Rock-Paper-Scissors is game for two players, A and B, who each choose, independently of the other, one of *rock, paper,* or *scissors*. A player chosing *paper* wins over a player chosing *rock*; a player chosing *scissors* wins over a player chosing *paper*; a player chosing *rock* wins over a player chosing *scissors*. A player chosing the same thing as the other player neither wins nor loses.

A tournament has been organized in which each of n players plays k rock-scissors-paper games with each of the other players — $k * n * (n-1)/2$ games in total. Your job is to compute the *win average* for each player, defined as $w/(w+l)$ where w is the number of games won, and l is the number of games lost, by the player.

Input

Input consists of several test cases. The first line of input for each case contains $1 \leq n \leq 100$ $1 \leq k \leq 100$ as defined above. For each game, a line follows containing p_1, m_1, p_2, m_2. $1 \leq p_1 \leq n$ and $1 \leq p_2 \leq n$ are distinct integers identifying two players; m_1 and m_2 are their respective moves ('`rock`', '`scissors`', or '`paper`'). A line containing '`0`' follows the last test case.

Output

Output one line each for player 1, player 2, and so on, through player n, giving the player's win average rounded to three decimal places. If the win average is undefined, output '`-`'. Output an empty line between cases.

Sample Input

```
2 4
1 rock 2 paper
1 scissors 2 paper
1 rock 2 rock
2 rock 1 scissors
2 1
1 rock 2 paper
0
```

Sample Output

```
0.333
0.667

0.000
1.000
```