'Odds, Evens and More Evens'

sequence	n^{th} term
A_0	$2n-1$
A_1	$4n-2$
A_2	$8n-4$
A_3	$16n-8$
A_4	$32n-16$
A_5	$64n-32$
A_6	$128n-64$
A_7	$256n-128$
A_8	$512n-256$
A_9	$1024n-512$
A_{10}	$2048n-1024$

All sequences are infinite

Which sequences will contain the numbers 1 000?

$2n-1=1000$ no integer solution
$4n-2=1000$ no
$8n-4=1000$ no
$16n-8=1000$ yes $n=63$
$32n-16=1000$ no
$64n-32=1000$ no
$128n-64=1000$ no
$256n-125=1000$ no
$512n-256=1000$ no
$1024n-512=1000$ no
$2048n-1024=1000$ no

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How many of the numbers from 1 to 63?

A_0: 32 A_1: 16
A_2: 8 A_3: 4
A_4: 2 A_5: 1
A_6: 0 A_7: 0 ...