

Mayan Math

May 11, 2012

Math was a part of the Mayan culture with their numbers for thousands of years. The Mayan's math was logical and ahead of its time. Their number system was similar to ours in that they had place value, but different in that they wrote their numbers vertically instead of horizontally. Where we use ten symbols, they only used three to represent all numbers:



zero














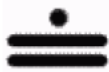








one



five

They used a stone or dot to represent one, a bar or stick to represent five, and a shell to represent zero. Using just these three symbols they were able to write all the numbers and do simple arithmetic. The Maya used a base number of 20 also known as vigesimal. This means that, instead of the number in the second position having a value 10 times that of the digit in the Mayan system, the number in the second place has a value 20 times the value of the numeral.

In the following table, you can see how the first 19 numbers are written:

				
0	1	2	3	4
				
5	6	7	8	9
				
10	11	12	13	14
				
15	16	17	18	19

1. Identify the following Mayan numbers:



2. Write the following numbers using the Mayan symbols:

(a) 3 =

(b) 8 =

(c) 11 =

(d) 14 =

(e) 15 =

(f) 18 =

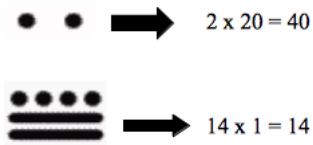
3. Mayan numbers have a base 20 instead of a base 10 which we are used to:

- The first place (the bottom row) has a value of 1;
- The second place (second row from the bottom) has a value of 20;
- The third place (third row from the bottom) has a value of $20 \times 20 = 400$, and so forth.





















For example, the number $54 = (2 \times \mathbf{20}) + (14 \times \mathbf{1})$ is made up of:

- 2 groups of 20 and
- 14 groups of 1;

Thus the first place (bottom) will have 14 units and the second place (top) will have 2 units:



Below is a table of Mayan numbers 20-39. Fill in the missing numbers:

									
20	21	22	23	24	25	26	27	28	29
									
30	31	32	33	34	35	36	37	38	39

4. Write these numbers in Mayan notation:

(a) Mayan notation for 23 = $\underline{\quad}$ has group(s) of 20
 $\underline{\quad}$ has group(s) of 1

(b) Mayan notation for 47 = $\underline{\quad}$ has group(s) of 20
 $\underline{\quad}$ has group(s) of 1

(c) Mayan notation for 61 = $\underline{\quad}$ has group(s) of 20
 $\underline{\quad}$ has group(s) of 1

(d) Mayan notation for 90 = $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ has group(s) of 20
 $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ has group(s) of 1

(e) Mayan notation for 156 = $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ has group(s) of 20
 $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ has group(s) of 1

(f) Mayan notation for 389 = $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ group(s) of 20
 $\begin{array}{l} \text{---} \\ \text{---} \end{array}$ group(s) of 1

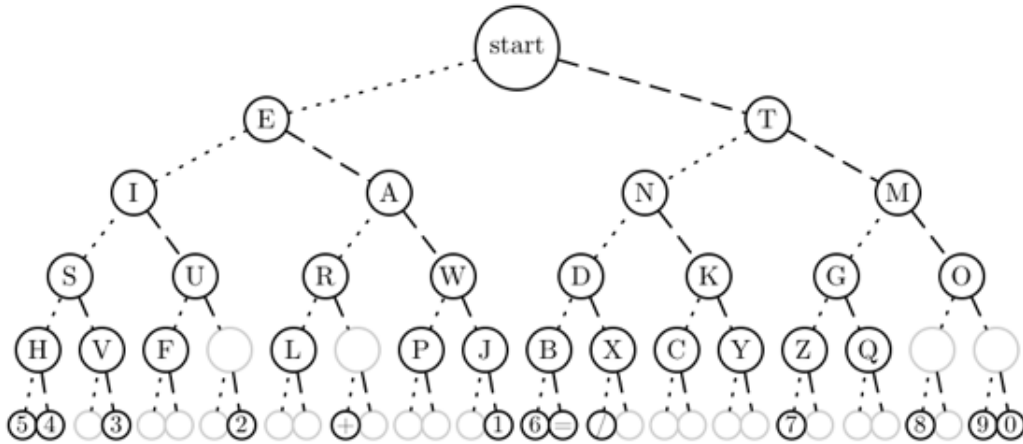
5. Draw the Mayan form of the numbers in the boxes below:

78	100	46	232

6. Back to Binary Trees!

Morse code is a system of representing letters, numbers and punctuation marks by means of a code signal sent intermittently. Morse's original code consisted of sending dots and dashes that represented numbers. Each number represented a word. This required looking up the number in a book to find the word.

The chart below is a binary tree made up of paths of dots and dashes. Each box represents a letter:



Your job is to decode the following phrase:

•••• | •— | •••— | •

•—

—• | •• | —•—• | •

—•• | •— | •— — —

Now, put your first name into Morse code. Use the similar structure I used above to box your letters!

7. Sudoku!

6					4
	5	2	6	3	
	2			5	
	6			1	
	4	3	1	6	
5					3