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# *MAHĀBHĀRATA:* THE NUMBERS 18 AND 108 THROUGH AKṢAUHIṆĪ

This is an attempt to look at the numbers 18 and 108 in the division of the army of the Pāṇḍava and the one of the Kauravas. Moreover, one knows the 18 *parvan* of the *Mahābhārata* and also the 18 chapters of the *Bhagavadgītā*. I think the number 18 is also connected with the total strength of the two armies on the battle field of Kurukṣetra.

I am not a mathematician but I acknowledge the case of the 18 as a fact by using a simple arithmetical operation.

*Commun platform*. - **(CP)** An akṣauhiṇī has:

21870 chariots, 21870 elephants, 65610 horses,
109350 foot soldiers (CP1).

Without considering the final zero (0) or dividing the terms by ten, the sum of the terms is:

chariots 2+1+8+7 = **18**; elephants 2+1+8+7 = **18**
horses 6+5+6+1 = **18**; foot soldiers 1+9+3+5 = **18** (CP2).

We see the number 18 at each division, we can write:

18 x 4 = 72,
2 + 7 = 9;
7 x 2 = 14,
1 + 4 = 5,
9 x 5 = 45; 72 - 45 = **27** (CP3).

Suppress the final zero (0) or dividing them by ten:

chariots 2187; elephants 2187
horses 6561; foot soldiers 10935; divide each number by 27:
chariots 2187 / 27 = **81**; elephants 2187 / 27 = **81**;
horses 6561 / 27 = 243 foot soldiers 10935 / 27 = 405 (CP4).

*N.B.* The numbers 81, 81, 243, 405 shows the division known as vāhinī. It may be noticed:

81 x 3 = 243 (for horses)
81 x 5 = 405 (for foot soldiers).

81 x 81 = 6561 anīkinī being equal to the number of horses (CP5).
3 x 5 = 15 (CP6),
243 x 405 = 98415, by adding the terms together
9+8+4+1+5 = 27 (CP7).
2187 x 2 = 4374; 6561 - 2187 = 4374; 10935 - 6561 = 4374,
we add the terms together: 4 + 3 + 7 + 4 = 18 (CP8).
6561 + 2187 = 8748; 10935 - 2187 = 8748,
8748 x 2 = 17497, by adding the terms together,
1 + 7 + 4 + 9 + 7 = 27 (CP9).

| | **Pāṇḍavas' Camp** | **Kauravas' Camp** |
|---|---|---|
| | The Pāṇḍavas had 7 akṣauhiṇī: | The Kauravas had 11 akṣauhiṇī: |
| Chariots | 21870 x 7 = 153090 | 21870 x 11 = 240570 |
| Elephants | 21870 x 7 = 153090 | 21870 x 11 = 240570 |
| Horses | 65610 x 7 = 459270 | 65610 x 11 = 721710 |
| Foot soldiers | 109350 x 7 = 765450 (P1) | 109350 x 11 = 1202850 (K1). |

By suppressing the final zero (0) of dividing these numbers by ten, we obtain:

| | | |
|---|---|---|
| Chariots | 15309 | 24057 |
| Elephants | 15309 | 24057 |
| Horses | 45927 | 72171 |
| Foot soldiers | 76545 (P2) | 120285 (K2). |

We make a series of additions of the terms of each number:

| | | |
|---|---|---|
| Chariots | 1+5+3+9 = 18 | 2+4+5+7 = 18 |
| Elephants | 1+5+3+9 = 18 | 2+4+5+7 = 18 |
| Horses | 4+5+9 = 18* (or 36 / 2 = 18) | 7+2+1+7+1 = 18 |
| Foot soldiers | 7+6+5 = 18* (P3) | 1+2+2+8+5 = 18 (K3). |

*N.B.** the sum of the terms belonging to *horses* is 4 + 5 + 9 + 2 + 7 = 27; 27 - 9 = 18; or 18 can be obtained by adding 18 + 18 = 36 and its half is 18.
For the case of foot soldiers, we add 7 + 6 + 5 (last term), the terms 5, 4 of 54 are not considered as 54 = 27 x 2 or 18 x 3 = 54. The sum of the terms belonging to *foot soldiers* is 7 + 6 + 5 + 4 + 5 = 27. The number 18 can be obtained: 72 - 54 = 18. By the way, we see a balance facing (K3).

*N.B.* An akṣauhiṇī has:
- *anīkinī* being one-tenth of it,
- a *vāhinī* being 1/27 of anīkinī.

Considering the numbers in (P2) and (K2) and divide them respectively into 27 and 7 (for P2) and 11 (for K2).

| | | |
|---|---|---|
| Chariots | 15309 / 27 = 567, 567 / 7 = **81;** | 24057 / 27 = 891, 891 / 11 = **81;** |
| Elephants | 15309 / 27 = 567, 567 / 7 = **81;** | 24057 / 27 = 891, 891 / 11 = **81;** |
| Horses | 45927 / 27 = 1701, 1701 / 7 = **243;** | 72171 / 27 = 2673, 2673 / 11 = **243;** |
| Foot soldiers | 76545 / 27 = 2835, 2835 / 7 = **405** (P4). | 120285 / 27 = 4455, 4455 / 11 = **405** (K4). |

By considering (P1) and (K1), we start a series of substractions:

| | | |
|---|---|---|
| Chariots | 153 - 090 = 63; | 570 - 240 = 330; |
| Elephants | 153 - 090 = 63; | 570 - 240 = 330; |
| Horses | 459 - 270 = 189; | 721 - 710 = 11; |
| Foot soldiers | 765 - 450 = 315 (P5). | 850 - 202 = **648** (K5). |

We add the results:
63 + 63 + 189 + 315 = **630** (P6);
630 - 63 = **567** (P7);
This number 63 can be obtained by dividing
189 / 3 and 315 / 5.

*N.B.* The number 1 of 1202850 is not considered as it is the 7th position by counting from right to left. The limit of six digits may seem for the moment to be conductive to an appreciated result.

630 + 11 = **641** (P8).

648 - 81 = **567** (K6), it is equal to (P7).
648 - 7= 641 (K7), it is equal to (P8).

Consider (P7), 567 and add the terms:
5 + 6 + 7 =18 (P9).

Consider (K6), 567 and add the terms:
5 + 6 + 7 = 18 (K8).

At the step called (P4) and (K4), some interesting operations can be made as following:

567 + 567 + 1701 = 2835 (P10), 891 + 891 + 2673 = 4455 (K9).

The principal purpose of all operations is the numbers connected with the numbers 18 and 108. Then, the result of (P10) is the same (P4) being 2835 vāhinī of foot soldiers. The result of (K9) is equal to 4455 vāhinī of foot soldiers in the Kauravas' camp. We make an operation like:

(K9) - (P10) = 4455 - 2835 = 1620,

1620 / 15 = **108**.

[for the number 15, see relation (CP6)].

The relations (P7) and (K6) provide the same number *567* which through its terms can be seen as following: 56 ---> 5 + 6 = 11, this the 11 akṣauhiṇī of the Kauravas army; the last term 7 is the 7 akṣauhiṇī of the Pāṇḍavas army. Consider the relation (K5) - (P8) = 648 - 641 = 7, that is the 7 akṣauhiṇī of the Pāṇḍavas army. Hence, the subtraction 18 - 7 = **11**.

*Corollary*. - We see beetween the relations (CP7) to (CP9), the numbers:
a) 4374 ---> 4 + 3 + 7 + 4 = 18; b) 8748 ---> 8 + 7 + 4 + 8 = 27.
Through the relations (P4) we have:
567 ---> 5 + 6 + 7 = 18; 2835 ---> 18.
Otherwise, through the relation (K4), we record:
891 ---> 8 + 9 + 1 = 18; 2673 ---> 2 + 6 + 7 + 3 = 18;
4455 ---> 4 + 4 + 5 + 5 = 18.

## The number 18, 108 in connection with arithmetical progression.

We have the number 27 as we have seen in (CP3); 27 is equal to 3 x 3 x 3 = $3^3$.
Then, we set about writing an arithmetical progression with the ratio 3.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st line | 3 | 6 | 9 | 12 | 15 | **18** | 21 | 24 | **27** | 30 |
| 2nd line | 33 | 36 | 39 | 42 | 45 | 48 | 51 | 54 | 57 | 60 |
| 3rd line | 63 | 66 | 69 | **72** | 75 | 78 | **81** | 84 | 87 | 90 |
| 4th line | 93 | 96 | 99 | 102 | 105 | **108** | 111 | 114 | 117 | 120 |

**A.** 81 + 27 = **108** as we have 108 *upanishad-texts*, according to the Hindu traditional view. We have 27 *nakṣatra*, when we operate 27 x 4 = 108, as the number 4 could be represented the four seasons.

**B.** When increasing the number 27 by multiplying by 3 as 3 x 3 x 3 x 3 = 81 = $3^4$
(b1) 27 x 27 = *729*
---> 72 + 9 = 81. [for the number 72, it is the result of 18 x 4, see (CP3)].

(b2) 729

---> 72 x 9 = *648* [see the step (K5)],

---> *6* + *4*, 8

---> 10 8 (at that very step, the way cannot be entirely accepted).

The number 54, (or 27 x 2; 18 x 3, see in *N.B.* page 2), is at the 18th position in the arithmetical progression. By multiplying by ten:

54 x 10 = 540.

(b3) 648 - 540 = **108**. [for 648, see (b2) and (K5)].

With the number 729 of (b1), we make the sum of the three terms:

(b4) 7 + 2 + 9 = **18**.

(b5) 108 - 18 = 90.

(b6) 90 + 18 = 108 [The relations (b5) and (b6) are the natural consequences of the operation].

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1st line | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| 2nd line | 33 | 36 | 39 | 42 | 45 | 48 | 51 | 54 | 57 | 60 |
| 3rd line | 63 | 66 | 69 | 72 | 75 | 78 | 81 | 84 | 87 | 90 |
| 4th line | 93 | 96 | 99 | 102 | 105 | 108 | 111 | 114 | 117 | 120 |

**C.** We consider the 1st line of the progression, and we make an addition from the number 3 (1st case) to the number 24 (8th case)

(c1) 3 + 6 + 9 + 12 + 15 + 18 + 21 + 24 = **108**;

from the number 15 (5th case) to the number 30 (10th case), except the number 27:

(c2) 15 + 18 + 21 + 24 + 30 = **108**.

On the 2nd line of the progression, we make a series of subtractions by using the number 27 (the 9th position of the 1st line); the operations start from the number 42 (4th case) to the number 57 (9th case), except the number 54 as 54 - 27 = 27 (or 54 = 27 x 2):

42 - 27 = 15; 45 - 27 = 18; 48 - 27 = 21; 51 - 27 = 24; 57 - 27 = 30.

We add the results of the operations:

(c3) 15 + 18 + 21 + 24 + 30 = **108**. This is the same result as in (c2).
(c4) 33 + 36 + 39 = **108**, (on the 2nd line from the 1st case to 3rd case).
(c5) 63 + 66 + 69 = **198**, (on the 3rd line from the 1st case to 3rd case).
(c6) 198 - 90 = **108**. (the number 90 is at the 10th position on the 3rd line).

On the 3rd line, we consider the number 72 to 87, (except the number 84 as 84 - 57 = 27) and we make a series of operations as we have done on the 2nd line as well; at this very case, we must take the number 57 the 9th position of the 2nd line) as a constant one:

72 - 57 = 15; 75 - 57 = 18; 78 - 57 = 24; 87 - 57 = 30;

by adding these results, we obtain:
(c7) 15 + 18 + 21 + 24 + 30 = **108**. This is the same result as in (c2).
The same way may be applied for the 4th line as:
(c8) 93 + 96 + 99 = 288;
(c9) 288 - (90 x 2) = 288 - 180 = **108**.
On the 4th line by considering the number 87 (the 9th position of the 3rd line) as a constant number, we make a series of operations from number 102 to the number 117, except the number 114 as 114 - 87 = 27, we can write down the following subtractions:

102 - 87 = 15; 105 - 87 = 18; 108 - 87 = 21; 111 - 87 = 24, 117- 87 = 30; by adding these results we obtain

(c10) 15 + 18 + 21 + 24 + 30 = **108**.

**D.** *The numbers 18 and 27 with akṣauhiṇī itself.*

In the beginning (CP2) we have seen
21870 ---> 2187
---> 2+1+8+7 = **18**.
The numbers 18 and 27 can be obtained through six relations.
(d1) (21870 x 2) + 65610 = 109350, (number of foot soldiers, see in (CP1),
1 +9+ 3 + 5 = **18** (see in CP2);
(d2) (21870 x 2) + 65610 + 109350 = 218700
or 21870 x 10
---> 2+1+8+7 = **18** (see in CP1);

(d3) 65610 + 109350 = 174960 -----> *17496*
---> 1 + 7 + 4 + 6 = **27**;
(d4) 17960 + 21870 = *19683*0
---> 1 + 9 + 8 + 3 = **27**;
(d5) 65610 + 21870 = *8748*0
---> 8 + 7 + 4 + 8 = **27**;
(d6) (21870 x 2) + 109350 = *15309*0
---> 1 + 5 + 3 + 9 = **27**.

Through many operations, we obtain the numbers 18 and 108 and also the leading digit 27 from which an akṣauhiṇī is known to us. Have I got to give an explanation? Unless compelled to add anything else, I prefer not to. Whatever one may think, the digits and the numbers would catch one's attention. One is supposed to be certain of what is stated in *Amarakoṣa* in *Kālavarga* as **30** *muhūrtas* are equal a day and night (i.e. 24 hours).

When multiplying the number 108 by ten: 108 x 10 = 1080 (F1).
In the relation (d5), we have 87480, and 87480 - 1080 = 86400 (F2).
30 *muhūrtas* = 24 hours, we can have 24 x 60 x 60 = 86400 seconds (F3).
In (F1), the number is chosen as from zero (0) to nine (9), we have 10 numbers of single digit. In (F2) and (F3), by dividing by hundred (100), we obtain 864. We make a multiplication of the three terms: 8 x 6 x 4 = 192 (F4),

192 / 8 = 24 (F5).

At last, by adding the three terms: 8 + 6 + 4 = **18**. Not that it has become dull nor even I produce a guess of it; it is just that it has been obtained by simple computation.

*Memorandum*

| **Pāṇḍavas' Camp** (Commanders in chief) | **Kauravas' Camp** (Commanders in Chief) |
|---|---|
| 1. Drupada | 1. Kṛpa |
| 2. Virāṭa | 2. Droṇa |
| 3. Dhṛṣṭadyumna | 3. Śalya |
| 4. Śikhandin | 4. Jayaratha |
| 5. Sātyaki | 5. Sudakṣiṇa |
| 6. Cekitāna | 6. Kṛtavarman |
| 7. Bhīma | 7. Aśvatthāman |
| | 8. Karṇa |
| | 9. Bhūriśravas |
| | 10. Śakuni |
| | 11. Bāhlika |
| Cf. *Mahābhārata*, Udyogaparvan (V) Adhyāya 149, st. 3-6, p. 529, Poona Edition. | Cf. *Mahābhārata*, Udyogaparvan (V) Adhyāya 152, st. 18-19, p. 542, Poona Edition. |

*Some Useful References*

Apte's *Practical Sanskrit-English Dictionary* notices at page 8:

*Ūhaḥ samūhaḥ saṃvikalpajñānaṃ vā so'syāmista iti akṣāṇāṃ rathānāṃ sarvoṣamindriyāṇāṃ vā ūhinī ṇatvaṃ vṛddhiś ca.*

Pāṇini's sūtraVI.1.89: **etyedhatyūṭhsu** // 89 // padāni // **eti edhati ūṭhsu** //

*Vṛttiḥ* // *vṛddhirecīti vartate āditi ca / tadetadej grahaṇameteva viśeṣaṇaṃ na punaredha teravyabhicarārād ūthaś cāsabhavāt // iṇ gatāvi-*

*tyetasmin dhātāveci edha vṛddhāvityetasmin ūṭhi ca pūrvaṃ yadavarṇaṃ tataś ca paro yoc tayoḥ pūrvaparayoravarṇācoḥ sthāne vṛddhir ekādeśo bhavati //*

*Vārttikam // akṣādūhinyāṃ vṛddhir vaktavyā // vā° // svādīror iṇyor vṛddhir vaktavyā // vā° // prādūhoḍhoḍhayeṣaiṣyeṣu vṛddhir vaktavyā // vā° // ṛte ca tṛtīyāsamāse varṇād vṛddhir vaktavyā // vā° // pravatsatarakambalavasanānāmṛṇe vṛddhir vaktavyā // vā° // ṛṇdaśābhyāṃ vṛddhir vaktavyā //*

## Listening to *Amarakoṣa*

*Astādaśanimeṣās tu kāṣṭhā aṣṭādaśeti triṃśat tu tāḥ kalā /*
*tās tu triṃśatkṣaṇaḥ te tu muhūrto dvādaśāstriyām //* 11 *//*
*Te tu triṃśad ahorātraḥ pakṣas te daśapañca ca*
*pakṣau pūrvāparau śuklakṛṣṇau māsas tu tāvubhau //* 12.

*Prathamakāṇḍa, Kālavargavivaraṇam*, 2nd edition
Bombay, 1987, p. 47.

*Senāmukhaṃ gulmagaṇau vāhinī pṛtanā camūḥ /*
*anīkinī daśānīkinyo'kṣauhiṇī atha saṃpadi //* 81 *//*

*Dvitīyam kāṇḍam*. 2nd edition,
Bombay, 1987, pp. 290-291.

*Vahinī* according to Apte's *Dictionary* (p. 848, coll. 2)
(vāho astyasyāḥ ini ṅīp); a *vāhinī* has 81 chariots, 81 elephants, 243 horses and 405 foot soldiers.

An *akṣauhiṇī* recorded in *Ādiparvan* of **Mahābhārata**.

*Akṣauhiṇyāḥ prasaṃkhyāta sthānaṃ dvijasattamāḥ*
*saṃkhyā gaṇitatatvajñaiḥ sahasrāṇyekaviṃśatiḥ //*
*Śatānyupari caivāṣṭau tathā bhūyaś ca saptatiḥ*
*gajānāṃ tu parimāṇam etad eva vinirdiśet //*
*Jñeyaṃ śatasahasraṃ tu sahasrāṇi naiva tu*

*narāṇām api pañcaśac chatāni trīṇi cānaghāḥ //*
*Pañcaṣaṣtiḥ sahasrāṇi tathāśvānāṃ śatāni ca*
*daśottarāṇi ṣaṭ prahur yathāvad iha saṃkhyayā //*

*Pāṇḍavas' army*

*Mahābhārata, Uddyogaparvan* (V), adhyāya 149, st. 3-5, Poona edition.

*Tasmāt senāvibhāgaṃ me kurudhvaṃ narasattamāḥ*
*akṣauhiṇyastu saptaitāḥ sametā vijayāya vai //* 3 *//*
*Tāsāṃ me patayaḥ sapta vikhyātās tān nibodhata*
*drupadaś ca virāṭaś ca dhṛṣṭadyumnaśikhaṇḍinau //* 4 *//*
*Sātyakiś cekitānaś ca bhīmasenaś ca vīryavān*
*ete senā praṇetāro vīrāh sarve tanu-tyajaḥ //* 5 *//*

*Kauravas' army*

*Mahābhārata, Udyogaparvan* (V), adhyāya 152, st. 22-24, Poona edition.

*Vāhinī pṛtanā senā dhvajinī sādinī camūḥ*
*akṣauhinīti paryāyair niruktātha varūthinī*
*evaṃ vyūḍhānyanīkāni kaurave yena dhīmatā //* 22 *//*
*Akṣauhiṇyo daśaikā ca saṃkhyātāḥ sapta caiva ha*
*akṣauhiṇyastu saptaiva pāṇḍavānām abhūd balam*
*akṣauhiṇyo daśaikā ca kauravāṇam abhūd balam //* 23 *//*
*Narāṇāṃ pañcapañcaśad eṣā pattir vidhīyate*
*senāmukhaṃ ca tisras tā gulma ityabhisaṃjñitaḥ //* 24 *//*

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N.B. This is a sole article dealing with the numeral 18.

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