

Taxes in Sanskrit mathematical sources

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SAW seminar
02/2012

Gaṇitasāraśāstram

GSK

“The moonlight of the essence of mathematics”

by Ṭhakkura Pherū (ca. 1270-1323)

a śvetāmbara Jain

b. in Haryana, worked in Delhi

SaKHYa, Manohar, 2009

Yield of Grains

GSK.5.9 All the spices, garden cresses, fenugreek, leafy vegetables, kora grains etc. (...) are for a tax (*karassa*) of one hundred *dammās* per *viggahaya*.

Yield of Sugarcane Juice and oil

Yield of Regional Tax (*deśa-kara-phala*)

GSK.5.14 Ten for a she-goat, the same for a cow, twice that for a she-buffalo, and four *vayallas* for a plough. For fire of hearth, the heart tax, excepting things related to barbers, jewels and dowry

Tolls

GSK.4.47 There is a temple with four doors. At each of them is one Yakṣa <image> equal to the door <in height>. In the middle of them (i.e., at the centre of the temple) is <located the image of> the lord of gods (Indra). A pious man laid all the plentiful flowers by half each time <he paid homage to> the image, giving one to Yakṣa while passing through each door. If the remainder, twenty, remains with him, how many <flowers> did he possess in total?

Computing with fractions

GSK. part-mother class (*bhāga-mātr-jāti*)

2.10. Three diminished by <its> half, this less by <its> quarter, this less by its one-sixth. Likewise, a half deprived of <its> one-third, this of <its> one-fourth. What are the results separately?

Pāṭīgaṇita of Śrīdhāra (VIIIth century) PG

K.S. Shukla, Lucknow, 1959

PG 77. Ex. 101. After giving way one (out of a certain number), then **one-sixth** (*ṣaṣṭha*) of what remains, the **one-fourth** (*caturtha*) of what remains after that, then one-third (*tryaṃśa*) of what remains after that, and then the square root of the original number, the residue left is five. (What is that number?)

Gaṇitasārasaṃgraha, Mahāvīra (VIIIth century?) GSS

Rangacarya, Madras, 1912

GSS 3.127. *Karṣas* three, eight, four and ten diminished by a quarter, a half, a **twelfth** (*dvadaśāṃśa*) and a **sixth** (*ṣaṣṭha*) of a *karṣa* are offered by certain men for the worship of *tīrthaṅkaras*. What is (the sum) when they are added?

GSS.3.133. A certain fraction is diminished (in consecution) by one fourth (*caraṇa*) one fifth (*pañcamabhāga*), and one sixth (*ṣaṣṭha*) of itself; another fraction is similarly diminished by one half, one sixth (*ṣaḍāṃśa*) and one fifth (*pañcamāṃśa*) of itself; yet another is similarly diminished by two fifth, one fourth and sixth of itself. The sum of these (quantities so diminished) is one half. What are the unknown fractions here?

GSS.4.29 Of a collection of mango fruits, the king (took) one sixth (*ṣaḍbhāga*); the queen took one fifth (*pañcama*) of the remainder, and three chief princes took one fourth, one third and one half (of that same remainder); and the youngest child took the remaining three mangoes. O you, who are clever in (working) miscellaneous problems on fractions, give out the measure of that (collection of mangoes).

Proportionate division

GSS.6.80 Here, a hundred and twenty gold pieces are divided among four servants in the proportional parts of a half, a third, a quarter and a sixth. O arithmetician, tell me quickly what they obtained.

Vallikākuṭṭikāra

On a certain man bringing mango fruits, <his> elder son took one fruit first and then half of what remained. The younger did similarly; and the other took the other half. <Find the number of fruits brought by the father>.

Tax ratios evoked

$1/6$ or $1/8$ or $1/10$ or $(1/12)$ of the yield

$1/50$ or $1/20$ th of cattle and gold

Sheperds $1/4$ on each cow, $1/2$
panna on each buffalo, $1/4$ panna
on 8 sheeps

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Monetary Units

GSK.1.3. *Paḍikāiṇi* and *kāiṇi*, *paḍivissaṃsa* and *vissaṃsa*; it should be known that these <units> up to *visova* are **twenty times** <the preceding unit of currency>

GSK1.4.a **Twenty** *visova* <make> one *damma* and **fifty** *dammās* one <silver> *taṃkaya*



taṃka

PG.1.9A *purāṇa* is **sixteen** *paṇas*; a *paṇa* should be <measured> by **four** *kākiṇīs*!

And one *kākiṇī* by **five times four** *varāṇatakas* (cowries)!!



paṇas



kākiṇīs



purāṇa

Capacity and gold weights

GSK.1.8. **Four** *karapudās* (the hand joined and hollowed) <make> one *pāī*, four *pāīs* it is said <make> one *māṇaya*, four *māṇayas* one *seī*, and sixteen *seīs* become one *pattha* (skt *prastha*).



AS.19.2.

Ten *māṣa*-beans (mung beans) make one *māṣaka* of gold, or **five** *guñja*-berries (crab's eye)/



19.3. Sixteen of these make one *suvarṇa* or *karṣa*/

19.4. A *pala* is equivalent to four *karṣas*/