Kick Start 2020 - Round A

Bundling

Problem

Pip has **N** strings. Each string consists only of letters from `A` to `Z`. Pip would like to bundle their strings into *groups* of size **K**. Each string must belong to exactly one group.

The *score* of a group is equal to the length of the longest prefix shared by all the strings in that group. For example:

- The group `{RAINBOW, RANK, RANDOM, RANK}` has a score of 2 (the longest prefix is `'RA'`).
- The group `{FIRE, FIREBALL, FIREFIGHTER}` has a score of 4 (the longest prefix is `'FIRE'`).
- The group `{ALLOCATION, PLATE, WORKOUT, BUNDLING}` has a score of 0 (the longest prefix is `''`).

Please help Pip bundle their strings into groups of size **K**, such that the sum of scores of the groups is maximized.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the two integers **N** and **K**. Then, **N** lines follow, each containing one of Pip's strings.

Output

For each test case, output one line containing `Case #x: y`, where `x` is the test case number (starting from 1) and `y` is the maximum sum of scores possible.

Limits

Time limit: 20 seconds.
Memory limit: 1 GB.
$1 \leq \mathbf{T} \leq 100$.
$2 \leq \mathbf{N} \leq 10^5$.
$2 \leq \mathbf{K} \leq \mathbf{N}$.
K divides **N**.
Each of Pip's strings contain at least one character.
Each string consists only of letters from `A` to `Z`.

Test Set 1

Each of Pip's strings contain at most 5 characters.

Test Set 2

The total number of characters in Pip's strings across all test cases is at most 2×10^6.

Sample

Note: there are additional samples that are not run on submissions down below.

Sample Input

```
2
2 2
KICK
START
8 2
G
G
GO
GO
GOO
GOO
GOOO
GOOO
```

Sample Output

```
Case #1: 0
Case #2: 10
```

In Sample Case #1, Pip can achieve a total score of 0 by making the groups:

- `{KICK, START}`, with a score of 0.

In Sample Case #2, Pip can achieve a total score of 10 by making the groups:

- `{G, G}`, with a score of 1.
- `{GO, GO}`, with a score of 2.
- `{GOO, GOO}`, with a score of 3.
- `{GOOO, GOOO}`, with a score of 4.

Additional Sample - Test Set 2

The following additional sample fits the limits of Test Set 2. It will not be run against your submitted solutions.

Sample Input

```
1
6 3
RAINBOW
FIREBALL
RANK
RANDOM
FIREWALL
FIREFIGHTER
```

Sample Output

```
Case #1: 6
```

In Sample Case #1, Pip can achieve a total score of 6 by making the groups:

- `{RAINBOW, RANK, RANDOM}`, with a score of 2.
- `{FIREBALL, FIREWALL, FIREFIGHTER}`, with a score of 4.

Note: Unlike previous editions, in Kick Start 2020, all test sets are visible verdict test sets, meaning you receive instant feedback upon submission.