Autocomplete Strikes Back

Facebook Hacker Cup 2015 Round 2

This morning you woke up with an uncontrollable urge to send a text message made up of K distinct words. But, can you believe it? Your new phone just crashed and all of the words are missing from its dictionary! You used to have N words in there, and you certainly don't have time to add all of them back right now.

Your plan is to just choose K of the N possible words, add them to your phone's dictionary, and then text each of them. To text a certain word, you must either type the word itself, or any nonempty prefix of it which is not a prefix of any other word in the dictionary.

What's the minimum number of letters you must type to send your message of K words?

Input

Input begins with an integer T, the number of test cases. For each test case, there is first a line containing the space-separated integers N and K. Then, N lines follow, each containing a word that used to be in your phone's dictionary.

Output

For the ith test case, print a line containing `Case #i:` followed by the minimum number of characters you need to type to send your text message.

Constraints

$1 \leq T \leq 20$
$2 \leq N \leq 4\,000$
$1 \leq K \leq \min(N-1, 100)$

The N words will have a total length of no more than $20\,000$ characters.
The words are made up of only lower-case alphabetic characters.
The words are pairwise distinct.

Explanation of Sample

In the first case, one option is to choose the words `tin`, `tinny`, `gigantic`, and `tilts`. You can then text these words by typing `tin`, `tinn`, `g`, and `til`, respectively, for a total of $3 + 4 + 1 + 3 = 11$ letters.

Sample Input

```
5
6 4
tin
tiny
tinny
gigantic
tilt
tilts
3 2
apple
apricot
cherry
5 3
a
aa
aaa
aaaa
aaaaa
5 3
the
quick
brown
fox
jumped
8 7
cork
work
card
ward
font
front
word
sword
```

Sample Output

```
Case #1: 11
Case #2: 2
Case #3: 6
Case #4: 3
Case #5: 13
```