Fenwick Iterations

Problem Code: **FENWITER**

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Chef has just learned a new data structure - Fenwick tree. This data structure holds information about array of **N** elements and can process two types of operations:

- Add some value to i^{th} element of the array
- Calculate sum of all elements on any prefix of the array

Both operations take O(log N) time. This data structure is also well known for its low memory usage. To be more precise, it needs exactly the same amount of memory as that of array.

Given some array **A**, first we build data structure in some other array **T**. T_i stores the sum of the elements A_{start}, $A_{start + 1}$, ..., A_i. Index **start** is calculated with formula **start** $= F_{down}(i) = (i \& (i + 1))$. Here "&" denotes bitwise **AND** operation.

So, in order to find a sum of elements A_0, A_1, ..., A_L you start with index **L** and calculate sum of $T_L + T_{F_{down}(L)-1} + T_{F_{down}(F_{down}(L)-1)-1} + ... + T_{F_{down}(F_{down}(...(F_{down}(L)-1)-1)-1}$. Usually it is performed with cycle that goes from **L** down to **0** with function F_{down} and sums some elements from T. Chef wants to verify that the time complexity to calculate sum of A_0, A_1, A_2, ..., A_L is **O(log L)**. In order to do so, he wonders how many times he has to access array **T** to calculate this sum. Help him to find this out.

Since Chef works with really big indices. The value of **L** can be very large and is provided to you in binary representation as concatenation of strings L_1, L_2 repeated **N** times and string L_3.

Input

The first line of the input contains an integer **T** denoting the number of test cases. The description of **T** test cases follows.

The only line of each test case contains three non-empty strings L_1, L_2, L_3 and an

Output

For each test case, output a single line containing number of times Fenwick tree data structure will access array **T** in order to compute sum of A_0, A_1, A_2, ..., A_L.

Constraints

- $1 \le T \le 300$
- $1 \le Length(L_i) \le 1000$
- $1 \le N \le 10^6$

Subtasks

- Subtask #1 (20 points): $|L_1| + |L_2| * N + |L_3| \le 60$
- Subtask #2 (30 points): $1 \le T \le 30, 1 \le N \le 100$
- Subtask #3 (50 points): **No additional constraints**

Example

Input:

```
4
001 100 011 4
1000 1101 100 3
1010 001 101 4
010 101 000 4
```

Output:

```
6
12
8
10
```

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Editorial:	http://discuss.codechef.com/problems/FENWITER
Tags:	bit, cenadar, easy, oct16
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Time Limit:	1 secs
Source Limit:	50000 Bytes
Languages:	C, CPP14, JAVA, PYTH, PYTH 3.5, PYPY, CS2, PAS fpc, PAS gpc, RUBY, PHP, GO, NODEJS, HASK, SCALA, D, PERL, FORT, WSPC, ADA, CAML, ICK, BF, ASM, CLPS, PRLG, ICON, SCM qobi, PIKE, ST, NICE, LUA, BASH, NEM, LISP sbcl, LISP clisp, SCM guile, JS, ERL, TCL, PERL6, TEXT, SCM chicken, CLOJ, FS

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