Cut the Rope

Limits: 5s, 512 MB

Bokkor is a rope seller. He has a special tool for cutting rope. But recently this tool is behaving weirdly. When he tries to cut the rope, it puts the cut in a random position of the rope from the starting position. He doesn't have enough money to repair the machine. As his friend, you need to find the $\mathbf{k^{th}}$ smallest rope segment after cutting the rope few times with the machine.

Input

There will be several test cases. First line of the input contains the number **T** < 40 (Number of test cases).

Every test case start with a value **N** (Length of the rope) and **Q**(number of query). Next **Q** lines contain a character (**'C'** or **'F'**) and an integer **'X'**. If the query starts with **'C'**, then the machine cut the rope at position **X**. If it starts with **'F'** then find the Length of the $\mathbf{X^{th}}$ rope segment, after sorting the ropes by length. Queries will always be valid.

Constraints:
$\mathbf{1 < N < 10^{15}}$
$\mathbf{1 \le Q \le 10^{5}}$
$\mathbf{1 \le X \le 10^{15}}$

Output

For every test case, the first line contains **"Case X:"**. **X** is the case number.
For every query starts with **F**. you need to print the length of the desired rope in a single line.

Samples

Input	Output
1 10 5 C 4 F 1 F 2 C 9 F 1	