

MATH 110-02 – Algebra Through History
 Discussion – An Old Babylonian Mathematical Table
 September 11, 2019

A number of Old Babylonian tablets with information equivalent to the following table of base 60 numbers have been found. This was clearly a standard part of the Babylonian mathematicians’ “calculation toolkit.” To make things simpler for a first encounter with “the real thing,” we’ll use the following convention for the cuneiform number symbols: in the base 60 digits, < = 10 and ∨ = 1. *Spaces* separate each base 60 digit from the next one. The first number on the row is added just to help us identify the rows in the table.

1	∨∨	<<<
2	∨∨∨	<<
3	∨∨∨∨	< ∨∨∨∨∨
4	∨∨∨∨∨	< ∨∨
5	∨∨∨∨∨∨	<
6	∨∨∨∨∨∨∨∨	∨∨∨∨∨∨∨∨ <<<
7	∨∨∨∨∨∨∨∨∨∨	∨∨∨∨∨∨ <<<<
8	<	∨∨∨∨∨∨
9	< ∨∨	∨∨∨∨∨
10	< ∨∨∨∨∨∨	∨∨∨∨
11	< ∨∨∨∨∨∨∨	∨∨∨ <<<< ∨∨∨∨∨∨
12	< ∨∨∨∨∨∨∨∨∨	∨∨∨ <<
13	<<	∨∨∨
14	<< ∨∨∨∨	∨∨ <<<
15	<< ∨∨∨∨∨∨	∨∨ << ∨∨∨∨
16	<< ∨∨∨∨∨∨∨∨	∨∨ < ∨∨∨ <<
17	<<<	∨∨
18	<<< ∨∨	∨ <<<<< ∨∨ <<<
⋮		

Thus for instance, the 6th row would translate to base 60 numbers expressed like this in our notation.

$$(8)_{60} \quad \text{and} \quad (7; 30)_{60}$$

(note the space between the ∨∨∨∨∨∨∨∨ and the <<< on the right on this row). The equivalent base-10 numbers are

$$8 \quad \text{and} \quad 7 + \frac{30}{60} = 7.5$$

Figuring out the table

A) Translate all the table entries into base 10 numbers like this.

- B) Then figure out what the table is and how the numbers in the second column relate to the numbers in the first. Also, is there any ambiguity involved? *Hint:* A good way to approach this is to interpret the numbers in the left column as whole numbers. However, the ones on the right are best understood as base-60 *fractions*, which you will convert to decimal numbers. (Where does the *sexagesimal point* or the decimal point go?)
- C) Babylonian mathematicians would have used a table like this to compute things like the base-60 form of fractions like $5/32$. How could this table (and perhaps information from another table) be used for that?

Assignment

Group writeups due no later than 5:00pm on Monday, September 16.