2

JJOOII 2

Bitaro received a string S of length N for his birthday present. String S consists of three kinds of characters, J, O and I.

For each positive integer K, we will call the string which consists of K J's, K O's, and K I's in this order **JOI-string of level** K. For example, JJOOII is a JOI-string of level 2.

Bitaro likes a JOI-string of level K, so he is going to make a JOI-string of level K from string S by using the following three operations any number of times in arbitrary order:

Operation 1 Bitaro deletes the first character of S.

Operation 2 Bitaro deletes the last character of S.

Operation 3 Bitaro deletes a character of S which is neither the first nor the last.

Because using Operation 3 is time-consuming, Bitaro wants to make a JOI-string of level K with as small number of Operation 3 as possible.

Write a program which, given a string S of length N and a positive integer K, prints the smallest number of Operation 3 required to make a JOI-string of level K from S. If it is impossible to make a JOI-string of level K with the operations, print -1 instead.

Input

Read the following data from the standard input. N and K are integers. S is a string.

> N K
> S

Output

Write one line to the standard output. The output should contain the smallest number of Operation 3 required to make a JOI-string of level K from S. If it is impossible to make a JOI-string of level K, print -1 instead.

Constraints

- $3 \le N \le 200\,000$.

- $1 \le K \le \dfrac{N}{3}$.

- S is a string of length N which consists of J, O and I.

Subtasks

1. (1 point) $N \leq 21$.

2. (12 points) $N \leq 3\,000$.

3. (87 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
10 2 OJIJOIOIIJ	2

You can make a JOI-string of level K from string S by the following operations:

1. You use Operation 1 and S becomes JIJOIOIIJ.

2. You use Operation 2 and S becomes JIJOIOII.

3. You use Operation 3 to remove the second character and S becomes JJOIOII.

4. You use Operation 3 to remove the fourth character and S becomes JJOOII.

It is impossible to make a JOI-string of level K with using Operation 3 less than twice, so you should print 2.

Sample Input 2	Sample Output 2
9 3 JJJOOOIII	0

You need not use an operation.

Sample Input 3	Sample Input 3
9 1 IIIOOOJJJ	-1

In this sample, it is impossible to make a JOI-string of level 1 from string S.