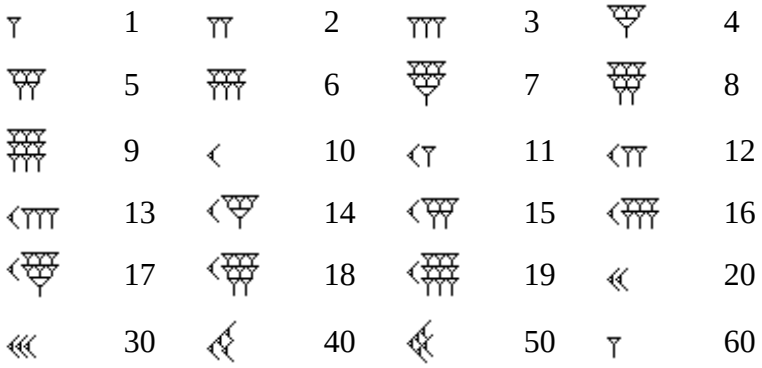
Centre Three: Sumerian Math

What to do:

1. Read through the material entitled: What is Cuneiform Numbers.
2. Can you see the relationship to our numbers and Cuneiform Numbers?
3. On the provided sheets, show us some math. Use cuneiform to make lists of things in the class. Use either your own cuneiform or pictograms to identify what it is that you are counting. Also, do some computations and make sure that you identify numbers larger than 60, in order to demonstrate a knowledge of the more complex numbers.
4. For the more complex numbers, try to identify the relationship between the cuneiform transliteration of 1 - 6, 15 - 75. How can that be?
5. Solve this problem on your sheets using cuneiform numbers:
   Your king sent his slaves to buy 19 apples and 30 oranges but the slaves became very hungry and ate 5 apples and 10 oranges. How much of the fruit did the slaves bring back? SHOW ALL YOUR WORK!

Cuneiform numbers

Cuneiform numbers were written using a combination of just two signs: a vertical wedge for '1' and a corner wedge for '10'. Handwriting varied as much in Old Babylonian times as it does now but the basic system of numbers is illustrated below.



Some common variants are

 for 4

 for 7

 for 8.

Occasionally, 19 was written as something like  , meaning 20 - 1, although there are a huge number of minor variations in the way this sign is written.
Additionally, there were special signs for some common fractions. These were used when the numbers stood for metrological quantities, such as 1/2 gin.

	1/2
	1/3
	2/3
	5/6

To find out how Mesopotamian scribes wrote numbers larger than 60, go to the larger numbers page.
If you want to know the Sumerian and Akkadian words for numbers, go here.
For practice in writing and reading cuneiform numbers, try a worksheet, or a different one.

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  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
	`1,15`	75
	`1,40`	100
	`16,43`	1003
	`44,26,40`	160000
	`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 𒁹𒁹 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 𒌋𒁹𒁹𒌋𒁹𒁹𒌋 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.