SYRACUSE ARITHMETIC.

3N+1 Problem

From the rule n even : n/2 we remark that an equality specific to that arithmetic appears :

2*k. n=2*m. n = n

This is shown on table 1 below.

s(1)	∞	….	8	4	2	1
	∞	….	2*3	2*2	2*1	2*0
Égalité	∞	….	1	1	1	1
s(3)	∞	….	24	12	6	3
	∞	….	2*3x3	2*2x3	2*1x3	2*0x3
Égalité	∞	….	3	3	3	3
s(n)	∞	….	2*3xn	2*2xn	2*1xn	2*0xn
Égalité	∞	….	n	n	n	n
S(7)	∞	….	2*3x7	2*2x7	2*1x7	2*0x7
Égalité	∞	….	7	7	7	7
	∞	….	2*3x11	2*2x11	2*1x11	2*0x11
Égalité	∞	….	11	11	11	11
	∞	….	2*3x17	2*2x17	2*1x17	2*0x17

Égalité	∞	….	17	17	17	17
	∞	….	2*3x13	2*2x13	2*1x13	2*0x13
Égalité	∞	….	13	13	13	13
	∞	….	2*3x5	2*2x5	2*1x5	2*0x5
Égalité	∞	….	5	5	5	5
	∞	….	2*3x1	2*2x1	2*1x1	2*0x1
Égalité	∞	….	1	1	1	1

In table 1, we develop classic sequence S (7): 11 , 17 , 13 , 5 , 1

CONCLUSION : In the development of the Syracuse sequence it is obvious that : 2*3.7 = 2*2.7 = 2*1.7 = 2*0.7 = 7 or 56 = 28 = 14 = 7 (n/2 rule n even) this does not require any demonstration. BUT, this result can be extended to all numbers even and odd! Using a new arithmetic: SYRACUSE ARITHMETIC.

1 = 2*0

2 = (1+1) =2*0+2*0= 2*1 = 2*0 =1

3 = (1+1) +1 =2*1+2*0 = 2*0+2*0 =2*1= 2*0=1

7 = 2*2+ 2*1+ 2*0= 2*0+2*0+2*0 = 2*1+2*0= 2*0+2*0 = 2*1 = 2*0 =1

So on.

All Syracuse sequence ends by one, because each term of the sequence is equal to 1.

S (7): 11, 17, 13, 5, 1

11 = 2*3+2*1+2*0 = 2*0+2*0+2*0 = 2*1+2*0 = 2*0+2*0 2*1 = 2*0 1

17= 2*4+2*0 = 2*0+2*0 =2*1 = 2*0 = 1

13 = 2*3+ 2*2 +2*0 = 2*0+2*0+2*0 = 2*1+2*0 = 2*0+2*0 = 2*1 = 2*0 =1

5= 2*2+2*1 = 2*0+2*0 = 2*1 =2*0 =1

1= 2*0= 1

I have been asked is your arithmetic valid if the sequences are 5n+1 , the first answer is Collatz was only interested on the 3n+1 problem, but I took a time to study 5n+1 and I say the Syracuse Arithmetic is also valid, How that is the question; and I will not deliver the answer here as I know how my study will be received.

Anyway, if Collatz and successors had considered that due to the rule n/2 : 2∞ = 2*0 =1 they had concluded each n = 1, each sequence 3n+1 ends by 1.