THE ON-LINE ENCYCLOPEDIA OF INTEGER SEQUENCES®

founded in 1964 by N. J. A. Sloane

A264962 Pulsating Checkpoint Sequence: use powers of 2 as checkpoints; place powers of 2, starting with 4, [1] with spacing equal to the previous power of 2. Whenever we encounter a checkpoint, we jump over it; otherwise, we insert four numbers into the sequence: 2p, p, 3p, and 3p+3, where p is the smallest odd prime not yet in the sequence.

4, 6, 3, 9, 12, 8, 10, 5, 15, 18, 14, 7, 21, 24, 16, 22, 11, 33, 36, 26, 13, 39, 42, 34, 17, 51, 54, 38, 19, 57, 60, 32, 46, 23, 69, 72, 58, 29, 87, 90, 62, 31, 93, 96, 74, 37, 111, 114, 82, 41, 123, 126, 86, 43, 129, 132, 94, 47, 141, 144, 106, 53, 159 (list; graph; refs; listen; history; text; internal format)

OFFSET 1,1

COMMENTS The checkpoints, which are the numbers 4, 8, 16, 32, etc., are placed so that the number 2^k is located at the (2^k + k - 5)th position in the sequence, for k>=2; thus:
4 = 2^2 = a(2^2 + 2 - 5) = a(4 + 2 - 5) = a(1);
8 = 2^3 = a(2^3 + 3 - 5) = a(8 + 3 - 5) = a(6);
16 = 2^4 = a(2^4 + 4 - 5) = a(16 + 4 - 5) = a(15);
32 = 2^5 = a(2^5 + 5 - 5) = a(32 + 5 - 5) = a(32); etc.
The number of terms that will be placed between successive checkpoints 2^k and 2^(k+1) is (2^(k+1) + (k+1) - 5) - (2^k + k - 5) - 1 = 2^k for each k>=2; i.e., there will be 4 terms placed between 4 and 8, 8 terms placed between 8 and 16, 16 terms placed between 16 and 32, etc
Not every positive integer greater than four will appear in this sequence. If p and q are two consecutive primes with |p-q|>2, then the numbers from (p+2)*3 to (q-1)*3 will not occur in this sequence. No number of the form 2^k*m, where k>1 and m is an odd number not divisible by 3, will occur in this sequence (for example, 20, 28). Also, the numbers of form t^k, where t>3 is an odd prime and k>1 will not occur in this sequence (for example, 25, 49).
No two adjacent terms will share more than one prime factor.

LINKS Table of n, a(n) for n=1..63.
Gaurish Korpal, Pulsating graph for first 32 terms
Gaurish Korpal, Comment: 'Be Still My Pulsating Sequence', Quanta Magazine, 14 November 2015
Pradeep Mutalik, Solution: 'Be Still My Pulsating Sequence', Quanta Magazine, 25 November 2015

EXAMPLE We begin by placing successive powers of 2, starting with 2^2 = 4, with spacing equal to the value of the previous power of 2, in the sequence as checkpoints:

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.
.|4 terms|
.|<----->| |<-- 8 terms -->|  |<---------- 16 terms --------->|
4,_,_,_,_,8,_,_,_,_,_,_,_,_,16,_,_,_,_,_,_,_,_,_,_,_,_,_,_,_,32,...
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Then we fill in the remaining locations sequentially, jumping over each checkpoint as we encounter it. Those remaining locations are filled in sequentially, in sets of four terms at a time (i.e., in quadruples). We begin inserting the quadruples of the form {2p, p, 3p, 3p+3}, where p in the j-th quadruple inserted is the j-th odd prime; thus, the first quadruple is {2*3, 3, 3*3, 3*3+3} = {6,3,9,12}, and inserting it gives
4,6,3,9,12,8,_,_,_,_,_,_,_,_,16,_,_,_,_,_,_,_,_,_,_,_,_,_,_,_,32,...
Now we jump over the checkpoint 8 and insert the next two quadruples (which have p=5 and p=7, respectively):
4,6,3,9,12,8,10,5,15,18,14,7,21,24,16,_,_,_,_,_,_,_,_,_,_,_,_,_,_,_,32,...
Continuing as above, we insert the next 4 quadruples (16 terms) after the checkpoint term 16, the next 8 quadruples (32 terms) after the checkpoint term 32, etc.

CROSSREFS Cf. A000040, A000079. Graph shape is similar to A064413.
Sequence in context: A273819 A073000 A198113 * A082193 A255767 A079171
Adjacent sequences: A264959 A264960 A264961 * A264963 A264964 A264965

KEYWORD nonn

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