

No. 16.—NEW SPECIAL TABLES FOR THE COMPUTATION OF HINDU DATES.

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The new Special Tables which I publish now are intended to supplement the General Tables in the same way as the old Special Tables do, which were published in Vol. I. above, p. 450 ff., i.e. they are intended to test, according to one of the principal *siddhāntas* named at the head of the several Tables, the approximate result calculated previously by the General Tables. To these new Tables the remark in § 4, p. 403 l. c. applies also. "The General Table is to be used first; and only when by that table the end of the *tithi* falls very near the beginning of the day, and the week day comes out in error by one day only, need the Special Tables for the several *siddhāntas* be tried to see if one of them will furnish the desired result."

The plan on which the new Tables have been constructed is the same as in the General Tables, as far as their object, the highest possible degree of accuracy, will allow. Therefore the new Tables (1) refer throughout to mean sunrise at Lankā, not, as the old Special Tables do, to the beginning of the Solar year; (2) they furnish the quantities on which the *tithi* depends, in decimals of the circle and not in degrees, minutes and seconds as is the case in the old Tables. These innovations render the working of the new Tables very easy and almost mechanical.

The Special Tables differ from the General Tables in two points; (1) They contain three columns headed *a*, *b*, *c* instead of the two in the General Tables headed '*Tithi*' and '*☾*'s anomaly. *a* denotes mean distance of Sun and Moon, expressed in five decimals of the circle. By Tables XVIII, XIV, XV *a* can be converted into *tithis*, *ghaṭikās*, and *palas*; *b* denotes the mean anomaly of the moon in four decimals of the circle; and *c* the mean anomaly of the Sun, also in

four decimals. (2) To the sum of a (mean distance of Sun and Moon) two corrections (equations) must be applied, while in the General Tables only one equation is needed. The arguments of these equations are the sums of b and c , respectively, and they are to be looked out in the tables of equations under the several *siddhāntas*. In order to calculate the value of the equation for an argument not entered in the table, but lying between two table values, a column headed $\Delta 10$ has been inserted in the middle of these tables, which gives the increase or decrease of the equation for a difference of ten in the argument.

I now proceed to illustrate the working of the new Tables by a few examples.

First example.—Let it be proposed to verify the date: Kali-Yuga 4198, Chaitra *su. di. 2 ravaṇ*, according to the Sūrya-Siddhānta. We first calculate the date according to the General Tables, and write down the calculation in the proper form (see above, Vol. I. p. 410).

4100 K.Y.	(1)	5·58	111	Ind. ●	=20·43
98 years	(4)	399	59	Ind. su. di. 2	=22·43
4198 K.Y.	(5)	9·57	170		
15th sol. Chaitra	(4)	22·52	593		
	(2)	2·09	763		
	eq.	763	=0		

2·09

Result: On the Monday (2) in question, the third *tithi* was running; it commenced on the preceding day (Sunday), about $5\frac{1}{2}$ *ghaṭikās* before mean sunrise. Now in order to calculate the result according to the Sūrya-Siddhānta, proceed as follows. Look out K. Y. 4100 or 41st century K. Y. in table I, 98 years in table II, and 15th Chaitra in table XIII (which is the same for all Siddhāntas) and sum up the quantities in the several columns (rejecting integers); thus:—

	w	a	b	c
41st century	(1)	18563	6157	7863
98 years	(4)	13299	571	9990
15th sol. Chaitra	(4)	75053	5932	9500

K. Y. 4198, 15 Chaitra (2) 6915 2660 7353

Now find the equation for b 2660 from table III, *vis.* 5, and the equation for c =7353 from table IV, *vis.* 3; then add these equations to a , *vis.* 6915+5+3=6923. Table XVIII gives 6667=*su. di. 2*; the difference from a just found, 6923–6667=256; this is according to tables XIV and XV equal to 4 *ghaṭikās* (a =226) and 32 *palas* (a =30). Therefore, according to the Sūrya-Siddhānta, the 2nd *tithi* ended 4 *ghaṭikās* 34 *palas* before mean sunrise. This result is very nearly right, and we may in most cases rest satisfied with it. If the highest degree of accuracy be required we subtract the increase of a b c for 4 *ghaṭikās* 2 *palas* from tables XIV and XV to the result found before; *vis.* from 6915 22—

4 <i>ghaṭikās</i>	226	24	2	6915	2660	7353
32 <i>palas</i>	30	3	—	—256	27	2
	256	27	2	6659	2633	7351

Equation for $b=2633$ is 4; equation c for 7351 is 3; the sum of both equations=7 added to 6659 makes 6666, which falls short of 6667 by 1. Therefore the end of the *tithi* occurred one *pala* after the moment calculated or 4 *ghaṭikās* 31 *palas* before mean sunrise at Laṅkā.

Second example.—Computing the date K. Y. 4276 Bhādrapada *su. di* 13 *ravau*, our calculation by the General Tables stands thus (*l. c. p.* 411):—

4200 K. Y.	(1)	2.19	699	Ind. ● = 26.54
76 years	(5)	1.27	454	Ind. <i>su. di.</i> 13 = 9.54
	(6)	3.46	153	
3rd Āśvina	(2)	8.83	661	
	(1)	12.29	814	
eq. 814	=	0.03		
	(1)	12.32	= Sunday, <i>su. di.</i> 13.	

Let it now be required to calculate the end of the 13th *tithi* according to the Arya-Siddhānta. By the General Tables we find that this moment occurred about 40 *ghaṭikās* (=0.68 *tithi*, table IV) after mean sunrise at Laṅkā. The Tables for Ārya-Siddhānta furnish the following data:—

4200 K. Y.	(1)	7236	1988	7848
76 years	(5)	4208	4555	9
3 Āśvina	(2)	28266	6615	4271
	(1)	39710	3158	2128
40 <i>ghaṭikās</i>		2257	242	18
		41967	3400	2146

equation b for 3400 is 215, equation c for 2146 is 1178; their sum 1393 added to a 41967 = 43360. The difference from 43333, the value of 13th *tithi*, is a 27 = 25 *palas*, by which the end of the *tithi* occurred before the moment calculated. The exact time is therefore 39 *ghaṭikās* 35 *palas* after mean sunrise at Laṅkā.

Possible error.—As in the tables fractions are neglected or counted as 1, according as they are less or larger than $\frac{1}{2}$, the absolute error in every quantity may amount to ± 0.5 . Usually the plus and the minus of the different figures will compensate for each other, but in extreme cases the neglected fractions may sum up to ± 2.5 or ± 3.5 , according as 5 or 7 a 's are summed up. This error, in time, would be 2, 7 and 3, 7 *palas*, or 1 minute 5 seconds and 1 m. 29 s., respectively.

SŪRYA-SIDDHĀNTA.

TABLE I.—For centuries (of the Kali-Yuga).

cent.	<i>w</i>	<i>a</i>	<i>b</i>	<i>c</i>	sol. corr.	
					gh. p.	
30	2	46261	2028	7854	+ 1 10	
31	2	34960	7891	7857	— 6 18	For Sūrya-Siddhānta with <i>br̥ja</i> the last two figures of <i>b</i> must be augmented by: 42 in 4500 K. Y.
32	2	23659	3754	7861	—13 46	" 43 " 4600 "
33	2	12348	9616	7864	—21 13	" 43 " 4700 "
34	2	1057	5479	7868	—28 41	" 44 " 4800 "
						" 45 " 4900 "
						" 46 " 5000 "
						For mean Distance (—⊙ add 2006 to <i>a</i> .
35	1	86370	979	7843	+23 52	
36	1	75068	6842	7847	+16 24	For mean Longitude of the Sun add to <i>c</i> :
37	1	63767	2705	7850	+ 8 56	2145 between 3000 and 3300
38	1	52466	8568	7853	+ 1 29	2146 " 3400 " 4400
39	1	41165	4431	7857	— 5 59	2147 " 4500 " 5000
						For true Longitude of the Sun add 2206 to <i>c</i> , and subtract tenth part of equation <i>c</i> .
40	1	29864	294	7860	—13 27	
41	1	18563	6157	7863	—20 54	
42	1	7262	2020	7867	—28 22	
43	0	92574	7520	7842	+24 10	
44	0	81273	3383	7846	+16 43	
45	0	69972	9246	7849	+ 9 15	
46	0	58671	5109	7853	+ 1 47	
47	0	47370	972	7856	— 5 40	
48	0	36069	6835	7859	—13 8	
49	0	24768	2698	7863	—20 36	
50	6	10080	8198	7838	+31 57	

TABLE II.—*Sūrya-Siddhānta: Years of the century.*

year	w	a	b	c	corr.		year	w	a	b	c	corr.	
					gh.	p.						gh.	p.
0	0	0	0	0	0	0	50	0	44349	7931	2	— 3	44
1	1	36006	2464	9993	+ 15	32	51	1	80356	395	9995	+ 11	47
2	2	72013	4928	9986	+ 31	3	52	2	16362	2860	9987	+ 27	12
3	4	11406	7756	6	— 13	25	53	4	55755	5687	8	— 17	10
4	5	47412	220	9999	+ 2	6	54	5	91762	8151	1	— 1	38
5	6	83419	2684	9992	+ 17	38	55	6	27768	616	9994	+ 13	54
6	0	19426	5148	9985	+ 33	9	56	0	63775	3080	9987	+ 29	25
7	2	58818	7976	5	— 11	19	57	2	3168	5907	7	— 15	3
8	3	94825	440	9998	+ 4	12	58	3	39174	8371	0	— 0	28
9	4	30831	2904	9991	+ 19	44	59	4	75181	836	9993	+ 16	0
10	5	66838	5368	9984	+ 35	15	60	5	11187	3300	9986	+ 31	31
11	0	6231	8196	4	— 9	13	61	0	50580	6127	6	— 12	57
12	1	42237	660	9997	+ 6	18	62	1	86587	8591	9999	+ 2	34
13	2	78244	3124	9990	+ 21	50	63	2	22593	1056	9992	+ 18	6
14	4	17637	5951	10	— 22	39	64	3	58600	3520	9985	+ 33	37
15	5	53643	8416	3	— 7	7	65	5	97993	6347	5	— 10	51
16	6	89650	880	9996	+ 8	24	66	6	33999	8811	9998	+ 4	41
17	0	25657	3344	9989	+ 23	56	67	0	70006	1276	9991	+ 20	12
18	2	65049	6171	9	— 20	32	68	1	6012	3740	9984	+ 35	44
19	3	1056	8636	2	— 5	1	69	3	45405	6567	4	— 8	45
20	4	37062	1100	9995	+ 10	30	70	4	81412	9031	9997	+ 6	47
21	5	73069	3564	9988	+ 26	2	71	5	17418	1496	9990	+ 22	18
22	0	12462	6391	8	— 16	26	72	0	56811	4323	10	— 22	10
23	1	48468	8856	1	— 2	55	73	1	92818	6787	3	— 6	39
24	2	84475	1320	9994	+ 12	37	74	2	28824	9251	9996	+ 8	53
25	3	20482	3784	9987	+ 28	8	75	3	64831	1716	9989	+ 24	24
26	5	59874	6611	7	— 16	20	76	5	4224	4543	9	— 20	4
27	6	95881	9076	0	— 0	49	77	6	40230	7007	2	— 4	33
28	0	31887	1540	9993	+ 14	43	78	0	76237	9471	9995	+ 10	59
29	1	67894	4004	9986	+ 30	14	79	1	12243	1936	9988	+ 26	30
30	3	7287	6831	6	— 14	14	80	3	51636	4763	8	— 17	58
31	4	43293	9296	9999	+ 1	17	81	4	87643	7227	1	— 2	27
32	5	79300	1760	9992	+ 16	49	82	5	23649	9691	9994	+ 13	5
33	6	15307	4224	9985	+ 32	20	83	6	59656	2156	9987	+ 28	36
34	1	54699	7051	6	— 12	8	84	1	99049	4983	7	— 15	52
35	2	90706	9516	9998	+ 3	13	85	2	35055	7447	0	— 0	21
36	3	26712	1980	9991	+ 18	55	86	3	71062	9911	9993	+ 15	11
37	4	62719	4444	9984	+ 34	26	87	4	7068	2376	9986	+ 30	42
38	6	2112	7271	5	— 10	2	88	6	46461	5203	6	— 13	46
39	0	38118	9736	9997	+ 5	29	89	0	82468	7667	9999	+ 1	45
40	1	74125	2200	9990	+ 21	1	90	1	18474	131	9992	+ 17	17
41	2	10132	4664	9983	+ 36	32	91	2	54481	2596	9985	+ 32	49
42	4	49524	7491	4	— 7	56	92	4	93874	5423	5	— 11	40
43	5	85531	9956	9996	+ 7	35	93	5	29880	7887	9998	+ 3	52
44	6	21537	2420	9989	+ 23	7	94	6	65887	351	9991	+ 19	23
45	1	60930	5247	10	— 21	22	95	0	1893	2816	9984	+ 34	55
46	2	96937	7711	3	— 5	50	96	2	41286	5643	4	— 9	34
47	3	32943	176	9995	+ 9	41	97	3	77293	8107	9997	+ 5	58
48	4	68950	2640	9988	+ 25	13	98	4	13299	571	9990	+ 21	29
49	6	8343	5467	9	— 19	16	99	5	49306	3036	9983	+ 37	1

TABLE IV.—*Sārya-Siddhānta*.

Equation c.

argument : c		equation.	Δ 10.	equation.	argument : c	
0	5000	604	384	604	0	5000
104	4896	644	384	564	104	4896
208	4792	684	384	524	208	4792
313	4687	724	374	484	313	4687
417	4583	763	365	445	417	4583
521	4479	801	365	407	521	4479
625	4375	839	345	369	625	4375
729	4271	875	336	333	729	4271
833	4167	910	317	298	833	4167
938	4062	943	307	265	938	4062
1042	3958	975	288	233	1042	3958
1146	3854	1006	269	202	1146	3854
1250	3750	1034	260	174	1250	3750
1354	3646	1061	240	147	1354	3646
1458	3542	1086	211	122	1458	3542
1562	3438	1108	201	100	1562	3438
1667	3333	1129	179	79	1667	3333
1771	3229	1147	154	61	1771	3229
1875	3125	1163	134	45	1875	3125
1979	3021	1174	102	31	1979	3021
2083	2917	1188	086	20	2083	2917
2187	2813	1197	058	11	2187	2813
2292	2708	1203	029	5	2292	2708
2396	2604	1206	020	2	2396	2604
2500	2500	1208	0	0	2500	2500

TABLE III.—*Sārya-Siddhānta*.

Equation b.

argument : b		equation.	Δ 10.	equation.	argument : b	
0	5000	1402	8-92	1402	0	5000
104	4896	1307	8-83	1495	104	4896
208	4792	1215	8-74	1587	208	4792
313	4687	1124	8-64	1678	313	4687
417	4583	1035	8-54	1767	417	4583
521	4479	947	8-35	1855	521	4479
625	4375	861	8-06	1941	625	4375
729	4271	777	7-78	2025	729	4271
833	4167	696	7-40	2106	833	4167
938	4062	619	7-20	2183	938	4062
1042	3958	546	6-81	2258	1042	3958
1146	3854	473	6-53	2329	1146	3854
1250	3750	407	6-04	2398	1250	3750
1354	3646	344	5-57	2468	1354	3646
1458	3542	286	5-09	2516	1458	3542
1562	3438	233	4-60	2569	1562	3438
1667	3333	185	4-13	2617	1667	3333
1771	3229	142	3-64	2660	1771	3229
1875	3125	104	3-07	2698	1875	3125
1979	3021	72	2-60	2730	1979	3021
2083	2917	45	1-81	2757	2083	2917
2187	2813	25	1-44	2777	2187	2813
2292	2708	10	0-77	2792	2292	2708
2396	2604	2	0-38	2800	2396	2604
2500	2500	0		2804	2500	2500

ĀRYA-SIDDHĀNTA.

TABLE V.—Centuries of Kali-Yuga.

A.—Original Ārya-Siddhānta.

cent.	w	a	b	c	sol. corr.	
36	1	76166	6718	7826	gh. +15	p. 0
37	1	63891	2580	7830	+ 7	5
38	1	52615	8442	7834	— 0	50
39	1	41340	4304	7837	— 8	45
40	1	30064	166	7841	—16	40
41	1	19789	6028	7845	—24	35
42	1	7513	1890	7848	—32	30

B.—The same with Lalla's corrections.

cent.	w	a	b	c	sol. corr.	
36	1	76166	6718	7826	gh. +15	p. 0
37	1	63844	2596	7830	+ 7	5
38	1	52523	8475	7834	— 0	50
39	1	41201	4353	7837	— 8	45
40	1	29880	232	7841	—16	40
41	1	18556	6110	7844	—24	35
42	1	7236	1988	7848	—32	30
43	0	92528	7504	7824	+19	35
44	0	81206	3383	7828	+11	40
45	0	69884	9261	7832	+ 3	45
46	0	58563	5140	7835	— 4	10
47	0	47241	1018	7840	—12	50
48	0	35919	6896	7843	—20	0
49	0	24597	2775	7847	—27	55
50	6	9890	8291	7823	+24	10

For mean Distance (—☉ add 1987 to a.

For mean Longitude of the Sun add 2167 to c.

For true Longitude of the Sun add 2227 to c and subtract tenth part of equation c.

TABLE VI.—*Ārya-Siddhānta: Years of the Century.*

year	w	a	b	c	sol. corr.	year	w	a	b	c	sol. corr.
					gh. p.						gh. p.
0	0	0	0	0	0	50	0	44339	7939	2	-3 58
1	1	36006	2464	9993	+15 31	51	1	80345	404	9995	+11 34
2	2	72013	4928	9986	+31 2	52	2	16312	2868	9988	+27 5
3	4	11405	7756	61	-13 26	53	4	55744	5695	8	-17 24
4	5	47412	220	9999	+2 5	54	5	91751	8160	1	-1 53
5	6	83418	2685	9992	+17 36	55	6	27757	624	9994	+13 39
6	0	19424	5149	9985	+33 7	56	0	63763	3089	9987	+29 10
7	2	58817	7977	5	-11 21	57	2	3156	5916	7	-15 19
8	3	94823	441	9998	+4 10	58	3	39162	8380	0	+0 12
9	4	30830	2906	9991	+19 41	59	4	75169	845	9993	+15 44
10	5	66836	5370	9984	+35 12	60	5	11175	3309	9986	+31 15
11	0	6223	8197	4	-9 16	61	0	50568	6136	6	-13 14
12	1	42235	662	9997	+6 15	62	1	86574	8601	9999	+2 17
13	2	78241	3126	9990	+21 46	63	2	22580	1065	9992	+17 49
14	4	17634	5953	10	-22 43	64	3	58587	3530	9985	+30 20
15	5	53640	8418	3	-7 11	65	5	97979	6357	5	-11 9
16	6	89646	882	9996	+8 20	66	6	33986	8822	9998	+4 12
17	0	25653	3347	9989	+23 51	67	0	69992	1286	9991	+19 54
18	2	65045	6174	9	-20 37	68	1	5998	3751	9984	+35 25
19	3	1052	8639	2	-5 6	69	3	45391	6578	4	-9 4
20	4	37058	1103	9995	+10 25	70	4	81397	9042	9997	+6 27
21	5	73064	3567	9988	+25 56	71	5	17404	1507	9990	+21 59
22	0	12457	6395	8	-18 33	72	0	56796	4334	10	-22 30
23	1	48464	8859	1	-3 1	73	1	92803	6799	3	-6 59
24	2	84470	1324	9994	+12 30	74	2	28809	9263	9996	+8 32
25	3	20476	3788	9987	+28 1	75	3	64816	1727	9989	+24 4
26	5	59869	6615	7	-16 28	76	5	4208	4555	9	-20 25
27	6	95875	9080	0	-0 56	77	6	40215	7019	2	-4 54
28	0	31882	1544	9993	+14 35	78	0	76221	9484	9995	+10 37
29	1	67888	4009	9986	+30 6	79	1	12227	1948	9988	+26 9
30	3	7281	6836	7	-14 23	80	3	51620	4775	8	-18 20
31	4	43287	9301	9999	+1 9	81	4	87626	7240	1	-2 49
32	5	79293	1765	9992	+16 40	82	5	23633	9704	9994	+12 42
33	6	15300	4229	9985	+32 11	83	6	59639	2169	9987	+28 14
34	1	54692	7057	6	-12 18	84	1	99032	4996	7	-16 15
35	2	90699	9521	9999	+3 13	85	2	35038	7460	0	-0 44
36	3	26705	1986	9991	+18 45	86	3	71044	9925	9993	+14 47
37	4	62711	4450	9984	+34 16	87	4	7051	2389	9986	+30 19
38	6	2104	7277	5	-10 13	88	6	46443	5217	6	-14 10
39	0	38110	9742	9998	+5 19	89	0	82450	7681	9999	+1 21
40	1	74117	2206	9990	+20 50	90	1	18456	145	9992	+16 52
41	2	10123	4671	9983	+36 21	91	2	54462	2610	9985	+32 24
42	4	49516	7498	4	-8 8	92	4	93855	5437	6	-12 5
43	5	85522	9962	9997	+7 24	93	5	29861	7902	9998	+3 26
44	6	21528	2427	9990	+22 55	94	6	65868	366	9991	+18 57
45	1	60921	5254	10	-21 33	95	0	1874	2830	9984	+34 29
46	2	96927	7719	3	-6 3	96	2	41267	5658	5	-10 0
47	3	32934	183	9996	+9 28	97	3	77273	8122	9997	+5 31
48	4	68940	2647	9989	+25 0	98	4	13280	587	9990	+21 2
49	6	8333	5475	9	-19 29	99	5	49286	3051	9983	+36 34

TABLE VIII.—*Ārya-Siddhānta* :
Equation c.

argument : c.		equation	Δ 10	equation	argument : c	
0	5000	597	3.74	597	0	5000
104	4896	636	3.74	558	9896	5104
208	4792	675	3.64	519	9792	5208
313	4687	713	3.64	481	9687	5313
417	4583	752	3.55	442	9583	5417
521	4479	789	3.46	405	9479	5521
625	4375	825	3.46	369	9375	5625
729	4271	861	3.26	333	9271	5729
833	4167	895	3.26	299	9167	5833
938	4062	929	2.98	265	9062	5938
1042	3958	960	2.88	234	8958	6042
1146	3854	990	2.78	204	8854	6146
1250	3750	1019	2.59	175	8750	6250
1354	3646	1046	2.40	148	8646	6354
1458	3542	1071		123	8542	6458
			2.11			
1562	3438	1093	2.02	101	8438	6562
1667	3333	1114	1.73	80	8333	6667
1771	3229	1132	1.63	62	8229	6771
1875	3125	1149	1.25	45	8125	6875
1979	3021	1162		32	8021	6979
			0.96			
2083	2917	1174	0.77	20	7917	7083
2187	2813	1182	0.66	12	7813	7187
2292	2708	1189	0.38	5	7708	7292
2396	2604	1193	0.10	1	7604	7396
2500	2500	1194		0	7500	7500

TABLE VII.—*Ārya-Siddhānta* :
Equation b.

argument : b.		equation	Δ 10	equation	argument : b	
0	5000	1390	8.74	1390	0	5000
104	4896	1299	8.74	1481	9896	5104
208	4792	1208	8.64	1572	9792	5208
313	4687	1118	8.54	1662	9687	5313
417	4583	1029		1751	9583	5417
			8.35			
521	4479	942	8.16	1838	9479	5521
625	4375	857	7.97	1923	9375	5625
729	4271	774	7.68	2006	9271	5729
833	4167	694	7.59	2086	9167	5833
938	4062	626	7.10	2164	9062	5938
1042	3958	542	6.72	2238	8958	6042
1146	3854	472	6.43	2308	8854	6146
1250	3750	405	5.95	2375	8750	6250
1354	3646	343	5.57	2437	8646	6354
1458	3542	285	5.09	2495	8542	6458
1562	3438	232	4.61	2548	8438	6562
1667	3333	184	4.03	2596	8333	6667
1771	3229	152	3.64	2638	8229	6771
1875	3125	104	3.07	2676	8125	6875
1979	3021	72	2.69	2708	8021	6979
2083	2917	46	2.02	2734	7917	7083
2187	2813	25	1.44	2755	7813	7187
2292	2708	10	0.77	2770	7708	7292
2396	2604	2	0.19	2778	7604	7396
2500	2500	0		2780	7500	7500

BRAHMA-SIDDHĀNTA AND SIDDHĀNTA-ŚIRŌMAṆI.

TABLE IX.—Centuries of *Kali-Yuga*.

A.—BRAHMA-SIDDHĀNTA.

cent.	<i>w</i>	<i>a</i>	<i>b</i>	<i>c</i>	sol. corr.	
37	1	63840	2581	7857	gh. +13	p. 7
38	1	52564	8469	7861	+ 3	45
39	1	41287	4358	7866	— 5	37
40	1	30010	247	7870	—14	59
41	1	18734	6135	7874	—24	22
42	1	7458	2024	7878	—33	44
43	0	92795	7550	7855	+16	53

B.—SIDDHĀNTA-ŚIRŌMAṆI.

cent.	<i>w</i>	<i>a</i>	<i>b</i>	<i>c</i>	sol. corr.	
42	1	7263	1995	7849	gh. —33	p. 44
43	0	92595	7520	7825	+16	53
44	0	81114	3408	7828	+ 7	31
45	0	70033	9296	7832	— 1	52
46	0	58752	5184	7836	—11	14
47	0	47471	1072	7839	—20	37
48	0	36190	6960	7841	—29	59
49	0	24909	2848	7846	—39	22
50	6	10241	8373	7822	+11	16

For mean Distance (—☉ add 1999 to *a*.

For mean Longitude of the Sun add to *c*: 2164 before 4100 K. Y. and 2165 after 4100 K. Y.

For true Longitude of the Sun add 2224 to *c* and subtract tenth part of equation *c*.

NOTE.—The beginning of the Solar month according to the Brahma-Siddhānta and the Siddhānta-Śirōmaṇi is earlier by one day than according to the other Siddhāntas.

TABLE X.—*Brahma-Siddhānta and Siddhānta-Śirōmaṇi; Years of the Century.*

NOTE.—The Table is correct for Siddhānta-Śirōmaṇi; for Brahma-Siddhānta the table value of α must be augmented: by 1 after the year 7, by 2 after 22, by 3 after 37, by 4 after 51, by 5 after 65, by 6 after 80, by 7 after 94.

year.	w	α	b	c	sol. corr.	year	w	α	b	c	sol. corr.
					gh. p.						gh. p.
0	0	0	0	0	0	50	0	40359	7944	2	— 4 41
1	1	36006	2465	9993	+15 30	51	1	80366	408	9994	+10 49
2	2	72013	4929	9986	+31 1	52	2	16373	2873	9987	+26 19
3	4	11406	7756	6	—13 29	53	4	55766	5700	8	— 8 10
4	5	47413	221	9999	+ 2 2	54	5	91773	8165	1	— 2 40
5	6	83420	2685	9992	+17 32	55	6	27779	629	9993	+12 51
6	0	19427	5150	9985	+33 2	56	0	63786	3094	9986	+28 21
7	2	58820	7977	5	—11 27	57	2	3179	5921	7	—16 9
8	3	94827	442	9998	+ 4 3	58	3	39186	8386	0	— 0 38
9	4	30833	2906	9991	+19 33	59	4	75193	850	9993	+14 52
10	5	66840	5371	9984	+35 3	60	5	11199	3315	9985	+30 22
11	0	6233	8198	4	— 9 26	61	0	50593	6142	6	—14 7
12	1	42240	663	9997	+ 6 4	62	1	86599	8607	9999	+ 1 23
13	2	78247	3127	9990	+21 35	63	2	22606	1071	9992	+16 54
14	4	17640	5955	10	—22 55	64	3	58613	3536	9984	+32 24
15	5	53646	8419	3	— 7 24	65	5	98006	6363	5	—12 6
16	6	89653	884	9996	+ 8 6	66	6	34013	8828	9998	+ 3 25
17	0	25660	3348	9989	+23 36	67	0	70019	1292	9991	+18 55
18	2	65053	6176	9	—20 53	68	1	6026	3757	9983	+34 25
19	3	1060	8640	2	— 5 23	69	3	45417	6584	4	—10 4
20	4	37066	1105	9995	+10 7	70	4	81426	9049	9997	+ 5 26
21	5	73073	3569	9988	+25 38	71	5	17433	1513	9990	+20 57
22	0	12466	6397	8	—18 52	72	0	56826	4341	10	—23 33
23	1	48473	8861	1	— 3 21	73	1	82832	6805	3	— 8 3
24	2	84480	1326	9994	+12 9	74	2	28839	9270	9996	+ 7 28
25	3	20487	3790	9987	+27 39	75	3	64846	1734	9989	+22 58
26	5	59880	6618	7	—16 51	76	5	4239	4562	9	—21 32
27	6	95886	9082	0	— 1 20	77	6	40246	7026	2	— 6 1
28	0	31893	1547	9993	+14 10	78	0	76253	9491	9995	+ 9 29
29	1	67900	4011	9986	+29 41	79	1	12260	1955	9988	+25 0
30	3	7293	6839	6	—14 49	80	3	51652	4783	8	—19 30
31	4	43300	9303	9999	+ 0 42	81	4	87659	7247	1	— 4 0
32	5	79306	1768	9992	+16 12	82	5	23666	9712	9994	+11 31
33	6	15313	4232	9985	+31 42	83	6	59673	2176	9987	+27 1
34	1	54706	7060	5	—12 57	84	1	99066	5004	7	—17 29
35	2	90713	9524	9998	+ 2 43	85	2	35072	7468	0	— 1 58
36	3	26720	1989	9991	+18 13	86	3	71079	9933	9993	+13 32
37	4	62726	4453	9984	+33 44	87	4	7086	2397	9986	+29 3
38	6	2119	7281	4	—10 46	88	6	46489	5225	6	—15 27
39	0	38126	9745	9997	+ 4 45	89	0	82486	7689	9999	+ 0 3
40	1	74133	2210	9990	+20 15	90	1	18492	154	9992	+15 34
41	2	10140	4674	9983	+35 45	91	2	54499	2618	9985	+31 4
42	4	49533	7502	3	— 8 44	92	4	93892	5446	5	—13 26
43	5	85540	9966	9996	+ 6 46	93	5	29899	7910	9998	+ 2 5
44	6	21546	2431	9989	+22 16	94	6	65906	375	9991	+17 35
45	1	60939	5258	10	—22 13	95	0	1912	2839	9984	+33 6
46	2	96946	7723	2	— 6 44	96	2	41306	5667	4	—11 24
47	3	32953	187	9995	+ 8 47	97	3	77312	8131	9997	+ 4 6
48	4	68960	2652	9988	+24 18	98	4	13319	596	9990	+19 37
49	6	8353	5479	9	—20 12	99	6	49326	3060	9983	+35 7

TABLE XI.—*Brahma-Siddhānta and Siddhānta-Śirōmaṇi.*EQUATION *b*.

argument: <i>b</i> .		equation.	Δ 10	equation.	argument: <i>b</i> .	
0	5000	1395	8-74	1395	0	5000
104	4896	1304	8-73	1486	9896	5104
208	4792	1212	8-64	1578	9792	5208
313	4637	1122	8-54	1668	9687	5313
417	4583	1033		1757	9583	5417
			8-35			
521	4479	946		1843	9479	5521
625	4375	861	8-25	1929	9375	5625
729	4271	772	7-97	2013	9271	5729
833	4167	697	7-78	2093	9167	5833
938	4062	619	7-59	2171	9062	5938
			7-01			
1042	3958	546		2244	8958	6042
1146	3854	474	6-91	2316	8854	6146
1250	3750	407	6-43	2383	8750	6250
1354	3646	345	5-95	2445	8646	6354
1458	3542	287	5-57	2503	8542	6458
			5-09			
1562	3438	234		2556	8438	6562
1667	3333	186	4-61	2604	8333	6667
1771	3229	143	4-13	2647	8229	6771
1875	3125	105	3-64	2690	8125	6875
1979	3021	73	3-07	2717	8021	6979
			2-49			
2083	2917	47		2743	7917	7083
2187	2813	26	2-02	2764	7813	7187
2292	2708	11	1-44	2779	7708	7292
2396	2604	2	0-86	2788	7604	7396
2500	2500	0	0-19	2790	7500	7500

TABLE XII.—*Brahma-Siddhānta and Siddhānta-Śirōmaṇi.*EQUATION *c*.

argument : c.		equation.	Δ 10	equation.	argument : c.	
0	5000	604	3.75	604	0	5000
104	4896	643	3.85	565	9896	5104
208	4792	683	3.75	525	9792	5208
313	4687	722	3.65	486	9687	5313
417	4583	760		448	9583	5417
			3.65			
521	4479	798		410	9479	5521
625	4375	835	3.56	373	9375	5625
729	4271	871	3.46	337	9271	5729
833	4167	908	3.36	302	9167	5833
938	4062	940	3.26	268	9062	5938
			3.07			
1042	3958	972		236	8958	6042
1146	3854	1002	2.88	206	8854	6146
1250	3750	1031	2.78	177	8750	6250
1354	3646	1058	2.59	150	8646	6354
1458	3542	1083	2.40	125	8542	6458
			2.21			
1562	3438	1108		102	8438	6562
1667	3333	1127	2.02	81	8333	6667
1771	3229	1146	1.83	62	8229	6771
1875	3125	1162	1.53	46	8125	6875
1979	3021	1176	1.34	32	8021	6979
			1.15			
2083	2917	1188		20	7917	7083
2187	2813	1197	0.86	11	7813	7187
2292	2708	1203	0.58	5	7708	7292
2396	2604	1207	0.38	1	7604	7396
2500	2500	1208	0.10	0	7500	7500

TABLE XIII.
For the months and days.

CHAITRA OF PRECEDING YEAR.																			
1										2									
VAIŚĀKA										3									
JYAIŚTHA										4									
ĀSHĀDEHA										5									
ŚRĀVANA										6									
BHĀDRAPADA																			
day	w	a	b	c	day	w	a	b	c	day	w	a	b	c	day	w	a	b	c
0	3	88251	8024	9096	0	4	89841	8911	9918	0	1	94317	162	99203	0	3	13131	4276	8340
1	3	91353	8587	9124	1	5	93217	8945	9945	1	2	95203	525	99453	1	4	16517	4639	3367
2	4	96024	8740	9151	2	6	96614	9637	9973	2	3	10360	821	10360	2	5	19044	5002	3395
3	5	96410	9112	9179	3	7	0	0	0	3	4	4976	1350	9852	3	6	23290	5364	3422
4	6	1797	9475	9205	4	8	3386	363	27	4	5	8893	1613	876	4	7	26576	5727	3450
5	0	5183	9838	9233	5	9	6773	728	55	5	6	11749	1976	903	5	8	30063	6090	3477
6	1	8569	901	9261	6	10	10159	1069	83	6	7	15135	2339	981	6	9	33449	6433	3504
7	2	11956	564	9288	7	11	13545	1452	110	7	8	18521	2702	988	7	10	36853	6816	3532
8	3	15943	927	9316	8	12	16933	1815	137	8	9	21907	3065	986	8	11	40221	7179	3559
9	4	18728	1391	9343	9	13	20318	2177	164	9	10	25294	3428	1013	9	12	43603	7505	3586
10	5	22115	1853	9370	10	14	23704	2540	192	10	11	28680	3791	1040	10	13	46984	7945	3613
11	6	25501	2016	9398	11	15	27096	2903	219	11	12	32066	4154	1068	11	14	50366	8268	3641
12	0	28867	2379	9425	12	16	30477	3266	246	12	13	35453	4517	1095	12	15	53767	8681	3669
13	1	32274	2742	9452	13	17	33893	3629	274	13	14	38839	4879	1122	13	16	57133	8994	3696
14	2	35060	3105	9480	14	18	37249	3982	301	14	15	43815	5242	1151	14	17	60489	9357	3723
15	3	38046	3467	9508	15	19	40636	4318	328	15	16	48901	5605	1180	15	18	63926	9719	3751
16	4	42433	3830	9535	16	20	44052	4718	355	16	17	53974	5968	1209	16	19	67312	10082	3778
17	5	46819	4193	9562	17	21	47469	5081	383	17	18	58984	6331	1232	17	20	70698	10445	3806
18	6	49205	4556	9589	18	22	50795	5444	411	18	19	63939	6694	1259	18	21	74065	10808	3833
19	0	52591	4919	9617	19	23	54181	5807	438	19	20	69157	7057	1287	19	22	77471	11171	3860
20	1	55973	5282	9644	20	24	57587	6170	465	20	21	74383	7420	1314	20	23	80857	11534	3888
21	2	59864	5645	9671	21	25	60854	6533	493	21	22	79699	7783	1342	21	24	84244	11897	3915
22	3	62750	6008	9699	22	26	64340	6895	520	22	23	84931	8146	1369	22	25	87690	12260	3942
23	4	66137	6371	9726	23	27	67726	7258	548	23	24	89702	8509	1396	23	26	9016	12623	3969
24	5	69523	6734	9753	24	28	71113	7621	575	24	25	94969	8872	1424	24	27	92783	12986	3997
25	6	72904	7097	9781	25	29	74469	7984	602	25	26	99845	9234	1451	25	28	97765	13349	4025
26	0	76286	7460	9808	26	30	77865	8347	629	26	27	103611	9587	1478	26	29	101175	13712	4053
27	1	79662	7832	9836	27	31	81272	8710	657	27	28	108484	9960	1506	27	30	105862	14074	4079
28	2	83068	8186	9863	28	32	84638	9073	684	28	29	113304	10333	1533	28	31	109633	14437	4107
29	3	86455	8548	9890	29	33	88204	9468	712	29	30	118129	10602	1561	29	32	113354	14800	4134
30	4				30	34	91981	9759	739	30	31	122980	10871	1588	30	33	117205	15163	4161

TABLE XIII.

For the months and days.

7 द्वितीया.				8 कृत्तिका.				9 मङ्गशिरा.				10 रावणा.				11 मिथुना.				12 रेवतीया.					
day	w	a	c	day	w	a	b	day	w	a	b	day	w	a	b	day	w	a	b	day	w	a	b	c	
0	6	18168	5526	5088	0	2	23068	6776	5088	7664	5859	0	5	22876	8188	6853	0	6	21079	8713	7447	1	32668	9801	8988
1	0	21405	5859	5095	1	3	26460	7189	5095	8027	5986	1	6	23062	8351	6850	1	0	22865	9076	7474	2	32653	9963	8995
2	1	24879	6252	5099	2	4	29855	7502	5099	8890	5914	2	0	23648	8914	6708	2	2	27851	9459	7502	3	32641	10833	9028
3	2	28266	6615	5120	3	5	33942	7865	5120	9373	5941	3	1	33035	9277	6735	3	3	31298	9802	7529	4	32627	11689	9050
4	3	31653	6978	5147	4	6	36988	8228	5147	9860	5968	4	2	36424	9640	6780	4	4	34624	1052	7556	5	32614	12546	9096
5	4	35038	7341	5174	5	7	40014	8591	5174	10347	5995	5	3	39807	10013	6790	5	5	38010	1136	7584	6	32600	13402	9141
6	5	38423	7704	5202	6	8	43941	8954	5202	10822	6023	6	4	43193	10480	6817	6	6	41397	1218	7611	7	32586	14258	9186
7	6	41811	8068	5229	7	9	46787	9317	5229	11304	6051	7	5	46580	10952	6844	7	7	44783	1253	7638	8	32573	15114	9231
8	0	45197	8429	5257	8	10	50173	9690	5257	11789	6075	8	6	49966	11425	6872	8	8	48169	1316	7666	9	32559	15970	9276
9	1	48584	8792	5284	9	11	53546	10048	5284	12284	6105	9	7	53352	11900	6899	9	9	51556	1441	7693	10	32546	16826	9321
10	2	51970	9155	5311	10	12	56940	10466	5311	12789	6133	10	8	56739	12761	6927	10	10	54942	1510	7720	11	32532	17682	9366
11	3	55356	9518	5338	11	13	60382	10884	5338	13294	6160	11	9	60125	13633	6954	11	11	58338	1638	7748	12	32519	18593	9411
12	4	58742	9881	5366	12	14	63719	1131	5366	13804	6187	12	10	63311	14584	6981	12	12	61715	1708	7775	13	32506	19494	9456
13	5	62128	10244	5393	13	15	67105	11894	5393	14314	6215	13	11	66508	15575	7009	13	13	65101	1857	7803	14	32493	20404	9501
14	6	65515	10607	5421	14	16	70491	12517	5421	14844	6242	14	12	70284	16666	7036	14	14	68497	1956	7830	15	32480	21314	9546
15	0	68902	10970	5448	15	17	73878	12920	5448	15374	6270	15	13	73487	17757	7063	15	15	71874	2055	7857	16	32467	22224	9591
16	1	72288	11333	5476	16	18	77864	13384	5476	15904	6297	16	14	76690	18848	7091	16	16	75076	2154	7884	17	32454	23134	9636
17	2	75674	11696	5503	17	19	80650	13946	5503	16434	6324	17	15	80443	19839	7118	17	17	78864	2253	7912	18	32441	24044	9681
18	3	79061	12059	5530	18	20	84006	14369	5530	16964	6352	18	16	83646	20830	7146	18	18	82053	2352	7939	19	32428	24954	9726
19	4	82447	12422	5558	19	21	87883	14788	5558	17494	6379	19	17	87266	21821	7173	19	19	85669	2451	7966	20	32415	25864	9771
20	5	85833	12785	5585	20	22	90800	15197	5585	18024	6406	20	18	90763	22808	7200	20	20	89072	2550	7993	21	32402	26774	9816
21	6	89219	13148	5612	21	23	94195	15606	5612	18554	6434	21	19	94939	23793	7228	21	21	93183	2649	8021	22	32389	27684	9861
22	0	92605	13511	5639	22	24	97582	16015	5639	19084	6461	22	20	98502	24782	7255	22	22	96727	2748	8049	23	32376	28594	9906
23	1	95991	13874	5666	23	25	100968	16424	5666	19614	6489	23	21	101285	25771	7283	23	23	98904	2847	8076	24	32363	29404	9951
24	2	99377	14237	5693	24	26	104884	16833	5693	20144	6516	24	22	104629	26758	7310	24	24	10269	2946	8104	25	32350	30214	10041
25	3	102763	14600	5720	25	27	108890	17242	5720	20674	6543	25	23	107534	27745	7337	25	25	10676	3045	8131	26	32337	31024	10086
26	4	106149	14963	5747	26	28	112896	17651	5747	21204	6570	26	24	111440	28732	7365	26	26	11099	3144	8159	27	32324	31834	10131
27	5	109535	15326	5774	27	29	116902	18060	5774	21734	6597	27	25	115235	29719	7392	27	27	11509	3243	8186	28	32311	32644	10176
28	6	112921	15689	5801	28	30	120908	18469	5801	22264	6624	28	26	119028	30706	7419	28	28	11906	3342	8214	29	32298	33454	10221
29	0	116307	16052	5828	29	31	124914	18878	5828	22794	6651	29	27	122819	31693	7446	29	29	12281	3441	8241	30	32285	34264	10266
30	1	119693	16415	5855	30	32	128920	19287	5855	23324	6678	30	28	126602	32682	7473	30	30	12660	3540	8268				

TABLE XV.—For *Pulas*.

pala	a	b	pala	a	b
1	1	0	31	39	3
2	2	1	32	30	3
3	3	0	33	31	3
4	4	0	34	32	3
5	5	0	35	33	3
6	6	1	36	34	4
7	7	1	37	35	4
8	8	1	38	36	4
9	9	1	39	37	4
10	10	1	40	38	4
11	11	1	41	39	4
12	12	1	42	40	4
13	13	1	43	41	4
14	14	1	44	42	4
15	15	2	45	43	5
16	16	2	46	44	5
17	17	2	47	45	5
18	18	2	48	46	5
19	19	2	49	47	5
20	20	2	50	48	5
21	21	2	51	49	5
22	22	2	52	50	5
23	23	2	53	51	5
24	24	2	54	52	5
25	25	2	55	53	5
26	26	3	56	54	6
27	27	3	57	55	6
28	28	3	58	56	6
29	29	3	59	57	6
30	30	3	60	58	6

TABLE XIV.—For *Ghaṭikās*.

gh	a	b	c	gh	a	b	c
1	56	6	0	31	1750	187	14
2	113	12	0	32	1806	194	15
3	169	18	1	33	1862	200	15
4	228	24	2	34	1919	206	16
5	282	30	2	35	1975	213	16
6	339	36	3	36	2032	218	16
7	395	43	3	37	2088	224	17
8	451	49	4	38	2145	230	17
9	508	54	4	39	2201	236	18
10	564	60	5	40	2257	242	18
11	621	66	5	41	2314	248	19
12	677	73	5	42	2370	254	19
13	734	79	6	43	2427	260	20
14	790	85	6	44	2483	266	20
15	847	91	7	45	2540	272	21
16	903	97	7	46	2596	278	21
17	959	103	8	47	2653	284	21
18	1016	109	8	48	2709	290	22
19	1072	115	9	49	2765	296	22
20	1129	121	9	50	2822	302	23
21	1185	127	9	51	2878	308	23
22	1242	133	10	52	2935	314	24
23	1298	139	10	53	2991	320	24
24	1354	145	11	54	3048	327	25
25	1411	151	11	55	3094	333	25
26	1467	157	12	56	3151	339	26
27	1524	163	12	57	3207	345	26
28	1580	169	13	58	3273	351	26
29	1637	175	13	59	3330	357	27
30	1693	181	14	60	3386	363	27

TABLE XIII.
(Continued from p. 177.)13
CHAITRA.

day	w	a	b	c
0	3	24260	488	9069
1	4	27646	851	9177
2	5	31033	1214	9144
3	6	34419	1577	9172
4	7	37805	1940	9199
5	8	41192	2303	9226
6	9	44578	2665	9253
7	10	47964	3028	9281
8	11	51350	3391	9308
9	12	54735	3754	9336
10	13	58121	4117	9363
11	14	61507	4480	9391
12	15	64894	4843	9418
13	16	68280	5206	9445
14	17	71666	5569	9473
15	18	75053	5932	9500
16	19	78439	6295	9527
17	20	81825	6658	9555
18	21	85212	7020	9582
19	22	88598	7383	9610
20	23	91984	7745	9637
21	24	95371	8109	9664
22	25	98757	8472	9692
23	26	102143	8835	9719
24	27	105529	9198	9747
25	28	108915	9561	9774
26	29	112302	9924	9801
27	30	115689	10287	9829
28	31	119075	10650	9856
29	32	122461	11013	9883

VAIŚAKHA OF
FOLLOWING YEAR.

0	5	25849	1375	9911
1	6	29234	1738	9938
2	7	32620	2101	9965
3	8	36007	2464	9993
4	9	39393	2827	10020

TABLE XVI.—For converting Decimals of the circle into Degrees, Minutes and Seconds.

1st Decim.	°	2nd Decim.	°	'	3rd Decim.	°	'	"	4th Decim.	°	'	"	5th Decim.	°	'	"
0·1	36	0·01	3	36	0·001	0	21	36	0·0001	2	10		0·00001	0	13	
0·2	72	0·02	7	12	0·002	0	43	12	0·0002	4	19		0·00002	0	26	
0·3	108	0·03	10	48	0·003	1	4	48	0·0003	6	29		0·00003	0	39	
0·4	144	0·04	14	24	0·004	1	26	24	0·0004	8	38		0·00004	0	52	
0·5	180	0·05	18	...	0·005	1	48	...	0·0005	10	48		0·00005	1	5	
0·6	216	0·06	21	36	0·006	2	9	36	0·0006	12	58		0·00006	1	18	
0·7	252	0·07	25	12	0·007	2	31	12	0·0007	15	7		0·00007	1	31	
0·8	288	0·08	28	48	0·008	2	52	48	0·0008	17	17		0·00008	1	44	
0·9	324	0·09	32	24	0·009	3	14	24	0·0009	19	26		0·00009	1	57	

TABLE XVIII.—Tithi Table.

TABLE XVII.—For converting Degrees, Minutes and Seconds into Decimals of the circle.

(Argument A = a corrected by eq. b and eq. c.)

Degrees.		Minutes.		Seconds.	
1	0·00277·8	1	0·00004·6	1	0·00000·1
2	0·00555·6	2	0·00009·3	2	0·00000·2
3	0·00833·3	3	0·00013·9	3	0·00000·2
4	0·01111·1	4	0·00018·5	4	0·00000·3
5	0·01388·9	5	0·00023·1	5	0·00000·4
6	0·01666·7	6	0·00027·8	6	0·00000·4
7	0·01944·4	7	0·00032·4	7	0·00000·5
8	0·02222·2	8	0·00037·0	8	0·00000·6
9	0·02500·0	9	0·00041·7	9	0·00000·7
10	0·02777·8	10	0·00046·3	10	0·00000·8
20	0·05555·6	20	0·00092·6	20	0·00001·5
30	0·08333·3	30	0·00138·9	30	0·00002·3
40	0·11111·1	40	0·00185·2	40	0·00003·1
50	0·13888·9	50	0·00231·5	50	0·00003·8
60	0·16666·7				
70	0·19444·4				
80	0·22222·2				
90	0·25000·0				
100	0·27777·8				
200	0·55555·6				
300	0·83333·3				

Tithi.	Bright fort- night.	Dark fort- night.
	A	A
0	0	50000
1	3333	53333
2	6667	56667
3	10000	60000
4	13333	63333
5	16667	66667
6	20000	70000
7	23333	73333
8	26667	76667
9	30000	80000
10	33333	83333
11	36667	86667
12	40000	90000
13	43333	93333
14	46667	96667
15	50000	00000