## Week 01

### Part 1 Morse De-Code

Welcome to your first day aboard the STS Space Ghost, where you'll be venturing into the vastness of space for the very first time. After settling into your cabin, your next stop is to meet with the Officer on Deck, who will provide you with your inaugural job assignment.

To your surprise, you find yourself entrusted with the important task of communications decoding in the Comms Bay, despite your limited experience in the field. Fortunately, a stroke of luck comes your way when you recall that a significant portion of space communication is conducted using Morse Code.

Although you've heard of Morse Code in passing, your understanding of it is a bit hazy. With a sense of urgency, you frantically search your desk drawer, and lo and behold! Serendipity leads you to a weathered booklet with yellowing pages titled "Deciphering Morse Code" a TopNet(\_ \_\_\_ .\_\_. \_. . \_) Retroflex Inc. Publication. Inside, you discover a comprehensive table containing Letter-to-Morse Code translations, along with a detailed guide on how your machine interprets the input code:

|  |  |
| --- | --- |
| * Letters in the words will be separated by spaces * Words will be separated by new lines (\n) * Dots (dits) will be represented with decimal characters (.) * Dashes (dahs) will be represented with underscore characters (\_) * Dots and dashes for each letter or character will not have spaces between them | |
| (morse code table) | This table shows the corresponding code for each letter or symbol with spaces between each dot or dash for ease of viewing. Remember, as per the rules of input, the actual input will not contain spaces between the dots and dashes for a single character.  ⭐︎ Additional symbols and numerical digits are not required for this challenge but can be included in your solution if you would like. |

### Part 2 Something Alien

Just as you translate the question received, another source sends a reply. This must be the answer to the question previously asked, but the contents of the new message cause your script to error. This is not Morse Code; it looks like something alien.

Rather than panic and run to your supervisor, you set your mind toward solving this problem on your own. You re-read your Morse Code booklet to no avail and open your desk drawer to see if there might be anything else in there that could be of use… Nothing.

Sighing heavily and putting your head in your hands, you catch a glimpse of a poster on the wall beside your monitor, which you hadn't noticed before. It's titled, "O.B.M.T. for Alien Communication", and it reads:

1. Convert each character to its Ordinal (Unicode code points)
2. Concatenate those numbers to one large integer, then convert that number to Binary
3. Convert the Binary number into Morse Code (considering the 0s dits and the 1s dahs)
4. Convert the Morse Code to Text

Underneath the fourth step there's a footnote:

* Alien communication is always only one word. Each received alien transmission begins with three Exclamation Marks at the start and end of the message, with an additional exclamation mark between each letter.

## Week 02

### Part 1 What a Mess!

You awake, ready to start a new day. Your holographic tablet dings, displaying a message:

"Rise and shine, Cadet! Due to your exemplary performance in the Comms Bay, we are assigning you to the Electrical Control Room. Report there at 0800 hours."

When you arrive, the room is in chaos. The crew are grabbing at piles of loose paper, which completely cover the floor. The pages seem to be from an instruction manual of sorts. Someone sees you standing there and tells you to grab some paper and sort them, leaving before you can ask any questions. You grab a pile.

The sheets of printed paper do not have page numbers, but they all have a header printed at the top:

Section Title, Chapter Number, Subchapter Letter, Section Number

You decide to sort the pages like any book — first by chapter, then by subchapter, then by section. Each category sorted in ascending order.

When everyone is done sorting their piles, you assume you will have to work together to combine all your piles into one, so you decide to create a mnemonic out of the section titles to help you contribute to this collaboration.

### Part 2 BrailLED

Now that that's all sorted, no pun intended, it's time to get to work. The stress of this new assignment, caused by the chaos of the paper storm, has left you feeling overwhelmed. It seems like the Electric Control Room might not be the place for you. You should put in a Change of Assignment request with the Operations Manager, but you've left your holographic tablet in your bunk. That's okay, because aboard the ship, all devices have the capability of communicating with the Operations Manager, provided there's a screen to display the reply. Luckily for you, you're stood in front of the "Binary Represented All-Inclusive Lettering LED" System, or "BrailLED" for short.

The BrailLED is a long strip of LED lights, totaling six rows and fifty-two columns of individual lights.<image>

Transmissions are sent to the LED lights as a packet of tuples. The first item of the tuple is a binary string and the second is a column header. The columns are assigned, from left to right, the sorted uppercase letters, A-Z, followed by the sorted lowercase letters, a-z. The binary string fills its respective column from top to bottom, assigning the individual lights in that column ON for 1 or OFF for 0. The resulting LED display is a two-row, 26-column strip of 3x2 light groupings, each grouping representing one letter in braille. <image>  
Someone must have bumped the BrailLED amidst all the confusion this morning, because the inputs are not coming in sorted. You will have to sort the inputs first before letting the LED display show you your message in braille.

## Week 03

### Part 1 Stop, Dock, and Roll

Today, you head to the Cargo Hold for your next assignment. The room is brightly lit in a white light, and you see thick tubes and chutes crisscrossing the walls and the high ceiling. Immediately in front of you, centered in the room, you see a row of 40 giant capsule-filled tubes with an opening for each at the very top and at the front of the bottom, like upside-down PEZ dispensers. Beside this dispensing system, bolted to the floor, is a large robotic arm. It is nearly as tall as the ceiling and features spherical grips at the end of its long arm.

You're greeted by the supervisor of the Cargo Hold, who has a kind voice and an even kinder smile. She explains what you need to do:

The spherical capsules inside these tubes are all different kinds of cargo. They are heavy metallic balls studded with rivets and embellishments. To tell them apart, most of the capsules are painted with a large, bright red character (either alphabetical or a punctuation symbol). The ones that lack any marking are all the same item, so it might be helpful to think of them as a space character rather than as nothing.

What's inside them? She has no idea. She just gets a request from somewhere and runs the machine to fulfill it. Requests come on a piece of paper with two sections. The first line of the request is a number from 0 to 39, which indicates which dispenser to set the machine to start at. The next line on the paper is a long series of commands for the robotic arm, separated by commas. Each command either begins with an R, L, T, or D, followed by a number.

When the machine gets an R or an L command, the robotic arm moves its position either **Right** or **Left** by the number of places indicated. For example, "R3" would move the robotic arm 3 places to the right.

When the machine gets a T command, it **Takes** a capsule from the dispenser at its current position. The robotic arm pulls a single capsule from the dispenser, letting the remaining capsules descend to fill the empty space. The grabbed capsule is then vacuumed into the robotic arm's C-shaped tube, where capsules are stored, always inserting itself into the front of the tube. For example, if the command is "T3", the arm will take "A" from the current dispenser, then "B" and "C". Those capsules are stored in the tube in the order [C, B, A].

When the machine gets a "D" command, it **Drops** the specified number of capsules into the top of the dispenser it's currently facing. Because of the C-shaped tube, capsules are dispensed from the opposite end of the tube, one at a time. For example, if the command is "D2" and the robotic arm's tube contains [C, B, A] from before, it will drop "A" into the dispenser and then "B", leaving "C" still inside the robotic arm's tube.

One last thing: the scanner is broken, so you need to manually control the machine while following the instructions. Otherwise, she says, she could easily do this by herself, but now that you're here, it will be a great help. Thank you very much. Once the order is complete, you press the "release" button and one capsule from each dispenser rolls out from the bottom, in order, onto the delivery cart to be shipped to the appropriate department of the ship.

### Part 2 Blunder Belt

Stop, stop, stop, stop! You see the supervisor running at full speed out of her office, frantically waving her arms. When she reaches you at the robotic arm, she pauses to catch her breath and says:

She's forgotten to tell you the most important step! Each time the robot arm receives a **T**ake command, after taking the correct number of capsules from the dispenser, you must push the "shift" button. This button activates a conveyor belt under all the dispensers, shifting their contents one space to the left. The contents of dispenser 12 move to dispenser 11, the contents of dispenser 1 move to dispenser 0, and so on. The contents that were in dispenser 0 are displaced all the way to the end, ending up in dispenser 39. The shift happens internally, and the robotic arm's position is not affected by this change. If the arm's position is 19, it remains 19 despite the contents of dispenser 19 changing. The conveyor belt shift occurs only after Take commands; commands for Right, Left, or Drop do not trigger the shift.

She then pushes a big red reset button, which empties the dispensers and fills them back up again with their predetermined order. "Now you can start again", she says, and hands you a new command sheet.

## Week 04

### Part 1 The Center of Flavor

It's a new day on the STS Space Ghost, and today you're headed to the galley. That's perfect—you could use a snack…

You meet the ship's head chef, who is deep in thought about the menu. Just as you're about to mention that you could really go for a cheeseburger, he begins speaking to you, explaining what's on his mind.

It turns out, the only food that the crew eats aboard the ship is Galactic Algae Blooms; a thought which slightly turns your stomach, but you hide your disgust well. There are five species of Galactic Algae Blooms: Sweet, Bitter, Umami, Salty, and Sour. The depth of flavor of each of these species varies from bloom to bloom, each having its own scores for both flavor complexity, persistence of taste, and intensity. A skilled chef can take these individual flavor profiles and create dishes that resemble many non-algae-based dishes the crew are familiar with from home. The process is as follows:

1. Gather algae from each of the required species:

* You have to select three individual algae blooms (your puzzle input) and obtain each of their flavor profiles.
* Complexity of flavor is labeled X, so the three algae blooms you would use of a certain species have x1, x2, and x3.
* Persistence of taste is labeled Y; y1, y2, and y3.
* Intensity of flavor is cleverly labeled m for "Mmm". Each algae bloom has its own individual intensity; m1, m2, and m3.

1. Seek out the Center of Flavor for each species:

* To determine the Center of Flavor of a species with three individual algae blooms, you use the common Center of Mass (cm) equations.
* <equations here>
* Finding the Center of Flavor at X and at Y will provide you with the Center of Flavor coordinates on the complexity-persistence graph. You will have a set of coordinates for each species used in the recipe.

1. Lookup the values in the ASCII Recipe Cards:

* Translating the numerical value of each coordinate to its ASCII value will provide you with two letters per species of Galactic Algae Blooms. One letter for X and one letter for Y.

1. Complete the recipe.

* Concatenating the lettters for all the X coordinates in order, a space, and all the letters for the Y coordinates in order, will spell out the recipe item.

### Part 2 Gone Fishin'

Now that you have a recipe in mind, it's time to gather the Galactic Algae Blooms from deep space. You do this using a deep space net. The chef shows you the control panel for the net, a big screen displaying glowing blobs in a gradient of color. These blobs, you are told, represent clusters of Galactic Algae Blooms. Pressing the toggle button will alternate between displaying the algae cluster blobs and a grid of numbers, your puzzle input, representing how many algae are at each point.

The cost of casting this deep space net is very high, so you are informed you can only cast once per day. Fortunately, the algae blooms migrate around each cluster's center of mass, so casting the net directly into that location will collect every algae bloom from that cluster. Since the STS Space Ghost has a large crew, you should aim to collect as many algae blooms as possible.

In your previous equations for the Center of Mass, you had only 3 points to consider, but these clusters of algae blooms are much more numerous. Unfortunately, the previous equation will not work, but you notice that you can perform the summations in the numerator and the denominator of the equations with any number of points. <equations here>

Type the x and y coordinates, separated by a comma, into the machine to cast the net to the cluster with the greatest total mass.

## Week 05

### Part 1 Pixel Perfect Panic

You performed so well in the galley that the crew in the generator room has requested your help today. Their Power Harvester machine, which gathers energy from nearby stars to fuel the ship, is functioning fine. However, they are having trouble reading the outputs that indicate how many gigajoules (GJ) of energy have been collected.

Here's how the Power Harvester works: After sending a photon collection beam toward a star, the energy is gathered and stored in one of the power tanks in the generator room. Although the Power Harvester is somewhat outdated, it has been reliable over the years with minimal updates. Instead of a digital display, this antique machine extrudes a long, thin wire of singular pixels. This wire is then fed into the more modern P.I.L. System (Patterned Image Layout), which reconstructs it into a square image. The resulting image displays the number of GJ harvested.

Despite its age, the Power Harvester is known for its good old-fashioned reliability and continues to run smoothly. However, the P.I.L. System is failing and can no longer convert the wire into a viewable square image. You need to reprogram it to restore this function.

* You can be certain that the length of wire extruded from the Power Harvester machine is a perfect square, which means that it can be arranged into an image with equal width and height.
* To create the image, start at point (0,0) and lay wire to the right until you reach the end of the row, indicated by the width of the desired square image. Then, move down a row and lay the wire to the left, zigzagging from top to bottom and left to right until the entire wire is used.

### Part 2 Diamond in the Data Rough

In addition to harvesting gigajoules of power from the stars, the Power Harvester also collects diamond gas as a side effect. When compressed, this gas forms actual diamonds, which can be sold—likely another reason why this antique machine remains so popular. The diamond gas is filtered into separate containers, and the resulting diamonds help finance the missions of the STS Space Ghost.

Fortunately, the Power Harvester also tracks of the amount of diamond gas collected in liters, which is indicated within the extruded wire. Once again, the task of generating an image to display the total liters of diamond gas falls to the P.I.L System, which is still buggy. You'll need to reprogram it to convert the wire into a new formation to read the amount of diamond gas.

* To create this new image formation, use the same wire. Instead of zigzagging from left to right and top to bottom, zigzag diagonally from the upper left corner (point (0,0)) to the bottom right corner. Start at point (0,0) and lay the wire 1 pixel right, then move diagonally down-left. After completing one diagonal line down-left, lay the wire 1 pixel down and move diagonally up-right. This process continues until the entire wire is used.

### ~~Part 1 Qualification Exam~~

~~You performed so well in the galley that the crew in the generator room requested your help today. They, too, are dealing with expensive instruments where precision and efficiency are paramount. Before you can get your hands on these new machines, they would like to give you a comprehension exam.~~

~~There is only one question on the exam, and it is a text map of spaces and "#" characters that resemble a cave of tunnels and chambers. The instructions are as follows:~~

~~If you have a water pump at the top-left entrance of the cave (position (0,0)), and you immediately begin to fill the cave with water, how many square meters of the cave will be flooded? On the map, each character or space represents a square meter. The "#" characters represent cave walls where water cannot pass through. For the purposes of this exercise, water can flow either up, down, left, or right, but not diagonally.~~

### ~~Part 2 To the Stars~~

~~Having successfully passed the comprehension exam, you are admitted into the Laser Room. You see a gigantic machine pointed out into space, with a rather simple control panel featuring a monitor, two large buttons, and dials for adjusting coordinates. The label on the machine reads "P.I.L.", which stands for "Pulsar Intercepting Laser".~~

~~On the monitor, you see a map of pulsars that are within the laser's range. <img>~~

~~You are briefed by the lead technician:~~

~~-The PIL emits a frequency of light in the direction of your provided coordinates, which hits the pulsar and causes it to flood out in four directions (North, South, East, and West) until it reaches an edge.~~

~~-This reaction, if it covers the entire surface of the pulsar, will radiate 200 gigajoules (GJ) of energy, which is received by the PIL's sensors.~~

~~-Unfortunately, a single pulse of the PIL costs 100 GJ to run, so the net energy gained from completely filling a pulsar is 100 GJ.~~

~~-If a pulsar is completely filled more than once, the PIL's sensors can intercept 1100 GJ from it instead of 200 GJ. It does not matter if the pulsar is filled more than twice; it will only emit either 200 GJ for one fill or 1100 GJ for more than one.~~

~~-You should think of the pulsar map as a 2D grid of pixels. Each of your coordinates targets a pixel on the map. The reaction is interrupted by~~ **~~any~~** ~~edge, including both the outlines of other pulsars and the boundaries of the map.~~

~~Considering a smaller map and the four coordinates (66, 147) (120, 123) (329, 181) (368, 339), you try out this system: <img> There are two full pulsars colored (circled in red). The other yellow filled area does not count because the pulsar is not fully flooded.~~

~~Two full pulsars flooded only once provides 400 GJ of energy. However, using four coordinates cost 400 GJ of energy, making the net gain 0 GJ. This process does not seem as efficient as it could be. You open the metal cover on the side of the laser labeled "CALIBRATIONS", and inside you see a small mirror angled out of the laser's range. Moving that mirror into the laser's path will double the output of the laser by mirroring the x and y coordinates!~~

## Week 06

### Part 1 Here Comes a Sun

Today's assignment is in the Thermal Defense Room. This room serves as the ship's primary defense against the unforgiving natural perils of space—extreme heat and harmful radiation.

In space, the ship is constantly bombarded with waves of different frequencies and wavelengths. Some of these waves, called Solar Waves, are damaging to the structure of the ship, while others, called Comic Waves, are harmless.

The ship has a Thermal Defense system in place, but it works best when it is specifically targeted at harmful Solar Waves.

A CSV database is already on file, recording data about the individual frequencies and wavelengths of previously intercepted waves. However, some incoming waves have a combination of frequency and wavelength that has not yet been classified. Your job is to determine if these waves are harmful Solar Waves or harmless Cosmic Waves. To do so, you should find the 7 nearest known waves from the database.

The distance between waves is determined by graphing the coordinates, with frequency representing the x-axis and wavelength representing the y-axis. The Euclidean Distance Formula <formula> is then used to gague how near or far one point is from another. The majority type among the 7 closest neighbors of a new wave will determine whether that new wave is a Solar Wave or a Cosmic Wave.

Your puzzle input consists of a single line of new waves, with each wave represented by its frequency and wavelength separated by a comma, and individual waves separated by spaces. Following this line are several lines in a CSV format, providing a database of known waves. In this CSV structure, the first column is "frequency", the second column is "wavelength", and the third column is "type". Determine whether each new wave is a Solar Wave (S) or a Cosmic Wave (C), and concatenate these results without spaces into an uppercase five-character output.

### Part 2 Missing Mystery Part

You have successfully isolated some harmful Solar Waves and are ready to direct the Thermal Defense System (TDS) at them, but the diagnostic panel indicates a critical malfunction. This malfunction has caused the system to be unable to repair itself or provide you with difinitive information about the broken part.

The entire TDS comprises multiple types of bespoke parts, each designed for different levels of radiation protection and thermal management. Because many different parts share similar qualities, it is difficult to determine the exact replacement needed.

In the parts storage, you find a replacement part that matches some of the specifications of the broken shield. However, the specifications alone—mass, density, thickness, area, and radiation output—are insufficient to confirm the exact type of shield. This is because various shield types might have similar physical characteristics but different performance metrics and configurations.

To determine what this unknown part is, you must compare it with all the parts in the database in terms of how far off it is from each part on record. We can gauge this similarity using Euclidean distance. However, since there are more than two dimensions to each part, we need to use a more robust equation. <equation> Similar to how we sorted the waves, we need to look at the 7 TDS parts nearest to the mystery part to determine its function based on the majority of its nearest neighbors.

## Week 07

### Part 1 Pharma-geddon

After a few days of high-tension work in other areas of the ship, you put in a request for a more laid-back task. Helping to organize the inventory in the Sick Bay sounds like a great, mindless task that you can relax by doing.

As seems to be your usual misfortune, you arrive to yet another tableau of stress and confusion. The medical officer has just put in an order for some medical supplies, but someone has lost the reference sheet for the inventory. Without the four-symbol code for each item, you cannot retrieve it from the auto-vending storage.

The only files that are found are an inventory, listing the name and quantity of each supply, and a raw data file, your input puzzle, that stores the entire collections of medical supplies. As these items were entered into the ship's inventory in no particular order, their four-symbol codes were concatenated onto the raw data file with no separator.

You are asked if you know of any Counter that can process this raw data file and tell you the number of appearances of all the four-symbol codes. Then you can cross-check it with the plain text inventory.

// The medical officer has requested bandages, healing serum, and antacids. Based on the plain text inventory, you know that there are the following in stock:

* 1081 packages of standard adhesive bandages
* 1055 bottles of "InstaHeal" combination disinfectant and wound closure serum
* 965 blister packs of "Yucky Tummy No More" chewable

Using the raw data file, find each four-symbol code that appears the number of times corresponding to each item's quantity. Print these codes next to each other without any spaces to retrieve them from the storage.

### Part 2 Have a Proper Gander

With that crisis averted, the rest of your day goes by pretty smoothly as you help your crewmates reorganize the inventory. Suddenly, out of the corner of your eye, you spot a small colorful piece of paper.

Picking it up, you immediately recognize it as Dokarian propoganda that someone aboard the ship must have sneaked in. Could there be a traitor amongst us?

Call it a hunch, but you notice something very funny about the background colors of the paper. Luckily, there is a Propoganda Inspecting LumiCam (PIL) app built into your holographic tablet, designed to scan images for color. To uncover the hidden message, you need to program it to act as a Counter for each pixel color you scan.

You decide on a quick course of action.

1. Scan the Image

Use your PIL app to scan the background colors (your puzzle input)

1. Count the Colors

The app should count each color pixel and provide you with a list of RGB tuples for the top three most frequent colors

1. Convert Hex Values

Convert the RGB tuples to hex color values and then change all of the digits to their closest uppercase letter using the following mapping:

0=O, 1=I, 2=Z, 3=E, 4=A, 5=S, 6=G, 7=T, 8=B, and 9=P

The resulting six letter words from the top three hex color values will reveal the secret message hidden inside the propoganda paper.

## Week 08

### Part 1 Full of Beans

"ACCESS OFFICE COFFEE". What could that mean? The only place aboard the ship to get a cup of coffee is the coffee machine in the Crew Quarters' common room. No one's around so you put the propoganda paper down on the table and start to make a cup for yourself.

Suddenly, you hear a small high-pitched voice behind you. Turning around, you see what looks like a tiny Zorak, about 20cm tall. You whip around, keeping an eye out for some sort of weapon while trying not to break eye contact with the creature. Sensing your distress, he quickly tells you that he has come in peace, explaining further that he is a defector from the Dokarian army, led by Zorak. He left the propoganda on the ship in hopes someone would find it and get in touch because he has important information to share.

Zorak has taken over the Dokarian race and now rules oppressively over the entire planet. His army seeks to conquer the galaxy but provides no support to the beings under his rule. This Dokarian defector wants your help to overthrow this dictator and restore peace to the planet Dokar. You are skeptical, but something about his eyes tells you that you can trust him. The tiny defector says he needs to prepare some documents for you—a map to travel directly to Zorak, avoiding his entire fleet, and the blueprints of a shield that protects him. He promises to be in touch soon and asks you to wait for him.

In the meantime, you look around at the state of the common area. A new shipment of coffee beans had arrived just in time, as there was nothing left from the old shipment besides the handful of beans inside the machine. All the bags of coffee beans are wrapped up in knapsaks waiting to be shelved. To kill time, you decide to take some initiative and stock the coffee.

There are 100 bags of coffee beans in varying sizes from all over Earth, and they will not all fit on the shelf. You scan the inventory list with your holographic tablet and see a comma-separated document of the shipment, which shows the country, bean type, roast, width of the bag, and popularity rating—your puzzle input. You should:

1. Create a Class for Coffee Bags:

Define a class to represent each coffee bag with properties for country, bean type, roast, width, and popularity rating.

1. Create a Class for the Shelf:

Define a class for the shelf that can store a certain number of bags and has a limited width.

1. Stock the Shelf Efficiently:

Implement a method to store the coffee bags on the shelf with the best possible popularity rating while minimizing wasted space.

By organizing the coffee bags this way, you can ensure that the shelf is stocked with the best selection for the crew.

### Part 2 Bean Around the World

After finishing stocking one shelf, you look around for the Dokarian defector. Come to think of it, he didn't specify how soon he would be back, if at all today. You still have some time to kill before calling it a night, so you decide to stock the rest of the shelves.

This ship seems to have been designed with a limited budget for aesthetics, as the three available shelves are all different lengths. However, the mission remains the same: stock each of the shelves with the best possible bags of coffee based on their rating. Once the three shelves are stocked, you can return to your bunk to sleep.

Use the previously created classes for Coffee Bags and Shelves. The first shelf indicated is the shelf you have just completed, leaving two more to stock.

## Week 09

### Part 1 Get Us Outta Here

You wake up to find the Dokarian defector standing far too close to your face, staring at you intently. Startled, you nearly leap to the opposite end of your bunk. Clearly, these beings are not familiar with the concepts of privacy or personal space. He proudly announces that he's finished with his map to Zorak and hands you a piece of paper, your puzzle input. However, instead of containing any legible coordinates or paths, it has a list of nodes and their connections.

He explains that the path to Zorak's hideout must first cross a Nebula Labyrinth, riddled with electromagnetic storms. The node system reveals the paths that avoid the storms, guiding the ship safely outside the Nebula Labyrinth.

You realize you need to take this information to Captain Xarlos on the Bridge, but first, you must make sense of this strange system. Your task is to scour the depths of the Nebula Labyrinth and find the safest path through the storms.

* The first line of the paper contains the starting node and ending node, separated by commas. This represents the ship's current location and the exit of the Nebula Labyrinth.
* The subsequent lines list all the nodes and their connections, separated by colons. If a node has multiple connections, those connections are separated by commas.

### Part 2 Wormholey Moley!

At the Bridge, Captain Xarlos is delighted to have a map to Zorak. He expertly navigates the ship through the electromagnetic storms, following your path. Once clear of the Nebula Labyrinth, you find yourselves in a clearing of open space. There's no sign of Zorak in sight, so there must be more to the route ahead, but what?

Just then, you see Captain Xarlos' face turn white, his hand ready on his space blaster, staring just above your left shoulder. You instantly know it must be the tiny defector, but you turn to look anyway while trying to reassure the captain that everything is fine. Captain Xarlos is skeptical but ultimately trusts you and relaxes a bit as you explain the creature.

It turns out, the small Dokarian has forgotten to give you the other half of the directions to Zorak. He provides you with another sheet of nodes, in the same format as before. This time, there are no storms blocking your path, but instead, a vast open space guarded by Zorak's stealth army. The nodes represent paths on the map that are outside of the line of sight of those enemy ships.

You will need to travel through wormholes to reach Zorak. The issue is that each wormhole can connect to a great many other nodes, and choosing the wrong node could add hours or even days to your journey. Following every path from a wormhole will not be the most efficient route. It's clear that scouring the depths of space won't work. Instead, consider examining the breath of space for a more effective strategy.

## Week 10

### Part 1 All Hands on Deck

You've navigated through the wormhole and arrived just outside of Zorak's secret hideout, successfully avoiding detection by enemy ships. Suddenly, the tiny defector materializes again, seemingly out of nowhere, holding a large rolled sheet of paper. He explains that these are the blueprints for Zorak's Battle Dome, the protective shield guarding him against laser strikes.

You unroll the blueprints, but before you can examine them, Captain Xarlos interrupts, calling all hands to the Main Deck. The ship's high-powered laser needs to be manned for upcoming attack, and your assistance is required with logistics. The hallways leading to the Main Deck have different capacities, allowing varying numbers of crew members to pass through simultaneously.

Starting from the source, Storage Room 1 (S1), the crew must choose their paths through the hallways, passing other storage rooms or junctions, to reach the sink, the Main Deck (MD). Captain Xarlos emphasizes the need for fast, efficient movement and requests a calculation of the maximum flow—the greatest number of crew members that can move through the hallways at one time.

You quickly annotate the floor plan on your holographic tablet, listing each hallway by its connecting rooms, separated by a hyphen, followed by a space and the hallway's capacity—this serves as your puzzle input.

It's crucial that no crew members linger in any room or hallway, as this would restrict the flow. The entire crew that starts from the source (S1) must travel to the sink (MD) and arrive together. Captain Xarlos awaits your calculation of the maximum number of crew members that can flow through the hallways simultaneously so he can efficiently instruct his sizable crew.

### Part 2 Breach the Battle Dome™

The crew is in place and ready to commence. In the distance, you can see Zorak, protected inside his Battle Dome.

According to the blueprint, this dome is a lattice of interconnecting points, each with specific pathways for energy flow. There is only one viable point of attack—Point 0. Any laster blast targeting elsewhere on the shield will be deflected. However, when struck at Point 0, the dome is designed to dissipate the energy across all its connective edges. Each interconnecting point has a direction and a capacity for the amount of energy it can transmit.

To successfully penetrate the Battle Dome, you must deliver a precise blast of energy from the laser. Sending too little energy will dissipate across the edges and weaken the blast, while sending too much will cause a short-circuit if the capacity of any edge is exceeded with no alternative paths available to handle the overflow. Your task is to calculate the maximum flow from the source (Point 0) to the 5 sinks (Points 76-80).

HINT: Because there are multiple sinks, consider each of the five sinks (Points 76-80) as having an imaginary edge with infinite capacity, all directed toward an imaginary new sink that aggregates the maximum flow from all areas of the dome.

The tiny defector has also provided you with a list of capacities for each edge, formatted similarly to your previous floor plan annotations. Connecting points are separated by hyphens, followed by a space and the capacity for that edge. A listed capacity of "Inf" indicates infinite capacity, meaning there is no limitation on the energy that can flow between those two points.