MONT 108N – Mathematics Through Time
Discussion 2 – An Old Babylonian Mathematical Table
October 1, 2010

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," I have set the table using our 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.

$$(8)_{60} \qquad (7:30)_{60}$$

(note the space between the ∨ ∨ ∨ ∨ ∨ ∨ ∨ and the <<< on the right on this row).

Questions

A) Translate all the table entries into base 60 numbers like this.
B) Then figure out what the table is and explain in a paragraph 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*. (Where does the *sexagesimal 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?