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 $\vee = 1$. *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.

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

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

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

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.