Mind Game # 1 - Detailed Solution, Comments and Winners

Mind Game # 1

If different non negative integer powers of 10 from 1 to 10, 000 are assigned to stroke, heelbone, coiled rope, lotus flower and tadpole and the following addition is correct, then what is the maximum value of the sum in Hindu-Arabic numerals? (Note: The usual practice of putting the symbols with smaller values on the left is not followed.)

Solution
Since the coiled ropes and heelbones add up to less than ten coiled ropes and heelbones respectively and these totals are there in the sum, the powers of ten they represent can be any two powers of ten from 1 to 10, 000 inclusive of 1 and 10, 000.

There are 3 strokes and 7 strokes to add. So the total is 10 strokes and a 1 is carried over to the next power of ten higher than the power of ten a stroke represents. There are 4 lotus flowers and 5 lotus flowers to add so the total is 9 lotus flowers. But there is no lotus flower in the sum. Therefore the power of ten higher than the power of ten a stroke represents must be the power of ten a lotus flower represents. So when a 1 is carried over from strokes to the lotus flowers there are 10 lotus flowers. So a 1 is carried over to the next power of ten higher than the power of ten a lotus flower represents. But what symbol represents this next power of ten higher than the power of ten a lotus flower represents? It must be the tadpole. Therefore a stroke, a lotus flower and a tadpole must represent consecutive powers of ten respectively from 1 to 10, 000 inclusive of 1 and 10, 000 with a stroke representing the lowest power of ten.

So a coiled rope and a stroke can represent any two powers of ten from 1 to 10, 000 inclusive of 1 and 10, 000 but a stroke, a lotus flower and a tadpole have to represent consecutive powers of ten respectively from 1 to 10, 000 inclusive of 1 and 10, 000 with a stroke representing the lowest power of ten. So according to the possibilities of powers of 10 the 5 symbols can represent we have the following correct additions in the base ten positional system and the Hindu-Arabic numerals we use:

4, 321 + 5, 753 = 10, 074
4, 312 + 5, 735 = 10, 047
20, 431 + 50, 573 = 71, 004
10, 432 + 30, 575 = 41, 007
21, 043 + 53, 057 = 74, 100
12, 043 + 35, 057 = 47, 100
So the maximum value of the sum is 74, 100. □

Comment In the Hieroglyphic numerals there is no symbol for zero. But this did not affect computations in the non-positional base 10 system based on Hieroglyphic numerals used in Egypt around 3000 BCE.

Winners

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2. Heshan Andrews
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3. M. N. Jayashankha
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4. Gnanakrishnan Nisanthan
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5. Manoj Hasitha Kavinda Gunasekara.
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8. Chetahana Chathuprabha
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