FibSeq2 Tivenan

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1 Fibonacci Sequence 2

The list of all the multiples of 4 in the first 50 Fibonacci numbers are in the following set: {8, 144, 2584, 46368, 832040, 14930352, 267914296, 4807526976 }. The percentage of even integers in the sequence is 33%. Attempting to come up with an equation to predict the percentages of that have have a multiple m is seem to be very challenging. I created a chart to see a pattern. I notice that if we were to multiply some of the percentages of prime powers of the higher integers would would get the percentages of the numbers. For example if we multiplied 2, (1/3)% and 3, (1/4)% we would get 6 as (1/12)%. However this doesn't work for all integers in fact 8 and 4 have the same percentages and so does 6 and 12. Therefore my guess is that the equation has to deal with prime powers. Consider m a multiple in the Fibonacci sequence, $m = {p_1}^j {p_2}^i$ where i and j are the value of the exponents the prime numbers p_1 and p_2.Then, the percentage of m in the Fibonacci sequence might be $1/p_1 j$, where p_1 is the lowest prime number in the prime factorization. The equation comes close to some of the prime numbers but is off and is not perfect. For example $m = 2$ the percentage is 1/3, not one half.

number	Percentage
1	1
2	1/3
3	1/4
4	1/6
5	1/5
6	1/12
7	1/8
8	1/6
9	1/12
10	1/15
11	1/10
12	1/12
13	1/7
14	1/24
15	1/20
17	1/9
19	1/18
23	1/24
27	1/36