

DMPG '16 B6 - Counting Money

Bob is now so rich that he is no longer able to keep track of his own wealth. Instead, he now uses a computer to do it for him. Most computers use binary, or base 2 to count. However, Bob's computer needs to handle negative numbers as well, so instead, it uses base -2 . Base -2 is very similar to base 2, except the digits represent increasing powers of -2 instead of 2. This means that the digits (from right to left) represent 1, -2 , 4, -8 , and so on, instead of 1, 2, 4, 8. However, there is still a problem: his computer can't convert between base -2 and base 10 yet. Can you help Bob write a program to do this?

There are two operations that will be needed:

- **A x** Change x , a number in base -2 , into base 10.
- **B y** Change y , a number in base 10, into base -2 .

Base -2	Conversion	Base 10
11011	$(-2)^4 + (-2)^3 + (-2)^1 + (-2)^0$	7
11010	$(-2)^4 + (-2)^3 + (-2)^1$	6

Input Specification

The first line of input will contain N ($1 \leq N \leq 1\,000$), the number of operations to be performed.

The next N lines will each contain an operation in the format described above.

For at least 25% of the marks, you will only need to convert from base -2 to base 10.

For at least another 25% of the marks, $(-10\,000 \leq y \leq 10\,000)$.

Output Specification

For each operation, print out the result of the operation on a single line.

Sample Input

```
2
A 11011
B 6
```

Sample Output

7

11010