Quest 7: Namegraph

Quest 6 Quest 8

Part I

Story section

A group of a dozen or so people is currently traversing a dense, dark forest. The sun barely breaks through the tangled branches, and the air is humid and reeks of rotting moss. In the centre of this group walk a few nerdmasters. They seem completely detached from reality. They pay no attention to the shadows around them or the unsettling noises. They are too busy talking about runes, graphs, and other mysterious topics.

You walk at the back of the group, talking to Sir Mandelbrot, who volunteered to lead the escort. You observe the nerdmasters and their backpacks stuffed with books, scrolls, and strange tools that quietly jingle with each of their steps. One of them, much younger than the rest and somewhat dishevelled, occasionally glances at you with clear interest.

Finally, the forest thins out and the whole group stops for a short break. The young nerdmaster can't hold back and approaches you with almost childlike enthusiasm.

- Hello, dragonduck! Forgive my curiosity, but this is the first time I've seen a representative of your species in person. My name is Veronica McPathway, and I study magical creatures. I am currently working on a wonderful book entirely dedicated to dragonducks! I know that you possess extraordinary skills. Would you agree to a small test of solving problems of a slightly different kind?

You feel the pleasant warmth of knowledge from the nerdmaster. Hundreds of things you want to ask pop into your head, but you agree to do the experiment first. Veronica promises to answer all your questions later, if, of course, she is able to.

Veronica pulls a hefty tome from her backpack and opens it to a page showing a list of names and something below that list that looks like rules for letter connections (your notes). She explains that each line under the list of names represents a rule for a single letter, specifying after the `>` which letters can appear directly after it. Uppercase and lowercase letters matter here!

Only one name from the list of names can be constructed using the rules. Your task is to find that name, which shouldn't be difficult, because before all the rules were even presented to you, one name from the list began to shine with a bluish glow.

Example based on the following notes:

```
Oronris,Urakris,Oroneth,Uraketh

r > a,i,o
i > p,w
n > e,r
o > n,m
k > f,r
a > k
U > r
e > t
O > r
t > h
```

The only name from the sample list that can be constructed according to the rules is `Oroneth`. Below is the detailed check of each pair of letters in this name:

- `Or` is in line with the rule `O > r`
- `ro` is in line with the rule `r > a,i,o`
- `on` is in line with the rule `o > n,m`

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- `ne` is in line with the rule `n > e,r`
- `et` is in line with the rule `e > t`
- `th` is in line with the rule `t > h`

The remaining names do not meet at least one of the rules:

- Oronris is not in line with the rule `i > p,w`. After the letter `i`, the letter `s` is not allowed.
- Urakris is not following exactly the same rule as Oronris.
- Uraketh is not in line with the rule `k > f,r`. After the letter `k`, the letter `e` is not allowed.

Which name from the list can be created while following the rules?

Your notes for this part:

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Part 1 solved with answer: Uljorath

Check your progress

Part II

Veronica notes the word "instant" on the side of the page and flips the sheet, revealing the next part of the experiment. The rules are the same as in the first part, with just one difference, that there is more than one name that meets the given criteria, and you have to find them all.

Each name on the list has an index number: 1, 2, 3, etc. As an answer, you must provide the sum of all indices of names that meet the rules.

Example based on the following notes:

```
Xanverax,Khargyth,Nexzeth,Helther,Braerex,Tirgryph,Kharverax

r > v,e,a,g,y
a > e,v,x,r
e > r,x,v,t
h > a,e,v
g > r,y
y > p,t
i > v,r
K > h
v > e
B > r
t > h
N > e
p > h
H > e
l > t
z > e
X > a
n > v
x > z
T > i
```

Below is an indexed list of names, along with information on whether each name meets the rules or not.

1. Xanverax - does not meet the rules. Contains an illegal sequence `an`.
2. Khargyth - meets the rules.
3. Nexzeth - meets the rules.
4. Helther - does not meet the rules. Contains an illegal sequence `el`.
5. Braerex - meets the rules.
6. Tirgryph - meets the rules.
7. Kharverax - meets the rules.

After summing all indices of the names that meet the rules, you get:
2 + 3 + 5 + 6 + 7 = `23`

Find all the names that comply with the rules and calculate the sum of their indices.

Your notes for this part:

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Part 2 solved with answer: 1937

Check your progress

Part III

Veronica once again enthusiastically writes down the word "instant" and turns the page. This time, instead of a list of names, you see a list of name prefixes and a list of new rules (your notes). Your task is to find all possible unique names that begin with these prefixes and follow the rules.

Each name must have at least 7 and at most 11 letters.

Someone announces that the break is about to end, so Veronica suggests finishing the experiment later, but seeing the result of this puzzle in your mind, you smile and say that it's not necessary. Then you write down a quite big number on the task card and the word 'instant :)' next to your result.

Example based on the following notes:

```
Xaryt

X > a,o
a > r,t
r > y,e,a
h > a,e,v
t > h
v > e
y > p,t
```

For this example prefix and rules, there are 25 unique names that can be created:

```
Xarytha
Xarythe
Xarythv
Xarythar
Xarythat
Xarythve
Xarythary
Xarythare
Xarythara
Xarythath
Xarytharyp
Xarytharyt
Xarytharar
Xarytharat
Xarythatha
Xarythathe
Xarythathv
Xarytharyth
Xarytharary
Xarytharare
Xarytharara
Xarytharath
Xarythathar
Xarythathat
Xarythathve
```

```
Khara,Xaryt,Noxer,Kharax

r > v,e,a,g,y
a > e,v,x,r,g
e > r,x,v,t
h > a,e,v
g > r,y
y > p,t
i > v,r
K > h
v > e
B > r
t > h
N > e
p > h
H > e
l > t
z > e
X > a
n > v
x > z
T > i
```

For this slightly bigger example, there are `1154` unique names that can be created. Note that `Noxer` prefix is not compatible with the rule `N > e` so this prefix is skipped.

How many unique names can be created based on the given prefixes and rules?

Your notes for this part:

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Part 3 solved with answer: 2010907

Check your progress

Puzzle solved! Don't stop now!

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