UCF "Practice" Local Contest — August 27, 2011

Pick Men (filename: pickmen)

Commander Oroojimar was piloting his spaceship carelessly one day when he struck an asteroid. His ship was badly damaged, forcing him to crash land on a nearby planet. Various bits of his ship were scattered across the surface of the planet. Luckily the planet was filled with friendly and helpful Pick Men who were eager to assist Commander Oroojimar in gathering the pieces of his ship. After gathering together a group of Pick Men, Commander Oroojimar, being particularly careless that day, led them into a dangerous cave. Now he needs your help to escape.

There are many different varieties of Pick Men. Each variety is impervious to a particular hazard, but susceptible to all others. Below is a table enumerating the different varieties of Pick Men and their immunities.

Pick Men Variety	Impervious to
Ruby	Fire
Topaz	Electricity
Sapphire	Water
Ivory	Poison

The cave Commander Oroojimar has led his Pick Men into consists of a number of chambers connected by passageways. The chambers are filled with deadly monsters. Unless Commander Oroojimar has enough Pick Men with him to defeat the vile fiends, he will be unable to survive passing through a chamber. Even if he has enough Pick Men to pass through a chamber, one Pick Man of each variety present (i.e., in Commander Oroojimar's possession) will be eaten by the monsters on the way through the chamber.

The passages connecting the chambers have their own dangers. They contain no monsters, but they do contain traps based on fire, electricity, water, and/or poison. If Commander Oroojimar has Pick Men with him that are impervious to the traps, they can be disarmed, allowing the passage to be safely traversed by all. Otherwise, the passage will be completely impassable.

The Problem:

Given the number of Pick Men Commander Oroojimar begins with and a description of the cave, determine the greatest number of Pick Men he can leave the cave with.

The Input:

Input begins with a positive integer indicating the number of data sets (caves) to be processed. The cave descriptions are on the following input lines.

The description of each cave begins with a line containing six integers. The first integer n ($2 \leq n \leq 50$) is the number of chambers in the cave (assume chambers are numbered 1 through n). The second integer m ($0 \leq m \leq 200$) is the number of passageways. The remaining four integers (all in the range of 0 and 500, inclusive) indicate the number of ruby, topaz, sapphire, and ivory Pick Men accompanying Commander Oroojimar into the cave, respectively.

Each of the next n input lines for a data set (cave) describes a chamber, with the i^{th} line describing chamber i. A description of a chamber consists of a single integer (in the range of 0 and 2000, inclusive) representing the number of Pick Men needed for Commander Oroojimar to survive that chamber. A value of 0 for a chamber indicates that there are no monsters and that the chamber can be visited without loss of Pick Men. Chamber 1 is where Commander Oroojimar enters, and chamber n is the exit, and both are guaranteed to contain no monsters.

The following m input lines for a data set (cave) describe passageways. Each line describing a passageway contains two integers followed by a string. The integers indicate the chamber number of the passageway's two endpoints (assume these two values are distinct and each between 1 and n inclusive). The string is either "N" to indicate no hazards, or contains one or more of the characters 'F', 'E', 'W', or 'P' (each letter appearing at most once) indicating the presence of fire, electricity, water, or poison, respectively. Assume that these input lines start in column 1 and there is exactly one space separating the values. Also assume that there will be at most one passageway between any two chambers.

The Output:

For each input cave, print a message on a line by itself in the following format:

```
Cave #i: message
```

where `i` is the cave number, beginning with cave #1, and message is either ``` ``Commander Oroojimar can escape with j Pick Men.'' ```, with `j` representing the maximum number of Pick Men with whom Commander Oroojimar can escape, or ``` ``Commander Oroojimar is doomed.'' ``` if he cannot escape the cave.

Leave a blank line after the output for each data set. Follow the format illustrated in Sample Output.

(Sample Input/Output on the next page)

Sample Input:

```
2
4 3 1 15 15 1
0
20
28
0
1 2 FP
2 3 EW
3 4 N
4 4 20 1 20 20
0
62
5
0
1 2 N
2 4 N
1 3 N
3 4 E
```

Sample Output:

```
Cave #1: Commander Oroojimar can escape with 26 Pick Men.

Cave #2: Commander Oroojimar is doomed.
```