 arcs and 360 spokes]

FIGURE: 1
Further, Ṛg Veda Samhitā 1st Mandala 164th Śūktam (Hymn) 11th Mantram (verse) reveals.\(^2\)

\[ \text{द्वधारा हि नं तत्त्वं विकल्पं फलं परि न्यायस्तनम्} \]
\[ \text{षु पुण अथ विनिश्चितस्य अथ सत्य शास्तिं नितितित्वं तत्त्वम्} \]
\[ \text{व्द्वेद वै ताजज्य वै वर्ष वर्षम परि मेदिस्या} \]
\[ \text{पुर्णाम् मिथुनं सो अत्र सप्तविष्णु निवीतित्वं तश्चु} \]

Meaning: Dvadasa – 12; Mithunaso putra – sons in pairs; Saptasatani vinsati – 720;
The wheel of law (Sun) with 12 arcs goes round and round the Heaven. It is not indeed to be decayed. Here stand, O Agni, the seven hundred and twenty sons in pairs.

The astronomical events happening in the celestial sphere are expressed beautifully and poetically in these verses of Ṛg Veda Samhitā. The celestial pathway in which the Earth revolves round the Sun, with respect to the fixed stars of the sky, is called the Ecliptic. The ecliptic, though frequently drawn as circular, is an elliptical pathway (0.0167/1 of Ellipse), encircling the Sun. The above-mentioned verse of lbrace; inserts a two part section here about a wheel having 12 arcs, 3 axes and 360 spokes and mentions it as cakram ekam - one wheel. We all know that the Earth revolves round the Sun, in a unidirectional motion, in the ecliptic. This means that the Earth's position in the ecliptic will vary with the time. For example, at each Sunrise within a year, the Earth will definitely be at different positions in the ecliptic with respect to the fixed stars. If the light rays of the rising Sun, reaching the Earth in the morning, are imagined as spokes of a wheel, then there will be as many number of spokes, as the total number of Earth's positions at Sunrise, in the ecliptic which in turn, is equal to the total number of Sunrises in a year.

The verse 1-164-48 of Ṛg Veda mentions that there are 360 spokes for this one wheel – the ecliptic. So in turn, it means that there are 360 Sunrises in a year. Surya siddhanta reveals "Udayaḥ Udayam bhūnol bhūmi Sāvanavasārayaḥ". It means that Savana dina (one day) is the interval of time between one Sunrise and the next consecutive Sunrise.\(^4\) So if there are 360 Sunrises in a year, then it means that there are 360 days for a year. Thus, Ṛg Veda expresses that there are 360 spokes for one wheel, which in turn means 360 days for one year. The 12 arcs are the 12 divisions of the perimeter of this wheel (ecliptic), which denote the 12 months of a year. The 3 axes denote the three double seasons of one year.

So in the fore mentioned verses of Ṛg Veda,
1. One wheel denotes the ecliptic – the elliptical celestial pathway of the Earth, encircling the Sun.
2. Twelve arcs denote 12 divisions of the perimeter of the wheel and 12 months of a year.
3. 360 spokes denote 360 days of one Savana year.
4. 720 children in pairs mentioned in the verse 1-164-11 of Ṛg Veda denote 360 day time and 360 night time in pairs making a total of 720, that is 360 days of one Savana year.

Taittiriya Samhitā of Kṛṣṇa Yajur Veda (7-5-1) also gives the same view and mentions 360 stotriya (verses) for recitation for 360 nights of a year (samvatśara). The calculation of 360 days for one savana year has its base in the Yuga calculations and is calculated by observing the heliacal rising of the stars of the ecliptic.

HELIACAL RISING OF THE STARS
The rising of any star in the ecliptic in the eastern horizon, early in the morning, just before the Sunrise is called Heliacal rising of that particular star.

This heliacal rising of any particular star of the ecliptic, will happen only once in the whole year. The particular day of the heliacal rising of the star has been given a special importance in Vedic rituals. Taittiriya Brāhmaṇa (1-5-2-1) mentions about the heliacal rising of the stars and this particular verse is repeated even to-day as ‘Punyāṇa Vacana’ the purification ceremony, preceding the commencement of all important religious ceremonies. A star, which rises heliacally today, will rise in the eastern sky, at about four minutes earlier the next day. In the course of one month - 30 days – it rises (30x4) 120 minutes - 2 hours earlier. In the same way in 6 months, this self same star will rise in the east in the evening in our latitude, immediately after the Sun sets in the west, that is 12 hours earlier the Sunrise of the next day. This is called Acronycal rising of the star.\(^7\)
After another 6 months, that is, one full year after its heliacal rising, the self same star again rises heliacally in the east, just before the Sun rises. Our ancestors counted the total number of Sunrises between the two consecutive heliacal risings of the self same star of the ecliptic, that is during Earth’s one full revolution round the Sun, that is in one full year. It was found, that there are ordinarily 365 Sunrises during this period. Out of these 365 Sunrises, based on Yuga calculations, only 360 are taken as the days of one savana year.

**YUGA CALCULATIONS**

Aryabhāta (kālikriya-verse 7) says,⁸

रेखायां मानकां तपस्या सिद्धां धारणां यथाकार्यम्।
पितर्यां प्रसंगीतां दिव्यां प्रथमं कथितकरणम्।

Ravivarsha m’nushyang tumadi triśādgunyam bhavati pitrayam |
Pitrayam dv’dafaguntim divyam varsha vinirdishoam |
A Solar year is a year of men. Thirty times of this, is a year of Pitru. Twelve times a year of Pitru is a Divine year or a year of Gods. That is 360 years of men and one year of Gods are equal.

Sisyaśādhivṛddhida Tantra of Lalla in its 3rd and 7th verses of Pratama’dhyaaya, says that 342 multiplied by 10,000 gives the number of years in a yuga (43,200,000 years). 1,55,520 multiplied by 10,000 gives the number of solar days in a Yuga (155,52,00,000). Hence in one year there are 360 days (155,52,00,000 / 43,20,000 = 360).⁹ Surya siddhanta reveals “Dvīpa Abda” as one year of Gods of Heaven which is equal to 360 of our solar years.¹⁰ Our one year is equal to one day of Gods.¹⁰ God’s one year thus contains 360 days. Thus the civil or Savana year consists of 360 days and 12 months of 30 days each.¹¹

Out of these 365 Sunrises between the two consecutive heliacal risings of the self same star, only 360 are computed as the number of days of one savana year. The remaining five days are meant for conducting Panca Rātra Yajna to complete the seasons. As there are 365 Sunrises in one year, if we calculate only 360 days for one year, the seasonal periods tend to vary in the coming years. In order to ensure that the seasonal periods to fall in the same months of all the forthcoming years, our ancestors conducted this yajna, for five nights at the end of every savana year. After completing this Yajna for 5 days, the 6th day is calculated as the 1st day of the next savana year. Kṛṣṇa Yajurveda Taittirīya Samhitā 7-1-10 reveals¹² that 5 days are required over and above the savana year of 360 days to complete the seasons, adding specifically that 4 days are too short and 6 days are too long.

**360 DEGREES OF ANGLES OF A CIRCLE**

The Earth revolves round the Sun, in a unidirectional motion. Every day, it moves forward a little, from its previous day’s position at the perimeter of this wheel (the ecliptic). Thus, the Earth will be at 360 different places at Sunrise, with respect to the fixed stars, in one savana year of 360 days. The rays of the rising Sun, reaching the Earth in the morning, resembles and can be expressed as the spokes of a wheel, with the Sun nearly at its centre and the Earth at the perimeter. So, there will be 360 spokes of rays of the rising Sun reaching the Earth, in the mornings of one savana year of 360 days.

Thus there will be 360 spokes, from the Sun which is nearly at the centre, to the Earth at the perimeter of the wheel (ecliptic), during Earth’s one full revolution round the Sun (in one full circle). Then each spoke is calculated as one unit of angle of measurements for this circle – the ecliptic. Since there are 360 spokes for this one wheel, there will be 360 units of angles of measurements for one full circle. This is what exactly, the Rig Veda verse 1-164-48 had already revealed. In our Nation, ‘Amsa’ is the unit for the angle of measurements of a circle, whose modern equivalent is degree. Thus the concept of 360 degrees (Amsa) of angles for a circle had its origin in Rig Veda itself.

**TIME MEASUREMENTS**

Not only this, but the other time measurements in our Nation, is completely scientific and is based on the angular distance covered by the Earth on revolving round the Sun in the ecliptic, in that particular time. Aryanbhāṭa (kālikriya 1 & 2) mentions¹³

वेष्ट इतिहास वाचानविधानं न प्रकटं संस्कृतं।
व्याघ्यो विफा: वैदिक विज्ञानका साही।

Varsha dv’dāla m’s’striśād divaso bhavat sa m’sastu |

Shashīr n’vāyo divasaśe shashīrīca vin’vaikik n’vāt surveillance of vātikākaṣṭhā yad vaya prāgaḥ।

And even on this subject, in our Vedas, our科技成果 also

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**VIJNANA BHARATI**
Gurukshan ni shashir vin*4ik* rks l sha4 eva v*  
pr*n* t  
Evar k*lasth* gsa* kshetravish* ga* bhan*t  

Meaning:- A year consists of 12 months. A month consists of 30 days. A day consists of 60 nadiis. A nadi consists of 60 vinadikas. A vinadika is equal to (the time taken by a man in normal conditions in pronouncing) 60 long syllables (with moderate flow of voice) or (in taking) six respirations. This is the division of time. The division of a circle (the ecliptic) proceeds in a similar manner from the revolution.

Vatesvara Siddhanta and Gola by Vatesvara mentions in the 8th slogo of Bhagananirdesh of Madhyagatayadhikarah as “Six Asus make one sidereal pala, sixty pala make a ghatika. Sixty ghatika make a day. 30 days make a month, and 12 times of that, is a year. The divisions of the circle too have been defined in the same manner as those of time, excepting those up to asu”.

### The Time Measurements
- 1 Savana year - 12 months - 360 days
- 1 Month - 30 Days
- 1 Day - 60 Nadiis (Nadiika, ghatika)
- 1 Nadi - 60 Vinadiika (Vighatika)
- 1 Vinadiika - 60 Gurvakshaara (Long syllables)

### The Divisions of a Circle
- 1 Revolution - 12 rasis (Pradhayana, sign) - (Circle, Bhagana) 360 Amsa (Degrees)
- 1 Rasi - 30 Amsa (Degrees)
- 1 Amsa - 60 Lipta (Kalaminutes)
- 1 Lipta - 60 Vilipita (Vikala-Seconds)
- 1 Vilipita - 60 Tatpara (Thirds)

Thus the time division in our Nation is based on the angular distance covered by the Earth, in the ecliptic, round the Sun, in that particular time. For example, one year is the time required for the Earth to complete 360° (one full circle), one month for 30° (one arc-rasi-sign), one day for 1° (amasa-spoke), one ghatika for 1′ (tipta-kala), one vinadiika for 1″ (vilipita-vikala) and one guurvakshara for 1‴ (third-tatpara) of angular distance.

### CONCLUSION
From the table, we can able to conclude that there is an exact confluence of the spatial distance in the ecliptic travelled by the Earth in its unidirectional motion and the time measurements developed in our Nation. This is completely scientific, totally based on the angular distance covered by the Earth in the ecliptic and the time required for that.

Thus the space and the direction concept (Dik DeSa Kala)

Vardhamana of the most modern science and the concept of 360° of angles of a circle had been developed scientifically and applied in the day-to-day life, by our ancestors, in the remotest antiquity itself and this concept is fully revealed by Veda which are Anadi and Sanatana.

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