

--- Day 7: Handy Haversacks ---

You land at the regional airport in time for your next flight. In fact, it looks like you'll even have time to grab some food: all flights are currently delayed due to **issues in luggage processing**.

Due to recent aviation regulations, many rules (your puzzle input) are being enforced about bags and their contents; bags must be color-coded and must contain specific quantities of other color-coded bags. Apparently, nobody responsible for these regulations considered how long they would take to enforce!

For example, consider the following rules:

light red bags contain 1 bright white bag, 2 muted yellow bags.  
dark orange bags contain 3 bright white bags, 4 muted yellow bags.  
bright white bags contain 1 shiny gold bag.  
muted yellow bags contain 2 shiny gold bags, 9 faded blue bags.  
shiny gold bags contain 1 dark olive bag, 2 vibrant plum bags.  
dark olive bags contain 3 faded blue bags, 4 dotted black bags.  
vibrant plum bags contain 5 faded blue bags, 6 dotted black bags.  
faded blue bags contain no other bags.  
dotted black bags contain no other bags.

These rules specify the required contents for 9 bag types. In this example, every **faded blue** bag is empty, every **vibrant plum** bag contains 11 bags (5 **faded blue** and 6 **dotted black**), and so on.

You have a **shiny gold** bag. If you wanted to carry it in at least one other bag, how many different bag colors would be valid for the outermost bag? (In other words: how many colors can, eventually, contain at least one **shiny gold** bag?)

In the above rules, the following options would be available to you:

- A **bright white** bag, which can hold your **shiny gold** bag directly.
- A **muted yellow** bag, which can hold your **shiny gold** bag directly, plus some other bags.
- A **dark orange** bag, which can hold **bright white** and **muted yellow** bags, either of which could then hold your **shiny gold** bag.
- A **light red** bag, which can hold **bright white** and **muted yellow** bags, either of which could then hold your **shiny gold** bag.

So, in this example, the number of bag colors that can eventually contain at least one **shiny gold** bag is **4**.

**How many bag colors can eventually contain at least one shiny gold bag?**  
(The list of rules is quite long; make sure you get all of it.)

Your puzzle answer was **208**.

--- Part Two ---

It's getting pretty expensive to fly these days - not because of ticket prices, but because of the ridiculous number of bags you need to buy!

Consider again your **shiny gold** bag and the rules from the above example:

- **faded blue** bags contain **0** other bags.
- **dotted black** bags contain **0** other bags.
- **vibrant plum** bags contain **11** other bags: 5 **faded blue** bags and 6 **dotted black** bags.
- **dark olive** bags contain **7** other bags: 3 **faded blue** bags and 4 **dotted black** bags.

So, a single **shiny gold** bag must contain 1 **dark olive** bag (and the 7 bags within it) plus 2 **vibrant plum** bags (and the 11 bags within **each** of those): **1 + 1\*7 + 2 + 2\*11 = 32** bags!

Of course, the actual rules have a small chance of going several levels deeper than this example; be sure to count all of the bags, even if the nesting becomes topologically impractical!

Here's another example:

shiny gold bags contain 2 dark red bags.  
dark red bags contain 2 dark orange bags.  
dark orange bags contain 2 dark yellow bags.  
dark yellow bags contain 2 dark green bags.  
dark green bags contain 2 dark blue bags.  
dark blue bags contain 2 dark violet bags.  
dark violet bags contain no other bags.

In this example, a single **shiny gold** bag must contain **126** other bags.

**How many individual bags are required inside your single shiny gold bag?**

Your puzzle answer was **1664**.

**Both parts of this puzzle are complete! They provide two gold stars: \*\***

At this point, you should **return to your Advent calendar** and try another puzzle.

If you still want to see it, you can **get your puzzle input**.

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