BAUDHAYANA NUMBERS FOR N-DIMENSIONAL SPACE USING m^{th} POWER METHOD

Kailash and L P. Vishwakarma

Department of Physics, B.N.V.P.G. College Rath, Hamirpur, U.P., India, 210431

Abstract

The Vedas are the sacred and everlasting world rock of India's firm spiritual foundation. Vedic mathematics provides many one-line mental and super fast methods for several classes of problems. Development of mathematical and astronomical science is one of the most glorious chapters of Indian science. A part of Kalpasutra i.e. Sulba Sutra contains varied information about enumeration, arithmetical operation, fractions, irrational numbers etc. Vedic Sulba Sutra might have been many but out of those 8 are found. Rishi Baudhayana had defined the relationship among the sides of a right angled triangle. From this one can see that (diagonal)^2 = (base)^2 + (perpendicular)^2. This relationship gives important information about the right angled triangle in two dimensional spaces. Some Baudhayana numbers are quoted in Baudhayana Sulba Sutram. This concept can be applied for generation of Baudhayana numbers for N-dimensional space using m^{th} power. In this work, an attempt has been made to obtain the Baudhayana numbers for N-dimensional space using code numbers. A formula has been given to obtain the Baudhayana numbers for any dimensional space. Very interesting and fruitful results are obtained for three, four, five and six dimensional spaces.

INTRODUCTION

Vedas are the primary source of knowledge as the sun is the primary source of light. It is most ancient knowledge source on the earth that is first level of knowledge.[1] It is also a complete knowledge source having coverage about the origin of universe, its life cycle, existence of the creatures and their evolution, nature and its cycle including civilization.[2] The Vedas cover all fields of knowledge both material and spiritual. The Vedas constitute the principal source of ancient wisdom and the Upvedas and Upanishads are an integral part of the Vedic texts.[3-5] In ancient India, our ancestors (Rishies) used a rope to construct altar of different size and shape. In Sanskrit language, the rope is known as Rajju or Sulba. Therefore, mathematics of drawings is called Rajju Ganita, Sulba Ganita, Sulba Sastra, etc.[6,7] Now a day; it is popular as geometry. Various Sulba Sutras such as Baudhayana, Apastamba, Katyayana, Manava, Maitrayana, Varah and Vadhula are available in ancient Indian literature.[8-12] Geometry is the one of the Basis of the mathematical science which is exhausted in physical science.[13-16] The Katyayana Sulba Sutra belongs to the Shukla Yajurveda and the remaining Sulba Sutras to Krsna Yajurveda. In this work, we have given a new approach to Baudhayana numbers for N dimensional space using Sutras and Upsutras of Vedic Mathematics. Baudhayana numbers are defined in Section 2. The generation of Baudhayana numbers for N-dimensional space is elaborated in section 3 using different conditions. The results are discussed in concerned sub- sections. Conclusion has been given in Section 4.

BAUDHAYANA NUMBER

In his sulba sutra, the great mathematician Baudhayana has discussed about relationship among sides of a right angled triangle. In forty eighth sloka of first Chapter of Baudhayana Sulba Sutram:[9]

"Diirgha Caturasra akshanya rajjuh parsvamani Triyakmani Ca yat prathagbhute kurutah tat ubhayam karoti." [48]

The meaning of this verse is "The diagonal of a rectangle produces (area) which its length (bhuj) and breadth (Koti) produces separately" i.e. the square described on the diagonal of a rectangle has an area equal to the sum of the areas of the squares described on its two sides. The Bhaskaracharya had explained in first sloka of second part of Lilavati:[6,7]

"Isto baahuryah syattatsyardhinyam disiitaro baahuh Lyasre caturasre vaa saa Kotih Kiirtitaa tajnaih[1]

Tatkrityor Yogpadam Karno doh karnavargayorvivaraat Muulam Kotih kotishruti Kratyorantaratpadam baahuh." [2]

Its meaning is "The length of which a triangle or a quadrilateral is to be constructed, is known as abscissa or base (bahu or bhuj) the second side which checks abscissa is called ordinate or perpendicular (Koti). The line checking base and perpendicular is name as hypotenuse (Karna). The hypotenuse is equal to square root of sum of squares of base and perpendicular. The square root of difference of squares of hypotenuse and base or perpendicular is equal to perpendicular or base.

A right angled Triangle is shown in Fig. (1).

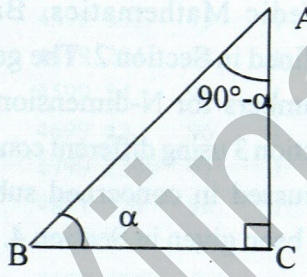

Figure 1

BC = Base or abscissa (bhuj)

AB = Ordinate or perpendicular (Koti)

AC = Hypotenuse (Karna)

From this verse

$(Bhuj)^2 + (Koti)^2 = (Karna)^2$

or $(Base)^2 + (Perpendicular)^2 = (Hypotenuse)^2$

or $BC^2 + AB^2 = AC^2$

The angle can also be defined in terms of measured value of Sides of a right angled triangle. When these values are written in a certain order, such as, base, perpendicular and hypotenuse; this order is called Baudhayana number[17,18] which represents a particular angle (α).

Baudhayana numbers for angle α and $90° - \alpha$

Angle	Baudhayana number		
	Base (b)	Perpendicular (p)	Hypotenuse (h)
α	15	8	17
$90°-\alpha$	8	15	17

It is clear from above notation that base and perpendicular are interchanged for complementary angle ($90° - \alpha$). If a constant (x) multiplied to Baudhayana number, it represents the same angle

α	b	p	h
α	xb	xp	xh

The base and perpendicular are independent variables while the hypotenuse is a dependent variable.

GENERATION OF BAUDHAYANA NUMBER

A right angled triangle of sides of 15, 36 and 39 units is given in taittiriya sanhita. In 49th verse of first chapter of Baudhayana sulba Sutram, the sides (base and perpendicular) of right angled triangle are quoted as below:

"Trik catus Kayoh dwadasik puncikayoh pancidasik astikayoh sapitak caturvinskayoh dwadasik panctrinsakayoh pancdasik sattrinsakayoh." [49]

It means 3, 4; 12, 5; 15, 8; 7, 24; 12, 35; and 15, 36; are the sides of a right angled triangle. The hypotenuse depends upon base and perpendicular therefore this is not quoted in this verse. In Baudhayana numbers notation, these can be written as

Baudhayana number

Angle	base	Perpendicular	Hypotenuse
α	3	4	5
β	12	5	13
γ	15	8	17
δ	7	24	25
ϑ	12	35	37
ϕ	15	36	39

In Apastamba sulba Sutram, one gets following Baudhayana numbers

Baudhayana number

Angle	Base	Perpendicular	Hypotenuse
α	15	36	39
β	12	16	20
γ	15	20	25
δ	5	12	13
ϕ	12	35	37

Bhaskaracharya had discussed several methods of generation of Baudhayana numbers for 2 – dimensional space in second part of Lilavati. In this work, an attempt has been for obtaining the Baudhayana numbers for N- dimensional space.

m^{th} power method for Generation of Baudhayana numbers for N- dimensional space when number of variables is known

For obtaining the Baudhayana number for N-dimensional space, one has to utilize the following formula: $\mathbf{N = 1 + p\,(n-p)}$

where N is number of dimensions for which one has to evaluate the Baudhayana numbers. p is number of minus signs. n is the number of variables with which one has to obtain the Baudhayana numbers for N- dimensional space . One has to remember that N-1 should be divisible by p and N, p and n are natural numbers. With the help of this formula, one can get the expressions for Baudhayana numbers. The expressions are presented in Table 1 for 2 to 6 dimensional spaces. The Sutras "Sankalan-vyavakalanabhyam, Urdhwatiryagbhyam" and Upsutras "Anurupyena" (meaning thereby "by addition and subtraction, vertically and crosswise" and "by ratio") of Vedic mathematics are used. It is clear from the Table that there is only one set of variables with different number (1 and N-1) of minus signs (p<N) for 2, 3, 4, and 6 dimensional spaces. There are two sets of variables with different number of minus signs (p<N) for 5, dimensional spaces. It is also clear from the table that using number of minus signs 1 or N-1, one can obtain the Baudhayana numbers for N- dimensional space with n variables. These Baudhayana numbers are perfect Baudhayana numbers because all assign an integral value.

CONCLUSION

It is clear from the preceding sections that in obtaining the solution of problems based on geometry; one has to solve various equations only on the basis of the right angled triangle. Basics of problem related with geometry mainly lies on the Baudhayana numbers. One can solve various tedious problems using the fundamentals of Baudhayana numbers. One can see that $\cos^2 \alpha_i = 1$, where α_i is the angle between diagonal and i^{th} axis of N-dimensional space. Using mth Power Method Generation of Baudhayana Numbers for N-dimensional Space are given in Table 1.Result for Six Dimensional space are Given in Tables 2-6.In Table 2, 22Sets for 2-Dimensional space Baudhayana numbers are Given. In table 3, 50 Sets for 3-Dimensional space Baudhayana numbers are given. When Numbers of variables is not perfect integer, one can obtain perfect Baudhayana numbers. In Table 4, 71 sets of Baudhayana numbers are given for 4-Dimensional space. In Table 5, 96 sets of Baudhayana numbers are presented for 5-Dimensional space. In table 6, 105 Sets of Baudhayana numbers are shown for 6-Dimensional space.

Acknowledgement

The authors are thankful to Defense Research and Development Organisation, New Delhi (India) for financial assistance to this valuable work.

References :

1. S.D. Satwalekar, *Yajurveda*, Swadhayaya Mandal, Killa Pardi, 1996.
2. RVSS Avadhanulu, *Aspects of Science and Technology in Vedas and Sastras*, Shri Veda Bharati, Hyderabad, 2005.
3. B. B. Datta and A. N. Singh, *History of Hindu Mathematics*, Bharatiya Kala Prakashan, New Delhi, 2004.
4. T.S. Bhanu Murthy, *a Modern Introduction to Ancient Indian Mathematics*, Wiley Eastern Limited, New Delhi, 1992.
5. R. N. Arya and R. Prasad, *Science and Technology in Ancient India*, Vijnana Bharati, Mumbai, 2002.
6. R.S. Sharma, *Lilavati*, Khemraj Shri Krishna Dass Publication Mumbai, 1987.
7. R.C. Pandey, *Lilavati*, Krishnadaas Academy, Varanasi, 1993.
8. Amma, T. A., *Geometry in Ancient and Medieval India*, Motilal Banarsidas, Delhi, 1979.
9. G. Thibaut, *Baudhayana Sulba Sutram*, Kolkata, 1913.
10. V. Sharma, *Katyayana Sulba Sutram*, Banaras, 1928.
11. RVSS Avadhanulu, *Vedas and Computers*, Shri Veda Bharati, Hyderabad, 2001.
12. S. K. Kapoor, *Vedic geometry*, Arya Book Depot, New Delhi, 1994.
13. K. Williams, *Astronomical Application of Vedic Mathematics*, Motilal Banarasi Dass, New Delhi, 2003.
14. B.K. Tirth, *Vedic Mathematics*, Motilal Banarsidass New Delhi, 1965.
15. K. Williams, Triples, Motilal Banarsidas, New Delhi, 2003.
16. A.W. Vyawahare, S. M. Chouthaiwale and S. S. Borgaonkar, *Introduction to Vedic Mathematics*, Swadhayaya Mandal, Killa, Pardi, 2003.
17. Kailash and L. P. Vishwakarma, *Concept of the Baudhayana Numbers (Part I)*, Bharatiya Bouddhik Sampada, Nagpur, 26, 16-32, 2006.
18. Kailash and L. P. Vishwakarma, *Concept of the Baudhayana Numbers (Part II)*, Bharatiya Bouddhik Sampada, Nagpur 27, 3-17, 2006.

Table 1- Formula for Generation of Baudhayana Numbers for N- dimensional space

Formula: N = 1+p (n-p)

Where n=No. of Variables, p= No. of minus signs, N= No. of Dimensions, m=Power

Sl. No.	n	p	N	Baudhayana Numbers
1	2	1	2	$a_1^m - a_2^m$, $2(a_1a_2)^{m/2}$, $\sum a_i^m$
2	33	12	3	$a_1^m - a_2^m + a_3^m$, $2(a_1a_2)^{m/2}$, $2(a_2a_3)^{m/2}$, $\sum a_i^m$ $a_1^m - a_2^m - a_3^m$, $2(a_1a_2)^{m/2}$, $2(a_1a_3)^{m/2}$, $\sum a_i^m$
3	44	13	4	$a_1^m + a_2^m + a_3^m - a_4^m$, $2(a_1a_4)^{m/2}$, $2(a_2a_4)^{m/2}$, $2(a_3a_4)^{m/2}$, $\sum a_i^m$ $a_1^m - a_2^m - a_3^m - a_4^m$, $2(a_1a_2)^{m/2}$, $2(a_1a_3)^{m/2}$, $2(a_1a_4)^{m/2}$, $\sum a_i^m$
4	545	124	5	$a_1^m - a_2^m + a_3^m + a_4^m + a_5^m$, $2(a_1a_2)^{m/2}$, $2(a_2a_3)^{m/2}$, $2(a_2a_4)^{m/2}$, $2(a_2a_5)^{m/2}$, $\sum a_i^m$ $a_1^m - a_2^m + a_3^m - a_4^m$, $2(a_1a_2)^{m/2}$, $2(a_2a_3)^{m/2}$, $2(a_3a_4)^{m/2}$, $\sum a_i^m$ $a_1^m - a_2^m - a_3^m - a_4^m - a_5^m$, $2(a_1a_2)^{m/2}$, $2(a_1a_3)^{m/2}$, $2(a_1a_4)^{m/2}$, $2(a_1a_5)^{m/2}$, $\sum a_i^m$
5	66	15	6	$a_1^m + a_2^m + a_3^m + a_4^m + a_5^m - a_6^m$, $2(a_1a_6)^{m/2}$, $2(a_2a_6)^{m/2}$, $2(a_3a_6)^{m/2}$, $2(a_4a_6)^{m/2}$, $2(a_5a_6)^{m/2}$, $\sum a_i^m$ $a_1^m - a_2^m - a_3^m - a_4^m - a_5^m - a_6^m$, $2(a_1a_2)^{m/2}$, $2(a_1a_3)^{m/2}$, $2(a_1a_4)^{m/2}$, $2(a_1a_5)^{m/2}$, $2(a_1a_6)^{m/2}$, $\sum a_i^m$

Table 2- Dimension (N) = 2, No. of minus sign (p) = 1, No. of Variables (n) = 2

1 1 2 3 4 5 7 3 4 7 24 25 13 1 6 35 12 37 19 6 7 13 84
85
2 1 3 4 3 5 8 1 7 24 7 25 14 2 7 45 28 53 20 2 9 77 36
85
3 2 3 5 12 13 9 4 5 9 40 41 15 5 6 11 60 61 21 5 8
39 80 89
4 1 5 12 5 13 10 3 7 20 21 2916 1 8 63 16 65 22 4 9 65 72
97
5 3 5 8 15 17 11 2 5 21 20 2917 4 7 33 56 65
6 1 4 15 8 17 12 5 7 12 35 3718 3 8 55 48 73

Table 3- Baudhayana numbers for 3-dimensional space (N = 3, p = 1, n = 3)

1 1 1 1.1 2 2 3 14 1 1 8 32 1 8 33 27 1 2 8 67 4 16 69 40 2 4 7 61 16 28 69
2 1 1 2 2 1 2 3 15 1 2 9 42 2 9 43 28 1 1 9 81 2 18 83 41 7 4 2 -29 56 28 69
3 1 2 3 6 2 3 7 16 3 4 1 4 12 3 13 29 1 3 989 6 18 91 42 4 5 6 45 40 48 77
4 5 3 1 -3 6 2 7 17 3 1 6 14 3 18 23 30 3 9 1 73 54 6 91 43 5 6 4 27 60 40 77
5 1 1 4 8 1 4 9 18 6 1 3 -13 6 18 23 31 2 3 4 21 12 16 29 44 2 8 3 69 32
12 77

5/√10
9/√10
6 4 1 1 -7 4 4 9 19 12/√10 20 9 12 25 32 3 4 2 11 24 12 29 45 3 8 2 59 48
12 77
7 1 1 3 9 2 6 11 20 1 1 5 25 2 10 27 33 2 4 5 37 16 20 45 46 4 8 3 57 64
24 89
8 3 1 1 -7 6 6 11 21 1 3 5 33 6 10 35 34 4 5 213 40 16 45 47 3 8 4 71 48 24 89
9 1 2 5 14 2 5 15 22 3 1 5 17 6 30 35 35 2 6 341 24 12 49 48 2 8 5 85 32 20 93
10 1 1 6 18 1 6 19 23 1 2 6 39 4 12 41 36 6 3 2-23 36 24 4949 5 2 8 43 20
80 93
11 1 2 4 19 4 8 21 24 1 1 7 49 2 14 51 37 7 3 1 -39 42 14 59 50 8 5 2
-35 80 32 93
12 1 3 6 22 3 6 23 25 1 3 7 57 6 14 59 38 4 6 3 29 48 24 61
13 1 2 7 26 2 7 27 26 3 1 7 41 6 42 59 39 6 3 4 -11 36 48 61

Table 4- Baudhayana numbers for 4-dimensional space (N = 4, p= 1, n= 4)

1 1 1 1 1 1 1 1 1 2 25 1 3 5 7 41 3 5 7 42 49 8 6 7 1 11 48 56 8 75
2 1 2 2 1 4 2 2 1 5 26 1 6 7 8 74 6 7 8 75 50 2 5 1 7 71 20 4 28 79
3 3 5 1 1 3 5 1 1 6 27 2 1 6 1 17 2 12 2 21 51 9 5 7 3 1 45 63 27 82
4 1 1 3 3 9 1 3 3 10 28 6 2 1 1 -15 12 6 6 21 52 9 3 4 8 4 27 36 72 85
5 2 1 1 4 7 2 2 8 11 29 1 6 1 1 37 12 2 2 28 53 9 2 5 8 6 18 45 72 87
√5 15/√5
6 4 2 1 1 -5 8 4 4 11 30 1 6 1 1 37 12 2 2 28 54 13/√5 –4/√5 77 30 26 -8 87
7 1 1 2 4 10 1 2 4 11 31 2 5 1 1 23 20 4 4 31 55 5 2 1 1 -19 20 10 10 31
8 6 1 1 1 -11 4 4 4 13 32 1 2 3 5 37 4 6 10 39 56 5 3 2 1 -11 30 20 10 39
9 5 1 1 1 -11 5 5 5 14 33 5/√10 - 4/√105/√10 18/√1034 -4 5 18 39 573 4 5 6 34 12 15 18 43
10 1 5 1 1 13 5 1 1 14 34 7 5 3 1 -7 35 21 7 42 58 7 1 2 1 -43 14 28 14 55
11 1 1 2 3 13 2 4 6 15 35 1 1 4 5 41 2 8 10 43 59 5/√2 7/√2 3/√2 -√2 32 35 30 -10 57
12 1 3 1 5 17 3 1 5 18 36 4 1 5 1 11 8 40 8 43 60 7 3 2 1 -35 42 28 14 63
13 5 1 3 1 -7 5 15 5 18 37 1 1 2 7 53 2 4 14 55 61 4 5 6 7 47 20 24 28 63
14 1 4 1 1 17 8 2 2 19 38 2 1 2 7 50 4 8 28 55 62 7 4 5 6 14 28 35 42 63
15 4 1 1 1 -13 8 8 8 19 39 1 2 3 7 61 4 6 14 63 635 18/5 2 24/5 15 36 20 48 65
16 1 1 2 6 20 1 2 6 21 401 8 1 1 65 16 2 2 67 64√(37/2) 25√(2/37)45/√62 –5√(2/37) 44 50 45 -10 81
17 1 7 1 1 25 7 1 1 26 41 4/√2 3/√2 3/√2 4/√2 9 12 12 16 25 65 3 5 7 9 73 15 21 27 82
18 7 1 1 1 -23 7 7 7 26 42 5 1 4 1 -7 10 40 10 43 66 3 4 8 9 76 12 24 27 85
191 1 3 4 25 2 6 8 274317/√2 13√(2/17)23/√34, –3/√(2/17)28 26 23 -6 4567√(61/2) 45/√12216√(2/61) 30√(2/61) 24 45 32 60 85
20 3 4 1 1 9 24 6 6 27 44 9 2 5 7 -1 12 30 42 53 68 2 5 8 9 83 10 16 18 87
21 1 3 1 4 25 6 2 8 27 45 8 3 7 2 -1 24 56 16 63 69 4 5 8 9 77 20 32 36 93
22 4 3 1 1 -5 24 8 8 27 46 1 1 5 6 61 2 10 12 63 70 9 4 5 8 12 36 45 72 93
23 1 1 3 4 25 2 6 8 27 47√10 17/√10 15/√10 –4/√10 43 34 30 -8 63 71 7/√2 9/√2 4/√2 -√2 50 63 56 -14 99
24 1 1 2 5 29 2 4 8 31 48 √(29/2) 41/√5819√(2/29) – 3/√(2/29) 40 41 38 -6 69

Table 5- Baudhayana numbers for 5-dimensional space (N = 5, p = 1, n = 5)

1	2 1 1 1 3	2 1 1 1 3 4	33	1 2 5 6 8	64 2 5 6 8 65	65	4 5 6 7 2	49 20 24 28 8 65
2	1 1 1 1 1	3 2 2 2 2 5	34	1 4 5 7 9	85 4 5 7 9 86	66	2 4 5 6 7	61 8 10 12 14 65
3	4 1 1 1 1	-3 2 2 2 2 5	35	1 4 6 8 9	98 4 6 8 9 99	67	9 2 3 7 5	3 18 27 63 45 84
4	1 2 2 2 1	6 2 2 2 1 7	36	2 4 1 1 1	15 16 4 4 4 23	68	3 7 5 9 2	75 21 15 27 6 84
5	2 2 2 1 1	3 4 4 2 2 7	37	1 1 1 1 5	27 2 2 2 10 29	69	7 9 1 4 5	37 63 7 28 35 86
6	3 3 1 1 1	1 6 2 2 2 7	38	1 1 1 3 5	35 2 2 6 10 37	70	5 7 9 1 4	61 35 45 5 20 86
7	4 3 1 1 1	-1 6 2 2 2 7	39	3 1 1 1 5	19 6 6 6 30 37	71	4 5 7 9 1	70 20 28 36 4 86
8	1 1 1 2 3	7 1 1 2 3 8	40	1 1 1 2 6	41 2 2 4 12 43	72	4 6 7 9 2	77 24 28 36 8 93
9	3 2 1 1 1	-1 6 3 3 3 8	41	2 1 1 1 6	35 4 4 4 12 43	73	2 4 6 7 9	89 8 12 14 18 93
10	2 1 1 1 5	6 1 1 1 5 8	42	1 1 1 1 7	51 2 2 2 14 53	74	9 1 4 6 8	18 9 36 54 72 99
11	1 1 1 1 4	9 1 1 1 4 10	43	1 2 3 4 5	53 4 6 8 10 55	75	8 9 1 4 6	35 72 8 32 48 99
12	6 1 1 1 1	-8 3 3 3 3 10	44	1 1 1 2 8	69 2 2 4 16 71	76	6 8 9 1 4	63 48 54 6 24 99
13	5 1 2 3 4	1 2 4 6 8 11	45	2 1 1 1 8	63 4 4 4 18 71	77	4 6 8 9 1	83 24 32 36 4 99
14	3 1 1 1 1	-5 6 6 6 6 13	46	3 6 7 1 2	27 12 14 2 4 33	78	5 1 1 1 1	-21 10 10 10 10 29
15	1 1 1 1 3	11 2 2 2 6 13	47	5 7 9 1 3	23 14 18 2 6 33	79	5 3 1 1 1	-13 30 10 10 10 37

16 3/√2 2√2 √2/6 √2/3 √2/3 4 12 1 2 2 13 486 1 2 4 5 5 6 12 24 30 41806 2 1 1 1-29 24 12 12 12 43
17 1 1 1 3 4 13 1 1 3 4 14 49 4 5 6 1 2 25 20 24 4 8 41817 1 1 1 1 -45 14 14 14 14 53
18 3 1 1 1 4 5 3 3 3 12 14 50 2 4 5 6 1 37 8 10 12 2 41824√3 6/√3 4/√38/√3 8/√3 57 12 8 16 16 63
19 2 1 1 1 7 12 1 1 1 7 14 51 √(3/2) √6 5/√65 √(2/3) 5√(2/3) 42 6 5 10 10 45 83 7 2 4 5 6 16 14 28 35 42 65
20 1 1 1 2 5 15 1 1 2 5 16 52 8 1 2 5 6 1 8 16 40 48 65 84 6 7 2 4 5 29 42 12 24 30 65
21 5 1 1 1 2 -9 5 5 5 10 16 53 √(3/2) √6 7/√6 7 √(2/3) 7√(2/3) 78 6 7 14 14 81 855 6 7 2 4 40 30 35 10 20 65
22 8 1 1 1 1 -15 4 4 4 4 17 54 9 1 4 5 7 5 9 36 45 63 8686 5 9 2 3 7 59 45 10 15 35 84
23 1/√2 1/√2 √2 2√2 2√2 18 1 2 4 4 19 55√(3/2) 3/√6 4 √(2/3)8 √(2/3) 8√(2/3) 96 3 8 16 16 99 87 7 5 9 2 335 35 63 14 21 84
24 1 1 1 1 6 19 1 1 1 6 20 56 5 7 8 6 1 25 14 16 12 2 35 88 2√3 3√3 4/√38/√3 8/√3 63 36 16 32 32 87
25 1 1 1 3 3 19 2 2 6 6 21 57 5 6 1 2 4 16 30 5 10 20 41 89 9 2 4 6 7 12 18 36 54 63 93
26 4 2 1 1 1 -9 16 8 8 8 23 58 3 6 7 8 1 47 12 14 16 2 53 90 7 9 2 4 6 44 63 14 28 42 93
27 1 1 1 2 4 21 2 2 4 8 23 59 4 5 1 2 3 23 40 8 16 24 55 91 6 7 9 2 4 57 42 54 12 24 93
28 1/√2 3/√2 √2 2√2 2√2 22 3 2 4 4 23 603 4 5 1 237 24 30 6 12 55924 5 6 7 8 79 20 24 28 32 95
29 1 1 1 2 7 27 1 1 2 7 28 61 2 3 4 5 1 47 12 16 20 4 55 93 8 4 5 6 7 31 32 40 48 56 95
30 1 1 1 1 8 33 1 1 1 8 34 62 6 8 1 2 5 29 48 6 12 30 65 94 7 8 4 5 6 46 56 28 35 42 95
31 1 2 4 5 6 40 2 4 5 6 41 63 5 6 8 1 2 40 30 40 5 10 65 95 6 7 8 4 5 59 42 48 24 30 95
32 2 3 7 5 9 40 3 7 5 9 42 64 2 5 6 8 1 61 10 12 16 2 65 96 5 6 7 8 4 70 30 35 40 20 95

Table 6- Baudhayana numbers for 6-dimensional space (N = 6, p = 1, n = 6)

1 1 1 1 1 1 2 1 1 1 1 1 3
2 4 2 1 1 1 1 -1 2 1 1 1 1 3
3 2 4 1 1 1 1 4 4 1 1 1 1 6
4 1 1 1 1 1 3 6 1 1 1 1 3 7
5 3 1 1 1 1 1 -2 3 3 3 3 3 7
6 1 1 1 1 1 3 6 1 1 1 1 3 7
7 3 1 1 1 1 1 -2 3 3 3 3 3 7
8 2 2 1 1 3 3 5 2 1 1 3 3 7
9 2 3 4 1 1 1 6 3 4 1 1 1 8
10 1 2 2 2 2 1 8 2 2 2 2 1 9
11 2 2 2 2 1 1 5 4 4 4 2 2 9
12 1 1 1 1 1 2 7 2 2 2 2 4 9
13 2 1 1 1 1 1 1 4 4 4 4 4 9
14 2 2 1 1 1 5 7 2 1 1 1 5 9
15 8 2 1 1 1 1 -7 4 2 2 2 2 9
16 4 3 1 1 1 1 -3 24 8 8 8 8 2
17 3 3 1 1 1 1 2 9 3 3 3 3 11
18 3 3 2 2 1 1 5 9 6 6 3 3 14
19 3 3 2 2 1 1 5 9 6 6 3 3 14
20 3 3 3 1 1 1 6 9 9 3 3 3 15
21 4 1 1 2 2 2 -1 4 4 8 8 8 15
22 1 1 1 1 3 3 10 1 1 1 3 3 11
23 2 6 1 1 1 1 9 6 1 1 1 1 11
24 6 2 1 1 1 1 -7 6 3 3 3 3 11
25 1 1 1 1 2 4 11 1 1 1 2 4 12
26 1 1 2 2 3 3 13 1 2 2 3 3 14
27 1 1 1 3 3 3 14 1 1 3 3 3 15
28 1 1 1 1 1 5 14 1 1 1 1 5 15
29 5 1 1 1 1 1 -10 5 5 5 5 5 15
30 2 2 1 1 1 7 13 2 1 1 1 7 15
31 1 1 2 2 2 4 14 1 2 2 2 4 15
32 1 1 1 2 3 4 15 1 1 2 3 4 16
33 1 1 1 1 2 3 15 2 2 2 4 6 17
34 2 1 1 1 1 3 9 4 4 4 4 12 17
35 3 2 1 1 1 1 -1 12 6 6 6 6 17
36 1 1 1 2 2 5 17 1 1 2 2 5 18
37 2 8 1 1 1 1 16 8 1 1 1 1 18
38 1 1 1 1 3 5 18 1 1 1 3 5 19
39 5 3 1 1 1 1 -6 15 5 5 5 5 19
40 1 1 1 1 1 4 19 2 2 2 2 8 21
41 4 1 1 1 1 1 -11 8 8 8 8 8 21
42 1 1 1 1 2 6 21 1 1 1 2 6 22
43 1 1 2 2 2 3 21 2 4 4 4 6 23
44 1 1 2 2 2 6 24 1 2 2 2 6 25
45 1 1 1 1 1 7 26 1 1 1 1 7 27
46 7 1 1 1 1 1 -22 7 7 7 7 7 27
47 1 1 1 2 2 4 25 2 2 4 4 8 27
48 1 1 1 1 3 4 27 2 2 2 6 8 29
49 4 3 1 1 1 1 -3 24 8 8 8 8 29
50 1 1 1 2 2 7 29 1 1 2 2 7 30
51 2 2 2 1 1 4 22 8 8 4 4 16 30
52 1 1 1 1 3 7 30 1 1 1 3 7 31
53 1 1 1 1 2 8 35 1 1 1 2 8 36
54 1 1 1 1 1 9 42 1 1 1 1 9 43
55 9 1 1 1 1 1 -38 9 9 9 9 9 43
56 1 1 1 1 3 9 46 1 1 1 3 9 47
57 1 3 5 6 7 8 91 3 5 6 7 8 92
58 5 2 2 1 1 1 -7 10 10 5 5 5 18
59 2 2 2 1 1 3 15 8 8 4 4 12 23
60 2 2 1 1 1 4 19 8 4 4 4 16 27
61 4 2 2 1 1 1 -5 16 16 8 8 8 27
62 3 1 1 1 1 4 11 6 6 6 6 24 29
63 1 1 1 1 2 5 31 2 2 2 4 10 33
64 2 5 1 1 1 1 25 20 4 4 4 4 33
65 3 1 1 1 1 5 20 6 6 6 6 30 38
66 1 1 2 2 2 5 37 2 4 4 4 10 39
67 2 2 2 1 1 5 31 8 8 4 4 20 39
68 1 1 1 1 1 6 39 2 2 2 2 12 41
69 1 1 1 2 2 6 45 2 2 4 4 12 47
70 2 2 1 1 1 6 39 8 4 4 4 24 47
71 1 1 1 1 3 6 47 2 2 2 6 12 49
72 3 6 1 1 1 1 31 36 6 6 6 6 49
73 2 2 2 1 1 6 42 8 8 4 4 24 50
74 1 1 1 1 2 7 55 2 2 2 4 14 57
75 2 7 1 1 1 1 49 28 4 4 4 4 57
76 3 7 1 1 1 1 44 42 6 6 6 6 62
77 7 3 1 1 1 1 -36 42 14 14 14 14 62
78 1 1 1 1 1 8 67 2 2 2 2 16 69
79 3 8 1 1 1 1 59 48 6 6 6 6 77
80 1 1 1 1 3 8 75 2 2 2 6 16 77
81 1 1 1 1 2 9 87 2 2 2 4 18 89
82 2 9 1 1 1 1 81 36 4 4 4 4 89
83 3 9 1 1 1 1 76 54 6 6 6 6 94
84 9 3 1 1 1 1 -34 27 9 9 9 9 47
85 3 2 2 2 1 1 5 12 12 12 6 6 23
86 7 2 2 1 1 1 -19 14 14 7 7 7 30
87 1 2 3 4 5 6 89 4 6 8 10 12 91
88 6 7 8 3 1 5 28 21 24 9 3 15 46
89 4 5 6 1 2 3 59 40 48 8 16 24 91
90 3 4 5 6 1 2 73 24 30 36 6 12 91
91 2 3 4 5 6 1 83 12 16 20 24 4 91
92 5 6 7 8 1 3 67 30 35 40 5 15 92
93 3 5 6 7 8 1 83 15 18 21 24 3 92
94 5 2 1 1 1 1 -17 20 10 10 10 10 33
95 5 2 2 2 1 1 -11 20 20 20 10 10 39
96 6 1 1 1 1 1 -31 12 12 12 12 12 41
97 6 2 2 1 1 1 -25 24 24 12 12 12 47
98 6 3 1 1 1 1 -23 36 12 12 12 12 49
99 6 2 2 2 1 1 -22 24 24 24 12 12 50
100 7 2 1 1 1 1 -41 28 14 14 14 14 57
101 8 1 1 1 1 1 -59 16 16 16 16 16 69
102 8 3 1 1 1 1 -51 48 16 16 16 16 77
103 9 2 1 1 1 1 -73 36 18 18 18 18 89
104 6 4 2 3 1 5 19 48 24 36 12 60 91
105 5 6 1 2 3 4 41 60 10 20 30 40 91