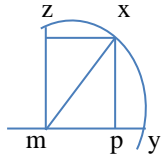


abār zamīgpeymānīh

§ hangār kū xy kamān-ē (*dhanus*) ī ēv girdag, u-š m meyān, ud b brāh ōn kū b = mx = my, ud xp āgōzāg az x ō my kišīšn.



xp nēmzīh, ayāb zīh (*jyā, jyā-ardha*), ī kamān xy xvānend, u-š ped rēzak (*lipta*) peymāyend. kamān xy ped sus (*amśa*) peymāyend. girdag rāy 360 sus ast. ped *sūryasiddhānta* brāh b 3438 rēzak grift ēsted –brāh b *trijyā* xvand ēsted, ‘zīh ī se daxšag’, ē 190°. agar kamān xy ōn cōn peymān ī gōšag xmy gīrem, ēg zīh ī rāst (*jīvā*) ī hān kamān

$$zīh \langle xmy = xp / mx = xp / b$$

xp = b zīh $\langle xmy$ (b zīh ī gōšag ī xmy) = b zīh $\langle xy$ (b zīh ī kamān ī xy)

mp xvad b zīh $\langle xz$ ast, u-š b abāgzīh $\langle xy$ xvānišn (*koṭijyā* ‘abāgzīh’). ud py kanār zīh $\langle xy$ xvānišn (*utkramajyā* ‘kanār zīh’).

§ parvann (*paridhi*) ī ēv girdag baxšīhed ō 360 bahr ayāb sus (*amśa/ bhāga*). harv bahr šast rēzak (*kalā*), ud harv rēzak šast judrēzak (*vikalā*).

$$1 \text{ sus} = 60 \text{ rēzak}$$

$$1 \text{ rēzak} = 60 \text{ judrēzak}$$

parvann-z ī ēv girdag ō 12 daxšag (*rāśī*) baxšīhed, ud harv daxšag ō 30 bahr.

drang andar do āxēzišn ī payāpay ī ēv star rōz ī axtarīg (*nakṣatra*) gōbed. ēv rōz ō šast nāy (*nāḍī*) baxšīhed, ud harv nāy ō šast judnāy (*vināḍī*), ud harv judnāy ō šaš vēn (*prāṇa*).

$$1 \text{ rōz axtarīg} = 60 \text{ nāy}$$

$$1 \text{ nāy} = 60 \text{ judnāy}$$

$$1 \text{ judnāy} = 6 \text{ vēn}$$

vardišn axtarīg (*bhagaṇa*) vardišn ī bavandag ī ēv star abar starpāyag ī xvēš gōbed. parvann ī ēv starpāyag 360 sus, ē 21 600 rēzak ; ēn ham zamān ī vardišn ī ēk rōz axtarīg, ē 21 600 vēn. ēdōn

peymānag ī ēv kamān ped rēzak ped hamtāgīh ī zamān-z ped vēn ī ēv star kē tar hān kamān vihēzed.

$$1 \text{ nāy} = 24 \text{ rēzak}$$

$$1 \text{ judnāy} = 24 \text{ judrēzak}$$

$$1 \text{ vēn} = 4 \text{ judrēzak}$$

§ nūn cahārēk-ē ī ēv girdag ō 24 bahr hamōg baxšišn. ēg harv bahr 3° 45', ayāb 225'. hangār kū b zīh 225' hamhandāzag ī 225', u-š nazdist zīh xvānem, z_1 . ped hamšōn, duvum zīh b zīh 7°30', z_2 , seyum zīh b zīh 11° 15', z_3 , ..., vīst-cahārum zīh, z_{24} , b zīh 90° xvānem u-šān ped ēn ēvēn peymāyem :

$$\text{ēvēn. } z_{n+1} = z_n + z_1 - (z_1 + \dots + z_n)/z_1$$

$$(z_1 = 225', z_{24} = 3438')$$

nimūdār 1

peyvann ī kamān ud zīh

mar	kamān	b zīh	b kanār zīh	b zīh / zīh	arz vizurd
1	225	225	7	.065445	.06540313
2	450	449	29	.1305992	.13052619
3	675	671	66	.1951716	.19509032
4	900	890	117	.2588714	.25881905
5	1125	1105	182	.3214078	.32143947
6	1350	1315	261	.3824898	.38268343
7	1575	1520	354	.4421175	.44228869
8	1800	1719	460	.5	.5
9	2025	1910	579	.5555556	.55557023
10	2250	2093	710	.6087842	.60876143
11	2475	2267	853	.659395	.65934582
12	2700	2431	1007	.7070971	.70710678
13	2925	2585	1171	.7518906	.75183981
14	3150	2728	1345	.7934846	.79335334
15	3375	2859	1528	.8315881	.83146961
16	3600	2978	1719	.8662013	.8660254
17	3825	3084	1918	.8970332	.89687274
18	4050	3177	2123	.9240838	.92387953
19	4275	3256	2333	.9470622	.94693013
20	4500	3321	2548	.9659686	.96592583
21	4725	3372	2767	.9808028	.098078528
22	4950	3409	2989	.9915649	.99144486
23	5175	3431	3213	.9979639	.99785892
24	5400	3438	3438	1	1

§ ēvēn ī peymūdan ī m ī andarg do arz ī nimūdār ēk

ka g kamān ī pēš az m (*gatajyā*) ; ud g + 3° 45' kamān ī pas az m (*gamyajyā*) ;

$$j_1 = b \text{ zīh } g - b \text{ zīh } (g + 3^\circ 45')$$

$$j_2 = m - g$$

ēg

$$b \text{ zīh } m = b \text{ zīh } g + j_1 j_2 / 3^\circ 45'$$

nimōnag. b zīh 60° 15'

$$b \text{ zīh } 60 = 2978'$$

$$b \text{ zīh } 63^\circ.45' = 3084'$$

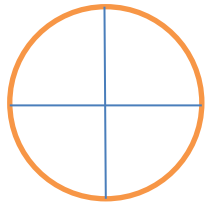
$$j_1 = 106'$$

$$J_2 = 15'$$

$$b \text{ zīh } m = 2985'$$

§ b zīh ī kamān ī frāy az 90°

girdag ped cahār bahr hamōg baxšišn.



$$zīh (90^\circ + f) = \text{abāgzīh } f$$

$$zīh (180^\circ + f) = - zīh f$$

$$zīh (180^\circ - f) = zīh f$$

$$zīh (270^\circ + f) = - \text{abāgzīh } f$$

$$zīh (270^\circ - f) = - \text{abāgzīh } f$$

nimūdār 2

sus	zīh	sus	judīh
+		-	+
0.00	000	180.00	...

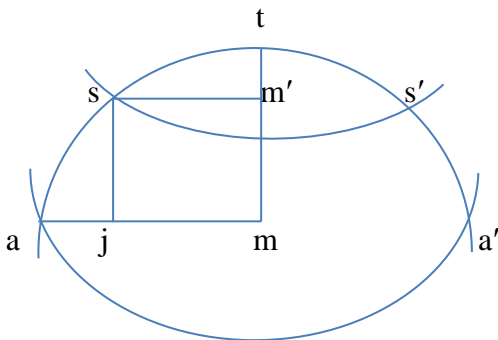
3.75	225	183.75	225
7.50	449	187.50	224
11.25	671	191.25	222
15.00	890	195.00	219
18.75	1105	198.75	215
22.50	1315	202.50	210
26.25	1520	206.25	205
30.00	1719	210.00	199
33.75	1910	213.75	191
37.50	2093	217.50	183
41.25	2267	221.25	174
45.00	2431	225.00	164
48.75	2585	228.75	154
52.50	2728	232.50	143
56.25	2859	236.25	131
60.00	2978	240.00	119
63.75	30.84	243.75	106
67.50	3177	247.50	93
71.25	3256	251.25	79
75.00	3321	255.00	65
78.75	3372	258.75	51
82.50	3409	262.50	37
86.25	3431	266.25	22
90.00	3438	270.00	7
		-	
93.75	3431	273.75	7
97.50	3409	277.50	22
101.25	3372	281.25	37
105.00	3321	285.00	51
108.75	3256	288.75	65
112.50	3177	292.90	79
116.25	3084	296.25	93
120.00	2978	300.00	106
123.75	2859	303.75	119
127.50	2728	307.50	131
131.25	2585	311.25	143
135.00	2431	315.00	154
138.75	2267	318.75	164
142.50	2093	322.50	174
146.25	1910	326.25	183
150.00	1719	330.00	191
153.75	1520	333.75	199
157.50	1315	337.50	205
161.25	1105	341.25	210
165.00	890	345.00	215
168.75	671	348.75	219
172.50	449	352.50	222
176.25	225	356.25	224
180.00	000	360.00	225

§ zamīg rāy do tēg ast, ēk ped kust ī abāxtar, ud ēk ped kust ī nēmrōz. kōf ī meru (≈ tērag), tar meyān ī zamīg videred, sar ō abāxtar

rōn ud pāy ō nēmrōz rōn, harv ēk ō star-ē rōn, mēx ī gāh (*dhruva-tārā*) nām. kōf ī meru xvad aš ī zamīg. tar meyān zamīg girdag ī zamīg (*bhū-vṛtta*), ud harv tēg 90° aziš dūr. pahnāy (*akṣa*) ī harv tēg 90°. karān ī zamīg (*kṣitija*) girdag ī ō nigerīdār ōn sahed cōn parvann ī zamīg. girdag ī zamīg girdag ī abēpahnāy (*nirakṣa vṛtta*). ped ēn girdag cahār šahrestān, harv ēk cahārēk dūr az did: yamakoṭi (≈ kangdiz) ped ušastar, laṅkā ped rabihvīndar, romaka ped dōšastar, siddhapura ped abāxtar. girdag ī tar do tēg ud laṅkā bē videred madhyarekhā (fradum nēmrōzān); ud šahrestān ī Avanti ud hān ī rohitaka ped ēn girdag hend.

zahā ī zamīg 1600 yujyast (*yojana*); ud parvann ī zamīg 1600 yujyast bār $\sqrt{10}$ ($\sqrt{10} \approx \pi$). ud parvann ī abēpahnāy (girdag) ī zamīg 5059.64 yujyast (brāh ī abēpahnāy: 6 378 140 peymān).

hān ī girdag ī abēpahnāy tar gyāg-ē videred parvann ī frāx (*sphuṭa paridhi*) ī hān gyāg xvānend.



hangār kū aa' abēpahnāy zamīgīg, t tēg ī zamīg, ss' hampahlūg ī abēpahnāy ī az s kišend. ma brāh ī abēpahnāy, ud m's brāh ī frāx parvann; ud sj āgōzāg abar ma.

$$m's = mj = b \text{ abāgzīh sa}$$

ēg brāh ī frāx parvann hamōg ī b abāgzīh ī pahnāy ī ēv gyāg.

dūrīh ī ēv gyāg az fradum nēmrōzān (ayāb az gyāg ī fradum nēmrōzān abar frāx parvann) drahnāy (*deśāntara*) ī hān gyāg xvānišn.

hangar kū b brāh ī abēpahnāy (trijyā), ēg

parvann ī frāx parvann = (b abāgzīh ī abēpahnāy × parvann ī abēpanāy) / 3438