

Binary Sequence of Prime Number

Binary Sequence of Prime Number is a binary sequence that created by converting prime number to base-2 (without leading zeros):

- $(2)_{10}=(10)_2$
- $(3)_{10}=(11)_2$
- $(5)_{10}=(101)_2$
- $(7)_{10}=(111)_2$
- ...

If all base-2 of prime number joined, then we get the binary sequence like this:

10111011111011110110...

Now your task is to count how many digit '1' appear in the first **N** terms of the sequence, example:

- If $N=3$, digit '1' appear 2 times: 101110...
- If $N=10$, digit '1' appear 8 times: 1011101111101...

Input

The first line is an integer **T** ($1 \leq T \leq 50,000$), denoting the number of test cases. Then, **T** test cases follow.

For each test case, there is an integer **N** ($0 \leq N \leq 150,000,000$) written in one line.

Output

For each test case, output the number of digit '1' appear in the first **N** terms of the sequence

Example

Input:

3
3
10
50

Output:

2
8
36

See also: [Another problem added by Tjandra Satria Gunawan](#)