History of mathematics

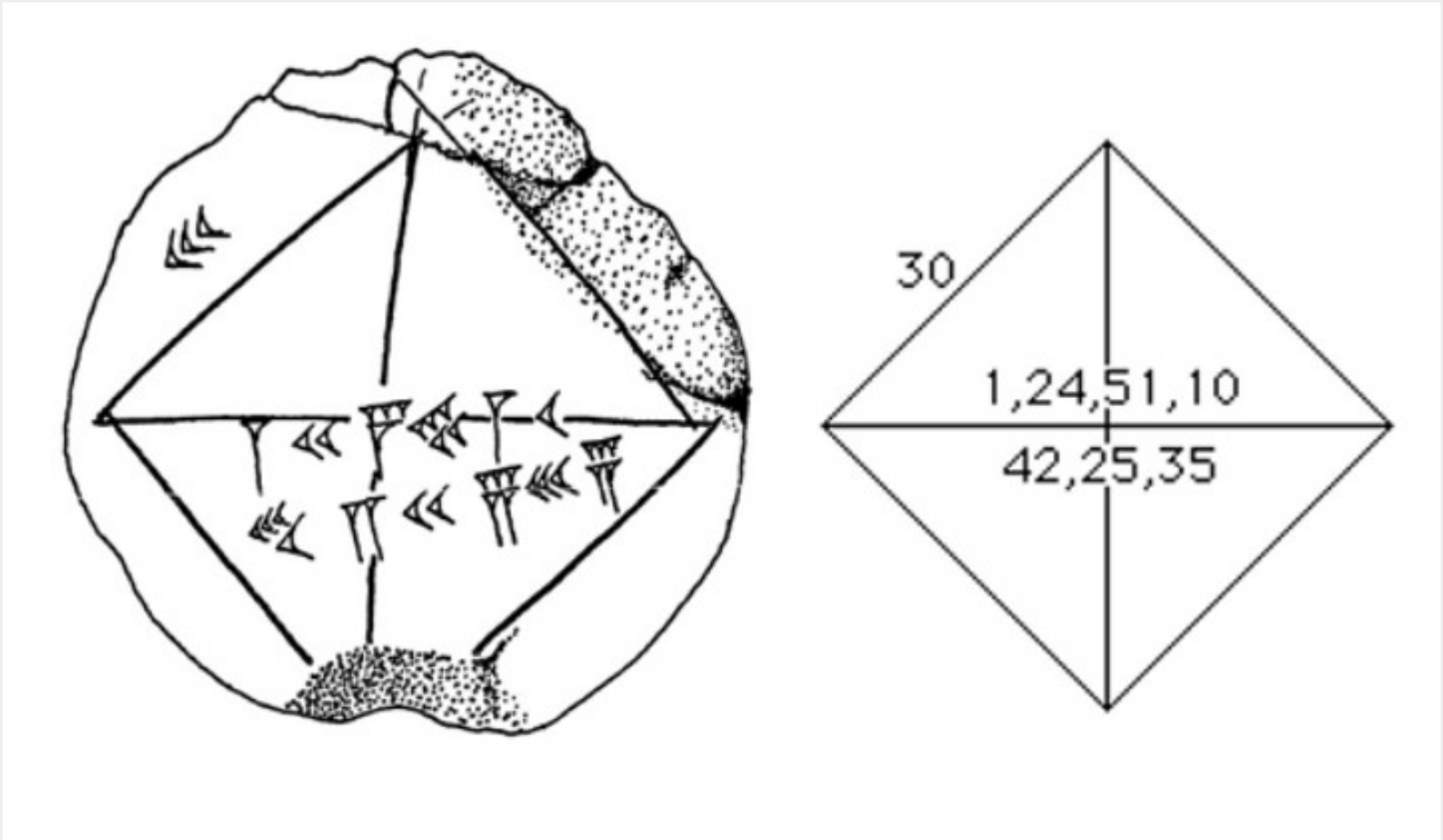## *Babylonian mathematics as seen by a mathematician and by a historian*

Helena Durnová

27. 2. 2025

Tablet YCB 7289

# Square root and the diagonal

Mesopotamian mathematics

- Eleanor Robson, 2009, *Mathematics in Ancient Iraq: A Social History* (Princeton University Press)

- The region of modern-day Iraq is uniquely rich in evidence for ancient mathematics because its prehistoric inhabitants wrote on clay tablets, many hundreds of thousands of which have been archaeologically excavated, deciphered, and translated. Drawing from these and a wealth of other textual and archaeological evidence, Robson gives an extraordinarily detailed picture of how mathematical ideas and practices were conceived, used, and taught during this period. She challenges the prevailing view that they were merely the simplistic precursors of classical Greek mathematics, and explains how the prevailing view came to be. Robson reveals the true sophistication and beauty of ancient Middle Eastern mathematics as it evolved over three thousand years, from the earliest beginnings of recorded accounting to complex mathematical astronomy. Every chapter provides detailed information on sources, and the book includes an appendix on all mathematical cuneiform tablets published before 2007.
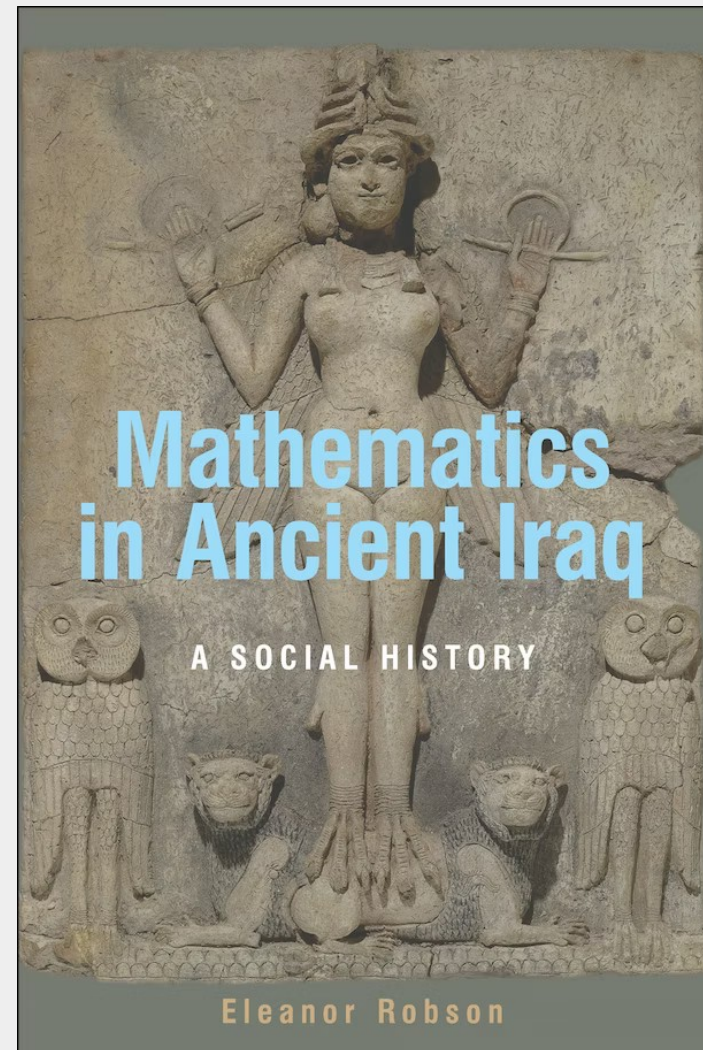
Donald Knuth (*1938)
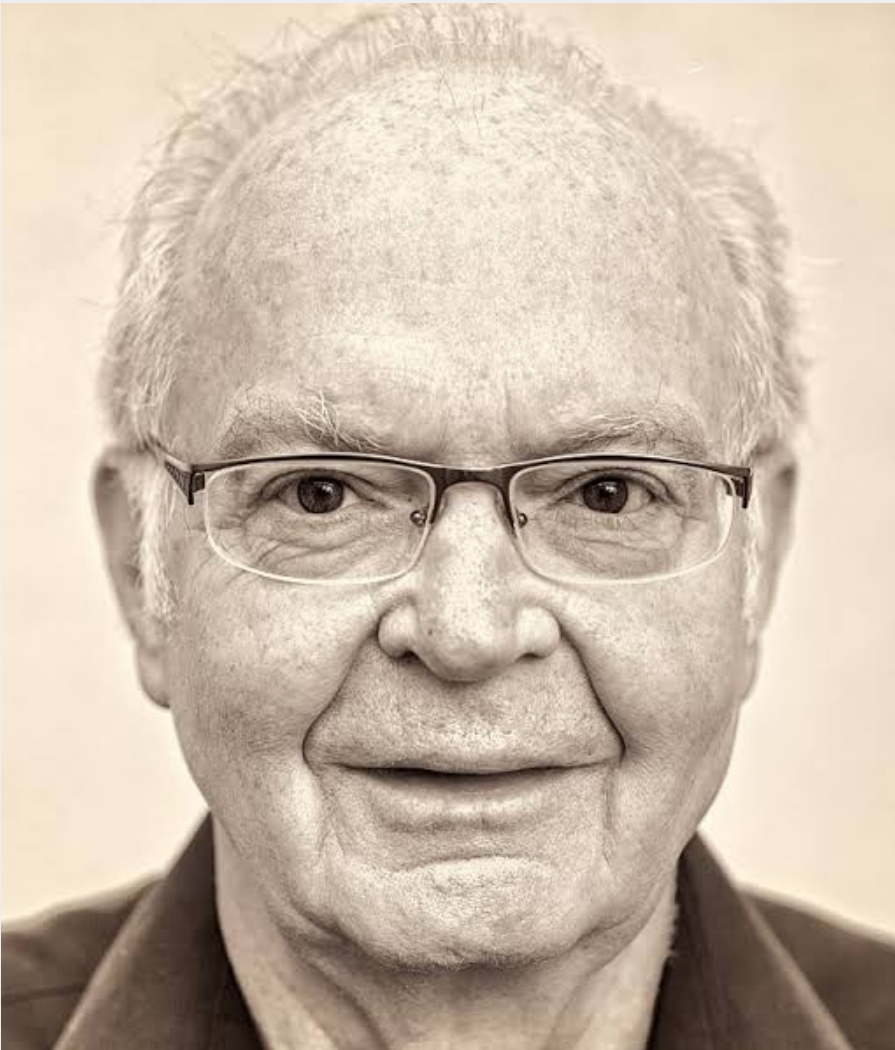
- Programmer? Mathematician? Physicist?

- Honorary doctorate, MU

- TeX typesetting system

- *The Art of Computer Programming* (1997 and on, in notes before)

- John von Neumann (1902-1957) and Donald Knuth

- ACM Turing Prize, 1974

(Who was Alan Turing?)

Honorary doctorate at MU Brno, 1996

Donald E. Knuth

Computer scientist, United States

A proposal to grant an honorary degree of Doctor Honoris Causa in the field of Mathematical Sciences was submitted by the Faculty of Informatics of Masaryk University. The graduation ceremony was held on 7 March 1996.

Jens Hoyrup (*1943)

- Danish ... mathematician? physicist? historian of mathematics?

- Studied mathematics and physics (1962-1969)

- Later turned to history of mathematics and science

- Specialisation: Babylonian (Mesopotamian) mathematics

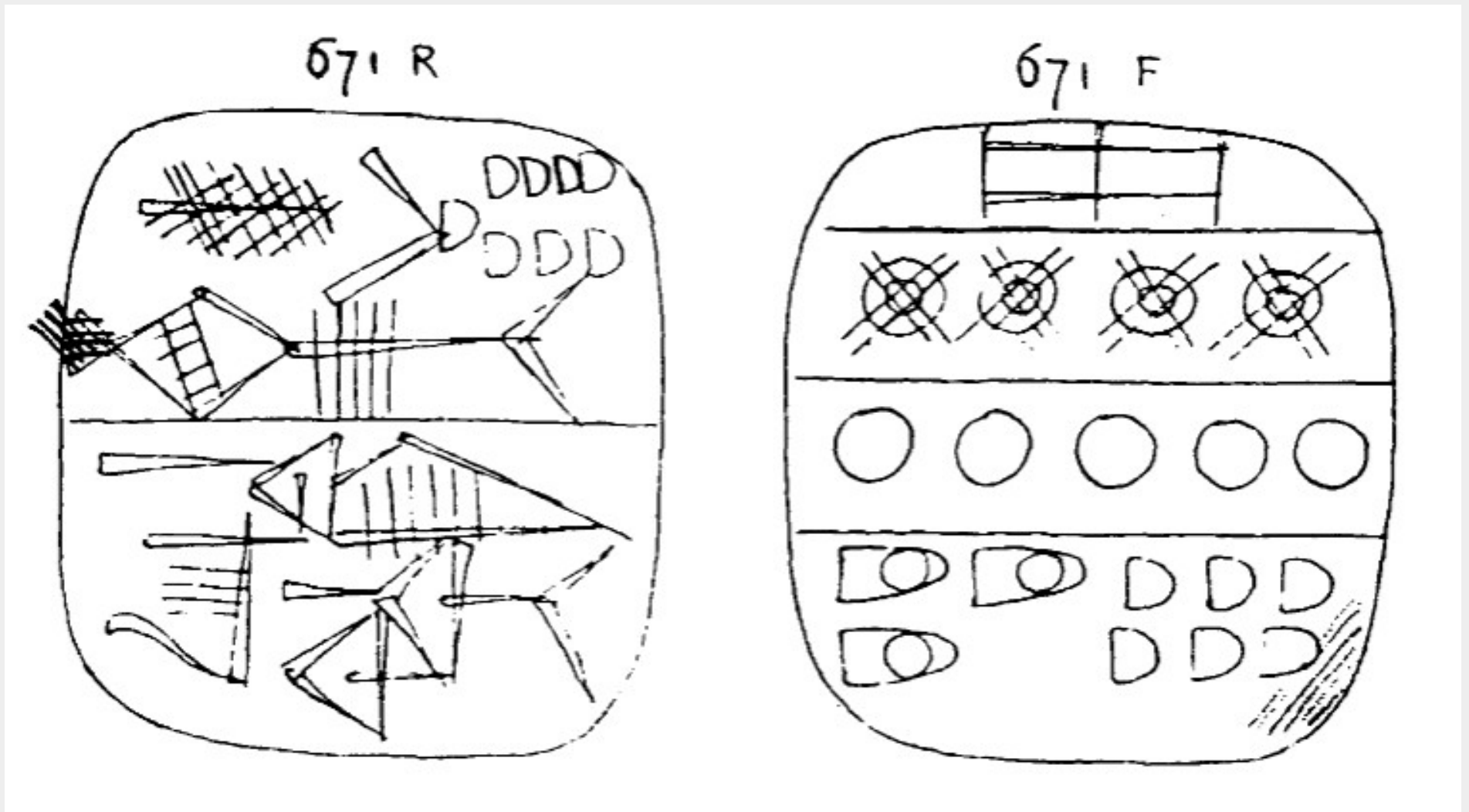- A historian of mathematics should know more languages (Latin German, French and the old scripts

50 F 1

- The contents of the storehouse of grain was distributed among men and consequently, 45, 42, 51 rations (together 164571) were distributed, while 3 sila were left over.

- What is the size of the granary? Either standard, or known to the pupil (scribe).
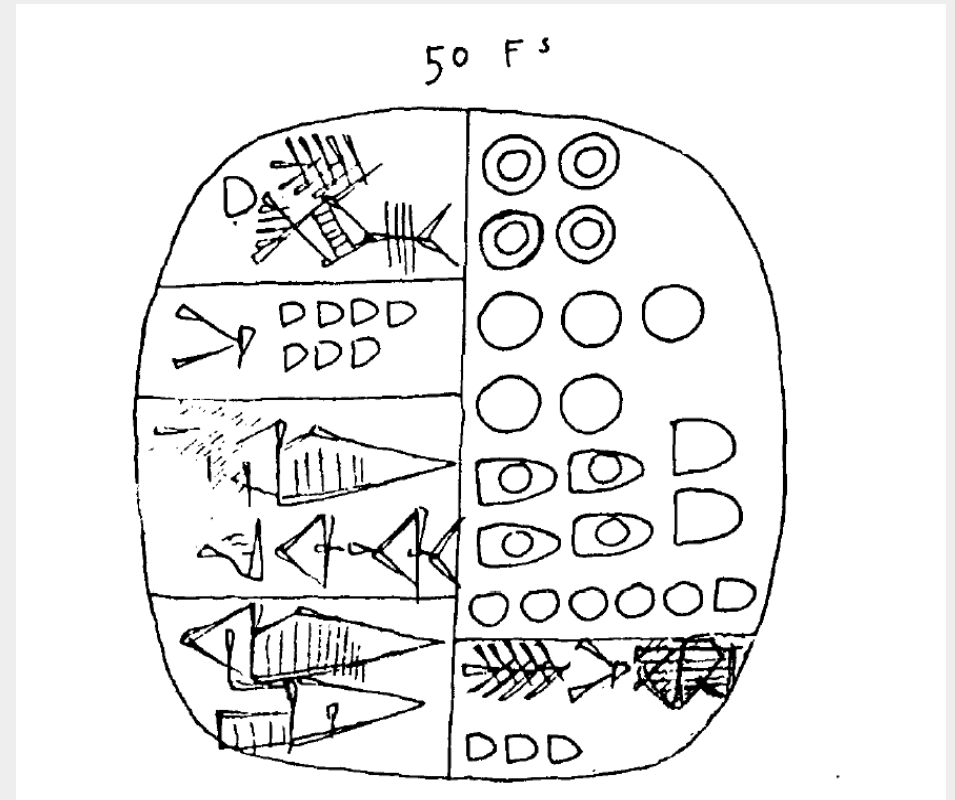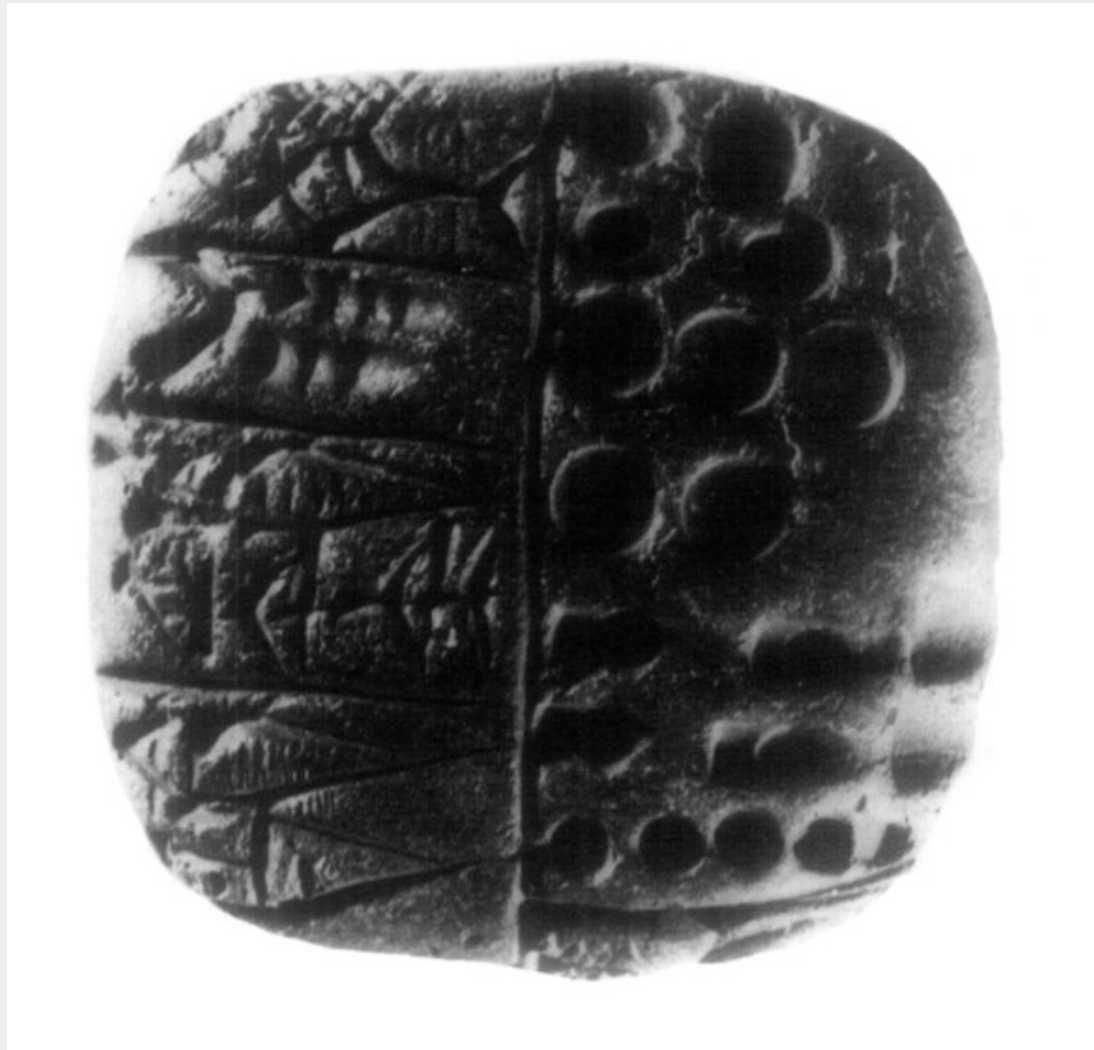
671 R and 671 F

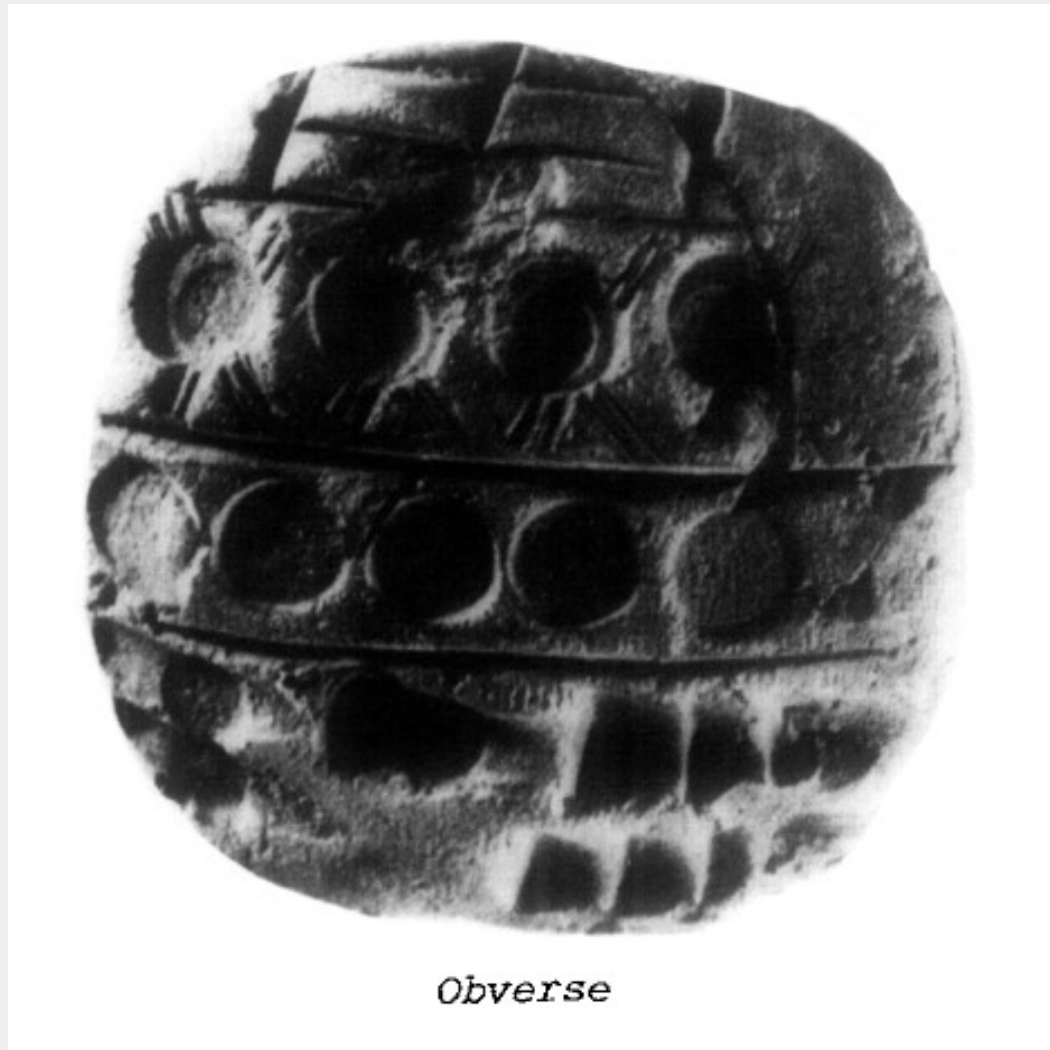# Tablet 50: top

Tablet 50: from the side

FIG. 2. Tablet 50. At bottom the lower right corner of the tablet ("3 *sila* of grain left on hand"). Photographs kindly supplied by Istanbul Arkeoloji Müzeleri Müdürlüğü.

Tablet 671: from the bottom

Reverse

Tablet 671: from the top

Obverse

Tablet 671: from the side

Obverse, lower edge

Reverse, upper edge

FIG. 3. Tablet 671. Photographs kindly supplied by Istanbul Arkeoloji Müzeleri Müdürlüğü.

... actually, a formal division problem

- Why is it interesting? Unlike other traditions, it uses reciprocals.

$$
\begin{aligned}
&(1) &&5,20,0,0 \cdot 0;8,34,17,8 = 45,42,51;22,40, \\
&(2) &&45,42,51 \cdot 7 = 5,19,59,57, \\
&(3) &&5,20,0,0 - 5,19,59,57 = 3.
\end{aligned}
$$

Some numerals in Mesopotamia

TABLE 1. The Numerals Used in the Fara Tablets, together with Their Corresponding Number Words.

Symbol	Word	Value	
⬭	= *diš*	= 1	
◯	= *u*	= 10	
⬭	= *g̃eš*	= 60	= 1,0
◖◉	= *g̃ešu*	= 600	= 10,0
◯	= *šar*	= 3600	= 1,0,0
◎	= *šaru*	= 36000	= 10,0,0

Capacity (volume) units

TABLE 2. The Basic Capacity Units in Use in the Fara Tablets.

1 sila

1 ban = 10 sila (= 1(u) sila)

1 bariga = 6 ban = 1,0 sila (= 1(g̃eš) sila)

1 gur-maḫ = 8 bariga = 8,0 sila (= 8(g̃eš) sila)

Algorithm?

- What is an algorithm? - Al Khwarizmi, 8th century

- Can Ancient Babylonian procedures be called algorithms?

- Purpose of Knuth's paper: trace history of informatics as far back as possible.

- Purpose of history of mathematics – similar.

- History of calculating / computing, history of geometry, history of book keeping, history of table making, …

- Which one do we want?

Implications for the course

- Both versions present "out there"

- If "it's history, it cannot be new", then what about historians?

- Euclid: a well-known figure, but do we know anything?

  - Vincenzo de Risi, "polycephalic Euclid"

- Egyptian fractions

  - repeated in textbooks often with looking down on the ancients

  - Unit fractions: fictional reason, "they were UNABLE to work

- Giving ancient concepts modern names

  - Sabetai Unguru