TMS p.025 P254835 {1900-1600BC} Susa (mod. Shush)

"TMS p. 025 Artifact Entry." 2005. Cuneiform Digital Library Initiative (CDLI). February 1, 2005. https://cdli.ucla.edu/P254835.

QUELQUES TEXTES MA THÉMA TIQUES DE LA MISSION DE SUSE PAR E. M. BRUINS – Translation Judy Quinn and Fionnuala Quinn

This tablet contains 70 mathematical constants, among which appear again: 18, im-li-im. The first 36 given are constants for geometrical figures. The tablet begins with the values igigub, ri, and pi-ir-ku of the circle 5, 20, 10 for the area, diameter and the radius of the circle expressed by the perimeter c.

$$\frac{1}{4\pi}c^2, \qquad \frac{1}{\pi}c, \qquad \frac{1}{2\pi}c, \qquad \pi = 3$$

Further along we give 15, 40, 20 for the area, diameter and radius of an us-qa-ri which denotes the semicircle of which the area is calculated with a quarter of the product of the arc* and diameter (cf BM 85210) and which makes obvious the procedure followed in BM 85210 to get the arc, taking the sum of diameter and radius! In these two cases the table begins with the arc of the circle taken as the unit.

A whole series of constants grouped into analogous trios, which can be interpreted as analogous constants for different segments of the circle, having the arc as the unit of length.

*the length of the curved section of the semicircle

Bruins, E. M. "Quelques textes mathématiques de la mission de Suse." Proceedings of the Amsterdam Academy 53 (1950): 1025-1033.

MCT 044, YBC 07302 P255051 {1900-1600BC} Location Unknown

“MCT 044, YBC 07302 Artifact Entry.” (2005) 2023. Cuneiform Digital Library Initiative (CDLI). February 1, 2023. https://cdli.ucla.edu/P255051.

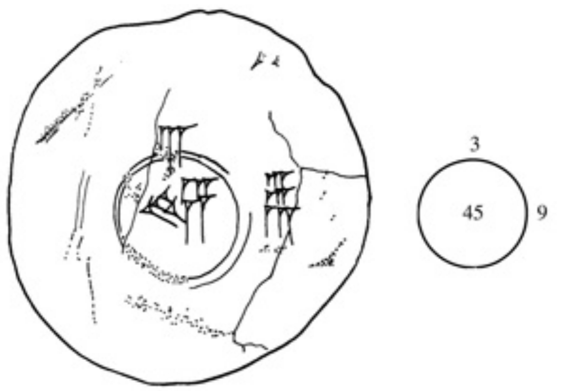


Figure 7. YBC 7302 (obverse). Drawing by the author.

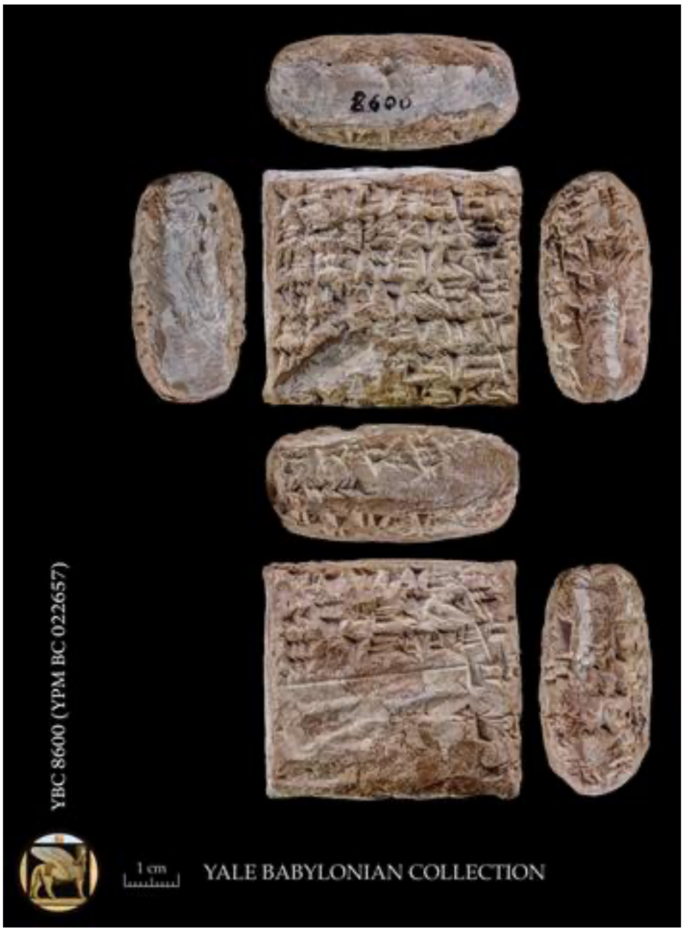
Circular tablet in which we find the area to be 45, the diameter to be 3 and the circumference to be 9. Being aware that we are in the Babylonian sexagesimal system, the 45 corresponds to 45/60. Thus, we can find that π is 3.

MCT 057 (P255065) {1900-1600BC} Uruk (mod. Warka)

“MCT 057 Artifact Entry.” (2005) 2023. Cuneiform Digital Library Initiative (CDLI). February 1, 2023. https://cdli.ucla.edu/P255065.

https://archive.org/details/mathematicalcune0000neug/page/56/mode/2up

https://collections.peabody.yale.edu/search/Record/YPM-BC-022657



This suggests at a value of π which is 3.125, however as Neugeberger attests – this is not seen anywhere else in the Babylonian texts.

1 Kings 7:23 NRSV

Then he made the molten sea; it was round, ten cubits from brim to brim, and five cubits high. A line of thirty cubits would encircle it completely.

2 Chronicles 4:2 NRSV

Then he made the molten sea; it was round, ten cubits from rim to rim and five cubits high. A line of thirty cubits would encircle it completely.

The Bible and Pi
Author(s): Michael A. B. Deakin and Hans Lausch
Source: The Mathematical Gazette , Jul., 1998, Vol. 82, No. 494 (Jul., 1998), pp. 162-166
Published by: The Mathematical Association Stable URL:
https://www.jstor.org/stable/3620398

At first glance it seems that the value of π used is 3. However, Deakin and Lausch make a claim that it was far more accurate by taking some words to be letters which represent numbers.

Rhind Papyrus

Clagett, M. (1999), *Ancient Egyptian Science A Source Book,* Philadelphia: American Philosophical Society. [pages 156-158]

Problem 41

Example of making (i.e., calculating the volume of a) round (i.e. cylindrical) granary of [diameter] 9 and [height] 10.

Take away 1/9 of 9, namely, 1; the remainder is 8. Multiply 8 times 8; it makes 64. Multiply 64 times 10; it makes 640 [cubic] cubits. Add 1/2 of h to h; h makes 960: the calculation of [the content of] it in khar (h3rw). Take 1/20 of 960, namely, 48. This is what goes into h in [the number of hundreds of] quadrupleheqats, (4-hk3t) [i e.,] in grains, 4800 heqats.

Method of reckoning it (ky n ssmth).

1	8
2	16
4	32
\8	64.

1	64
\10	640
\1/2	320
Total:	960

\1/10	96
\1/20	48.

Problem 42

[Find the volume of] a round [he., cylindrical] granary of [base-diameter] 10 and [height] 10.

Take away 1/9 of 10, i.e., 1 1/9; the remainder is 8 2/3 1/6 1/18. Multiply 8 2/3 1/6 1/18 times 8 2/3 1/6 1/18; it makes 79 1/108 1/324. Multiply 79 1/108 1/324 times 10; it makes 790 1/18 1/27 1/54 1/81 [cubic cubits]. Add 1/2 of it to it; it makes 1 185 1/6 1/54, [This is its content or volume in khar.] [We find that] 1/20 of it is 59 1/4 1/108. [Multiplying this times 100 heqat,] we find what goes into this in quadruple heqat is, namely, 5925 heqat of grains.

Method of the reckoning of it:

1	8 2/3 1/6 1/18
2	17 2/3 1/9
4	35 1/2 1/18
\8	71 1/9
\2/3	5 2/3 1/6 1/18 1/27
1/3	2 2/3 1/6 1/12 1/36 1/54
\1/6	1 1/3 1/12 1/24 1/72 1/108
\1/18	1/3 1/9 1/27 1/108 1/324
Total:	79 1/108 1/324.

1	79 1/108 1/324
10	790 1/18 1/27 1/108 1/324
1/2	395 1/36 1/54 1/108 1/162
Total:	1185 1/6 1/54
1/10	118 1/2 1/54
1/20	59 1/4 1/108.

Problem 43

A round (i.e., cylindrical) granary of 9 cubits in its height (! diameter?) and 6 in its breadth (! height?), what is the content [or volume] of grain that goes into it?

The procedure is as follows:

Take away 1/9 from 9; the remainder is 8. Add to 8 its 1/3; it makes 10 2/3. Multiply 10 2/3 times 10 2/3; it makes 113 2/3 1/9. Multiply 113 2/3 1/9 times 4, 4 being 2/3 of 6 cubits which is its breadth (! height?). 455 1/9 is the amount [of the volume] in khar. Find 1/20 of the amount of it in khar; this is the amount that goes into it of quadruple heqat, i.e., grain to the amount of 2200 heqat [and] 50, 25, 1/2, 1/32, 1/64 [heqat, and] 2 1/2,1/4, 1/36 ro.

Method of reckoning it:

\1	8
2/3	5 1/3
\1/3	2 2/3
Total:	10 2/3.

1	10 2/3
\10	106 2/3
\2/3	7 1/9
Total:	113 2/3 1/9.

1	113 2/3 1/9
2	227 1/2 1/18
\4	455 1/9

1	455 1/9
1/10	45 1/2 1/90
\1/20	22 1/2 1/4 1/45 (!, 1/180)

Moscow Papyrus

Clagett, M. (1999), *Ancient Egyptian Science A Source Book,* Philadelphia: American Philosophical Society. [pages 218-219]

Problem 10

[Problem 10 following the text and to some extent the German translation of Struve; see Fig. IV. 6g, Cols. XVIII-XX; cf. Fig, IV, 7] [Col. XVIII]

[Lin. 1] Example of calculating a basket (, *nbt*) [assumed by Struve as hemispheric in shape; see Fig. IV. 8] [Lin. 2] If someone says to you: "A basket with a mouth opening [Lin. 3] of 4 1/2 (i.e., a diameter of this size) in good condition (^{c}d), oh

[Lin. 4] let me know its [surface] area (*3ht*)."
[Lin. 5] [First] calculate 1/9 of 9, since the basket is
[Lin- 6] 1/2 of an egg-shell (*? Inr?*) The result is 1.

[Col. XIX]
[Lin. 1] Calculate the remainder as 8.
[Lin. 2] Calculate 1/9 of 8.
[Lin. 3] The result is 2/3 1/6 1/18. Cal-
[Lin. 4] culate the remainder from these 8 after
[Lin. 5] taking away those 2/3 1/6 1/18. The result is 7 1/9.

[Col. XX]
[Lin. 1] Reckon with 7 1/9 four and one-half times.
[Lin. 2] The result is 32. Behold, this is its area.
[Lin. 3] You will find that it is correct.

[An interpretation of Problem 10 as concerned with the area of the curved surface of a half-cylinder outlined by T. E. Peet, "A Problem in Egyptian Geometry," JEA, Vol. 17 (1931), pp.104-06, and p.105. Peet included the following translation, with the lines numbered consecutively rather than by each of the papyrus columns:]

1 . Example of working out a semi-cylinder.
2. If they say to you, A semi-cylinder <of 4 1/2> in diameter
3. by 4 1/2 in height; pray
4. let me know its area. You are to
5. take a ninth of 9, since a semi-cylinder
6. is half of a [cylinder]: result 1.

7. Take the remainder, namely 8.

8. You are to take a ninth of 8;

9. result 2/3 + 1/6 + 1/18. You are to take

10. the remainder of the 8 after (subtraction of) li the 2/3 + 1/6 + 1/18, result 7 1/9.

11. You are to take 7 1/9 4 1/2 times;

13. result 32. See, this is its area.

14. You will find it correct.

Kahun Papyrus

Clagett, M. (1999), *Ancient Egyptian Science A Source Book,* Philadelphia: American Philosophical Society. [pages 243-244]

IV.3 Cols 13-14

[What is the volume in khar (1 khar = 2/3 a cubic cubit) of a cylindrical granary whose diameter is 12 cubits and whose height is 8 cubits? The procedure is to add 1/3 of the diameter to the diameter, multiply the total by itself; then multiply that result by 2/3 of the height, i.e., 5 1/3, to produce 1365 1/3 khar. I put the operations of Col. 14 first].

[Col. 14]

[\1	12]
2/3	8
\1/3	4
Total	16.
\1	16
\10	160
\5	80
Total	256.

[Col. 13]

\1	256
2	512
\4	1024
\ (1/30)*	85 1/3 [* 2/3 in Papyrus]
Total	1365 1/3 [khar].