

Problem G - Guardians of Eftal

In recent years, the economy of the Great Kingdom of Eftal has tanked and crime rate is going up. You are the master of the Guardians of Eftal, and you seek to remedy the situation. As a first step, you would like to strengthen the security of the major cities.

Each city is surrounded by a great wall, and is internally divided into many districts with walls as well. Wherever walls join, there is a watch tower. To travel between different districts, or to exit the city, one must pass through checkpoints. There is a checkpoint on every wall, which you control.

Recently, you heard rumors that the Maximum Wolf Trade Syndicate (MWTS) has been planning to bypass the checkpoints by digging a network of tunnels underneath the walls. You know that in particular, they want to be able to move their illegal goods from their main warehouse in the capital city to all districts in every city. You would like to investigate just how much this network of tunnels would cost.

Note that this network of tunnels can connect to the “outside” of a city if necessary.

Input

The first line contains an integer T , denoting the number of test cases.

Each test case begins with a single line containing an integer, $1 \leq N \leq 100$, which describes the total number of districts in all cities. Each of the next N lines describe a district. The first district described contains the main warehouse of MWTS.

The description of a single district begins with an integer, $3 \leq M \leq 8$, describing the number of walls (= number of towers) surrounding the district.

Then, in the same line, there are M strings of alpha-numeric characters, s_1, \dots, s_M , representing the unique name of the towers between the walls, in either clockwise or counter-clockwise order. The walls surrounding this district are connected between adjacent towers in the sequence: $s_1 \rightarrow s_2 \rightarrow \dots, s_{M-1} \rightarrow s_M \rightarrow s_1$.

Finally, there are M positive integers, a_1, \dots, a_M ($0 \leq a_i \leq 5000$), where a_i represents the cost of digging a tunnel underneath the wall between towers s_i and s_{i+1} .

Note 1: if towers A and B appear together in two different districts, then they are either adjacent in both districts, or not adjacent in both districts; in the former case, the two districts share the wall (A, B) .

Note 2: each wall = pair of adjacent towers is shared by at most two districts. If a wall appear in two districts, then these two districts share that wall, and the cost of digging a tunnel underneath the wall is guaranteed to be identical in the description of both districts; if a wall appear in only one district, then the district borders the “outside” of the city through that wall.

Output

For each test case, output, on its own line, the minimum cost of digging tunnels so that one can travel from the main warehouse of MWTS to every district in every city without passing through checkpoints.

Sample Input

```
1
5
5 A B J I H 6 1 16 1 4
5 B J K D C 1 16 2 10 8
5 K D E F L 2 10 12 2 16
5 L F G H I 2 12 5 1 16
4 I J K L 16 16 16 16
```

Sample Output

20

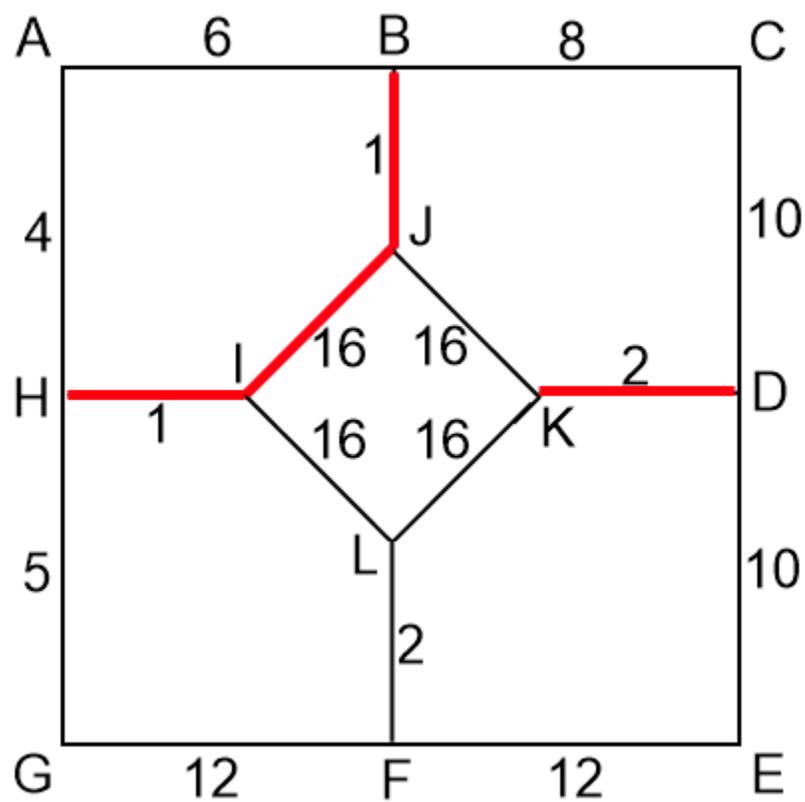


Figure 1: A representation of the sample input. An optimal solution is to dig tunnels under the red walls.