Larger cuneiform numbers

For computation, the Mesopotamians used what is usually referred to as a 'sexagesimal' (i.e., base-60) system. Technically, this is a slightly inaccurate designation as they used only combinations of two symbols bundled together for writing numbers up to 60. For writing numbers greater than 60, they just repeated the symbols in different columns, just as we do, except that where for us a '1' in the 'tens' column means 10, for the Babylonians a 𒐕 in the 'sixties' column meant 60. Each column increased the value of the number by a factor of 60, and the Babylonians wrote their numbers with the largest values to the left, just as we do. Here are some examples of cuneiform numbers, their transliterations and values in our notation.

Cuneiform	Transliteration	Decimal value
𒐕𒌋𒐗𒐐	1,15	75
𒐕	1,40	100
𒌋𒐗𒐐 𒐕𒐕𒐕	16,43	1003
𒐖𒐐𒌋𒐗𒐐	44,26,40	160000
𒐕𒐐𒐖𒐐 𒐕𒌋	1,24,51,10	305470

There are a few differences between the way we write our numbers and the way the Babylonians did. First, they had no special way to mark an empty column. We would write a zero to mark the place, they would often leave a space, but not always. For example, it is not always clear if 𒐕𒐕 should mean '2' or '61', or even '3601'. In practice, empty columns don't arise that often in a base-60 system and so this was not such a problem as you may think. Later on, in the Neo-Babylonian and Seleucid times, when astronomers needed to do lots of many-place sexagesimal computations, they did introduce an empty-column marker.

One of the great advantages of a place-value system is that you can use the same symbols to make ever larger numbers. There is no limit to how large a number you can write down. Another advantage is that you can continue writing numbers in places to the right of the units column in order to denote fractions. All that distinguishes the number 1234 from the number 1.234 is the use of a decimal point (or comma in Europe) to mark where the units come. Computations with fractions are just the same as computations with whole numbers. The Babylonians used the same idea, except that they did not bother with a decimal point - that absolute size of a number was 'determined by inspection.' For example, the number 𒐖𒐐𒌋𒐗𒐐 could mean 160000, as noted above, but it could also be 1/81, the reciprocal of 81, which is why it was widely used. In the early days of deciphering Mesopotamian mathematics, people were puzzled as to why they would go to the trouble of writing a 160000-times multiplication table. The last sexagesimal number given in the table above, 𒐕𒐐𒐖𒐐 𒐕𒌋, also has a more useful meaning than 305470. I leave it to you to figure out what it is, but the answer is on another page in this site.

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