

The mathematical chapter of the Āryabhaṭīya (499) as a compilation of oral rules?

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Ab.1.1. Having bowed to Ka who is one and many, who is the true god, the supreme Brahman (Āryabhaṭa tells three: Mathematics, Time-reckoning, and the Sphere) ||

*praṇipatyā ekam anekam kam satyām devatām param brahma |*

*āryabhaṭaḥ trīṇi gadati gaṇitam kālakriyām golam ||*

Ab.2.1. Having paid homage to Brahma, Earth, Moon, Mercury, Venus, Sun, Mars, Jupiter, Saturn, and the group of stars |

Here Āryabhaṭa proclaims the knowledge honored in Kusumapuram |

*brahmakuśāsibudhabhṛguravikujaḡurukoṇabhagaṇān namaskṛtya |*

*Āryabhaṭas tv iha nigadati kusumapure 'bhārcitam jñānam ||*

Ab.2.4. One should divide, constantly, the non-square <place> by twice the square-root |

When the square has been subtracted from the square <place>, the quotient is the root in a different place |

*bhāgaṃ hared avargān nityaṃ dviguṇena vargamūlenā |*

*vargād varge śuddhe labdhaṃ sthānāntare mūlam ||*

Ab.2.5. One should divide the second non-cube <place> by three times the square of the root of the cube |

The square <of the quotient> multiplied by three and the former <quantity> should be subtracted from the first <non-cube place> and the cube from the cube <place> ||

*aghanād bhajed dvitīyāt triguṇena ghanasya mūlavargeṇā |*

*vargas tripūrvaguṇitaḥ śodhyaḥ prathamād ghanaś ca ghanāt ||*

Ab.2.11.

One should divide the quarter of the circumference of an evenly-circular <field>. And, from trilaterals and quadrilaterals

As many half-chords of an even <number of> unit arcs as one desires <are produced>, on the semi-diameter.||

*samavṛttaparidhipādaṃ chindyāt tribhujāc caturbhujāc caival*

*samacāpajyārdhāni tu viṣkambhārdhe yatheṣṭānill*

Ab.2.32-33 One should divide the divisor of the greater remainder by the divisor of the smaller remainder. |

The mutual division <of the previous divisor> by the remainder <is made continuously.

The last remainder> having a clever <thought> for multiplier is added to the difference of the <initial> remainders <and divided by the last divisor>.||

33. The one above is multiplied by the one below, and increased by the last. When <the result of this procedure> is divided by the divisor of the smaller remainder |

The remainder, having the divisor of the greater remainder for multiplier, and increased by the greater remainder is the <quantity that has such> remainders for two divisors||

*Ab.2.32 adhikāgrabhāgahāraṃ chindyād ūnāgrabhāgahāreṇal*

*śeṣaparasparabhaktaṃ matiguṇam agrāntare kṣiptam||*

*AB.2.33 adhaupariguṇitam antyayugūnāgracchedabhājite śeṣam|*

*adhikāgracchedaguṇam dvicchedāgram adhikāgrayutam||*

Ab.2.3 A square is an equi-quadrilateral and the area/result (phala) is the product of two identicals |

A cube is the product of a triple of identicals as well as a twelve edged <solid>||

*vargaḥ samacaturaśraḥ phalaṃ ca sadṛśadvayasya saṃvargaḥ|*

*adṛśatrayasaṃvargo ghanas tathā dvādāśāsriḥ syāt||*

Ab.2.6 The bulk of the area of a trilateral is the product of half the base and the perpendicular|

Half the product of that and the upward side, that is <the volume of> a solid called

`six-edged' ||

*tribhujasya phalaśarīraṃ samadalakoṭībhujārdhasaṃvargaḥ| ūrdhvabhujātatsaṃvargārdhaṃ sa ghaṇaḥ  
śaḍaśriritil*

Ab.2.7 Half of the even circumference multiplied by the semi-diameter, only, is the area of a circle|

That multiplied by its own root is the volume of the circular solid without remainder.||

*samapariṇāhasyārdhaṃ viṣkambhārdhahatam eva vṛttaphalam|*

*tan nijamūlena hatam ghanagolaphalam niravaśeṣam||*

Ab.2.8. The two sides, multiplied by the height <and> divided by their sum are the ``two lines on their own fallings".|

When the height is multiplied by half the sum of both widths, one will know the area.||

*Āyāmaguṇe pārśve tadyogaḥṛte svapātalekhe tel*

*vistarayogārdhaguṇe jñeyam kṣetraphalamāyāmell*

Ab.2.9 For all fields, when one has acquired the two sides, the area is their product |

The chord of a sixth part of the circumference, that is equal to the semi-diameter||

*sarveṣāṃ kṣetrāṇāṃ prasādhya pārśve phalam tadabhyāsaḥ|*

*paridheḥ ṣaḍbhāgajyā viṣkambhārdhena sā tulyā||*

Ab.2.24. The square root of the product <of two

quantities> with the square of two for multiplier, increased by the

square of the difference of the two,|

Is increased or decreased by the difference, and halved, <this will produce> the two multipliers of that

<product>.||

*dvikṛtiguṇāt saṃvargād dvyantaravargeṇa saṃyutān mūlam|*

*antarayuktaṃ hīnaṃ tadguṇakāradvayaṃ dalitam||*

Ab.2.20 The value of the terms multiplied by eight and the common difference, increased by the square of the difference of twice the first term and the common difference,|

<Its> square root, decreased by twice the first term, divided by its common difference, increased by one and halved.||

In French: Ab.2.20 La racine carrée de la valeur des termes multipliée par huit fois la raison et augmenté par le carré de la différence de deux fois le premier terme et la raison/

Diminué de deux fois le premier terme, divisé par sa raison, la moitié de cela augmenté de un.//

*gaccho 'ṣṭottaraḡuṇitād dviguṇādyuttaraviśeṣavargayutāt |*

*mūlaṃ dviguṇādyūnaṃ svottarabhajitaṃ sarūpārdham ||*

Ab.2.19. The desired <number of terms>, decreased by one, halved, increased by the previous <number of terms>, having the common difference for multiplier, increased by the first term, is the mean <value>|

<The result>, multiplied by the desired, is the value of the desired <number of terms>. Or else, the first and last <added together> multiplied by half the number of terms <is the value>.||

In French: Le désiré, diminué de un, la moitié prise, augmenté du précédent, multiplié par la raison (arithmétique), augmenté du premier terme est la moyenne/

Multiplié par le désiré est la valeur du désiré. Ou encore, [la somme] du premier et du dernier divisé par la moitié du nombre de termes//

*iṣṭaṃ vyekaṃ dalitaṃ sapūrvam uttaraḡuṇaṃ samukhaṃ madhyam|*

*iṣṭaḡuṇitam iṣṭadhanaṃ tv athādyantaṃ padārdhahatam||*

Ab.2.2. One and ten and a hundred and one thousand, now ten thousand and a hundred thousand, in the same way a million|

Ten million, a hundred million, and a thousand million. A place should be ten times the <previous> place||

*ekaṃ ca daśa ca śataṃ ca sahasraṃ tv ayutaniyute tathā prayutam|*

*koṭyarbudaṃ ca vṛndaṃ sthānāt sthānaṃ daśaḡuṇaṃ syāt||*

Ab.2.10 A hundred increased by four, multiplied by eight, and also sixty-two thousand|

Is an approximate circumference of a circle whose diameter is two ayutas||

In French : Cent plus quatre multiplié par huit (i.e. huit cent trente deux) avec soixante deux mille/

Est la circonférence approximative d'un cercle dont le diamètre est deux [fois] dix-mille//

*caturadhikaṃ śatam aṣṭaḡuṇaṃ dvāśaṣṭis tathā sahasrāṇām|*

*ayutadvayaviṣkambhasyāsanno vṛttapariṇāhaḥ||*

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