Aryabhata-I
(b. 476 AD)

ARYABHATIYA
CRYPTOGRAPHIC-NUMERALS

Number of Revolutions of Geo-centric planets in a Mahayuga (43,20,000 years) and Reason for naming Hindu week-days

(*Aryabhatiya of Aryabhatiya I* (499 AD))

[Ref : 1 . *Aryabhatiya, with the commentary of Bhaskara-I and Someswara* : Edited by K S Shukla, INSA, New Delhi, (1976) p.71, 78-83.

2. *Aryabhatiya, with the commentary of Suryadeva Yajvan* : Edited by K V Sharma, INSA, New Delhi, (1976) p. 47]

3. *A concise History of Science in India* : D. M. Bose, S. N. Sen, B. V. Subbarayappa *(Editors),* INSA, New Delhi, (1989)

Sanskrit Alphabets as Cryptographic Numerals in Aryabhatiya (499 A.D.) *of Aryabhata-I*

वर्गाक्षराणि वर्गेऽवर्गेऽवर्गाक्षराणी कात् ङ्मौ यः ।
खद्विनवके स्वरा नव वर्गेऽवर्गे नवान्त्यवर्गे वा ॥

[*Aryabhatiya, with the commentary of Suryadeva Yajvan* : Edited by K V Sharma, INSA, New Delhi, (1976), p. 9-11]

वर्ग letters (*from* क् *to* म्) are to be written in the वर्ग places (of even powers of ten),

अवर्ग letters (*from* य् *to* ह्) in the अवर्ग places (of odd powers of ten).

The numerical value of initial अवर्ग Letter य is 30, because

य = (य् × A) = 3 × 10, (ङ् + म्) = 5 + 25.

Each of the nine स्वराः (vowels) has two zeros to denote place values (in powers of ten) so that वर्ग letters occupy the places of even powers of ten and अवर्ग letters occupy places of odd powers of ten.

[Connective for व्यञ्जन and स्वर is x. Connective for व्यञ्जन and व्यञ्जन is +].

Number of Revolutions of Heavenly Bodies in a Yuga

(*One Yuga* = 43,20,000 *years*)

युगरविभगणाः ख्युघृ, शशि चयगियिङुशुछृलृ,
शनि ढुङ्विघ्व,गुरु खिच्युभ, कुज भद्लिझ्नुनुखृ,
बुध सुगुशिथृन, भृगु जषबिखुछृ ॥

[Refer : *Aryabhatiya, with the commentary of Bhaskara-I and Someswara* : Edited by K S Shukla, INSA, New Delhi, (1976), p. 18]

Number of revolutions made by (Geo-centric) *Planets* in a *Yuga* (*One Yuga* = 43,20,000 *years*) :

Sun रवि, ख्युघृ; 43,20,000, *Moon* सोम, चयगियिङुशुछृलृ,; 5,77,53,336,

Saturn शनि ढुङ्विघ्व; 1,46,564 *Jupitor* गुरु, खिच्युभ; 3,64,224,

Mars कुज (मङ्गळ),भद्लिझ्नुनुख; 22,96,824

Mercury बुध, सुगुशिथृन; 1,79,37,020, *Venus* भृगु, जषबिखुछृ μ; 70,22,388

Table of Aryabhatiya Devnagary cryptic numerals

वर्गः	क्	ख्	ग्	घ्	ङ्	च्	छ्	ज्	झ्	ञ्	ट्	ठ्	ड्	ढ्	ण्
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	त्	थ्	द्	ध्	न्	प्	फ्	ब्	भ्	म्					
	16	17	18	19	20	21	22	23	24	25					

अवर्गः	य्	र्	ल्	व्	श्	ष्	स्	ह्
	3	4	5	6	7	8	9	10

स्वरः	अ	इ	उ	ऋ	ए	ऐ	ओ	औ
वर्गः	10^0	10^2	10^4	10^6	10^8	10^{10}	10^{12}	10^{14}
अवर्गः	10^1	10^3	10^5	10^7	10^9	10^{11}	10^{13}	10^{15}

Number of revolutions of Saturn (शनि) in 43,20,000 years is ढुङ्विघ्व in *Aryabhatiya cryptographic numerals*

ढुङ्विघ्व = (ढ् . उ) + (ङ् . इ) + (व् . इ) + (घ् . अ) + (व् . अ)

= $(14 \times 10^4) + (5 \times 10^2) + (6 \times 10^3) + (4 \times 1) + (6 \times 10)$

= 1,46,564. [Number of revolutions of Saturn in 43,20,000 years].

वर्गः	क्	ख्	ग्	घ्	ङ्	च्	छ्	ज्	झ्	ञ्	ट्	ठ्	ड्	ढ्	ण्
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	त्	थ्	द्	ध्	न्	प्	फ्	ब्	भ्	म्					
	16	17	18	19	20	21	22	23	24	25					

अवर्गः	य्	र्	ल्	व्	श्	ष्	स्	ह्
	3	4	5	6	7	8	9	10

स्वरः	अ	इ	उ	ऋ	ए	ऐ	ओ	औ
वर्गः	10^0	10^2	10^4	10^6	10^8	10^{10}	10^{12}	10^{14}
अवर्गः	10^1	10^3	10^5	10^7	10^9	10^{11}	10^{13}	10^{15}

Number of revolutions of jupitor (गुरु) in 43,20,000 years is खिच्युभ in *Aryabhatiya cryptographic numerals*

खिच्युभ = (ख् . इ) + (र् . इ) + (च् . उ) + (य् . उ) + (भ् . अ)

= $(2 \times 10^2) + (4 \times 10^3) + (6 \times 10^4) + (3 \times 10^5) + (24 \times 10^0)$

= 3,64,224 . [Number of revolutions of Jupitor in 43,20,000 years].

वर्गः	क्	ख्	ग्	घ्	ङ्	च्	छ्	ज्	झ्	ञ्	ट्	ठ्	ड्	ढ्	ण्
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	त्	थ्	द्	ध्	न्	प्	फ्	ब्	भ्	म्					
	16	17	18	19	20	21	22	23	24	25					

अवर्गः	य्	र्	ल्	व्	श्	ष्	स्	ह्
	3	4	5	6	7	8	9	10

स्वरः	अ	इ	उ	ऋ	ए	ऐ	ओ	औ
वर्गः	10^0	10^2	10^4	10^6	10^8	10^{10}	10^{12}	10^{14}
अवर्गः	10^1	10^3	10^5	10^7	10^9	10^{11}	10^{13}	10^{15}

Number of revolutions of *Mars* (मङ्गळ) in 43,20,000 years is भद्लिझनुखृ in *Aryabhatiya cryptographic numerals*

भद्लिझुनुखृ = (भ्. अ) + (द. इ) + (ल्. इ) + (झ्. उ) + (न्. उ) + (ख् . ऋ)

$= (24\times 10^{0}) + (18\times 10^{2}) + (5\times 10^{3}) + (9\times 10^{4}) + (20\times 10^{4}) + (2\times 10^{6})$

= 22,96,824 . [Number of revolutions of Jupitor in 43,20,000 years].

वर्गः	क्	ख्	ग्	घ्	ङ्	च्	छ्	ज्	झ्	ञ्	ट्	ठ्	ड्	ढ्	ण्
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	त्	थ्	द्	ध्	न्	प्	फ्	ब्	भ्	म्					
	16	17	18	19	20	21	22	23	24	25					

अवर्गः	य्	र्	ल्	व्	श्	ष्	स्	ह्
	3	4	5	6	7	8	9	10

स्वरः	अ	इ	उ	ऋ	ए	ऐ	ओ	औ
वर्गः	10^{0}	10^{2}	10^{4}	10^{6}	10^{8}	10^{10}	10^{12}	10^{14}
अवर्गः	10^{1}	10^{3}	10^{5}	10^{7}	10^{9}	10^{11}	10^{13}	10^{15}

Aryabhatiya Numerals and its *International Numerals* of the Number of Revolutions (velocity) of (Geo-centric) *Planets* in *a Yuga* (43,20,000 yrs.), in the increasing order.

ग्रह	आर्यभटीयसङ्ख्या	*Planets*	*International Numeral*
शनि	ढुङ्विघ्व;	*Saturn*	1,46,564
गुरु,	ख्रिच्युभ;	*Jupitor*	3,64,224
कुज,	भद्लिझुनुखृ;	*Mars*	22,96,824
रवि,	ख्युघृ;	*Sun*	43,20,000
भृगु,	जषबिखुछृ μ;	*Venus*	70,22,388
बुध,	सुगुशिथृन;	*Mercury*	1,79,37,020
सोम,	चयगियिङुशुछृलृ,;	*Moon*	5,77,53,336

[Ref: *Aryabhatiya, with the commentary of Bhaskara-I and Someswara* : Edited by K S Shukla, INSA, New Delhi, (1976), p. 18]

A Comparison – Present day Sidereal Periods of planets & *of Aryabhatiya*

Number of Revolutions in a *Yuga* (43,20,000 years).			Sidereal Period (Number of days for one revolution)	
Geo-centric Planets	*Aryabhatiya* Numeral	International Numeral	*Aryabhatiya* Value	Present day Value
शनि (Saturn)	ढुङ्विघ्व	1,46,564	10,766.10	10,760.44
गुरु (Jupiter)	खिच्युभ	3,64,224	4332.29	4331.94
मङ्गळ (Mars)	भद्लिझुनुखृ	22,96,824	687.00	687.00
रवि (Sun)	ख्युघ्रु	43,20,000	365.26	365.26
शुक्र (Mars)	जषबिμखुछृ	70,22,388	224.70	224.70
बुध (Mars)	सुगुशिथृन	1,79,37,020	87. 97	87. 97
सोम (Moon)	चयगियिङ्गुशुछृल्ृ	5,77,53,336	27.32	27.32

$$\text{Sidereal period of a Planet (In number of days)} = \frac{43,20,000 \times 365.26}{\text{Number of revolution of the planet in a } \textit{yuga}} \text{ days}$$

A Table - to explain why weekdays are named so

Name of Geo-centric planets	Planets yuga Revolutions.	Hours in a day				Name of days
शनि(Saturn)	1,46,564	1	8	15	22	Shanivar
गुरु(Jupiter)	3,64,224	2	9	16	23	
मङ्गळ (Mars)	22,96,824	3	10	17	24	
रवि (Sun)	43,20,000	4	11	18	25 = 1	Ravivar
शुक्र (Mars)	70,22,388	5	12	19		
बुध (Mercury)	1,79,37,020	6	13	20		
सोम(Moon)	5,77,53,336	7	14	21		

Name of the *next day of any day* is the name of the planet ruling the 4^{th} hour of *the day*.

Why Weekdays are named so ?

An explanation from *Aryabhatiya*

सप्तैते होरेशाः शनैश्चराद्या यथाक्रमं शीघ्राः ।
शीघ्रक्रमाच्चतुथा भवन्ति सूर्योदयद् दिनपाः॥

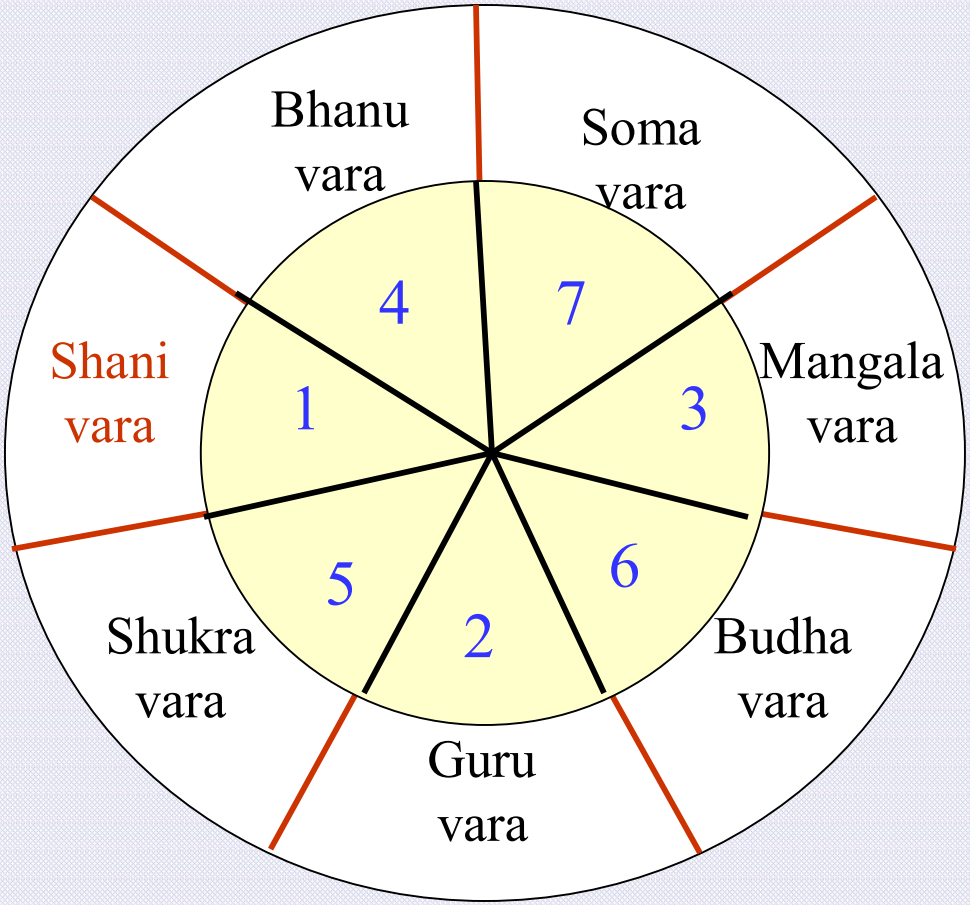
The seven planets beginning with *Saturn*
arranged in the order of *increasing velocity*
are the
Lords of the successive hours of a day.
The planets occurring *fourth* in the order of
increasing velocity are the *Lords of successive days*
which are reckoned from the Sunrise

Name of the

next day of any day

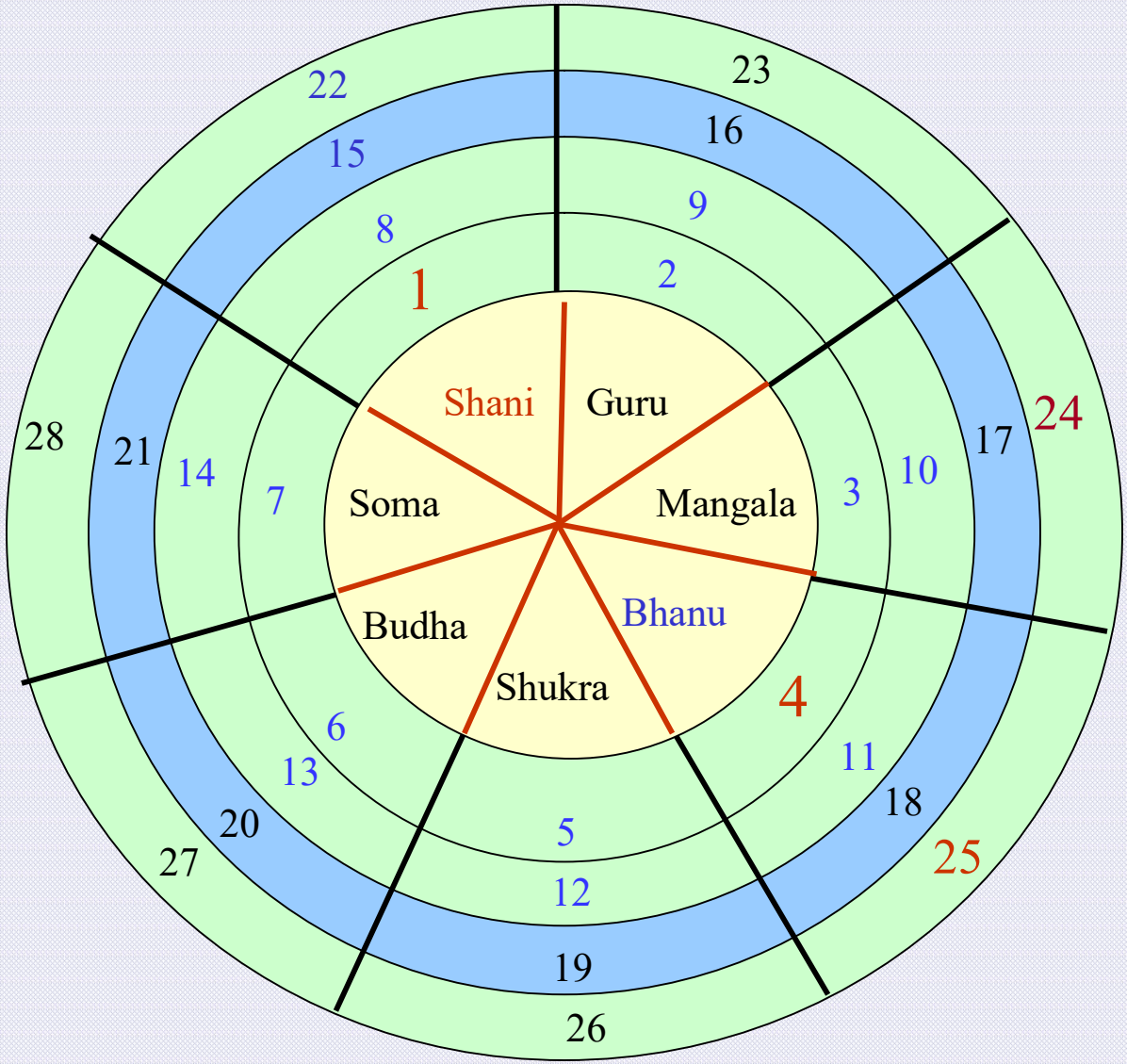
is the name of the planet ruling the 4th hour of *that day*.

Names of Geo-Centric Planets
from
Names of Weekdays



1. Shani
2. Guru
3. Mangala (Kuja)
4. Bhanu
5. Shukra
6. Budha
7. Soma

Why Weekdays are named so ?



4^{th}, 11^{th}, 18^{th} and 25^{th} hour of *Shanivar* is ruled by Bhanu.

25th hour of *Shanivar* is the 1st hour of next day to *Shanivar*.

1st hour of next day to *Shanivar* is ruled by Bhanu.

Therefore, next day to *Shanivar* is named Bhanuvar.

Names of the Weekdays in Order -

from *Atharvana jyotisa*

आदित्यः सोमो भौमश्च तथा बुधबृहस्पतिः ।
भार्गवः शनैश्चरश्चैव एते सप्त दिनाधिपाः ॥८.१॥

The lords of the weekdays are

(in order) the seven (planets)

The Sun आदित्यः , *The Moon* सोमः ,

Mars भौमः, *Mercury* बुधः, *Jupitor* बृहस्पतिः,

Venus भार्गवः, *Saturn* शनैश्चरः

[Ref.: "INDIAN ASTRONOMY, A Source-Book"; B V Subbarayappa, K V Sharma Nehru Centre, Bombay, (1985), P. 101, 11.6.1]

Thank You