



Dear, Vivi



### Description 📖

The Kingdom of Alabasta has been seized by Sir Crocodile's pirate gang 🏴‍☠️. The leader of the kingdom of Alabasta, King Cobra 👑, has been captured and is being kept in a secret prison. The royal princess and only child of King Cobra, Vivi 👑, has managed to escape from the country. From inside prison, King Cobra wrote a message to his daughter, which was secretly brought to Vivi with the help of her favorite bird, Karou 🦅.

[King Cobra's message to Vivi]

Dear Vivi,

Our kingdom, Alabasta, has been attacked by an evil pirate group, led by one of the members of the 7 sea warlords, Sir Crocodile, who had hidden themselves behind their created criminal organization, Baroque Works. I am writing this letter from the palace's secret prison, hoping this message reaches you.

As my only daughter, and the future successor of the Kingdom of Alabasta, I will tell you how to defeat the cunning Sir Crocodile, but you will need the help of an incredible ally, such as the hero Joyboy. I have never met him nor do I know where he is, but I am sure that Joyboy will arrive and aid our kingdom.

Before that, I will explain the kingdom's structure, in hopes that this will help in the fight for our kingdom. The kingdom of Alabasta consists of  $V$  cities and  $E$  connecting roads between cities. The kingdom of Alabasta is completely connected, meaning that there is always a route to get from one city to the other, though it is likely that some of the roads in Alabasta have since been damaged by Sir Crocodile and his crew. I will be conveying detailed information that can help in traversing Alabasta to help Joyboy reclaim our kingdom.

All cities in the Kingdom of Alabasta have been assigned codes from 1 to  $N$ . Joyboy will enter our kingdom through the city with code 1. Joyboy, Sir Crocodile, and all of Crocodile's subordinates have strength calculated in berries. Several towns in Alabasta have a secret supply of weapons that Joyboy can use in the final fight against Sir Crocodile. However, every road between cities is guarded by Sir Crocodile's trusted subordinates. You can only pass a road if Joyboy's strength is greater than or equal to the strength of the subordinates guarding that specific road. I hope you can find Joyboy and help him find weapons to beat Sir Crocodile and take back our kingdom. Convey my greetings to Joyboy, and don't forget to take care of yourself, Vivi. I'm sure everything will be fine

Kind Regards,

King Cobra

To execute her father's plans in helping Joyboy and reclaiming Alabasta, Vivi asks you for your help in realizing the suggested strategy. Vivi wants you to make a program that can answer several of the below queries in a short amount of time. The queries that Vivi will ask are the following:

- F [POWER] -> Finding Weapon 🔑

Let's say Joyboy with a total strength of [POWER] and Vivi were to travel starting from the city with code number 1, to find weapons

throughout the Kingdom of Alabasta. Vivi would like to know how many cities with weapons would they be able to reach in that scenario?

- S [CITY\_CODE] -> Saving Power 🩹  
Let's say Joyboy and Vivi are in the city with the code [CITY\_CODE] and intend to go to the next city with a weapon. Joyboy would like to know in that scenario, what is the minimum amount of strength he would need to get to a weaponised city.
- T -> Tactical Bribe 📄  
Before the war against Sir Crocodile, Vivi wants to take control over some of the roads that are guarded by Sir Crocodile's subordinates. She can do so by bribing Sir Crocodile's subordinates that are guarding the roads with an amount of berries equal to those subordinates' power. Vivi wants to bribe enough road guards so that the roads that she would get control over would be enough to connect all the cities in the Kingdom of Alabasta. Vivi wants to know what is the minimum amount of berries she would have to spend to execute this ultimate tactic.

**Note:** This 'Tactic' will only be done as the final step before fighting Sir Crocodile (Will only appear after all 'F' or 'S' queries are done)

#### Input Format:

- The first line has 2 integers V and E, separated by a space.
  - V is the number of cities in the Kingdom of Alabasta and E is the number of connecting roads between cities.
- The second line contains V characters  $V_i$  that are separated by spaces
  - $V_i$  can be either R or W, where if  $V_i$  is R then city i is a *Regular City* (a city without weapons), whereas if  $V_i$  is W then city i is a *Weaponized City*, (a city containing secret weapons in the Kingdom of Alabasta).
  - Note: Each city will be assigned a code starting from 1 to V
- The next E lines will contain 3 integers A B X.
  - A and B are the codes of 2 cities that are connected by a road.
  - X is the power of the subordinate guarding that road.
- The next line contains an integer Q (query), which represents the number of questions/queries that Vivi will ask.
- The next Q lines will contain queries that match the formats described earlier.

#### Output Format:

- Output of Query F [POWER] -> Finding Weapon:

- Output the maximum number of *Weaponized Cities* that Joyboy and Vivi can visit from city with code number 1, with a power of [POWER].
- Output of Query S [CITY\_CODE] -> Saving Power:
  - Output the minimum amount of power that Joyboy needs to get from the city with code [CITY\_CODE] to any *Weaponized City*.
- Output of Query T -> Tactical Bribe:
  - Output the minimum amount of berries that Vivi needs to fulfill her 'tactic'.

**Restrictions:**

- $2 \leq V \leq 5\ 000$
- $V - 1 \leq E \leq \min(10\ 000, V(V-1)/2)$
- $1 \leq V_w \leq V$ , where  $V_w$  is the amount of *Weaponized City*
- $1 \leq A_i, B_i \leq V$
- $1 \leq X_i \leq 10^9$
- $1 \leq Q \leq 5\ 000$
- It is guaranteed that all cities have a route to all other cities
- It is guaranteed that no more than 1 inter-city connecting road can connect the same 2 cities

**Example Input 1:**

```

7 10
R R R W W R W
1 2 8
1 3 4
2 5 6
2 6 12
3 4 7
3 5 20
3 7 15
4 6 13
5 6 15
6 7 10
2
F 10
F 20

```

**Example Output 1:**

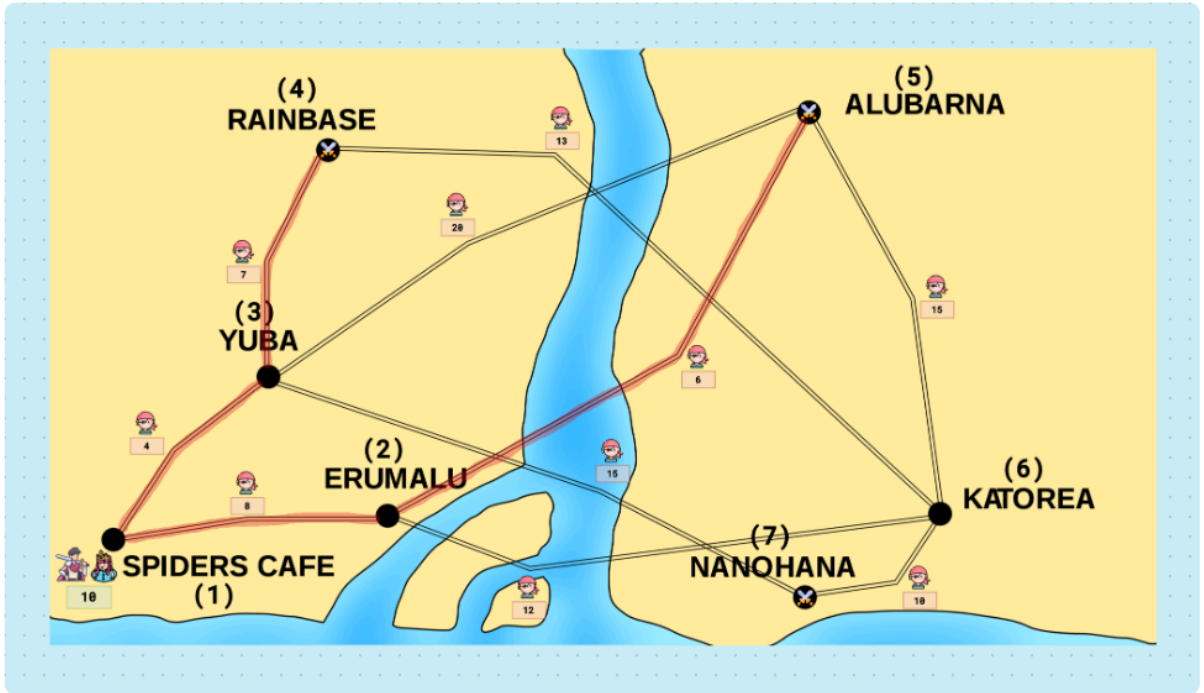
```

2
3

```

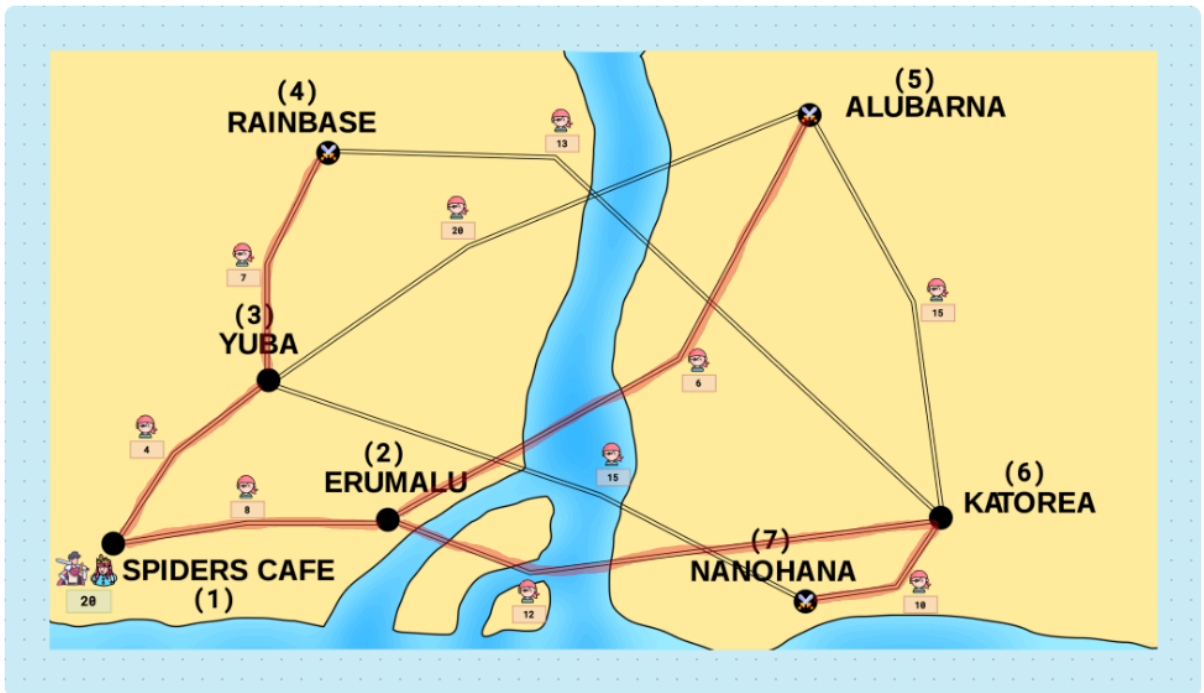
**Explanation:**

1. F 10



There are only 2 Weaponised cities, those being cities 4 and 5 that can be visited by Joyboy and Vivi with a power of 10.

2. F 20



All weaponized cities can be visited by Joyboy and Vivi with a power of 20. The route illustrated above is only one of many possible routes that could get you to all Weaponized cities.

Example Input 2:

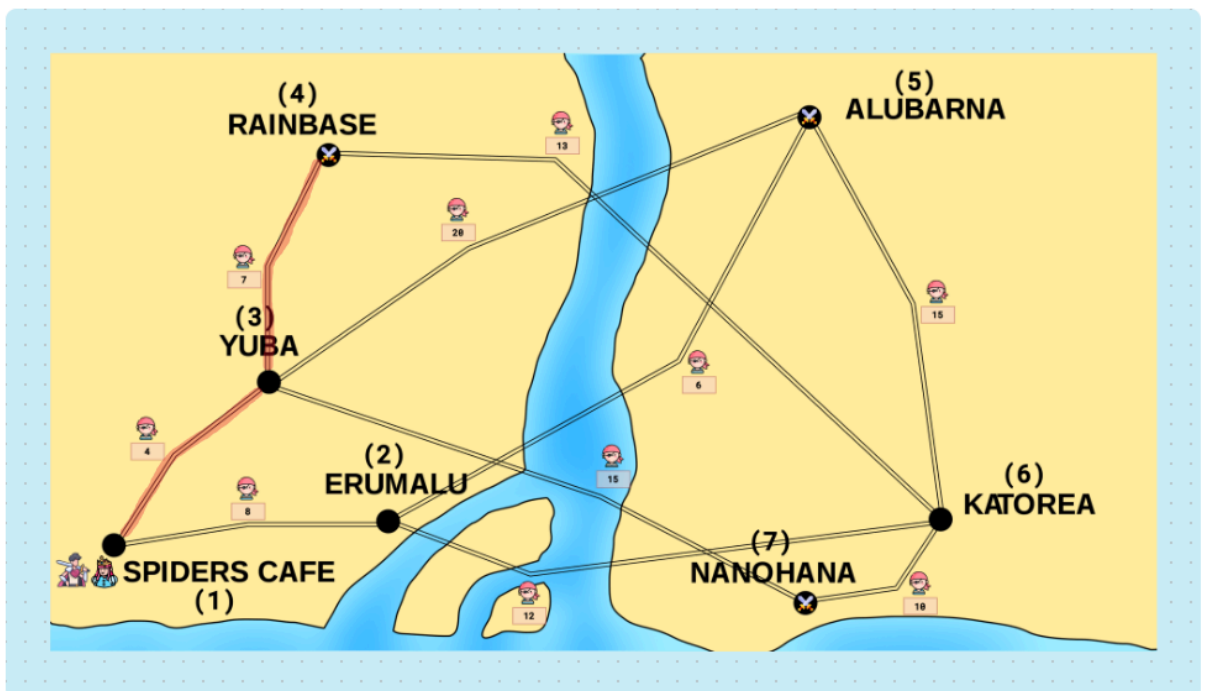
```
7 10
R R R W W R W
1 2 8
1 3 4
2 5 6
2 6 12
3 4 7
3 5 20
3 7 15
4 6 13
5 6 15
6 7 10
2
S 1
S 5
```

Example Output 2:

```
7
0
```

Explanation:

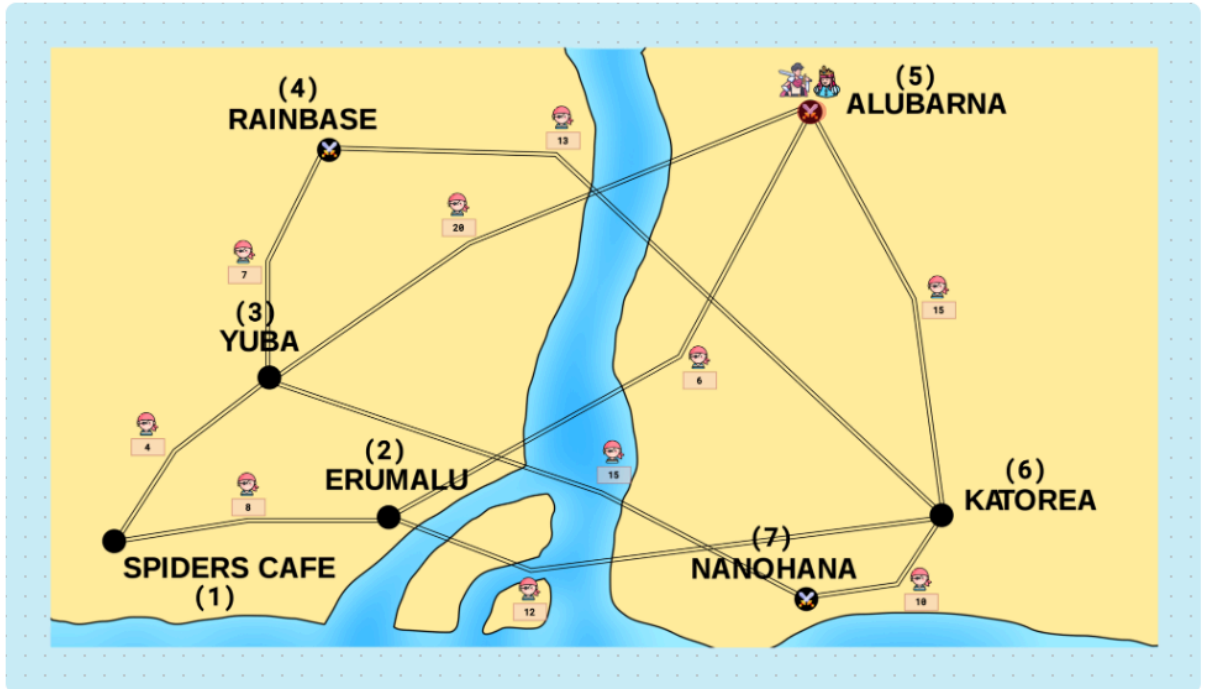
1. S 1



The minimum amount of strength needed to get to a weaponised city from city 1 is 7 berries. You need at least 7 berries of

strength to get to city 4, minimum of 8 berries to get to city 5 and a minimum of 12 berries to get to city 7.

2. S 5



The city with code number 5 is a weaponized city, thus you wouldn't need to move to another city. Because of that, the minimum amount of power needed is 0 berries.

Example Input 3:

```

7 10
R R R W W R W
1 2 8
1 3 4
2 5 6
2 6 12
3 4 7
3 5 20
3 7 15
4 6 13
5 6 15
6 7 10
5
F 10
F 20
S 1
S 5
T

```

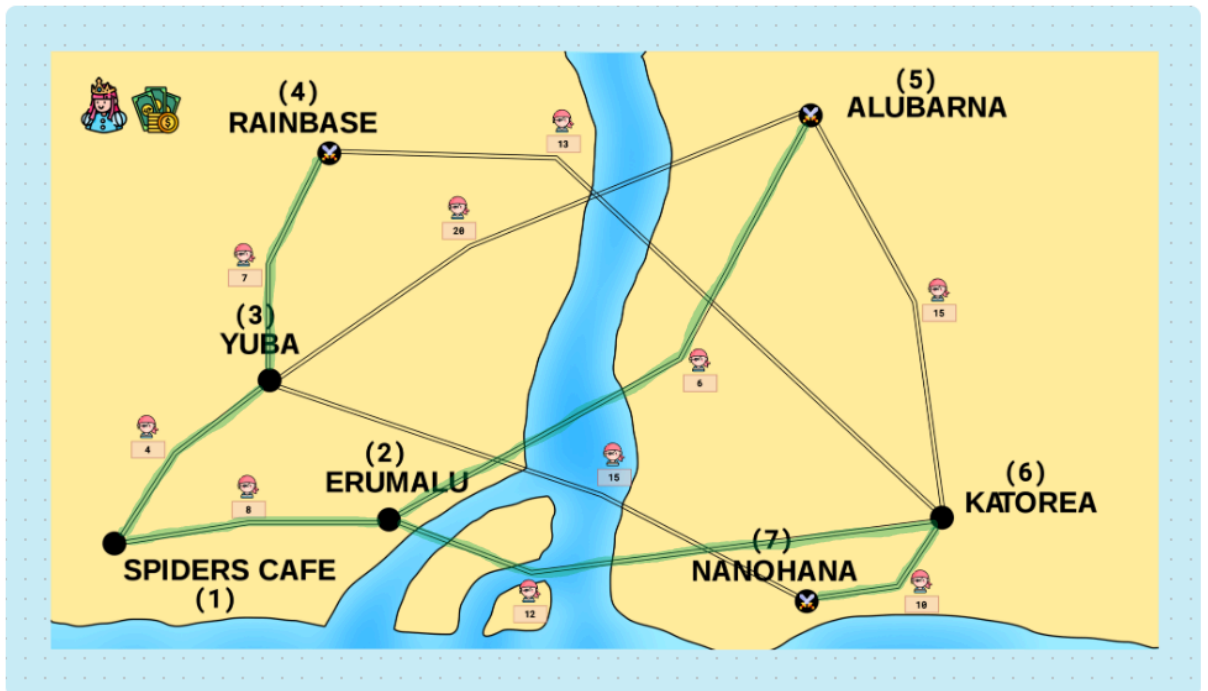
Example Output 3:

2  
3  
7  
0  
47

Explanation:

Query 1 until 4 is the same as the previous examples.

1. I



One of the possible ways to enact Vivi's ultimate tactic is to bribe a total of  $4 + 7 + 8 + 6 + 12 + 10 = 47$  berries.

## BONUS<sup>100</sup>

King Cobra and Vivi have their favorite companion that they have looked after since he was little, Karou. Karou is one of Alabasta's most legendary birds. On the mission to reclaim Alabasta, Vivi can summon Karou a maximum of 1 time to fly Vivi and Joyboy to any Weaponized city. With Karou's ability in mind, Vivi asks you an additional type of query which is stated in the following format:

- K [STARTING\_CODE] [ENDING\_CODE] -> Karou Help!!! 🦅  
Let's say Vivi and Joyboy are in the city with code number [STARTING\_CODE] and they want to get to the city with code number [ENDING\_CODE]. They are able to ask for Karou's assistance a maximum of 1 time. Vivi wants to know the total power in berries of the road guards they would have to pass to get to their destination.

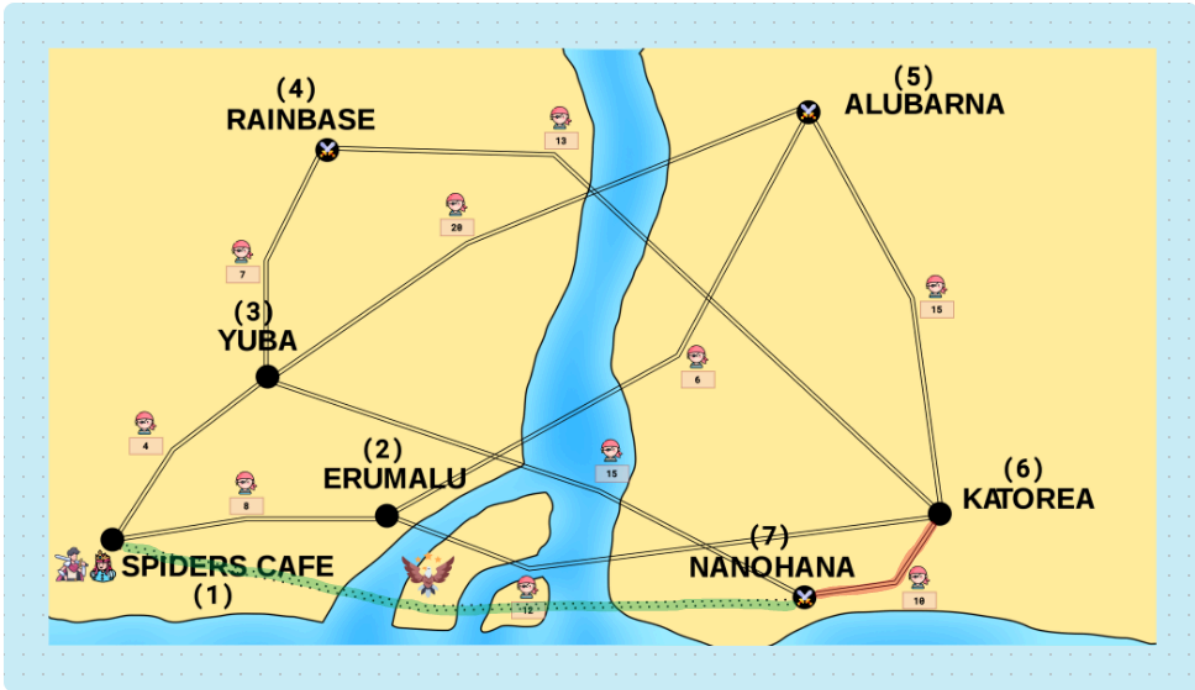
Example Input 3:

```
7 10
R R R W W R W
1 2 8
1 3 4
2 5 6
2 6 12
3 4 7
3 5 20
3 7 15
4 6 13
5 6 15
6 7 10
1
K 1 6
```

Example Output 3:

```
10
```

Explanation:



Vivi and Joyboy can get from the city with code number 1 to the city with code number 7 using the following route:

1. With the help of Karou you can go from city 1 to city 7 (which is a *Weaponized city*) -> 0
2. You can then take the road from city 7 to city 6 to get to your destination -> 10

Total = 0 + 10 = 10 Berries

### Additional Test-case Information

Deskripsi	Test Case
Contains Query F	1 - 25
Contains Query S	26 - 50
Contains Query T	51 - 75
Contains Query F, S, T	76 - 100
Contains Query K (Bonus)	101 - 110

<Good Luck & Happy Coding>