I Wanna Lockpick ~ *PATH OF LOGIC* (Part 2)

By TheTastyPi

This is a compilation of my (scuffed) logical analysis of all (new) puzzles in I Wanna Lockpick (Full version).

THIS WILL CONTAIN SPOILERS! YOU HAVE BEEN WARNED!

Part 1 can be found here: I Wanna Lockpick ~ PATH OF LOGIC (Part 1)

Let's go!

Puzzles Changed/Added from Part 1

There are some puzzles that were redesigned from part 1, or even added to old worlds. I've decided to do a (re)analysis of them!

- 2-10: The Bridge
  - A change was made to the bottom left. The purple door there now costs 3 instead of 2, and the cyan key behind it is now 2 instead of 1.
  - This change essentially eliminates the bottom left cyan as an option for the final gate, as it's now impossible to open the 3-purple door.
    - This is because there is only a single net+ purple exchange (mid-left path), and it only yields 2; not enough for 3.
  - The previous doc had to painstakingly show that the bottom right cyan key is a must, but with this new design, we can easily tell, because there are now only two possible sources of cyans, adding up to the 2 needed!
  - However, this introduces a new problem that wasn't addressed in the previous doc. How do we zero out purple now?
  - We can't use the 3 (previously 2) purple door now. So we need to use something else.
  - After getting the 2 cyan, we'll have 2 purples left, and the only two doors available are the top right and bottom right, simple as that!
  - And for orange, as long as you don't take the bottom right 4-stack, the numbers will just work out no matter what you do
  - Just make sure to open the bottom right purple door before breaking the bridge.
  - Solved!
- 3-4: Cargo Lift
  - New puzzle? In MY The Infrastructure?
  - To finish the puzzle, you must have 0 cyan.
    - The double blank door prevents you from mastering past.
  - And notably, most keys/doors here have values divisible by 3!
  - And there seems to be a pesky blast door in the way.

    - Let's first try opening the blast door normally:
        - After opening the door, you'll be left with 0 keys, or rather 0 mod 3.
        - The two door combo leading up to the exist guarantees that your key count will be either at 1 or 2 mod 6 (allowing use of master keys)
        - All other doors at your disposal are 0 mod 3, so you cannot use them to zero out cyan.
        - Therefore, this path is impossible, and we MUST master the blast door.
    - So let's master the blast door instead.
    - Now we keep the initial 2 mod 3 key count, allowing us to reach 0 by opening both doors blocking the exit normally.
    - This also makes the first few moves rather forced. You must collect the 12-stack and open up the big room, mastering the blast.
    - After that, you're left with 8 keys, but wait, there's more!
    - After opening the 5 locks blocking the end, you're left with 3 keys, but all doors and keys and a multiple of 6, save for the one on the top right.
    - So yeah, you have to get that.
    - This totals out to 1+4+12+3=20 keys exactly needed. The door blocked by the blank door on the top is inaccessible now because we aren't using the blast.
    - This mandates the net 12 trade on the left, getting up to 20 keys. The net 6 trade on the right would just ruin things.
    - Solved!
- 4-5: Little Hallways
    - Completely new puzzle! Like 3-4.
    - Another one of these pick-a-path puzzles, like 1-B and 2-A.
    - Your total keys are 12, and you need to open 12 locks: All keys need to be spent.
    - The two choices in the middle with the red lock are the exact same. Since you need to spend your red key at some point, one of them will do that, while the other will use the other path.
    - This means you're forced to spend one of each color at the center two choices.
    - You're left with 2 cyans. 1 of them forced to be spent on the top left, leaving you with 1.
    - Therefore, the double cyan lock on the bottom right is impossible, forcing you to go through the ice, resolving the middle two choices.
    - You're also forced to take the top option in the top-right choice in order to spend your cyan.
    - This leaves you with 1 white, forcing the top path in the beginning.
    - The rest is trivial and left as an exercise to the reader.
    - Solved!
- 4-6: Good Reception
    - The unnecessary clutter at the bottom has been removed.
    - But other than that, the puzzle has not changed, so I'll just refer you to PoL Part 1.
    - Solved!
- 5-3: Perfect Accounting

- This is a new level added on 7/29/2024, replacing This Looks Familiar.
- We need 30 white keys, which is all of them, so we must clear all paths.
- Firstly, let's determine what needs to be opened by brown, and what needs to be opened normally.
- The 30 cyan door must be opened normally, as there are not enough brown keys to reach 30.
- This also means that the cyan blast must be opened with brown, using at least 1 brown.
- Next, the 15 orange door must be browned, because there aren't enough orange keys to open it normally. This brings us to 1+15=16 required browns, out of 1+5+8+9=23 total browns.
- Also, the white blast must be browned, as we can't waste any white keys. That's plus 1 required browns, making it 17/23 required browns.
- There are not enough purple keys to open both the 4 and 5 door. As such, at least one of them must be browned, using up at least 4 browns. This brings us to 21/23 required browns.
- Since we only have 2 free browns remaining. We cannot brown any door with a value of 3 or more. As such, all of the 3 pink doors must be opened normally, making the pink blast (which is blocking a 3 pink door) a must-brown. Bringing us to 22/23 browns.
- The 7 orange door is now also a no-brown, so we're left with 1 orange, and two orange doors that cost at least 1 orange. Therefore, one of those two doors must be browned, bringing us to 23/23 browns used. That's all of them!
- So we now know that we must brown the 4 purple door, for minimal brown usage.
- Also, we now know that all browned blast doors must be opened with 1 brown.
- There's only a maximum of 3 opportunities for that, because the number of times we can reach 1 brown is limited by the amount of brown pickups, but, knowing the doors we can't brown, we cannot reach 1 from 8 or 9 directly. As such, the best we can do is 3.
- We must make use of all 3 opportunities, because we need to brown 3 blast doors.
- Therefore, the remaining undecided blast door (orange) must be opened normally, and the orange 1 door must be browned.
- Now, knowing that the orange blast door and the orange 7 door must be opened normally, as well as us having 8 orange keys, we need to open the pink blast (to gain access to the orange 7) before the orange blast.
- And, knowing that the purple blast door and the purple 5 door must be opened normally, as well as us having 6 orange keys, we need to open the orange blast (to gain access to the purple 5) before the purple blast.
- Therefore, by considering the requirements to reach 1 brown and open a blast door, we can determine that the first move must be to open the pink blast door using a single brown, because it's the only available blast door to open that would later give access to a browned door, giving another instance of 1 brown.

    - Now, since 8 and 9 cannot reach 1 directly, to have the 3 required instances of 1 brown, they must be summed to reach 17. It is then apparent that the only way to reach 1 from there is by subtracting 15 and 1.
    - That leaves the 5, which can reach 1 by subtracting 4.
    - After opening the pink blast and making some already deduced moves, the orange 1 is inaccessible, so the next instance of 1 brown must come from 5-4.
    - And the blast door opened must be while, as to gain access to the orange 1.
    - The rest is simple, and the puzzle is…
    - Solved!
- 7-3: I Think I Get It
    - Nice redesigned puzzle.
    - Suddenly, math.
    - cyan = 97.
    - cyan = 2 + red * {2,3,4,5}
    - 2 + red * {2,3,4,5} = 97
    - red * {2,3,4,5} = 95
    - Out of {2,3,4,5}, 95 is only divisible by 5
    - red * 5 = 95
    - red = 19 (well, negative)
    - 19 in binary is 10011 => 1+2+16
    - Solved!
- 7-7: Supernova
    - A cyan blast door was added on the bottom.
    - This does not change the logic, since the original puzzle didn't have cheese in the first place. Though it does make the logic easier, due to the added restriction.
    - So I'll just consider this..
    - Solved!
- 9-3: Summation Station
    - Some of the numbers were increased a bit to make the logic a bit more apparent.
    - The logic itself is unchanged however, so:
    - Solved!
- 10-5: Preservation
    - The red herrings have been removed, and a couple redundant constraints have been added.
    - This is to make this more of a tutorial. :)
    - The puzzle itself has not changed.
    - Solved!
- 11-B: Road to Zero
    - Yoooo. New Puzzle?!?!?
    - Our ultimate goal is to reach 0 cyan keys.
    - Our only way to change our cyan key is via this complex blast door.
    - We're given a lot of master keys, as well as a lot of ways to rotate both our master keys and purple keys, so we can basically subtract by any complex multiple of purple, rotated such that both parts are positive (6+5i).

    - So we need to find x where 58-33i = x(6+5i).
    - So we just need to find the value of (58-33i)/(6+5i).
    - (58-33i)/(6+5i)
    - = ((58-33i)*(6-5i))/((6+5i)*(6-5i))
    - = (183-488i)/61
    - = 3-8i
    - So, we need just to get the combo door to a copy count of 3-8i, then open them all!
    - Solved!
- Part 2 Tutorial: Let's Lockpick! (Normal Finish)
    - This is the brand new tutorial for the salvage mechanic!
    - Goal: reach the end with 0 pinks.
    - We can't take the bottom path, because the input point prevents us from opening any doors.
    - So we need to depaint the blue blank, which means getting the 3 blues on the top right.
        - The blank door itself *could* be mastered.
    - Getting the 3 blue
        - The max amount of pink you can have at once is 7 (because of the blast door)
        - So the only way to open the C/P 6-door+the pink 2-door in front is by using a master, whether on the 2-door, of the bicolored door itself.
    - The rest of the puzzle is a bit hard to reason with while still having a master key, so let's start looking at pinks
        - There are a few ways to zero the 6 pink:
            - Normal locks:
                - The 2-lock and 4-lock are the only way to do it.
                - This means mastering the pink 1-door and the bicolor door.
                - We can't get the blue 3-door this way, so we'll need to master that as well
                - That's 3 masters, impossible!
            - Blast door:
                - We still can't get the blue 3-door this way, so we'll need to master the blue blank.
                - This means opening the rest of the locks normally, including the white blank, which needs you to collect the single white key to cancel out the -1.
                - That means opening the cyan -6 => opening the bicolor door => mastering the pink 2-door
                - There are no other issues with the route.
                - It's Solved! But let's investigate another route for completeness.
            - Zeroing the 7

            - The only way to zero the 7 is to use all available doors (1+2+4=7)
            - But we had to open the 2-door before we could access the 7.
            - This is impossible.
        - Zeroing 6+7=13 (use master on blast)
            - Because we're using the master on the blast, we have no more masters.
            - We can't use the 2-door to zero pink (for reasons mentioned prior)
            - The rest of the doors perfectly zeros pink (8+4+1=13)
            - This also means opening the cyan -8 normally => opening the bicolor normally => mastering the pink 2-door
            - As well as opening the -3 black to access the pink 8-door, but that's resolved after opening the pink 4-door.
            - We'll need to open the blue blank normally now, but that's no problem. We can do that any time after getting the 7 pink.
            - There're also no problems with this route
    - So, with 2 ways…
    - Solved!
- But now, we need a white door to get past the white blank outside.
- Part 2 Tutorial: Let's Lockpick! (Salvage: 1 White Door)
    - We'll need to enter the bottom path from the opposite side to activate the input, and open the target door.
    - There are two ways to open the white door, with a white key, or with a master key. Let's consider both cases:
    - Case 1, White key:
        - We cannot collect the -1 white key, as we'll need it to open the target door.
        - We still need to depaint, so all that reasoning from before still applies.
        - We cannot use the blue 3-door, so we'll need to master the blue blank.
        - No more masters!
        - We again have to open the cyan -6 normally, which I hope you already know means that we need to master the pink 2-door.
        - Now just open the white blank before picking up the keys and you're good!
        - Salvaged!
    - Case 2, Master key:
        - We still need to depaint, again, so, again, the reasoning from before applies.
        - Since we're now using the master key for the white door, that's all our master keys!

        - This means we'll need to get -3 black, which means getting -6 cyan from the cyan/pink door, which then means mastering the 2 door blocking it.
        - Then, we'll need to open the blue 3 door to open the blue blank, but that's no problem either.
        - The white blank is also no problem.
        - Salvaged!

New Puzzles!

Now this is what we've been waiting for! Let's dig in…

Chapter 1: Autumn Woods

- Well, this is a lot to take in. But we only have one option, to the first page!
- Page 1: Wakeup Call (Normal Finish)
    - Let's first try to solve the puzzle normally shall we?
    - There's no output points in this puzzle, so no need to worry about not being able to solve this.
    - We're given the possibility of a negative star master key, but because the goal is blocked by a blank master door, that would be a bad idea.
    - The next thing notable is the fact we need 8 whites, but the only source of white is the White/Red door on the top right.
    - It only gives 4, so we'll need to dup it.
    - But also, to open it at all, we'll need -4 reds, which makes that 0 red exact key a bit troublesome.
    - We cannot take the exact key, because we're forced to take the initial -10 red, and our only other source of red is the -3 stack, which is not enough for -4.
    - Therefore, to reach our source of white, we need to collect the cyan keys.
    - Additionally, we need to open the pink 3-door blocking our white source, so we need to collect the 8 pinks, as there's no other source of pinks.
    - Since we cannot touch the exact key, we can either go through the 3 cyan door or the -8 red door.
    - The -8 red is impossible, as it leaves us with too little -reds for -4, even with the -3 stack, we're left with -3 red, -1 off.
    - Therefore, opening the 3 cyan door is forced, plus the -2 red.
    - Now, our biggest problem is how to zero out cyan.
    - We currently have 17 cyan, and the only source of cyans are the cyan blast doors and the 100 cyan door, which we obviously cannot open without the star master key we don't have.
    - The double blast door requires -pink, and the only source of that is behind our source of white, so we don't have to worry about spending pinks to get there since it's all we can do with pink right now anyway.

    - But also, we have the cyan/white blast, that, at most, can subtract 8 cyans, since we'll have at most 8 whites. This brings us down to 9 cyans.
    - Then, to maximize -cyans from the other blast door, we need to get red and pink as high as possible.
    - We'll do this by getting red low, (with the -3 stack), then flipping it.
    - Then, we'll spend as much pink as we can (the 4 door), then get it negative with the bicolored door.
    - With this, we'll get 2-11=-9 cyans, perfect! Plus we have the reds to remove the ice.
    - Solved!
- The next puzzle is blocked by a blank cyan and 100 cyans. I think we know what to do here.
- Page 1: Wakeup Call (Salvage: 100 Cyan Door)
    - We need 100 cyans. The only way to get +cyans is the double blast door, but once isn't enough, and also not twice, we'll need the negative star master key.
        - Even if we get the most negative pinks possible (-2 or -5 with a dup), and exactly 1 red key. We still need a lot of openings to reach 100. Definitely more than 2.
    - We still need to open the doors blocking the 100 cyan door. Which means getting 6 whites.
    - We'll need to do the thing with the white/red door again.
    - Which means, again, we can't touch the exact key, can't open the -8 red, all that.
    - Now, with the star -master key, we can get infinite -pink keys, which, with the blast door, means infinite cyan!
    - Now just build up, touch the input, and open the cyan door.
    - Salvaged!
- Page 2: Summation Station MINI
    - No meta stuff here, just a normal puzzle!
    - We need to reach exactly -63 black, which means that the sum of all the other colors (plus an extra copy of one color) is exactly 63.
    - The glitch color cannot be cyan, because then there would be too many keys.
    - Same reason for why the 72 cyan is useless, it's just too much.
    - Notably, the only odd number here is the 1 orange. Since 63 is odd, this key must contribute to the sum.
    - However, this also means that the glitch color cannot be orange, otherwise, this 1 would become a 2, removing its odd-ness.
    - And by process of elimination, the glitch color is blue.
    - That now eliminates the 54 cyan, because even with the lowest possible orange and blue, the sum would still be 1+6*2+54 = 67 > 63.
    - Therefore, cyan must be 36. Making the remaining sum needed 63-36 = 27. With the orange 1, 26.
    - Now, another notable thing, all of the blue keys are 0 mod 6.
    - 26 is 2 mod 6, and that must come from orange, and therefore, the 2 orange keys are required, and the 4, required to be blasted away.

    - Now, all that's remaining from the sum is 26-2 = 24, which is 12*2, so we need to get 12 blue keys, the center option.
    - Just remember to use the other blue keys to open the blast door and get mimic:blue.
    - Solved!
- Page 3: Tunnel Vision (Normal Finish)
    - No outputs. We can solve this now!
    - The final door needs 5 greens for the erosion and -2 purples.
        - There's no masters, so no way around the purple.
    - The only source of -purples is on the top. That -2 stack.
    - And the only source of greens is the 10 stack above, we cannot lose this, so we cannot touch the green 0 exact key, or open a green blast until we remove the erosion.
    - This forces us to take the bottom path in the first fork towards the goal.
    - This path needs 3 reds, and 5 greens, again, but after a signflip.
    - We'll need to counteract that flip with another one, which is above.
    - The flip either needs 2 oranges, or for us to come from the other side.
    - The other side is impossible, as that requires touching the 0 exact key.
    - Therefore we need to get the 5 oranges.
    - We have a choice now between starring and not starring red, so let's look ahead.
    - To reach the end, we have two choices, yet again, but one is impossible.
    - The 4 green door cannot be opened, as we'll need 5 green keys, but after opening that door, and the door above to reach the 5 orange, we'll be left with 4 greens, not enough!
    - So, the top path is forced. We need 2 more oranges, +reds, and zero out orange.
    - That means keeping our reds after opening the 3 red door before that, which means we're taking the star key!
    - Now, to zero out orange, since we currently have an odd amount, we need another odd amount to even it out. The only odd orange here is the -5 stack.
    - That is blocked by a green blast or a red blank. We can't open the green blast yet, so we must zero out red.
    - This means unstaring and opening the last 3 red door above.
    - Now we have -4 oranges, and we can remove those with the two -2 doors.
    - However, we still cannot touch the exact key, so we'll need to enter from behind.
    - This means getting the 8 purple, which is a problem. We don't want this to cancel out with the -2.
    - So, we'll blast this away with the glitch blast door. It's the only way to remove purple without the -2 at this point.
    - To access it without touching the -2, we'll need to touch the exact key, but now, we can go remove the erosion, and touch this safely.
    - We'll use the lockless purple to get mimic:purple, and that's all folks!
    - Solved!
        - Alternatively, you can use the blast door to zero out orange.

        - To do this, we'll have to open the 3 red door blocking the blast door while red is starred, so that you have an orange door to open to get mimic:orange
        - Then, you can open the orange blank no problem!
- The next puzzle is behind a blank door with 3 greens. We'll need a 3 green door.
- Page 1 doesn't have green, so we'll need to get this from Page 3!
- But wait, Page 3 doesn't have a 3 green door that can be salvaged! (It's blocking the input).
- There's no positive blast door either. (The glitch one doesn't work because there no green door for us to get mimic:green outside)
- There is one other thing we haven't considered, the glitch star key!
- If we lock green at 0, we should be able to open the blank no problem.
- Therefore, we'll need to salvage a green door that we can open, the blank door!
- Page 3: Tunnel Vision (Salvage: Green Blank Door)
    - The bottom path is not completely inaccessible, we need to keep that blank door around.
    - We'll need to open up the 3 green door blocking the input, so we cannot take the exact key yet.
    - Therefore, we must go through the bottom of the top path.
    - To get -orange now, we'll need the -12 behind the red star key.
    - This means we'll be forced to star red, which is a problem, since we have a blank red coming up.
    - We'll need to star red at 0.
    - The rest is simple enough, just open access to the input, zero out green with the exact key, and…
    - Salvaged!
- Page 4: Cave Escape
    - No I/O. Normal puzzle.
    - At the start, the bottom path is just better, top takes 5, while the bottom takes 5-2=3 to reach the same place.
    - The next split, starting at the 2 master stack, top costs 7-6=1. And you get a net +2 trade going back for the 8 stack, so cost -2.
    - Bottom costs 8, though there's a net +5 trade on the way, and you get a net +4 trade going back for the 6, so cost -1.
    - Top is better.
    - Now we have access to a tempting path towards a single lock. This would spend our brown key, allowing us to open every single door here.
    - Let's see if we'll need it.
    - To reach the end, at minimum, we'll need to open 23 doors, including the final master door (that door could be cursed, then mastered).
    - Which means 23 master keys, without using that path above.
    - What we have right now plus ones that we'll definitely encounter along the way adds to 8+5+1 = 14.
    - There are also a few favorable trades along the way:

        - Net +1 from the two 4s on the right.
        - Net +2 from the bottom 6
        - Net +3 from the 5 stack.
    - Now, we hav 14+1+2+3 = 20, still not enough.
    - There is no more way to get more master keys, so we'll need to get rid of this brown key.
    - Since we can't do it right now, we'll need to come here later, which means taking the right path so that we can get back up later.
    - The path to the 9 stack is actually a favorable trade now, a net +2. But it needs 7 keys, which we don't have right now.
    - Now we'll take the trade from the two 4s, an extra key is always good here.
    - Now we get more keys from the other favorable trade listed before, and we have 7 keys, enough for that net +2 from the 9 stack.
    - Now we have 9 keys, enough to reach that master lock, and get rid of our brown.
    - Now we just get the rest of the master keys in order to open the 5-door at the end.
    - Solved!
- Page 5: Not What I Asked For (Normal Finish)
    - Oh hey, the goal is right there.
    - Solved!
- Okay, page 6 is behind a frozen door. We have the -4 pink to open the door itself, but we'll need +reds to thaw it.
- In Page 5, the only thing that can do that is a red/pink -4 door.
- Page 5: Not What I Asked For (Salvage: Red/Pink -4 Door)
    - The text below nicely tells us that we cannot salvage a door if it has multiple copies.
    - But there are some other facts: after salvaging a door, its cursed status and mimic status are reset to the default. And the door salvaged will be the positive version of the door, even if you opened a negative or i copy of the door.
    - All that means for this puzzle is that we need to salvage either the door at the bottom, or the door 2nd from the top.
    - Both of those doors have two components, so we'll need to open both in order to salvage.
    - The bottom door has an i-copy, which requires -4i keys, which is impossible to attain.
        - There's no rotor, and the only i key available is positive.
    - Therefore, the other door it is!
    - For that, we'll need 4i keys at some point, which can only be from the browns.
    - We'll then also need to curse this door, which means we'll also need the 4 browns.
    - So basically, we need all the browns.
    - And also, the real copy needs to be opened, but this actually has two options:
    - We can either use browns, or use the -master key (it's a negative copy, so it'd destroy it).

    - But here comes another factor! The top door is blocking a brown key, but it costs +4 pinks, and since it's not a negative copy like the other one, we need to brown this.
    - Therefore, for the door we're salvaging, we need to master key it.
    - Also, because of the brown blank before the top 2i brown, we need to collect this 2i first, and before then, the 4 brown. We have an order now.
    - To collect the 4 brown, we need +reds to thaw the door.
    - The only sources of +reds available are the middle and bottom door.
    - But then we need to zero out red, so we'll also need a source of -reds.
    - The top two doors are impossible to open without browning, so the -12 stack is the only option.
    - Since there's no way to spend pink keys, you'll have to open the blank pink now.
    - Now, the -12 matches up perfectly with all the pink doors available. So you just need to open them all, doesn't matter how.
        - You can even ignore the mimic:pink you have right now and just get mimic:red to spend -4 reds as if it's a normal door.
    - Then you just open up the final door as planned and salvage!
        - Notably, you still salvage the door even if you master key it, unlike glitch mimicking.
    - Salvaged!
- Page 6: Cave Escape 2: Return Home
    - Well, there's a big door that needs 2 browns.
    - But, if you have 2 brown, then it'll be cursed, resulting in it requiring 2 browns and 0 browns at the same time.
    - We cannot open this door, we need to go a different path.
    - What we can do is just top up, over the big door, through the blank browns.
    - To do this, we'll need to zero out brown, which eliminates the 4 stack, there's not enough doors to spend them all.
    - We'll need to get through one of these paths though, and the middle path is impossible (there's no red), so the top path it is.
    - We'll need -cyan for that, so we need to open both the top and middle white doors.
    - That's a job for browns, and plus, you can open the other white door to zero it out! Perfect!
    - Solved!
- Page 7: Get a High Score…? (Normal Finish)
    - It's 7-A, but with some weird changes. As well as a higher score we need to reach.
    - Not that they matter though, we've solved this before, let's just do it again!
    - Solved!
- Okay… But now what?
- There's this very suspicious portion in Page 7 with the input.
- After you reach the input, the only thing you can salvage are the blank doors to the right.
- And also, there's this very suspicious looking -8 black door outside.

- Let's try opening that.
- Page 7: Get a High Score…? (Salvage: Blank Black Door)
    - There's a white blank blocking the input.
    - There's no way to spend any white keys, so we cannot collect any white keys.
    - By the time we get down to the input, we must have exactly 7 purple and -7 cyan.
    - Because of the doors on the top right, we only need to get one of the colors to their target.
    - Let's first try maximizing their values.
    - We'll start with the blast behind the purple 1, the most efficient choice from our previous analysis of 7-A.
    - Then, we open one of the two 2-doors. Opening the blast door after that would only give a single key. Not good.
    - So first, we'll use the top area to get the spent color up-to-speed.
    - Then, opening the other blast gets one of our colors to 7.
    - Using the equalizer thing up top gets both colors to 7, yay.
    - Salvaged!
- Alright, opening the suspicious black door, we discover… Chapter 2?!

Chapter 2: Frozen Palace

- Page 1: Reflective Wilderness (Normal Finish)
    - We need 4 pures. We already have 1, so we only need to go down 3 of these paths.
    - The bottom path is impossible, there is no way for us to spend 5 cyans.
    - In total, we need to spend:
        - 3 orange
        - 3 purple
        - 4 pink
        - 3 cyan
    - There's only 4 pink spenders on the left, and to open those, we need to spend 4 cyans.
    - This means we need to collect an extra cyan from the bottom path.
    - Also, we cannot spend any extra orange or purple, so we need to ignore the last two doors on the 2nd-from-the-top path on the left.
    - Just gotta be mindful of the blanks now. Not really sure what to add here.
    - Solved!
- Looking below, we need a way to spend a negative master to access Page 2.
- But if you look around, you'll see that everything has been master-proofed.
- We'll need to bring out something from Page 1, something that can be mastered…
- Page 1: Reflective Wilderness (Salvage: Cyan Blank Door)
    - Looks like we'll have to go through that bottom path after all!
    - We just need to spend 4 cyans, simple enough. Don't even have to worry about other colors!
    - It's so easy, I'll just-

    - Salvaged!
- Page 2: Corner Case
    - Normal puzzle.
    - The final path to the end has us collect -5 whites.
    - We then need to zero them out, so we need to collect the 5 white.
    - Also, we need to remove some erosion, so the glitch keys must be green.
    - Now, seemingly, we need to keep some reds to the end for the frozen door.
    - But to get the 5 whites, we need to spend out only red.
    - Okay, what if we master key the red door?
        - There's a master blast before the door, so we need to have a stack of master keys not in our possession to collect after.
        - We're forced to collect a single master at the start, so we need to use the 3 stack above for this purpose.
        - But wait, we can't open the green door before removing the erosion, so we need a master key for that.
        - We don't have 2 master keys. Contradiction!
    - Okay, so we can't master the red door. What now?
    - The flavor text provides a nice hint, but we don't HAVE to keep the red key to the end, because there's a neat little corner where our red aura can peek through and thaw the ice.
    - That means spending two masters to get into the corner, which means we still have to get that 3-stack.
    - Now for the blues below, we have to spend each of them individually. Why? Because of the white blanks in between.
    - Theoretically, you could master key one of the blue blanks to try and bypass it and spend two sets of keys at once, but your only method of getting mimic:blue are blank doors, and the white blank between the sets forces you to leave mimic:blue.
    - So, that's not an option.
    - And now for SURE, we need to spend a master key on the 5 green door, there's no way to access the erosion without the blast door behind it helping us with the blues.
    - 1 master for that, 2 more to thaw that door, and 1 more for the master blast.
    - You'll need to take the green path at first to leave blue blanks for mimic:blue btw.
    - That's all!
    - Solved!
- Page 3: Always Look Back (Normal Finish)
    - Solved!
- Okay, what do we need here.
- We need a way to spend 18 blues and 4 pures.
- Looking in Page 3, we see a way of dealing with blue, but not pure.
- Looking in Page 1, we see a 4 pure door, perfect! Let's go for that first.
- Page 1: Reflective Wilderness (Salvage: 4 Pure Door)
    - We just need to solve the puzzle again, but change the last step.

    - Salvaged!
- Now for blues…
- Page 3: Always Look Back (Salvage: 3 Blue Door)
    - We need 3 blues to get rid of the pain and access the 3 blue door.
        - Also, is this the first time we've seen a 3i door? It looks cool.
    - However, there's quite a few copies of the door in question, but we only have 3 blues, and we can't use browns because of the exact key, so we'll need some master keys.
    - The only source of +master key is the combo door on the bottom right. That door essentially sets your master key count to 2, but we need a bit more than that.
    - But also, to use this door in the first place, we need -master keys, which only comes from the top right door. Everytime we use the combo door, our master key count is reset to 2, so we need to use this door each time to get 2 masters.
    - We need at least 7 masters, so we need to do this 4 times!
    - So we'll need 3 masters for each door to get up to 4, plus 1 for an extra top door to spend browns, plus 1 more for the top door to get the i-masters.
    - Yeah, just enough!
    - Even though this puzzle looks suspiciously like 8-A, and can loop infinitely like 8-A, and through those loops, gain infinite master keys unlike 8-A, we didn't even need to do that.
    - Salvaged!
- Now, with these doors, and the -master outside, we can finally enter Page 4.
- Page 4: Little Stones
    - Normal puzzle!
    - You're forced to open the 5 stone door at the start.
    - You need 0 stone and 24 whites.
    - All available whites add to 24. You need all of them.
    - You have 1 mod 5 stone keys, and most things here that affect stone are 0 mod 5.
    - You would need the blast door in order to zero stone.
    - Therefore, the door with the blank stone and master locks is impossible to open normally.
    - And since it has master parts, you'll need to curse it, then master it.
    - That's our only master key gone! The rest needs to be opened normally.
    - The -5 stone door actually needs -5 stone. You can't open it with brown.
    - So you'll have to get -5 from the bicolored door, meaning you need to zero stone before opening that door.
    - This restricts your options, so much so that the puzzle solves itself from there.
    - You then use the -master to spend all 24 browns on the 12 door.
    - Solved!
- Page 5: Tricky Inputs (Normal Finish)
    - Solved!
- Our next goal is to get past these blanks. Blocked by 50 pinks, -50 pinks, and -6 black.
- You do get 4 pures in the middle, so that may or may not come in handy.

- It's pretty obvious what we need from Page 5. Combined with the -master over yonder, these two doors will get us to Page 6.
- Page 5: Tricky Inputs (Salvage: Pink All Door)
    - Since the black door is behind input 8, it's forced to go there, so this door will go to SID 7.
    - First off, we'll need to avoid these inputs as we reach the all door. As long as we don't have a clear path to the all door, touching inputs is forbidden.
    - So, we're forced to go down, then up, to reach the all door.
    - We must use the -master on the red door blocking the all door. It's the only way to open it.
    - Our first move is really restricted. We can't use the -master, so we can only spend our -1 black key.
    - We must spend it on the top one, in order to not get stuck.
    - Now, we have -3 purples, which can be used on one door, and one door only, so just, open it.
    - Now, we have 2 pinks, if we were to open the 2 pink door, we'll just get stuck, with no way of zeroing pink or opening the blast door.
    - So we go down, and open the blast door.
    - Now, we're forced to open the 2 pink door. Collect the -2, and zero it out with the negative blast door.
    - Now, you can collect the 6 purple and just beeline to the all door.
    - Salvaged!
- Page 5: Tricky Inputs (Salvage: -6 Black Door)
    - We'll need -6 black in order to salvage the door.
    - Our only way to get -6 black is the black/purple door on the bottom right.
    - But that is past input 8. If we open it, we'll salvage that instead!
    - That is unless we make a copy of that door, and open the copy. You don't salvage doors if it's not fully destroyed.
    - So again, we're forced to use our -master something at the end.
    - The start is basically the same, up until we get the 6 purple, bring us up to 5 purple keys.
    - We need 6 purples to open the black/purple door, so we'll need to get to the top-right, our only remaining source of purple.
    - To get there, we're forced to spend all our purple on a blast door, but thankfully, it gives us exactly 6 purples
    - But also, we'll need the -black to gain access to those doors, so we'll need to pick up the 04 stack.
    - Since that stack is blocked by a purple requirement, and we'll be getting rid of them soon, we'll get them now.
    - There's a black blank blocking the input, which means we'll need to zero these blacks out.
    - We have -4, and there's exactly 4 -1 doors, perfect.
    - To gain access to them, we'll need to open 6 |pink| locks. So if we cancel the -2 we have right now with the 6 pinks, we won't have enough.

    - Smooth sailing from here.
    - Salvaged!
- Page 6: Doors: A Retrospective
    - We need exactly -383 orange, and 872 white.
    - The two doors above effectively add one to the other (ignoring sign).
    - Given two values for the two colors, you can only reach this state by adding one to the other while the resulting greater value is smaller.
    - For example, given the state -383 | 872, you can only reach this from -383 | 489, and adding orange to white, the other way around would always cause orange to be greater than white.
    - So let's just work backward.
        - -383 | 872
        - -383 | 489
        - -383 | 106
        - -277 | 106
        - -171 | 106
        - -65 | 106
        - -65 | 41
        - -24 | 41
        - -24 | 17
        - -7 | 17
        - -7 | 10
        - -7 | 3
        - -4 | 3
        - -1 | 3
        - -1 | 2
        - -1 | 1
    - Now, just do that in reverse!
    - Solved!
        - Fun fact: This process is known as the "Euclidean Algorithm"!
- Page 7: Precipice of the Blizzard (Normal Finish)
    - This door blocking the goal is literally impossible to open normally. You need 8 and -8 master keys at the same time.
    - So the only way to open it is by cursing and then mastering.
    - Which means we need to get to the bottom there, with the master key and brown key.
    - You need -67 pures to get the brown, and it must be after reaching there, because there's a pure blank blocking the way.
    - The only way to get -67 pures after getting though is with the pures on the left.
    - Here, only -25 and -42 add to -67.
    - You need to take at least one of these stacks to enter the right, so take the top one.
    - Then just zero out pures. Binary, simple enough, won't even talk about it here.
    - Then, you'll need to spend your purples on the left.

    - That's about it.
    - Solved!
- Now to get past that suspicious looking door blocking the path to Chapter 3, we need negative: Orange, Red, Green, and Blue.
- We have all the RGB, positive, available. And we have some signflip doors in Page 7.
- Page 7: Precipice of the Blizzard (Salvage: Combo Red/Green/Blue Door)
    - These are just the same as the normal solution, just with another number to be translated to binary, nothing special, just master the final door to salvage it.
    - Salvaged!
- Now RGB is taken care of, we just need orange. Which brings us back to Page 1.
- Page 1: Reflective Wilderness (Salvage: 1 Pure/Orange Door)
    - Salvaged!
- Now, we can get the pure keys to open this door from the Page 4 entrance (you need the -master to escape), get rid of the pure keys using the -4 pures from the entrance of Page 6, and boom! Chapter 3!

Chapter 3: Sunshade Castle

- Page 1: Microcosm
    - To reach the exit, we need -6 cyan.
    - You only get 1 pure key, so you can only go down 1 path.
    - Down the path to the exit, you can get to -2 cyan easily, and you have a way to double your cyan and flip it to reach -6.
    - However, you're blocked by a blank orange with -4 orange on hand. To spend them, we'll need that -4 orange door from the right.
    - Going down the right path, we have the door right there, but we don't have enough orange to open it.
    - To get more orange, we must get the orange/white blast door from the bottom.
    - And all we now is a bit of height.
    - Well, a simple pure door would do.
    - (Salvage: 1 Pure Door)
    - Then, the rest…
    - (Salvage: Orange/White Blast Door)
    - (Salvage: -4 Orange Door)
    - Solved!
- Page 2: Vault Sabotage
    - In the end, we need something to master key.
    - And then, that something would be blocking our way (all doors here are 3+ blocks tall), so we'll have to open it.
    - Before that though, we have a pink blank with 1i pink key.
    - That 1i pink can only be removed with the 0 exact key.
    - For now, let's just open the triple blank door in the middle, no glitch doors here, and this door isn't gonna be salvaged

        - You cannot get past this door in the end because you're forced to get 1i pink.
    - To reach the exact key, we need to zero out white.
    - We have 5 whites. And we've got a 2 door, w/b -blast, and a signflip door.
    - We cannot reach -5 black, so the w/b -blast will have to be opened with -3 black.
    - The -3 black must come from the bicolored door on the bottom path, and the -1 in front of it must be ignored with the -black blast door.
    - Also, we'll need 3 pink, which will have to come from the bicolored door on the top.
    - It's blocked by a star key, so we'll just unstar it, no problem.
    - Then, we can flip it with the pink signflip door, and get the exact key.
    - Now, we're left with 3 black, so, what to salvage?
    - No matter what we salvage, there is no way for us to be able to master the door, then open it while having 1i pink and 3 black.
    - So, there's this sneaky mechanic.
    - Where if the door is too big to fit in the output, it'll just not show up.
    - The output is only 3 blocks tall. There's a door here that's 4 blocks tall, the pink blank.
        - Sidenote: Since a patch, a white blank door, also 4 tall, has been added.
        - This door is here to make this step more clear, and can also be used for the solution.
    - (Salvage: Pink Blank)
        - Just solve the level again
    - Solved!
- Page 3: High Five!
    - After going through the orange combo door, you'll have -5 orange.
    - You'll have to blank that by using both keys below.
    - At that point, we'll have 1 of each key, so we cannot open any blank doors.
    - As such, the door must be obstructed for the two outputs above them.
    - The only way for them to be obstructed is if they're obstructing each other, as there's nothing 3 high and 2 wide.
    - That means the salvaged door must be 3 wide.
    - (Salvage: 3 Wide Black Blank Door)
        - You're forced to not collect the black key, as you're salvaging a black blank.
        - You're forced to not collect the white key, as you'll need to enter the area with the doors.
        - You're forced to collect the purple key, because you'll need to jump into the input point room.
        - You're forced to not collect the cyan key, so that you can reach the 3 wide door.
        - You're forced to collect the pink key, so that you can reach the 3 wide door.

        - You're forced to collect the orange key, so that you can get back to the input after opening up the path to the 3 wide door.
        - That's it.
        - Salvaged!
    - Solved!
- Page 4: Third Party
    - We need to zero out pure.
    - With 36 pure, and most doors being a multiple of 12, the 1 door and 2 door are just a no-go.
    - As such, we'll need to open three 12 doors.
    - One actual 12 door, and two from the outputs.
    - (Salvage: 12 Pure Door => 15)
        - This is pretty simple. Master key the contradictory combo door.
    - (Salvage: 12 Pure Door => 16)
        - For this, we can't use the actual 12 door anymore, as that would need 2 master keys.
        - So we'll use the door we just salvaged and salvage that!
    - Solved!
- Page 5: Straightforward Puzzle (Normal Finish)
    - Solved!
- We'll… do that later.
- Page 6: Nowhere to Go
    - We must avoid salvaging doors to reach the end.
    - The final lockless door must be avoided by using a -masters key. Specifically, the one after the blank master door, so we'll need to use the positive master before that on the door to the right to avoid canceling it out.
    - We can *almost* handle the rest of the obstacles by canceling out the exact keys up top with the keys at the start, but unfortunately, the extra -10 cyan thwarts that plan.
    - As such, we'll have to take advantage of the door to the right somehow.
    - That door essentially "sets" your cyan to 10, or -10/10i/-10i, as long as you have the corresponding negative amount.
    - It's not exactly a signflip, because if you have -10+10i and you open the door, you will end up with 10 cyans. The setting also removes the other components of the key count.
    - So, to handle the final -10+10i stack and remove them both, we'll need to set it to either 10 or -10i.
    - But if we set it to 10, that'll open the first door, so we'll have to set it to -10i.
    - For that, we'll need a -i copy of the door, which means we'll need to use the i master on the door.
    - But before that, we're forced to pick up a -i master, so since we don't want to cancel it out, we'll have to also use this -i master in the door.
    - Then, we'll have to use the -10i we have to remove the i copy and make way for the -i copy.

    - Now, if we account for the final +master that we have to spend, we'll have exactly -i copy of the door.
    - However, that presents a new problem, if we open this now, we'll destroy it and salvage it! Not good!
    - As such, we'll need another copy by the end. And since all the masters we have now just cancel out, we'll need to involve the -10 cyans at the start somehow.
    - Which means we can't use it to solve the first door on the top, meaning we'll also need to open the door for that.
    - Now, we need 3 copies total, 1 for the first bridge, 1 for the second bridge, and 1 more to not salvage the door.
    - Since we can't mess with the imaginary component of the copies anymore, we'll need to get either +2 copies, or -2 copies.
    - -2 is the only way, as it's the only one we can reach, using the 2 positive master keys we have available.
    - So we'll need to dispose of both the original door AND the -1 master key. Both involves having -10 cyans.
    - We can get rid of one of them with the -10 at the start, but then we'll have 10, which is not -10.
    - But that's where the signflip comes in! We can use that to get -10 again, and finally get our -2 copies!
    - The rest of the puzzle goes as planned.
    - Solved!
        - Sidenote: Originally, this puzzle had major cheese that was since patched. I wrote about the cheese solution before.
        - The second exact key was originally just 10i, so you could just cancel both exacts out with the starting keys.
- Looking at the Chapter 4 entrance, we'll need to salvage a 1x1 door. That is unopenable with a single white key.
- Page 5: Straightforward Puzzle (Salvage: White Blank Door)
    - We'll need 0 master, white, cyan, and purple.
    - We're forced to get -32 purple.
    - Due to the positioning of outputs, we can have at most -24 purple locks.
    - As such, We must use the glitch exact key 0 to zero out purple.
    - So, before that, we need to open a purple door. Preferably as close to the glitch key as possible so that we don't have to use a ton of master keys.
    - So…
    - (Salvage: -8 Purple Door => 19)
        - Simple enough. With the 99 master key to the left, you can open any door.
    - The purple door is one door away from the glitch key, so we'll have to master the door in the way.
    - That door is a 6 orange door.
    - Now, originally, the count for orange worked out, and we got 0, and didn't have to use 3 master keys on the bottom. (Which we can't do)

    - Now we're 6 over, we need an extra 6 orange locks.
    - We cannot throw in a 6 door at output 18, because at that point, we have -orange.
    - So we have to resort to putting a thin door at 17 or 20.
    - The only tin orange door is the 3 door, so we need two of them.
    - One in both outputs? Or use a negative master on one?
    - We'll figure that out but looking at greens.
    - We'll need 5 greens at the end to remove erosion.
    - The only source of green is the green/cyan bicolored door.
    - That door cannot be -mastered, because there's +master key in the way.
    - So we need to actually use an output for this.
    - This means we'll have to use a negative master for the orange situation, and in order to be able to use the -master, we have to put that door in 17.
    - (Salvage: 3 Orange Door => 17)
    - Now, let's consider white.
    - Whatever salvaged door that resolves whites cannot fit in output 20, there's no white door that thin, and pink doors, which are related to white by a blast door, are useless at that point.
    - Therefore, The green door must be at 20.
    - (Salvage: 3 Green/Cyan Door => 20)
    - This also uses up another master key, leaving us with only the last one.
    - And that one must then be used for the -8 purple door. No more masters!
    - What's most notable is the white combo door near the end.
    - It essentially sets white to -2 pink.
    - Right after that door, we'll get -44-26 = -70 whites.
    - So we want 70 whites, or rather, -35 pinks.
    - Our pink count is completely determined by our white count at the beginning, because of the pink blast door.
    - Currently, when we reach the blast door, we'll have 50 whites, but we want 35.
    - This means we'll need an extra 35-50 = -15 white.
    - We have the 15 white door for that.
    - (Salvage: 15 White Door => 18)
    - That should be it!
    - Solved!

Final Chapter: The Dream Labyrinth

- To enter this door up there, we need exactly 1000 white keys.
- We have a few doublers, a few doors, as well as 80 keys to start.
- Using all the doubler without extra doors yields 1280.
- This is an extra 280, which can be reduced by some amount times 16, 4, or 1, depending on when you opened each door.
- This total can be accomplish with 10*16+30*4+0*1
- Open the 10 door first, then after two doublings, open the 30 door.

- That was found through trial and error. :P
- Page 1: Choice (Normal Finish)
    - We'll be going the top path; the bottom path is for salvaging.
    - We need to get all pure keys, and zero all colors.
    - Thankfully, all colors seem to be perfectly matched in keys and locks.
    - At some point, we'll need to have their sum be negative in order to get the cyan. But that does not seem possible at the moment.
    - Let's go somewhere else.
- We either need something that can give negative of one of those colors, and turn it back around, or something that gives cyan.
- Looking around, nothing grants cyan, so we'll go for the other option. A signflip door!
- Although we have some white multiply door that do signflip, they also increases the keycount, which we need to keep 0.
- Looking around, the only signflip door is an orange one, down the blue path.
- (Page 1, Salvage: -i Blue/Black Door => 23)
- (Salvage: Orange Signflip Door => 22)
- Let's go back!
- Page 1: Choice (Normal Finish cont.)
    - We'll dup the signflip door, as we'll need to flip orange back to positive.
    - Now, we want to keep orange high, and others low, but not 0.
    - For each non-orange color, we need to open at least 1 door, else they'll overshadow orange's negative-ness.
    - Each non-orange color will have to be at least 1, so orange's count will be at least 4.
    - And also, each non-orange color can have at most 7, because the sum of the non-orange colors can be at most 9.
    - Therefore, we must open the 8 white door.
    - Orange is at 8 now, so max other-color sum is 7, so max individual color is 4 (because white is now locked at 2).
    - Therefore, we must now open the purple 5.
    - If we don't open the 4 purple door, then the max pink becomes 1, which is impossible, as there's a pink door behind an orange one.
    - Now, if we were to open all remaining doors (you can't open the purple 1 yet as you need to have at least 1), you'll get 8-7 cyans.
    - Now you win.
    - Solved!
- The door in the red path opened! Let's check that out.
- (Page 1, Salvage: -i Red/Black Door => 23)
- To enter the red path, we need zero white, which can be done by opening all non-multiplying white doors.
- But hold on, we need to open 8 white locks, but only 2 keys?
- We have a few doublers back home, let's just use 'em.
- Now we have 8 whites.
- We need 0 pink, red, and white by the end.

- So, since we have 5 pink, we'll need to use the 1 pink door.
- But, hold on, there is another conundrum here!
- How do we have 0 red by the end? There's a 3 red door we need to open.
- If only we had more brown! Wait…
- Hey, remember those doublers we have at home? So yeah, we can get more browns.
- So, we have to open the 3 red door with browns.
- Excluding white and brown and that one pink key, we have a total of 14 keys.
- If we're taking all paths with the least locks, then that's 12 locks. 2 to spare
- If we look at what's actually in those paths, we get that we're spending 10 pinks, which is impossible.
- As such, we'll offload some of that to red by taking an nonoptimal path for key count, down at the first fork.
- Then, we can take advantage of how doubling signflips by flipping brown so that it doesn't curse that 1 pink door.
- Then, we can get -3 with the bicolored door, and reach Page 2 with another flip of the brown
- Page 2: Genesis (Normal Finish)
    - Okay, problem number 1: How do we even start?
    - There's no door we can open, no keys we can collect, literally nothing to interact with!
    - Well, except for this blank blue door, but even with that, there's nothing here. Much less a way to get 20 blues.
    - We're gonna have to bring something in with SID 22, but what?
    - It's gonna have to be something we can open with 0 keys, but those don't get you off 0 keys.
    - You need keys to start with! If you don't have keys, you've got nothing!
    - But wait, you don't exactly start with 0 keys, do you? You have 11 of something every time you enter a puzzle!
    - That's right, stone. We're bringing in a stone door so that we can get mimic:stone.
    - (Salvage: 1 Stone Door => 22)
        - To do this, we exit from Page 1 in the shortcut room.
    - Now we have a stone door, and we can actually start the puzzle.
    - To get anything other than stone, we'll have to use the Blue/Glitch door. This removes the color stone from the puzzle, but now we have keys.
    - In order to get 20 blue, we have to use the center blast door thingies, since there's nothing else that can increase blue.
    - Those things can set any color to -purple. So our goal is now -20 purple.
    - Our only source of -purple is the top right blast doors.
    - Our first purples cannot come from mimic:blue, because we need +blues for that, and +blue can only come from purple.
    - In fact, it must be orange, because cyan can also only be obtained from the center doors.

    - Now, if it's just that, we'll have at most -6 purple. We can't even use the tripler on the top left, because we need a way to flip back to positive.
    - If we use any color other than orange for the next blast door, that color will take its value from purple, leading to just a doubling of purple, which is not enough.
    - As such, we need to use orange again.
    - Now that a signflip for orange is accessible, we can use the tripler, but in its way is a blast door.
    - We could theoretically use blue to open that blast door, but that would involve changing the mimic color to blue, which is something we'll need to do later to get blue from purple.
    - As such, we'll use orange to open the door.
    - To be efficient, we'll use a single orange to open the blast. Using the -1 orange/blue door for this.
    - Then the rest is smooth sailing, just use mimic:cyan to use the blue blank door and set mimic:blue.
    - Solved!
- Okay, now the bottom left door opened up, let's go there!
- (Page 1, Salvage: -i Green/Black Door => 23)
- To access Page 3, we need to have 0 stone keys.
- We've seen something that can do that in Page 2, go back!
- Page 2: Genesis (Salvage: Glitch Blast Door => 24)
    - This is simple enough to salvage.
- Now, if we open the door to the shortcut room, we can get mimic:stone and blast them!
- Page 3: Mastery Mystery (Normal Finish)
    - Looks like there's an output 22 here, it currently has that stone door, but we could change it later. It just has to be 1 block tall for us to get past and spend all our i-masters.
    - The biggest problem here is that we need to zero out 3 blacks, but there's no black door here. We're gonna need to make use of that output 22.
    - I think I know a place where we can get a black door…
    - (Page 1, Salvage: -i Black Door => 23), then…
    - (Salvage: -i Black Door => 22)
    - Now let's get our green back.
    - (Page 1, Salvage: -i Green/Black Door => 23)
    - Now this works out perfectly, the i copies of the door have a cost of 1 black, perfect for spending black keys!
    - What we have here now is the surprising return of the First Principle™! These are just trades between master keys of various types. Make some matching net-0 trades!
    - Solved!
- Now, the bottom right door is open, let's check it out.
- (Page 1, Salvage: -i Blue/Black Door => 23)
- To enter the final door, we need to build orange and blue up as much as possible!
- Sum of all possible increase in |orange| =

    - 10+2+7+2+2+6+6+8+12 = 55, 15 to spare.
- Sum of all possible increase in |blue| =
    - 10+3+2+7+20+6+4 = 52, 2 to spare.
- The bottom path doesn't work, because we only have 2 blues to spare, and those blast doors plus this -7 door blocking the way loses us 7, and even if we bring in the blue 8 door from Page 2, we still won't have enough.
- Therefore, we have to take the top path, but we need 30 oranges somehow. I think I know a door.
- (Page 2, Salvage: Orange Tripler Door)
    - We'll need to get that stone door back.
    - (Salvage: 1 Stone Door => 22)
- We can now go through the top path!
- Now with the initial 10 oranges gone, we go from having 15 to spare to having 5 to spare.
- All orange bicolored doors with value greater than 5 must be opened.
- All normal orange doors with value greater than 5 must be opened while starred.
- All blue bicolored doors with value greater than 2 must be opened.
- All normal blue doors with value greater than 2 must be opened while starred.
- This forces at least one positive door with blue requirement to be opened.
    - Example: The 6 orange/blue door.
- That necessitates a signflip of blue, but the end door requires -blues, which would need a second signflip, but we don't have one.
- Well, I know where to get one.
- (Page 3, Salvage: Blue Signflip Door => 25)
- Now, if you just follow the restriction above, you'll get to Page 4 with a tiny bit of trial and error.
- Page 4: The Catalyst (Normal Finish)
    - We'll be going the top path. The bottom is for salvaging.
    - It starts with a setup to give you an arbitrary amount of pink keys (with some restrictions but we'll assume it's all positive integers for now).
    - Then, you get to open SID 22.
    - After that, you need some green key? There's none of that on this level. It'll have to come from SID 22.
    - Now for the fun part! This puzzle then check if:
        - (pink + green) < 10.
        - (pink - green) = 10a + 7, where a is a positive integer.
            - (pink - green) = 7 mod 10, and (pink - green) >= 17
        - (pink - green) < 80
        - -green > 30
        - -green = 5b + 3, where b is a positive integer.
            - -green = 3 mod 5
        - pink = 2c, where c is a positive integer.
            - pink is even.

    - Now, our only source of green from SID 22 would be one of the doors in the bottom left of this chapter.
    - Now, looking at these choices, even with just these two constraints:
        - -green > 30
        - -green = 3 mod 5
    - We have already narrowed it down to just two doors, 33 and 38.
    - Now let's look at these two clues in conjunction:
        - (pink - green) = 10a + 7, where a is a positive integer.
        - pink = 2c, where c is a positive integer.
    - (pink - green) = 10a + 7
    - 2c - green = 10a + 7
    - -green = 10a - 2c + 7
    - -green = 10a - 2c + 6 + 1
    - -green = 2(5a - c + 3) + 1
    - Therefore, -green is odd.
    - This then forces us to salvage the 33 door and not the 38.
    - (Page 1, Salvage: -i Green/Black Door => 23)
    - (Salvage: 33 Green/Pink Door => 22)
    - (Page 1, Salvage: -i Blue/Black Door => 23)
    - Also, pink >= 33 because we need to be able to open the door we just salvaged.
    - Okay, now that we know -green is 33, let's revisit the constraints to see what that means for pink.
    - (pink + green) < 10
        - pink - 33 < 10
        - pink < 43
    - (pink - green) < 80
        - pink + 33 < 80
        - pink < 47
    - (pink - green) = 10a + 7
        - pink + 33 = 10a + 7
        - pink = 10a + 7 - 33
        - pink = 10a - 26
        - pink = 10a - 30 + 4
        - pink = 10(a - 3) + 4
        - pink = 4 mod 10
    - So pink is in the range [33,43].
    - Since pink is 4 mod 10, pink must be 34.
    - Solved!
- The top right door is now open. Time to go there!
- (Page 1, Salvage: -i Black Door => 23)
- All we need is 12 stone keys.
- We have 11, so we just need one more.

- The only option we have of getting a stone key is with a glitch door, and the only one that has a glitch spend color and can actually give positive stone is the blast door thingy in Page 2.
- (Salvage: 1 Stone Door => 22)
- (Page 2, Salvage: Glitch Combo Door => 24)
- Now we need a way to get purple. Well, I think I know a door.
- (Page 4, Salvage: -12 Purple/Black Door => 26)
- We have a way to get -12 black in the top right, but it's blocked by a -4 cyan door. We need a way to get -cyan.
- Well, I know a door, again.
- (Page 3, Salvage: Cyan Combo Door => 25)
    - In order to get past those white doors without salvaging them, we'll need to have no master keys on hand, which means we'll need to open the cyan door there without masters.
    - But getting all those colors seems unreasonable… Good things there's a better option!
    - We're gonna use browns, but where are we getting browns? That one bicolored door on the top left of course!.
    - (Page 1, Salvage: -i Red/Black Door => 23)
    - (Salvage: 1 Brown/White Door => 22)
    - Now, all we need to do is just to salvage this cyan door, which is simple enough. You need to go for the 2 master keys in order to get the brown door negative, allowing you get positive brown. You only need 1 brown to open the door!
- (Page 1, Salvage: -i Black Door => 23)
- The top right nicely gives us the requirement for the cyan door outright! So no need to worry about that.
- Now, we need to get -12 purple so that we can set stone to 12.
- To do that, we need that purple signflip, but it's blocked by a 256 whites exactly requirement.
- Let's figure out how to get that. We'll do the same thing we did for the 1000 requirement for Page 1.
    - Using all the doubler without extra doors yields 1280.
    - This is an extra 1024, which can be reduced by some amount times 16, 4, or 1, depending on when you opened each door.
    - 1024 = 0*16 + 3*4 + (1000 + 10 + 2)*1 (yes we're using the 1000 door)
- Now, we can enter the final Page.
- Final Page: Awakening (Normal Finish)
    - Well this is simple enough. Just grab the purples, flip 'em, and dip.
    - Solved!
- Hm, well that wasn't very satisfying. We aren't exactly done here are we?
- I'll have to agree with the text box, that salvage point does look very suspicious.
    - Since a patch, a riddle was added to Page 5 here. It tells us to find ourselves "with no place to go", which is quite interesting…
- But hey, that salvage point seems awfully close to the entrance, doesn't it?

- If we were to say, salvage that very wide purple combo door, wouldn't we be inside of it when we exit the level?
- But that looks rather impossible right now. We need a different door in SID 22.
- But, we can't mess with the other SIDs, we still need to come back to this entrance in particular.
- It'd be nice if I had mimic:black here.
- (Salvage: Black Blank Door => 22)
- Now we have mimic:black.
- (Final Page, Salvage: Purple Combo Door)
- Oh no! I got telefragged! To a Baba reference no less.
- And… a new world?

World 0: The Cool Place

- 0-1: Framed Painting
    - Cool painting
    - Solved!
- 0-2: LLoocckkppiicckk
    - Initially, you're forced to open the white door.
    - Then, you're presented with a choice. The bottom door serves no point at the moment, so might as well conserve that path and go top.
    - Going down leads to a dead end. Why? Well uhhh. It just does okay? Just play it out and you'll see.
    - The rest is simple enough.
    - Solved!
- 0-3: The Impossible Gap
    - Fun fact: This level utilizes IWBTG aligns. I won't explain what they are, so just know that you need to touch a wall, any wall, to fit in that gap.
        - Alternatively, hold down to slow walk and change your align that way!
    - Solved!
- 0-4: Hot Potato Bridge
    - I agree with the text box, this is fun.
    - I got through with one copy of the bridge remaining.
    - Solved!
- 0-5: Battle
    - White: Your Health
    - Red: Your Attack
    - Blue: Your Defense
    - Black: Enemy Health
    - Orange: Enemy Attack
    - -Purple: Enemy Defense
    - The enemy gets to attack you for each time you attack, so you need to attack just enough to defeat the enemy, lest you die yourself.
    - Solved!

- 0-6: the door has door in it
    - The title is true.
    - Solved!
- 0-7: Door Millionare
    - The most efficient (least copy) way to reach 1,000,000 is to get
        - 1e6^(1/5) ~= 16 cyan, then
        - 1e6^(2/5) ~= 251 pink, then
        - 1e6^(3/5) ~= 3981 purple, then
        - 1e6^(4/5) ~= 63096 purple, then
        - 1,000,000 white
    - Solved!
    - Side note: This isn't actually the fastest solution in terms of time, because of the animations. I'll leave finding the optimal route there to someone else though!
- 12 stone keys! Never ever seen! Next!

ω Keys

- Now, I'll stop adding those lines for each salvage, because we'll need to do that a LOT.
- Remember those ~~w keys~~ ω Keys we've been seeing everywhere? It's time.
- Kina recommends going for the one that looks "most impossible", whatever that means.
- And I think I've found it. In Chapter 2, with the very impossible looking door with the contradictory requirements. We need to get the white omega key!
- White
    - Clearly, that door is impossible to open. We must get in through another way: from the top!
    - If you were to have a high enough door in SID 9 (or 10), you should be able to jump over to the white omega key.
    - So we'll salvage the big combo black door!
        - This should be simple enough, just redo the solution to the original puzzle, but change the last step to be a salvage.
    - White ω Key got!
- With this, we can change any salvaged door's color to white!
- Let's see what we can do with this…
- Well, it looks like we can get the Orange ω Key with this!
- Orange
    - This is in Chapter 1, to the left.
    - Just need to change SID 3's spend color to white. And we can get 4 whites for that door.
    - Orange ω Key got!
- Now we have the power of orange, plus the hint Kina gave us, that Purple ω Key is looking close!
- Purple
    - This is in Chapter 2, to the right.

    - We need to repeatedly get positive and negative orange. Which door could let us do that?
    - SID 6 is useless at the moment. If it wasn't the blue door, then we would get stuck down there.
    - We already have 3 signflip door in SID 9, 10, and 11, but they only go from positive to negative. We need a way to get positive orange, which means a negative door.
    - And it's looking like we must get it from Page 5. That's where all the negative doors are at.
    - We'll need 3 negative doors for three instances of positive orange, which means we'll need both SID 7 and 8 plus the -master for a total of 3 doors.
    - In order to open a negative door to get those oranges in the first place, we'll need to have negative of another color first.
    - The most accessible ones are the RGBs, but there's no negative door with RGB as the inner color.
    - So, which color? One might think pink, because there's a negative -50 right there, but reaching that will cost us SID 7, which we'll need. So that leaves us with white, which we can actually get because we have the white ω Key!
    - We can easily get negative white by taking one of the unused signflip doors from Page 7 and repurpose it. Let's go with… SID 9.
    - And for the negative doors in SID 7 and 8, one of them will be a -1 orange/white door, starting us off with 1 orange, and the other will be a -2 orange/white door.
        - Just use any -1 door and any -2 door in Page 5.
    - Now, we can do this:
        - Get -whites
        - Open the -1 door | At 1 orange
        - Signflip from SID 10 | At -1 orange
        - Open the -2 door | At 1 orange
        - Signflip from SID 11 | At -1 orange
        - Open the -2 door (duplicate) | At 1 orange
        - And that's it!
    - Purple ω Key got!
- With this, we unlocked a new place!
- But before we do this, let's first get the other ω Keys.
- From now on, it's going to be a bit more open, according to Kina.
- Pink
    - This is in T3-1.
    - We need to get exactly -314 (Hey! Pi! That's me!) purple keys.
    - It's clear we need a big multiplier, which means we'll need that cyan combo door over there.
    - Each of the colors given on the bottom left corresponds to a digit, we'll need to construct 314 using the locks on the combo door.
    - 3 purple, 1 orange, and 4 white.
    - And 1 extra purple to cancel out the ones we already have.

    - Pink ω Key got!
- Cyan
    - This is in Chapter 1, to the right.
    - We need -50 pink. This will have to come from the 100 cyan door, since it's the only door with a large enough value.
    - But then we need to open a blank door. We need to spend 50 pinks somehow.
    - There's no extra 50 door, so this calls for a negative blast door! There's one in T1-3.
    - Then we just make it pink, and…
    - Cyan ω Key got!
- Brown
    - This is in Chapter 2, top right.
    - We need, how many cyan? That's a lot.
    - This might bring up the thought of "going infinite" like in 8-A, or T2-3.
    - But that is infeasible, the setup for that is very specific, and not something we can actually make here.
    - Instead, all we need is to go exponential. A pair of opposite signed blast doors can get us very high numbers (as seen in 7-A).
    - We can get those, or an all door from T2-5.
    - We've got that, now we need a bunch of negative master keys.
    - Luckily, we have a source of master keys in T2-3. If we can get in with some pinks, we can get -40 master keys!
    - But how do we get out? We won't be zeroing our blues any time soon.
    - We'll go out via the cyan door.
    - We aren't going to get cyans from T2-3, however, so we'll need to get them from the blast doors we just got.
    - Set the positive one as cyan/pink, and the negative one as pink/cyan.
    - Now, you can use the starting -1 master to kickstart the whole thing.
    - Brown ω Key got!
- Black
    - This is in Chapter 1, to the right.
    - Now that we have browns, that combo door is no issue!
    - Just get some brown from the -4 pink door or literally any negative door.
    - Black ω Key got!
- Red
    - This is in Chapter 4, top left.
    - That -425 number is actually the sum of all doors in the bottom left. If we got access to the bottom left somehow, then we would have that amount of green.
    - That and the bottom right, which would get us the -10 blues.
    - We need to open several colors of the same door? Sounds like a job for brown!
    - We'll get our positive brown from T4-2, with the -1 door.
        - We'll use some random color that isn't involved as the inner color
        - We'll get negative of that random color using a blast door from T4-3 with the random color as outer color, and white as inner.

        - We're not using white as the negative color because there's a white blank.
    - Then we'll get our i-brown from the -i door from T4-1.
        - We'll keep black as the inner color
    - But we need 3i browns! We only have 1i.
    - But we have those doublers! Just use two and you're set!
    - To make sure that we don't brown the final door, we'll spend away the 1 brown with the stone door.
        - This means we'll pre-curse each of the i-doors, and 2 doublers.
    - Red ω Key got!
        - Sidenote: If you already have one of the blue or green ω Key, you can use those to get i green or blue from an green/black or blue/black all door in SID 24, then get the other color (also an all door) from SID 25.
        - Sidenote, the Second: Using my solution, you could've skipped the black ω key in getting this, but why would you do that?
        - Sidenote, the Third: You could also just use the white ω key to get this. You can get the -greens and -blue from a green/white all door (with 213 or more whites) in SID 25 and a blue/white 20 door in SID 24. You then have to zero out the white, which is possible, I assure you.
            - 1*(1000)+4*(35+2+3+30)+16*(0) = 1280. :)
- Green
    - This is in T4-2.
    - Just need to get the stone door in, then change the outer color to black.
    - Green ω Key got!
- Blue
    - This is in T4-5.
    - One may think to zero out black with a blast door. But there's no i-blast or all door anywhere for us to do that.
        - Since a patch, the all door in T4-3 was changed to a double all door, and thus cannot be used for this.
    - We can't brown the blank door either, because of the pure spend color.
    - As such, we'll have to actually spend 137i more black, after opening the existing 137i door.
    - This suggests that we need to somehow salvage the 137i door into SID 22, and use that to spend the remaining black keys.
    - We can salvage the 137i door into SID 27 easily enough, but getting it to SID 22 is the hard part.
    - To salvage the door, we need to be able to open it in the T4 hub. But there's master keys, and there seems to be no way to get that much i keys of a color.
    - Other than a single white rotor on the top right!
    - So what we need to do is to reach the top right like we did when we first entered T4-5, but instead of opening the white blank for the purple signflip, we use the white rotor to get 137i white and open the door (recolored to white).

    - Now that we actually have 12 stone keys, we can open the 12 stone door no problem, so we don't need the purple signflip.
    - But there is another problem: the input for SID 22 is blocked by another stone door, so we'll have to do some extra work.
        - If you have 13 stones already (yes this is possible), you won't have to worry about this.
    - There are several ways to get this door open. One way is to just get more stone keys the way you originally did it for the entrance to T4-5, but using the purple signflip above the T4-5 entrance instead of the purple signflip behind the white blank.
    - An alternative approach is to brown the door, since unlike the 12 stone door, this one does not have a pure component. So using any negative door and the Brown ω Key, you should be able to open the door no problem.
        - And to stop the browns from cursing the final 137i door, you can just use one of the white doublers at the start to turn it negative.
    - Blue ω Key got!
- The rest of the ω Keys are in Chapter EX, so let's do it!
- But wait, the sign mentions something about a 13th stone key. We should get that.
- It mentions searching in the Hub and the chapters we've visited…

Kina's Heart

- Since a patch, a riddle was added in the Secret Lab, telling us that "Kina holds something close to her heart. Something locked infinitely tight".
- And if you look very closely at Kina, you'll see that they have a lock on them! A master lock that costs infinity keys.
- Hmm, maybe we can somehow get that open!
- We'd need to brown it, then use a master key.
- But would we get that here? In the hub?
- If you search hard enough, you'll find a secret tunnel in the Hub (the very starting room).
- It has the output for those random inputs scattered about every since we started getting omega keys.
- We can use these doors to get our browns and master keys!
- Since we don't have the master ω Key, we must get a negative door with a master outer color (or glitch + a blank master door).
    - There's none in Chapter 1.
    - There's one in T2-3, but it's intentionally designed so that you can't salvage it, with its 99i copies.
    - There's none in Chapter 3. (In fact, we don't even see an input!)
    - There's a glitch all door in T4-2, that'll have to be it.
- Now we have our source of master, we need a source of brown, a source of mimic:master, and a way to get negative of a color.
- But before all that, we haven't seen the input for 30, haven't we?
- You can see a pattern here, and it implies that input 30 is in Chapter 3.

- When we go there, you may notice a very suspicious hole in the floor under output 21.
- We can get down now by changing the color of SID 21 so that we can open them.
- Down here, we find input 30! And a puzzle!
- Forgotten Page: Door Cache
    - Solved!
- For each of these pink gates, we need an exact amount of pinks.
- -4, 13, and 15.
- We'll need to find a good door from T3-7 to give each of these amounts.
    - SID 32, -4: The rightmost door.
    - SID 33, 13: The middle door
    - SID 34, 15: The mid-left door. (or the leftmost door, but strictly harder to open than the alternative, due to both locks being of higher absolute value)
- However, with 20 cyan and no orange, we cannot open most of these doors.
- We can open the middle door if we open the 32 cyan door first though, so the problem comes down to getting -orange.
- We need -16 orange. We can easily get very negative with the 24 cyan door. Just change the spend color to orange.
- Now that we have all these doors, we need to get to the actual puzzle.
- We can open the first door no problem, with no need to use any pure keys.
- Next, we need -9 of a color. The only way that's possible is with purple, so we'll need to use a pure key to flip purple.
- Next, we need -16 of a color. This must be done by orange, since even with everything at our disposal, purple can only reach -15.
    - Therefore, the positive requirement must be purple.
    - Alternatively, you can use the 1 white you got on the surface for this, which'll save you one pure key!
    - So you could then salvage a pure door, but why would you do that?
- So we need another purple flip to get positive purple.
- And a flip + 12 + flip again to get -16 orange.
- That's all our pures, and we're done!
- Now we have a blank master door. That is our source of mimic:master.
- The only way to a positive brown is with a negative door, but we only start with positive stone, so that will have to be step 2.
- Now we need a way to get negative of some color.
- The only key we have to start with are stone keys, so we need something that requires positive stone. (or glitch)
- There's a blast door in T1-3 that can serve that purpose.
    - We can use the brown we left in Chapter 1 from before to salvage this.
- Now for the source of brown. We just need a negative door.
- I'll just use the all door from when we got the brown ω Key.
- Now we have everything we need.
- We'll get -11 pinks, get 11 browns, curse Kina, spend browns on random stone doors lying around, get our master key, and open Kina's Heart.
- Kina's Heart got!

World 12: Return to Doorhaven

- What, we're back?
- 12-1: Endless
    - New mechanic: Infinite Keys! They can be collected infinitely many times to get infinitely many keys!
    - We can only go up though, so we'll need to be careful here.
    - In increasing order, the door values goes green, blue, orange, red.
    - We need to go down the path with that order.
    - Solved!
- 12-2: Boolean
    - New mechanic: Gates! You can't destroy them like you do doors, and even if you have the required amount of keys, if you lose it, they close back up!
    - This puzzle is pretty straight forward. There's only 1 cyan door, so you can't open any cyan door until you have 2 orange and are on the goal side of the door.
    - So you'll have to master the cyan door on the top right, but when you do that, the blank master gate opens back up! So no need to spend the purple up there!
    - Solved!
- 12-3 Tollbooth
    - We need 9 pure keys. There're 14 of them in the puzzle.
    - Passing through the center costs 1 purple. We have 9 total, with no way of replenishing.
    - Plus, we need at least 1 purple to reach the goal, so we can only go through the center 8 times.
        - This means we can only access the right side 4 times.
    - We're forced to go through it right away.
    - Now, assuming we don't spend any purples, we need to go from 1 key to 9 keys. That's a net +8 gain.
    - Looking around, summing up all net positive trades, we get a total of 10 (counting the -master => master lock for a net 0 => master blank for net +1).
    - But the net gain in green is not that useful, since there's more green locks than keys, so make that a +9.
    - So that net +4 in the right green path is a must.
    - Then the rest can't be logically deduced, because there are multiple solutions.
    - Sorry, but I'll just leave it off here.
    - Solved!
- 12-4: Trap
    - We need to get all the -pures, then flip them.
    - The most troubling portion, and this puzzle's namesake, in the bottom right.
    - Whatever the glitch color is, if you open the blast door, then not only will you lose all keys of the glitch color, closing the gate, in the case when you curse the blast door, it will also just set the mimic color to brown, closing the gate anyway.
    - Therefore, the only way to bypass this is with a star key to not lose keys upon opening the blast door.

        - We can't star pink, as we'll have to open a door with pink, then zero it out for the gate, but after that, we have no more pinks we can collect to star.
        - We can't star brown, because of the blank brown gate at the end.
    - As such, we must star purple.
    - Therefore, we must get the pure key past the blank purple gate before doing this.
    - Now, notice how there's 4 pink keys, but 6 pink locks?
    - This, combined with the fact that we need to zero out pink, means we'll have to open exactly 2 pink locks with browns. The rest of the browns must be spent on purple.
    - And thus, we cannot open the purple 3 door with brown. It must be opened with purple.
    - So we'll have to go for the top left to get net +2 purple to open the 3 door.
    - Then, to zero out purple, we'll have to open the 1 door.
    - To do this, we'll have to have a leftover purple key stack to collect after zeroing out purple.
    - But because of the net +purple needed, we cannot afford to leave keys behind.
    - That is, unless we brown a purple door blocking one of those key stack.
    - As such, we must brown the purple 2 door on the top right or top left.
    - And with that, this puzzle is…
    - Solved!
- 12-5: Unstable Loop (Written by hyperbolia)
    - First thing to notice is that you can get infinite master keys!
    - Here's how:
    - Get 2 cyans (using the infinite signflip).
    - Curse the 2 cyan/master door, then dupe it.
    - Signflip your browns, and open until you have 1 copy left, for more master keys!
    - Now, how many master keys will we need for the solve?
    - Well, we need 2 copies of the all door for each frozen red blank (one to set red to positive, and another to set it back to 0). This makes 5 so far.
    - We also need 2 more to open the -2 copy door, since there's no other way to open that.
    - We also need one more to open the 24 master door after browning it.
    - That makes 8 master keys. But we start with 1, and there's no way to flip parity!
    - The final master key is used to blank brown, by making another copy of the all door.
    - So if you perform the unstable loop until you get 9 master keys, the puzzle solves itself!
    - Solved!
- 12-6: In and Out
    - Each gate has an interesting conundrum to deal with. From top to bottom:
        - Gate 1: Needs white > 29
            - The positive white keys are not enough, we need to pick up all the negatives and flip with the glitch key to collect the positive.

        - Gate 2: Needs orange starred
            - Simple enough.
        - Gate 3: Needs complex purple with positive real
            - This means the i key goes to purple
            - Purple needs to pick up one of the -glitch keys and flip
        - Gate 4: Needs black < purple AND negative purple
            - Black needs the -glitch key purple didn't pickup
            - The inequality forces black to pick up the -8.
            - So purple gets the -4.
    - That should be enough for a solve
    - Solved!
- 12-7: Rotation Station
    - Infinite rotation!
    - If you view real and imaginary and all signs as the same, this puzzle becomes a simple application of the First Principle™ (It's back!).
    - We need twenty, so a net +15.
    - In total, counting up all trades, we have a net 3+2+3+1+5+1 = 15, perfect!
    - To "sum up" the real and imaginary in practice, you would need to spend one side, and add to the other.
    - Solved!
- 12-8: No Return
    - We have to collect all pure keys.
    - We enter the playing field with
        - [0,15] white
        - [0,15] purple
        - And any of 1 red, 3 blue, 5 green.
    - We need 5 greens, because of erosion, and there's no other way to get +green.
    - We need -2 greens. The only source of green is the green/white blast door.
    - We also need to open a blank green on the top right, so we need to get exactly -2 green.
    - So white = 7, because 5-7 = -2.
    - We need to open a blue blank, but there's no way to reduce blue, so we cannot bring blues in.
    - Therefore, we must go up on the right fork.
    - But we pick up a blue key here, so we'll have to do the left path first.
    - The bottom path of the left fork is no longer possible.
        - To open the blank red door, you must have zero red, but then you need positive red to thaw the white door, but since there's no way to get positive red, this path is impossible.
    - We need to go top, which means we need to open the purple/white blast door.
    - Counting locks gets us that purple >= 6.
    - Combining this blast door and our value for white earlier, we get purple >= 6+7 = 13.

    - Later, we're forced to open a red/purple blast door. Plus, we have a red blank to open at the very end.
    - So we need to cancel that out with the red/white blast door, with the red keys flipped.
    - So we need to reach the red signflip key, so we need to get the red key at the start.
        - Reaching the signflip needs a purple keys, so purple >= 13 + 1 = 14.
    - Now that we've opened all the purple doors, we can't spend any more purples, so to pass the blank purple gate at the end, we'll need exactly 14 purples.
    - Now with 14 purples, after opening the blast door, we'll have exactly 7 purples.
    - And with that amount, the only way to zero out red is to:
        - Reduce by white using the blast door. | Red = 1-7 = -6
        - Signflip. | Red = 6
        - Reduce by purple at 6. | Red = 6-6 = 0
    - That should be…
    - Solved!
- 12-9: The Bridge is Eternal
    - We need both -pure.
    - But how do we get past the bridge?
    - The only way is to curse the bridge, making it impossible to open.
    - Positive brown will have to come from the inf-key.
    - The mimic:brown will come from the -2 brown door, which will be opened with the -4 brown.
    - Then, we'll zero brown with the 2 black door.
    - Now, to get the pures, we need to zero white and black.
    - White: 20 keys, 8+1+4+2 = 15 locks
    - We'll need to copy a door to zero this, this only one that'll work is the 8 door.
    - So now we have 23 locks, 3 over.
    - We could skip the 2 and 1 door for 0 white.
    - But we can also just use the inf-key to get more white for those doors.
    - And in-fact, that's what we have to do, because we need to get the -master to copy the 8 door, but that is behind the 2 door.
    - We don't have to worry about having too many master keys, because we can always zero them out with the inf-keys below the bridge.
    - Once we open the master blanks, we get mimic:master, which means we can just get master keys from the inf-key!
    - All we need to worry about now is black. We no longer care about the doors because of masters, but there's still a -4 pickup in the way.
    - We just need to preemptively get 4 blacks from the inf-key to counter that. Simple!
    - Solved!
- 12-10: Bypass
    - That gate arrangement means we'll need to zero brown, then get mimic:purple, and go in with zero purple.

    - To get mimic:purple, we'll have to open that purple/glitch blast door, but that'll give us purple! We need to get rid of them.
    - The only option is the glitch/purple door right after. Since this can only sped -40, we'll have to get -40 purple from the blast door.
    - So our goal is to get exactly 40 of a color and have mimic: that color.
    - With these blank doors, we can get mimic:each color and preserve them with brown.
    - We can do that for each of these doubler doors as well as the purple blast door!
    - We can only open one of the -1 brown doors, because if we open 2, all non-preservered glitch locks becomes brown, which we can't open because we have 0 brown. Plus with 0 browns, we cannot uncurse any preserved glitch locks, so we're stuck.
    - As such, we can only open a single -1 brown door and get a single stack of keys.
    - With only 1 stack of keys of a single color, the only thing we can do with the blast doors are to signflip or multiply by -2.
    - The only key count that can get to 40 by those actions is the 5 oranges.
        - 40 = 2^3*5
    - So to get 40, we do these actions:
        - 5 => -5 => 10 => -20 => 40
    - Solved!
- 12-11: Stellar Showing
    - We have an infinite supply of star and unstar, so we can do that whenever we please.
    - We need exactly:
        - -80 red
            - We have a total of 10+10+20 = 40 |red|, and we have a doubler, so that gets us the -80.
            - Therefore, all source of decrease in |red| must be ignored with star.
            - Btw there's a red blank on the top, let's just open that real quick. There's no glitch here.
        - -20 green
            - We have a total of 5+8+6(neg)+16(neg) = 35 |green|
            - We can't pick up the 1+1i, because we can't get rid of it.
            - We need to remove 15 greens.
            - We can only remove even amounts via pos-neg cancelation, so we need to skip an odd amount.
            - The only odd amount of the 5, so bye-bye 5.
            - Now we're at 30 |green|, and we need to remove 10.
            - We cannot ignore the -16 key now. 16 > 10.
            - We can use the 4 door to remove 4, then ignore the -6 key to remove 6 more. Perfect!
        - -8 blue
            - To get -8 blues, the 50 doesn't help.

            - We definitely need to open the two -4 doors to get 8, then signflip to get -8.
            - Now, from what we know above, we can already take a few forced moves, then realize that we're stuck unless we take the 50 blues and throw them in the blast door up top.
            - And unless we star it while opening the blast, we're stuck again, so we'll have to spend this on the -blast before we start building towards -8.
        - Just keep the above in mind and puzzle solves itself with a few ordering pickles that clear themselves up pretty fast.
        - Solved!
- 12-A: Harmony
    - We need to remove 255 keys.
    - Since addition is commutative, order doesn't matter.
    - Now, all we need to do is to "close the gap" between real and imaginary. If we get their amount equal, then we can just use the 1+1i door a lot.
    - The only way to get -real is with the left inf-key, so let's get down to -reals first, that's a must anyways.
    - So after we reach negative, we'll have -49-32i. The gap is 17.
    - The two inf-keys to the right closes the gap by 7 and 33 respectively.
    - And the left key adds to the gap by 68
    - There's no way to add them up to get 17, so let's keep going.
    - We need to go all the way to -201-48i (gap: 153) to find a solution
    - 153 = 3*7+4*33
    - So use the rightmost key 4 times, and the one beside it 3 times.
    - Solved!
- 12-B: Peek
    - In the end, we need exactly 1 cyan key and 0 white.
    - We cannot pick up the star key right away, because we actually need positive white to be able to open any white doors here, which is required to even get our cyan count down from 6.
    - Cyan: 4+6+8 = 18 keys | 4+5+1+1 = 11 locks
    - Even if we use the -master on the 5 door, we still have too much cyan.
    - Therefore, we cannot pick up the 8, as the rest is forced.
    - Now we have 10 keys and 11 locks. If we ignore the 1 door blocking 8 stack, we'll be good.
    - We cannot pick up the 5 white, because there's no way to spend them all.
    - But because of cyan, we're forced to open the 1 door and pick up the -2.
    - So we'll open the 1, use the blast door (while staying in the gate), and star at 0 so we can ignore the -2.
    - Solved!
- 12-C: Gatemaze
    - The entrance is forced to be open, so we need to pick up -cyan.

    - Because of that big horizontal line of purple in the middle purple must be either 0 or -1, and cannot be 1.
    - Because of that, at the exit, orange is forced to be either 1 or -1, and not 0.
    - And again at the exit, pink is forced to be either 1 or -1, and not 0.
    - At the entrance, going up will always lead to a deadend, in both cases for purple. As such, red must be 1.
    - And blue must be 0.
    - And orange must be 1.
    - And pink must be 1.
    - And finally, purple must be -1.
    - Solved!
- 12-D: Factory Reset
    - The left setup lets us store an infinite amount of any 4 colors of our choosing.
    - Let's first match all the keys to their blank door to see what we have to work with.
    - After matching all the keys, we see that we'll have nothing by the time we get to the blank glitch door and the -8 glitch keys!
    - Because we'll need to still have +1 of each of the four colors by the end, we can't pick up the -8 with any of them!
    - And also because of that, the four locks in front of the final door must be disposed of with brown.
    - But that also means we can't pick up the -8 with brown either, because then we won't be able to have 4 browns to open those doors.
    - As such, we must resort to the one remaining color here: glitch!
    - To actually get mimic:glitch for the -8, we'll need to preserve it in the bottom left room.
    - But that leaves us with 3 slots remaining, with 4 colors we'd really like to preserve.
    - All four colors have at least 1 key stack that is blocked by a door of a different color, and therefore must all have a way to get mimic:[their color] back after opening the previous door
    - For most of these colors, there's no way to do that except by the bottom left setup, save for white, with the white/glitch all door on the top left.
    - So it'll have to be white that gets skipped, but how do we pull this off?
    - First off, we'll need to take advantage of the fact that the last color in the blank doors on the top left is white, which we can use to get rid of the first 3 whites.
    - Next, for the 5 whites coming up, we can use the white/glitch all door with mimic;purple to get exactly -5 whites using 5 purples.
    - And everything after is pretty straightforward.
    - Solved!
        - Sidenote: Originally, this puzzle had a +8 key on the top left that allowed you to cheese the mimic:glitch part and just pick up the -8 key with any non-brown color and cancel it out with the +8.
        - Sidenote, the Second: Though likely unintended, one can also skip preserving green by preemptively collecting -4 green keys when opening

the initial green blank. Then you collect the -7 green after opening the next green blank.

Chapter EX: Garden of Dreams

- Page 1: A Fitting Start
    - We need to zero all colors.
    - We have a total of 18 + 16 + 30 = 64 keys.
    - Each lock is a tile, and we have 8x8 = 64 tiles to work with.
    - Therefore, all tiles must be filled.
    - Notably, no outputs can be obstructed, as that would cause a tile to be unfilled.
    - The 35 in the bottom left corner shows that it must be 1 wide.
    - And also, it's impossible for any output to reach the tile 4 above the bottom left, except for the 35.
    - Therefore, 35 must be 1x5.
    - Now, it is impossible for any input, except 38, to reach the tile 4 up and 1 right from the bottom left.
    - Therefore, 38 must be 6 wide, and there's only one door that is 6 wide.
    - It's now impossible for any output, except for 37, to reach the tile 5 up from the bottom left.
    - This, combined with the adjacency of the two 37 near that tile, 37 must have a 4x1 door.
    - Now, it's pretty clear that 36 must be 2x3, and 39 must be 2x2.
    - Each SID will need to have a spend color now.
    - Each SID will cost this much keys:
        - 35: 2*5 = 10
        - 36: 3*6 = 18
        - 37: 4*4 = 16
        - 38: 2*6 = 12
        - 39: 2*4 = 8
    - Orange has to have SID 37
    - White can then have SID 36
    - The rest goes to Purple
    - Now, in order to actually be able to reach the upper doors via platforming, we need to be able to stand on some of these door.
    - Thankfully, the puzzle provides a cyan signflip, which can temporarily prevent us from open doors with cyan locks.
    - This means that the higher pu doors should have non-cyan locks.
        - Particularly, SID 38, 37, the rest can be reached from the floor.
    - Solved!
- Page 2: Blank Memory
    - Seems like we can only salvage a single door for SID 43-45, might as well do that. We can always change their colors later.
    - Another zeroing puzzle.

- Those salvaged doors are our only source of odd lock amounts.
- All of our key counts are odd, but we only have 3 1-doors.
- As such, one of them must use the 0 exact key.
- Plus, all 1 doors must be opened.
- Let's count each color now:
  - Pink: 9 keys | 8+4+2+1 = 15 locks
  - Orange: 15 keys | 8+2+2+2+1 = 15 Positive, 6+8 = 14 negative, 28 total.
  - White: 5 keys | 4+2+2+20+1 = 29 locks
  - Purple: 39 keys | 20+6+1 = 27 locks
- SID 45 is behind a 20 white door. That door can only be opened after zeroing white, and the only color left to zero after that point is purple, so SID 45 must be purple.
- This also means that purple must be zeroed normally.
- This also means we must avoid the purple i keys, as there's no way to spend them.
  - (this forces the bottom path below, and the top path above)
- We are lacking purple locks, 12 of them.
- We could duplicate the 6 door two times, but there's a better option.
- If we get the +8 purple, then we are now 20 away, which means we can just duplicate the 20 door once.
- Now, SID 44 is behind a negative orange door.
- This means that SID 44 cannot be for orange, as it can only be opened with positive orange, and there's no way to flip from positive to negative orange once you've reached here (you would have used the signflip already).
- Additionally, SID 44 cannot be pink, because before this, there's a 1i exact key. Right after the unstar too.
- So, by the time you reach SID 44, you either cannot open it, or have already zeroed pink beforehand; neither case involves opening this door.
- As such, by process of elimination, SID 44 must be white.
- There are a lot of orange doors we need to open.
- There's no orange star key, so they all must be opened normally.
- In total, the required locks are 13 positive and 14 negative, totalling 27 locks.
- But in total, counting the keys from the bottom, we have 25 keys, which is not enough.
- That seems impossible, but we do still have another source of orange, the bicolored door.
- That bicolored door requires pink, which, at that point, would have gotten set to 1i by the exact key.
- Therefore, this must come after zeroing pink, and getting the 24 below.
- If we were to use it with the 2 we still have, getting -4, we'll just get stuck, which is why we need to use it again with the -master key.
  - There goes all our -master!

    - But later, to open the white 1 door, we'll need 0 of some colors, and since at that point, we'll need have the -10 from the bottom to open this door, we'll have 24 pink that cannot be zeroed, and purples that need to be zeroed after white.
    - Therefore, this zero condition of the white door must be orange.
    - But that means zeroing orange again!
    - Which means all the doors and keys need to match. Previously, we added an extra 2 orange using the -master. We need to cancel that out now by opening an extra 2 door, which can be found above.
    - Now, we'll deduce the color for SID 43, as well as the exact key.
    - Assume SID 43 is pink.
        - That means we'll need to go through the top path, with the pink 8 door and 4 door to reach SID 43.
        - To zero out pink, we must open the 8 normally (we have no more -masters). If we didn't open it, we'd only have 7 locks left.
        - But then, we can't open the 4 door after that. A contradiction.
    - Therefore, SID 43 must be orange, and the exact key must be pink.
    - In order to get mimic:pink after reaching the exact key, we'll need to open the pink door at the bottom.
    - On to actually zeroing out the rest of these colors.
    - Now, if we're looking at white, one can notice that we need to open literally every door.
    - That would normally be impossible, because we only have 5 whites, but we have a star key, so we can use that to ignore 4 locks.
    - Next, for pink, reaching the exact key requires opening a bunch of pink door, which we don't have enough for, so we also use the star key for that.
    - To open the orange 1 door, we must have zero of some color, and that color must be pink.
        - This is because we need to open this door before zeroing white and purple, as shown earlier.
    - Now we can get our 0 whites easily enough, and right after, 0 purple, which will need that 1 door's blank condition be set to white or orange, because they're the colors we have 0 of at that time.
    - Solved!
- Page 3: Preserved Memory
    - Our master keys got starred at 0, so no master keys in this puzzle!
    - In the end, we need 0 cyan and pure.
    - We start with 15 pures, and since we don't have a pure ω Key, we need to collect all of the -3 stacks across the room.
    - And also, we need -3 cyan, which we can get right now by opening the cyan/pure 15 door.
    - We'll need the -40 orange to open the both -20 doors, that's non-negotiable. There's not enough positive doors to get -40 oranges any other way.
    - As of current, the positive cyan door in the center path is impossible to open.
    - We'll need to salvage a door to make that possible. We'll figure that out later.

- We need to zero cyan. We're forced to open the -3 door, which means our cyan count is now -12, 0 mod 4.
- Now, considering every door able to give cyan (we need to consider EVERY door due to salvages), we get that most doors are 0 mod 4, save for -1, -2, 3, and, -15.
- We seemingly need to open the 2 door with cyan, so let's first assume that's the case.
    - First, we'll need positive cyan, which can only be achieved by the glitch signflip or a salvaged door.
    - But the signflip is blocked by the 2 door! We must use a salvaged door.
    - The only negative doors available are -8 and -20.
    - Additionally, after opening the 2 door, we'll have 2 mod 4 cyan.
    - Neither the -8 nor -20 can fix that, as they're both 0 mod 4, so we'll have to use another salvaged door to fix this.
    - That door must be another 2 door, to get us back to 0 mod 4.
    - But now, with all this setup, we can no longer open the 1 door with cyan.
    - And also, we cannot open the 1 door with oranges either, because we need them to open the -20 doors, and there's no extra salvage to get extra oranges.
    - As such, this is impossible. We cannot open the cyan 2 door with cyan.
- Therefore, as the text hints, we must bring in brown to open the cyan 2 door.
- And therefore, one of the salvages must be a negative door that gives brown, which can be -3, -8, or -20.
- But after opening the 2 door, we'll need to open a -20 door with orange, so we'll need to either zero them out, or get them to negative.
- To get negative brown, we must use the other salvaged door.
- For both 8 or 20 browns, existing doors can't get us to 0, so we must also use the other salvaged door.
- For 3 browns, the existing doors ARE enough to spend them all (1 + 2 door), but the remaining doors are too much for cyans to open.
    - There're 4 extra locks, so we'll need to get exactly 4 extra cyan to reach 0 by the end.
    - This can be done by the 4 door, but we'll need positive of another color to open this while cyan is negative.
    - However, orange is negative, we can't get the 4 door to be pure, and brown would curse the door, so there's no options here.
    - As such, this is just plain impossible.
- So either way, we must use the second salvage for brown.
- As such, we can no longer get any extra cyans from the salvaged doors, meaning the only way to zero out cyan is by opening the -8 door, then signflip to open a 4 door.
    - The rest of the doors must be opened with brown.
- But now, the only way to reach any of those doors is via orange or brown, which both need us to open the first cyan/pure 15 door, so by then, our only source of mimic:cyan is the combo cyan door on the top left.

    - But we'll need to open that to reduce brown before opening the -20 door blocking the signflip, so we'll need a way of getting mimic:cyan back after opening the cyan combo door.
    - Which is why we'll have to preserve mimic:cyan in one of the glitch doors to use later.
    - This will have to be the -8 door, because it's the only door we can open with cyan before getting the signflip.
    - Now, we know we'll have to get +browns before opening the cyan combo door (so that we don't override it with mimic:brown), so that door will have to go to SID 46.
    - And, we know we'll have to get -browns to uncurse the preserved door, so we'll need to use SID 47 to do that.
    - Since we cannot get 0 browns using the doors we can open with brown, SID 47 must be part pure, else we can't open it and get -brown.
    - Therefore, SID 47 must be the 15 door.
    - Then, for SID 46, you can use either the -8 or -20, both works, though you will need to make the inner color orange if you use the -20 door.
    - That should be it!
    - Solved!
- Page 4: Starlit Memory
    - By the end, we need all three auras, and 0 black.
    - To get those keys, we'll need 3 doors, one for each color (there's no glitch door).
    - They will use all of the 3 SIDs we have.
    - Since none of the SID can affect black, black must be zeroed using the 0 exact key, as there's no odd black door anywhere.
    - Therefore, the latter two doors must either be a negative door opened by a non-black negative color, or a positive door with its result signflipped with the glitch key.
    - With these doors forced to output RGB, there's no way to get other negative key colors.
    - Therefore, we'll have to use a positive door to get negative keys for a following door.
    - But then we'll need to access the signflip key, so we'll need to open that 12 master door somehow.
    - We'll do that by cursing it, then using a master key, which will have to come from the middle path on the right.
    - Those two need positive green and blue respectively, so therefore, the negative color must be red.
    - Now for the doors themselve, we have two options here for the negative doors, the -5 door, and the -2 door.
    - And for the positive (red) door we have either the 1 or 4 door, but since this amount will have to be able to open a follow negative door, and the negative door will require at least -2 keys, we have to use the 4 door.

    - This also means that the negative door must be openable with -4 reds, so it must be the -2 door, which will then have to be duplicated with the -master key, because it's not enough for either green or blue.
    - And even with the -master, it only gives 4, so this has to be the blue door.
    - This means that the green door must be the -5 door, so that we can get 5 greens. However, since the positive door only gets us -4 keys, we must use black to open the green door, meaning it must be first.
    - Now that we can't use black to open the red door, we must use green, as that's the only positive color we have now.
    - So, with all our deductions, we know the salvaged door are, in order: -5 Green/Black, 4 Red/Green, and -2 Blue/Red.
    - Now, we just need to salvage these guys.
    - The 4 door and -2 door is no problem, but how do we get the -5 door?
    - There are two ways we can open the -5 door, via a master key, or via -5 browns.
    - Case 1: Master key
        - This needs 3 blue, which we can get easily from a -2 door.
        - We can't use black to open that door however, as we'll need to zero out black to get the master key. So we'll just use the same plan for the final step with reds.
    - Case 2: -5 browns
        - You need to open at least 2 positive brown doors, as the highest valued positive door that can actually be opened normally is the 4 door, which is not enough for -5.
        - If you try to open both with black, you run into a problem: you end up hitting the exact 0 before you get to open another door, a similar problem to the one for the actual solution.
        - So we'll just use the same plan for the final step with reds, but reversed, aiming to get positive to open the 3rd door instead of negative.
        - Then we can do either 1+4 to get 5, or 4+4 to get 8.
    - Now, just be careful with how to get the doors into the SIDs, and you should be good!
    - Solved!
- Page 5: Ancient Memory (Normal FInish)
    - At the end, we need exactly 1 (unstarred) stone key.
    - But we're also set to exactly 12 stone right before.
    - So we need to spend 11 keys here.
    - That only seems possible if we had, let's say, a stone/whatever blast door whilst having 11 whatevers.
    - But for that to happen, we need the Stone ω Key.
- Page 5: Ancient Memory (Stone ω Key)
    - We'll need -3, 3, -3, 3, -3 stones. That's a lot of switches.
    - We'll investigate various methods of doing this.
    - Case 1: Starting with 8 stone.
        - There's only 2 existing source of negative stone (-9 key + signflip)

        - We need 3, so we'll have to salvage a positive stone door. And turn it into a stone/??? Door, where ??? is a non-special color you have the ω Key for. I'll use… orange.
            - It will be either 2, 3, or 8.
            - 2 is a no-go, as we need -3 stone for the doors.
            - 8 is a no-go, because we won't have can't get enough orange from the next step.
            - So 3 it is.
        - Then, we'll also need to salvage a negative pure door (not stone!) to turn into a orange/pure door
            - We can't use stone because we don't have access to -3 stones at the start.
            - We'll use the -5 pure door. It's the only one.
        - In order to get the -5 pures to start the whole thing, we need to either get the -20 pure up top, or get the pure signflip, both of which need -stones or -pures.
        - So we'll have to start by getting our first dose of -stones from the -9 key.
        - However, we have 8 keys by the time we unstar, with no way to spend more, so we cannot reach -3 as desired.
        - But we can fix this with our remaining salvage! Just salvage a regular old stone door and get down to 6 or less. That way, we'll get enough to open the -3 door.
            - For now, any of the 2, 3, or 8 door would suffice.
        - Now, because of the exact stone key on the bottom, neither of the doors that affects stone can go to SID 53, so we'll have to put the -5 orange/pure in SID 53.
        - Then, we'll have to both open the inf key, and get our 5 oranges.
        - But to get to SID 53 to get those oranges, we'll star pure at negative, which means we can't open the blast door to reach the inf key.
        - As such, we must open the inf key first, but that means removing all pures, so we'll have to have a pure key stack available, which will have to be the -20.
        - So we'll use the -stones we have to open the -2 door so that we can access the -20, and use the rest on the blast door in order to access the stone signflip.
            - This means we'll need at least -6 stones after getting the -9, which means we'll have to salvage the 8 door to spend enough.
        - Now the rest of the puzzle should be simple enough.
    - Stone ω Key got! But we have another case to look at!
    - Case 2: Starting with -8 stone.
        - With -8 stone, we're forced to go for the upper unstar key.
            - We can't reach the bottom one because it's blocked by a positive stone door.

        - This forces us to salvage a negative pure door so that we can turn it into a pure/orange door to get the 20 pure required to reach the unstar.
            - The -5, naturally.
            - Also, we'll take the pure star key to bypass the -20.
        - As well as salvage a positive pure (not stone!) door to turn into an orange/pure to get -orange.
            - Not stone, because we cannot open a positive door with stone right now.
            - The 6 door, because we literally cannot open the 12 door right now.
        - With all this setup, we can no longer do the "use salvage to get negative stone" setup from earlier, which requires 2 more SIDs to work with.
        - As such, we must take advantage of all sources of negative stones we have.
            - Starting with -8, the -9 key, and the signflip.
        - Knowing that, this should be pretty simple!
    - Stone ω Key got! In two ways!
- Page 5: Ancient Memory (Normal Finish cont.)
    - Now that we have the ω Key, we can actually solve this puzzle.
    - As mentioned before, we'll need a stone/orange +blast door at the end.
        - You could use colors other than orange, but it cannot be pure, because they need to be 0 by the end.
    - As such, we need a way to get exactly 11 oranges, which will have to be an orange/stone -blast door.
    - Now, we need to get exactly -11 stone, how do we get that?
    - We can just do that by using the inf-key to get 11, then signflip!
    - Now, let's look at how we zero pure.
    - To get rid of the 1i pure, we'll need to pick up the -1i pure.
    - But that is behind a signflip, so we'll need to pick up the other signflip too in order to get back to 1i and cancel out properly.
    - And any extra pure we can get rid of with the blast door.
    - That requires us to open quite a lot of positive stone doors.
    - If we start with -8 stones, we will, again, have to go for the top unstar key.
    - However, we can't afford to pick up the pure star key to bypass the -20 this time, because we'll need to zero pure, so this is a no-go.
    - We need to start with +8 stones.
    - Now, when we try to go through with the plan, everything just works… out? That was unexpected.
    - Just remember you can get extra stone from the inf 12 exact key!
    - Solved!
- Page 6: Golden Memory
    - Master ω Key got!
    - Well that was nice. No puzzle to solve to get the dub!
    - Now, we'll need -master and 0 master, alternating, similar to 8-A.

    - Hey, isn't this just 8-A?
    - For the stable loop, we need a:
        - 5 master/stone door, to get -masters.
        - -5 brown/master door, to get +browns.
        - 5 brown/stone door, to get -browns.
    - They'll have to go into SID 54,55,56 in that order for the initial setup at the start to work out like in 8-A.
    - Then just do the solution for 8-A, it's literally the same.
    - Solved!
- Page 7: Fizzling Memory
    - Glitch ω Key got!
    - We start by starring every color except for the colors on the in-puzzle counter, and glitch (we start by opening a pure door, so we aren't gonna be able to collect glitch keys anyway).
        - Nice anti-cheese.
    - Each SID can only have exactly one type of door, so they're fixed. Only the colors can be changed.
    - In order to to actually be able to duplicate the glitch doors, we need to remove the initial mimic:pure by opening the blank orange door in the right portion before
    - For the first orange blank, we'll need to take 5 oranges, and turn it into -3.
        - That can only be done with the center door
    - Then, we need to turn -2 orange to 3 again.
        - The center door again.
    - The previous two steps indicate that the center door's must be a orange/(orange|3 glitch) door.
    - And we need to signflip purple.
        - The left door.
    - Then, we need to take -8 cyan, and turn it into -15, given 15 purple.
        - The left door again.
    - The previous two steps indicates that the left door must be a glitch/(glitch|purple) door.
    - Now, we need to take 1 pink, and turn it into 25, given +15 orange and exactly -40 pink.
        - The right door.
    - Now, we need to take 99 pures, and turn it into 0, which can be done with the following steps:
        - Get mimic:orange using the center door.
        - Set orange to -purple using the left door
        - Get mimic:pure.
        - Blast pure using the right door as a pure/(pure/orange/pink) door, now that orange and purple cancels out.
    - The above two usage of the right door indicates that it must be a glitch/(glitch|orange|purple) door.
    - Now with all the steps, just execute.

    - Solved!
    - And would you look at that? A new place!
- Page A: Compounding Memory
    - Well, we only have 1 door we can salvage, so let's just do that.
    - Now, we need to get an exact amount of 3 colors.
    - Each door needs to get us a unique color.
    - There's no way we can get -471 purples from the first door, because even with our highest number, 33, we cannot reach it by multiplying by 8.
    - And there's no way to get 266 whites either, because our only negative number, -5, cannot reach 266 with 8 copies.
    - As such, the first door must give -57 orange.
    - The 2nd door also cannot get us to -471 purple, for the same reason.
    - So the 2nd door must be white.
    - And the 3rd door must be purple.
    - Now, let's figure out what locks to put on these.
    - Door 1
        - We need these two equations to be true for natural numbers w, o, p, in the range [0,9].
        - (1) w + o + p = 9
        - (2) -5w + 8o + 33p = 57
        - (3) = 5(1) = 5w + 5o + 5p = 45
        - (4) = (2)+(3) = 13o + 38p = 102
        - Now, we take this to mod 13
        - 13o + 38p = 102 mod 13
        - 12p = 11 mod 13
        - Since 13 is prime, there exists a unique inverse to *12, and it's *12
        - 12p*12 = 11*12 mod 13
        - p = 2 mod 13
        - So p = 2
        - 13o + 38(2) = 102
        - 13o + 76 = 102
        - 13o = 26
        - o = 2
        - So w = 5
        - (w,o,p) = (5,2,2)
    - Door 2
        - (1) w + o + p = 9
        - (2) -5w - 49o + 33p = -271
        - (3) = 5(1) = 5w + 5o + 5p = 45
        - (4) = (2)+(3) = -44o + 38p = -226
        - (5) = (4)/2 = -22o + 19p = -113
        - Now, we take this to mod 19
        - -22o + 19p = -113 mod 19
        - 16o = 1 mod 19

        - Since 19 is prime, there exists a unique inverse to *16, and it's *6
        - 16o*6 = 1*6 mod 19
        - o = 6 mod 19
        - So o = 6
        - -22(6) + 19p = -113
        - -132 + 19p = -113
        - 19p = 19
        - p = 1
        - So w = 2
        - (w,o,p) = (2,6,1)
    - Door 3
        - (1) w + o + p = 9
        - (2) 266w - 49o + 33p = 504
        - (3) = 49(1) = 49w + 49o + 49p = 441
        - (4) = (2)+(3) = 315w + 82p = 945
        - I'm not gonna bother with modulus with this one.
        - The only answer here is w = 3, p = 0
        - So o = 6.
        - (w,o,p) = (3,6,0)
    - Solved!

Epilogue: Bridge to New Memories

- Pure ω Key got!
- Big room!
- Ultimately, we want to salvage that very wide door to SID 78.
- On the right, we can salvage anything in the room into any SID from 60 to 77.
    - 18 SIDs!
- To do that, we'll need to open every door on the left, and have 0 of everything by the end.
- We'll need exactly:
    - 256 master
    - 213 pure
    - 99 white
    - 54 purple
    - 50 stone
    - 33 cyan
    - 10 red (because of the signflip when entering)
    - -9 orange
    - -20 green
    - -30 blue
    - -75 black
    - -101 pink
    - -199 brown

- 13 colors, they need to occupy 13 SIDs. 5 left.
- I'll throw in a 5 glitch/stone door and an -8 glitch/pink door, so that I can reach all these numbers. Since they're coprime, this should be able to reach any integer.
- With these two doors, I estimate that we'll need at least:
    - (256+213+99+54+50-13+33+10)/8+(9+20+30+75+101+199)/5 ~= 175 negative masters.
- So we'll add in master/stone triblast, and a pure/master triblast and a master/pure dualblast, to get ourselves 13*3*3*2 = 234 -masters.
    - The extras are just in case of emergency. We aren't gonna be hitting the mark with the -5 and 8 every time, so we may need to do a bit of shuffling.
- Then, we'll just add a lockless door for each color we need.
- For pures and master, we'll just need to stockpile on door copies until we can get them done in one fell swoop!
- (This is NOT the most optimal way, but simply the way I solved it.)
- Salvaged!
- Now, all we need to do to cross the bridge is to enter and exit a puzzle on the other side of the 13 stone door, and viola! The End.
- Well, not quite.

World Ω: Lockpick Horizon

- We're in the home stretch.
- Ω-1: Copy
    - It looks like we need exactly 1 white, 4 pink, and 2 red to pass the bottom combo door.
    - All other doors are essentially all possible ways to set one color to the negative of another color.
        - We can also negate purple.
    - If we overwrite any of the required values (1,2,4) then we can never get them back, so our first move must be to write to purple.
    - We want to switch the count of red and pink, so could use purple as a buffer variable:
        - Starting at {1,2,4,8) (white,pink,red,purple)
        - Set purple to -red. (1,2,4,-4)
        - Set red to -pink. (1,2,-2,-4)
        - Set pink to -purple. (1,4,-2,-4)
    - That would result in the magnitudes all being correct, but red is negated.
    - We would need to use purple again to flip red, since we never had the chance to flip the 2 during this entire operation.
    - So let's just do that!
        - Set purple to -red (1,4,-2,2)
        - Negate purple (1,4,-2,-2)
        - Set red to -purple (1,4,2,-2)
    - Solved!

- Ω-2: Square
    - The bottom setup squares each color's amount, and puts the result in another color.
        - Pink => red
        - Cyan => green
        - Purple => blue
    - The puzzle can thus be modeled with this system of linear equations, where:
        - r + g = 337
        - g + b = 425
        - b + r = 250
    - We know how to solve systems of linear equations at this point, so I'll just say that the solution is (r, g, b) = (81, 256, 169).
    - So (pink, cyan, purple) = (9, 16, 13), as they must be positive.
    - Solved!
- Ω-3: Set
    - These doors with the blast lock and a normal lock "sets" their spend color to the value of the normal lock.
    - Of course, these also require that amount of the other color to open, so there's that.
    - Our goal is to reach all pure keys, then still have -20 pinks (via signflip) and -20 blues so that we can get 40 pures.
    - Only spend 1 color at a time until you open a "set 20" door.
    - The mid-top path has you needing all of your "set 20" doors, so you'll need to dig into that ASAP.
    - Remember to take the set door in the paths to your advantage to open more doors. That's all.
    - Solved!
- To access the rest of the puzzles, we'll need to get -12 pures outside, which means salvaging the 12 stone door, and changing it to a pure/stone door.
- …Looks like I've got my work cut out for me.
- Ω-4: Alternator
    - The machine on the left alternates giving out 4 whites and 4 pinks. And between each alternation, you must spend all of the keys you got.
    - If you count the lock, you'll see that there's 16 white, and 16 pinks, which means you'll cycle 4 times.
    - The path to the exit just so happens to require all four cyans to contribute to it, so you better do that!
    - Just make sure you've always got 5 of the next color to open when choosing which door to open. It's not that hard to do.
    - Solved!
- Ω-5: Average
    - The machine on the right takes sets both red and blue to their average, or (red+blue)/2.
    - It breaks if red+blue is odd though, since key amounts can't have decimals.

    - The end goal is to reach 832 reds and 64 blues.
    - After averaging, red can only be doubled, and blue can only be subtracted by 5.
    - Therefore, the average must be 64 mod 5 = 4 mod 5, and is 832/2^n for natural number n.
    - The only number that meets those criterias is 104.
    - So we need that red+blue = 104*2 = 208.
    - You can get that by going through the construct with 256 reds, then subtract blue 10 times to get a total of 208.
    - Finally, you just need to go through the machine again, and double red and subtract blue until you get to the target.
    - Solved!
- Ω-6: Root
    - This machine calculates the square root of black and puts it in red.
    - So this puzzle represents this equation:
        - 4x - 9sqrt(x) = 559
        - 4x - 9sqrt(x) - 559 = 0
        - 4(sqrt(x))^2 - 9sqrt(x) - 559 = 0
        - Use the quadratic formula to solve for sqrt(x)
        - sqrt(x) = (9+-sqrt(9^2-4*4*-559))/(2*4)
        - sqrt(x) = (9+-sqrt(9025))/8
        - sqrt(x) = (9+-95)/8
        - 9-95 is not divisible by 8, so it must be 9+95
        - sqrt(x) = (9+95)/8
        - sqrt(x) = 13
        - x = 169
    - Solved!
- Ω-7: Append
    - This machine computes (pink concatenates cyan), and puts it in black.
    - After each usage of the machine, you can copy black to pink or cyan.
    - So this is how to get “33113311311”:
        - pink|cyan => black
        - 3|11 => 311
        - 3|311 => 3311
        - 3311|311 => 3311311
        - 3311|3311311 => 33113311311
    - For each step, you need to collect green = (digits in cyan) - 1 for the machine to work.
    - Solved!
- Ω-8: Verify
    - This machine, for each digit in white, from lowest to highest, asks you what number is the digit, and you input by subtracting that amount.
    - If there are no subtractions needed for a digit, you go through the side path to skip the subtraction.
    - Of course, you’ll need to get 4038 whites, to match black.

    - Solved!
- Ω-9: Ten to Two
    - This machine is exactly the same as in Ω-8, but instead of asking for digits of white as a decimal number, it instead does so with white as a binary number.
    - Therefore, you need to convert the 101000111 black at the end to decimal and get that amount of white, which is 327.
    - Solved!
- Ω-10: Two to Ten
    - The machine is exactly the same as in Ω-9, but the subtract amount is different, making the input binary, and output decimal.
    - You need white equal to black (101) in binary, which is 1100101.
    - Solved!
- Ω-11: Limited Copy
    - This is exactly the same as Ω-1!, just without the star -master key.
    - We can try our previous solution, but it won't work, because we'll find that signflipping red via purple will need another instance of "purple to -red", which we can't get now because of the lack of a start -master.
    - Therefore, we have to mess with white a bit.
    - The problem is that using purple as a buffer to switch purple and pink overlaps with using purple to negate pink or purple.
    - So let's try to use white as the buffer instead (we'll buffer white in purple), then there should be no overlap.
        - –Buffer white in purple–
        - Purple = -White (1,2,4,-1)
        - –Switch pink and red using white as a buffer.--
        - White = -Pink (-2,2,4,-1)
        - Pink = -Red (-2,-4,4,-1)
        - Red = -White (-2,-4,2,-1)
        - –Return white from purple
        - White = -Purple (1,-4,2,-1)
        - –Negate pink–
        - Purple = -Pink (1,-4,2,4)
        - Purple = -Purple (1,-4,2,-4)
        - Pink = -Purple (1,4,2,-4)
    - Solved!
- Ω-12: Downward Spiral
    - We need exactly 7 orange, -33 purple, and 15 cyan.
    - We can subtract orange from purple, purple from cyan, or cyan from orange.
    - You can reach any amount with a combination of 1 and -1, by getting to 1 -1 1, then just flipping the 2nd 1/-1 in the consecutive 1/-1s using the 1st 1, until you reach your desired amount.
    - So we'll work backwards, aiming for one of those scenarios.
        - orange purple cyan
        - 7 -33 15

        - 7 -26 15
        - 7 -19 15
        - 7 -19 -4
        - 7 -12 -4
        - 7 -5 -4
        - 3 -5 -4
        - 3 -2 -4
        - 3 1 -4
        - 3 1 -3
        - 3 1 -2
        - 1 1 -2
        - 1 1 -1
    - Now just go backward and win.
    - Solved!
- Ω-13: Signature Puzzle
    - We need all blue keys.
    - To open each door on the right, we need 0 whites. But all of them give whites, which need to be countered with reds or else we can't open any more whites.
    - We are given a few exact keys to change red with.
    - This puzzle can be interpreted as such:
    - We want to hit every point on a 3x3 lattice on the complex plane consisting of all orange costs for those doors, starting from any point on the lattice.
        - We can start on any point by duplicating the two red/orange doors at the start.
    - We're given several "line segments".
        - Vertical 1
        - Horizontal 1
        - Both root 2 diagonals
        - And all root 5 diagonals
    - There's 8 of them, and 9 points to hit, so we need to use all of them.
    - We can only use each line segment once.
        - Or twice consecutively, but there's a solution where we only use them once.
    - This is similar to a phone's pattern password.
    - One possible solution, obtain via messing around
        - Starting at 1+1i
        - 1 up => 1+2i
        - 2 right 1 up => 3+3i
        - 1 left 2 down => 2+1i
        - 1 right 1 up => 3+2i
        - 2 left 1 up => 1+3i
        - 1 right => 2+3i
        - 1 right 2 down => 3+1i
        - 1 left 1 up = 2+2i

    - Solved!
- Ω-14: Shaft of Balance
    - We first need 0 green, master, orange, and red.
        - Well, you can technically master the green blank, so maybe not green.
    - Then, in a one-way fall, we need that white = blue = black.
    - Let's first figure out how to zero things out, we're used to doing that after all.
        - Orange: -12
            - Our only source of orange is the 6 door.
            - So we need to signflip, and dup this door.
                - 1 master gone, 6 left.
        - Red: 2
            - The only red locks are at the end, so we need to clear 2 paths.
    - Now for the equality check. We'll consider the gap between these numbers, and aim to make them 0.
        - Black-Blue: 23
            - Relevant door's contributed amount
                - -8, -5, 20, -8, 4, -20, -12, 10
            - We have an odd amount, so we need to open the 5 black door.
                - At 18 now.
            - 18 is 2 mod 4, and the only 2 mod 4 door here is -10 black door, so that needs to be opened.
                - At 28 now,
            - This also means we need to get -10 green.
                - This obviously needs -masters, but to even reach the master signflip, we need to get -6 greens.
                - This can only come from opening the -3 and -2 door to reach 6, then signflipping.
                - You can't open the 3 door, so it must be mastered.
                    - 1 master gone, 5 left.
                - Then, to get -10, open the 2 green/orange door 2 times.
                    - 1 master gone, 4 left.
                - During this whole process, you won't be getting 0 green, and you definitely won't be getting it by the end, so you need to master the green blank.
                    - 1 master gone, 3 left.
                - This process, along with the process for zeroing orange, maks opening the bottom right -6 white/orange door impossible, because you'll have -masters and +orange.
                - As such, the red door behind it is impossible to open, making the other two red locks required.
                - Also meaning that every other door is required to be opened, via master or not.
                - And so the doors after the master signflip must be opened normally, that being the -9 white/orange.

                - Therefore, the blue/green -8 door must be opened normally.
            - Now we have 20, but the rest of the doors add to -16, so we need to ignore the 4 door.
                - 1 master gone, 2 left.
        - Black-White: 57
            - From the forced doors previously, we need to open the 5 black, 20 black, -10 black/green, the -6 white/green, and the -9 white/orange.
            - As such, we have a gap of 27 now.
            - Relevant remaining door's contribution amount: -12, -6, -3.
            - All those doors sum to -21, which is not enough. We need to extra -6.
            - We can't duplicate the -6 door, because it's blocking the master signflip.
            - …Nor the -6 white/green, because it has a pure component.
            - As such, we'll have two doors to sum to -6, which will have to be two -3s.
                - 2 masters gone, no masters left!
                - Therefore, we must open the white blank normally, so make sure to do that!
    - And that's everything!
    - Solved!
- Ω-15: Division Derision
    - Wwe need to open that pure combo door 11 times!
    - For each opening, we need a color to be at 0, since opening the door changes the mimic color.
    - Our only way of changing the mimic color is with the lockless doors above, which we have 11 of, so we need to use all of them!
    - Therefore, we need to zero ALL these colors.
    - We could use the glitch blast door, but we only have one of those, so we need to take advantage of the glitch/pure blast door
    - To actually reach 0 with that, we need the key count to be divisible by the pure count.
    - Also, to get the 3rd -master for the last door, we'll need to use glitch, since we need 0 glitch.
    - And after each opening of the pure combo door, the pure count increases by 1.
    - So we need to have colors that are divisible by 2,3,4,5,6,7,8,9,10,11,12.
    - But we also have the option to skip a color using the glitch blast, so that'll complicate things a bit.
    - And we have the option to skip yet another number if we use the -1 pure/master door.
    - Here are the options for each possible pure count:
        - 2: White, Purple, Green, Pink, Black, Glitch

        - 3: White, Red, Pink, Brown
        - 4: Purple, Pink, Glitch
        - 5: White, Blue, Glitch
        - 6: White, Pink
        - 7: Orange, Black
        - 8: Pink?
        - 9: White, Brown
        - 10: White, Glitch
        - 11: Brown
        - 12: Pink?
    - Pink is forced to do both 8 and 12, that means one of them must either be done with the blast, or be skipped, plus pink cannot be used for anything else.
    - Also, Brown must be for 11, so it can't be used for anything else.
    - Current options for each pure count:
        - 2: White, Purple, Green, Black, Glitch
        - 3: White, Red
        - 4: Purple, Glitch
        - 5: White, Blue, Glitch
        - 6: White?
        - 7: Orange, Black
        - 8: Pink?
        - 9: White?
        - 10: White, Glitch
        - 11: Brown
        - 12: Pink?
    - Now, notice that white is in two spots. Now we have 2 contradictions, and they need to be resolved with the two method mentioned before, therefore, we now need a color for 13 pure. Plus white cannot be used for anything else.
    - Current options for each pure count:
        - 2: Purple, Green, Black, Glitch
        - 3: Red
        - 4: Purple, Glitch
        - 5: Blue, Glitch
        - 6: White?
        - 7: Orange, Black
        - 8: Pink?
        - 9: White?
        - 10: Glitch
        - 11: Brown
        - 12: Pink?
        - 13: Orange
    - Now orange, glitch, and red are forced!
    - With the few extra steps, the rest of the options falls into place.
    - Current options for each pure count:

        - 2: Green
        - 3: Red
        - 4: Purple
        - 5: Blue
        - 6: White?
        - 7: Black
        - 8: Pink?
        - 9: White?
        - 10: Glitch
        - 11: Brown
        - 12: Pink?
        - 13: Orange
    - Notice how cyan is unused? It needs to be the one we blast.
        - This is because it's value is prime! So it can't be divided by any of these numbers!
    - Now we just need to skip one of 6 and 9, and skip one of 8 and 12!
    - Solved!
- Ω-16: Re-Zero
    - We'll need to zero every color here at some point.
    - Every single color matches exactly with the lock count, so the problem here is actually the master keys!
    - Assuming we actually use all the -masters, we'll need to remove 13 master keys!
    - To waste master keys, you need to copy high value doors, then master key low value ones.
    - After going through all paths, you will have no doors remaining, but still have 2+ master keys to spend.
    - Therefore, you must leave a -2 stack for the finale, and your final path must give a 2.
    - And thus, you only have 4 duplications, and 11 master keys to spend.
    - Each duplication must spend 3 master keys, except for one, which can spend just 2.
    - Since each color only have a 1, 2, 3, 4, 5 and 6 door, to use 1 duplication to spend 3 master, you must duplicate a 6 door, then spend master keys on a 1 2 3 door.
    - Since each color only has one 6 door, you must do this for 3 colors.
    - Since we don't have a +master to start, we cannot open the 1, 2, or 3 door for any of these colors.
    - Since there's 5 colors, our first path cannot contain 1, 2, and 3 doors with all differing colors.
    - As such, only the top middle and bottom path are available as first. Let's first consider the bottom path.
        - The bottom forces white, purple, and pink to duplicate 6.
        - That blocks off the cyan 2 and 5.

        - With this, we must duplicate 2 doors in order to add back the missing 7 locks.
        - But the master keys need to be used for wasting +masters, not this.
        - Therefore, this is impossible. The top middle path is the only option.
    - With the top middle path, we're forced to use white, orange, and cyan for wasting 2 +masters, therefore, those color's 1, 2, 3 door must be mastered, and their 6 door must be copied.
    - Now, we need 0 orange, which, now that we know we cannot open its 1, 2, 3 doors, we need to open the 6x2, 5, and 4 door.
    - If pink were to waste a master key, it must now be from 2+4=6.
    - So we can safely open all doors in this first path.
        - Any doors 2 or lower cannot be duplicated, as they cannot waste a master key,
    - But now, since we still have a negative master on hand, if we pick up the +2 stack, we'll lose a -master. This cannot occur.
    - As such, we'll have to spend it now.
    - We cannot access the pink 6, so it'll have to be purple.
    - We have three options, the 4, 5, or 6 door:
        - 4 door
            - This means we'll have to master the 1 and 3.
            - And after a series of forced moves, you'll find yourself stuck due to lack of master keys.
        - 5 door
            - This means we'll have to master the 1 and 4.
            - And after a series of forced moves, you'll find yourself finishing the puzzle!
        - 6 door
            - This means we'll have to master the 1 and 5.
            - And you'll find yourself stuck immediately from a lack of master keys.
    - So the only choice here is 5, and…
    - Solved!
- Ω-17: Champion's Maze
    - By the end, we need 3 pinks.
    - We start with 1, and most trades here are net 0 total.
    - There are 2 net +1 trades in the rooms.
    - As such, they must both be taken.
    - Looking around, there's only 5 sources of net+ pink.
    - To reach the end, we need to spend at least 3(end)+1(last fork)+1(middle chokepoint) = 5 pinks, as such, they must all be taken.
    - There's also a source of net- pink that cannot be taken.
    - We now also cannot afford to waste any pinks, so on all forks, we must go through the path without pink/least pink.

    - Because of the net keys thing, in the end, we must spend all keys in our possession.
    - However, there are only 3 black locks available to open, and we're forced to take 3 as per our current deductions.
    - As such, we cannot take any more black keys.
    - Now, there are 8 required purple locks, and only 8 purple keys.
    - As such, all other purple locks cannot be opened, and all purple keys are required.
    - Now, there are 2 required cyan locks, and only 2 cyan keys.
    - As such, all other cyan locks cannot be opened, and all cyan keys are required.
    - Now, you're forced to spend the black before gaining access to a required pink door.
    - As such, your first pink key must be the one behind the black key, and it must be spent on the net 0 pink trade above, and eventually, you must collect the pink key in the trade.
    - Now that everything required is determined, with a mild amount of foresight, and the First Principle™ (it returns), you should be able to finish.
    - Solved!
- Ω-18: True Elimination
    - Ah, one of these puzzle!
    - We have 36 keys, and 36 required locks. All keys must be spent.
    - We have 3 cyans, and we need to spend all of them. As such, the top path must be taken on fork 3. This cost a master key.
        - Remaining masters 8
    - There's now only 7 red locks, and we have 7 red key, so all of them need to be opened.
    - Now, we cannot master the blank door, because we must spend the master key on a lock.
    - Therefore, we must pick the paths that zeros pink.
        - Fork 2 top.
        - Fork 4 top.
    - And we must master the pink in the 5th fork.
    - Now there's only one way to spend all 5 white keys: by taking paths with maximum white locks.
        - Fork 1 bottom.
        - Fork 6 bottom.
        - Fork 7 bottom.
        - Fork 9 top.
    - Now the only undecided fork is fork 11 and 12.
    - By the time you get to fork 11, you will have 2 blues remaining, and the only way to spend them is by going top on fork 11.
    - And for the last fork, it doesn't matter because you have 3 master keys.
    - Solved!
- Ω-19: The Problem

- The machine on the bottom right divides both pink and cyan by white.
- And the machine on the top adds cyan to either pink or green, and increments cyan.
- Our goal is 7 pink and 21 green.
- We start with 1 of each.
- To make this simpler, we'll only look at the sum of pink and green, and aim to make that 28.
    - I will justify this later.
- Now, we can produce a method for finding solutions for any goal value > 1. (Credit to scg13 for this method.)
    - Let sum = pink+green
    - To start, without any division, we have an invariant while the player is outside of the summation machine:
        - sum = 2+cyan(cyan-1)/2
    - So, To complete the level without any division, we must solve this equation:
        - sum = goal => 2+cyan(cyan-1)/2 = goal
    - Now, we include a division as the last step, thus allowing us to reach any multiples of the goal and divide down to it. Our equation can be modified to account for this by replacing "goal" with "0 mod goal".
        - sum = 0 mod goal => 2+cyan(cyan-1)/2 = 0 mod goal
    - However, this equation is NOT generally solvable.
    - See case goal = 7:
        - 2+cyan(cyan-1)/2 = 0 mod 7
        - 4+cyan(cyan-1) = 0 mod 14
        - cyan(cyan-1) = -4 mod 14 = 10 mod 14
        - If we were to check all cases of cyan = {0…13}, we would find that there exists no solution to this equation.
    - However, we can still divide more! We will now do one more division.
    - For our purposes, we will treat divisions as subtractions. This will make reasoning about this system easier.
        - For example, if we divide 10 by 5, we get 2, so effectively a subtraction by 8.
        - This will then subtract 8 from our equation, giving us a new invariant, as long as we make no more divisions:
            - 2-8+cyan(cyan-1)/2 = 0 mod goal
    - The equation we have right now is not very nice to work with, but as we can see, it is a quadratic, so if we can somehow make it factor into two terms with integer constants, we can then easily solve the equation.
    - So, we want to find a good n (that can be done in a single division, for simplicity) such that:
        - 2-n+cyan(cyan-1)/2 = 0 mod goal
        - 4-2n+cyan(cyan-1) = 0 mod 2*goal
        - cyan^2-cyan+(4-2n) = 0 mod 2*goal
    - Is factorable into two terms with integer constants.
    - Let's search the possible divisions! Starting at sum = 2:

        - Note that these sums cannot be divided by themselves, because pink and green must be at least 1, so both values must be < sum, thus not allowing a division by sum.
        - 2: None
        - 3: None
        - 5: None
        - 8: /2 (-4), /4 (-6), these result in:
            - -4: cyan^2-cyan-4, can't be factored into terms with integer constants.
            - -6: cyan^2-cyan-8, can't be factored into terms with integer constants.
        - 12: /2 (-6, already seen), /3 (-8), /4 (-9), /6 (-10), these result in:
            - -8: cyan^2-cyan-12 = (cyan+3)(cyan-4), we found it!
            - -9: cyan^2-cyan-14, can't be factored into terms with integer constants.
            - -10: cyan^2-cyan-16, can't be factored into terms with integer constants.
    - Now we can solve this equation!
        - (cyan+3)(cyan-4) = 0 mod 2*goal
        - cyan = -3, 4 mod 2*goal
        - cyan = 2*goal*n-3 for any integer n, and 2*goal*n+4 for any integer n.
        - Note that after this process of getting this -8, we will be at cyan = 5, as such, we have an added restriction that cyan >= 5, though since there is no upper bound, there will still always be an infinite number of solutions.
    - So what we want to do is to reach a sum of 12, then divide by 3, giving us an effective subtraction of -8.
    - Practically, it can be done by reaching (pink,green) = (3,9),(6,6),(9,3) and dividing by 3, getting us to (pink,green) = (1,3),(2,2),(3,1).
    - Then, we add until cyan is equal to any solutions in the set found above.
    - Now, let's justify why we can just sum up pink and green.
        - If we can get one of these two colors to the correct amount, the other one naturally follows suit, since the sum adds up. Therefore, we can just look at reaching the target value for one color.
        - Starting at cyan = 5, and pink being any of {1,2,3}, we can add to pink any subset of the natural numbers from 5 to cyan_f. (cyan_f = Final cyan count)
        - Lemma: For all k >= 10, and for all n such that 5 <= n <= (sum of {5...k}) - 5, there exists a subset of {5…k} that sums to n.
            - (An Informal) Proof:
            - Starting from 5, we can easily increment up to 10.
            - Then, to increment further, we can exchange 10 for 5+6 = 11.
            - Now, we can increment 5 and 6 individually, getting us to 10+k.
            - We can now exchange 10 for 5+6 against, getting us 5+6+k.

            - We can keep going, incrementing 6 up to the maximum, and 5 up to 10 (or less, if 6 can only be incremented up to 10 or less). Going to 10+(k-1)+k, then 10+(k-2)+(k-1)+k.
            - This method stops working once we reach 6+7+...(k-1)+k, because we can no longer exchange 10 for 5+6, as 6 is occupied.
            - This is the sum of {5…k}, but removing the first 5.
            - As such, there exists a subset of {5…k} that sums to every number from 5 to (sum of {5..k}) - 5.
        - Now, applying this lemma, we know that for our case, adding a subset from {5..cyan_f}, we can always add up to n where 5 <= n <= (sum of {5…cyan_f}) - 5, as long as cyan >= 10.
            - This increases our lower bound. Cyan must be >= 10.
        - Since we can look at just one of the colors, we can just look at the smaller value, thereby ignoring every value above (sum of {5…cyan_f})/2.
        - Given that, the only problem here is that you can't sum to any of {0…4}, so if (target pink - initial pink) (or green) is less than 5, we can't reach the target.
        - This can be easily avoided by just raising the value of n, thereby raising the target values (pink,green) to some greater multiple of them (k*pink,k*green).
        - As a large enough n, both pink_f-pink_i and green_f-green_i will be >= 5, allowing us to complete the level.
- Now, all we need to do is to apply this method for our case of 7 pink and 21 green, so goal = 28.
    - First, we find the final cyan count by solving one of:
        - 2*goal*n-3 = 2*28*n-3 = 56n-3 = [n=1] 56-3 = 53
        - 2*goal*n+4 = 2*28*n+4 = 56n+4 = [n=1] 56+4 = 60
    - We'll choose 53 because it's smaller.
    - Now, we just need to reach any of (3,9), (6,6), or (9,3) and divide by 3, giving us any of (1,3), (2,2), (3,1).
    - Choosing (1,3), both 7-1 and 21-3 are greater than 5, so we can easily sum up to our target.
- Solved!
- Alternatively, we can use a narrowed brute-force method to find a solution for specifically goal = 28:
    - For this search, we'll assume that there exists a solution that uses only 1 division and search exclusively for it.
        - No solution with 0 divisions exists, as no triangular number + 2 = 28.
    - Starting at 2 total keys, we'll just go through the addition machine until we reach above 28
        - 2 -> 3 -> 5 -> 8 -> 12 -> 17 -> 23 -> 30
    - Now, we're 2 over. Looking at the previous value, it looks as if we can divide 3 by 3 to reduce the count by 2, however, this is impossible, since

that can only happen if one of the key counts is 0 and the other 3, but it's impossible for either counts to reach 0.
        - So let's do another addition.
        - 30 -> 38
        - Now, we're 10 over, and it seems we can go from 12 -> 2 (-10) by dividing by 6, which IS actually possible, if both pink and green are 6.
        - This ends up being one of the shortest solutions, proven with the brute-force script below.
    - To find/confirm the shortest solution I just wrote a brute force program (in JavaScript).

```
function bruteForce(maxStep) {
       let step = -1;
       let workList = [[1,1,1,[]]];
    while (step < maxStep) {
        let nextWorkList = [];
       for (let i in workList) {
              let [pink,green,cyan,path] = workList[i];
              if (pink == 7 && green == 21) return path;
              nextWorkList.push([pink+cyan, green, cyan+1, [...path, "add pink"]]);
              nextWorkList.push([pink, green+cyan, cyan+1, [...path, "add green"]]);
              for (let j = 2; j <= Math.min(pink, green); j++) {
                     if (pink % j == 0 && green % j == 0) {
                            nextWorkList.push([pink/j, green/j, cyan, [...path,
"divide"+j]]);
                     }
              }
       }
        workList = [...nextWorkList];
        step++;
    }
    return "no solution"
}
```

    - Here's the shortest solution I got:
        - Add pink
        - Add green
        - Add green
        - Add pink
        - Divide 6
        - Add green
        - Add pink
        - Add green
        - Add green
    - Solved, but faster!
- Anyway, that's it for World Ω!
- …Well, except for, uhm, that puzzle.
- Yeah, I'm not quite done, am I?

Level Ω-Ω: Kina's Masterpiece

- The final, final, final mega puzzle.

- First off, we've got a few forced salvages for SID 95-99. These locks are fixed, the only thing we can change are the colors.
- The yellow room allows us to star the glitch color.
- The green room allows us to set the glitch color to any color.
- The gray room allows us to set the glitch color to any number.
    - Because of the glitch all gate, we cannot set any value from, or to 0.
    - Also, to even enter or exit to this room, we need 0 cyan and brown, so they cannot be altered by this room, period.
- The blue room contains the salvaged doors.
    - Because of the glitch all gate, it is impossible to set the glitch color to a 0-ed color and leave with it.
    - Each door is blocked by a cyan 10 door. We only have 20, and there's no way to gain more cyan (except for from the salvaged doors themselves), so we can only gain access to two of these unless we get more cyan from here, or star cyan.
- It will be useful later to consider these rooms (excluding the star key rooms) as a whole. So we'll encompass them into "resources", with each entry to top right rooms and salvaged doors count for 1. So to start, we have 11 resources.
- For all of the top right room, we can theoretically "cheese" the entry requirement by starring pure at 0, but we'll talk more about that later.
- Our goal is in the bottom right, in the purple section.
- We must enter that section with 0 or -masters, as such, all doors in this section (save for one) cannot be destroyed via master keys.
- The last obstacle is a -1111i cyan + glitch blank gate. Before it is a cyan 0 exact key.
- This combined with the infinite cyan unstar from the beginning means we have to come here, collect the cyan exact key, then go back to get -1111i cyan or less.
- Therefore, we must be able to exit this section, and so we need to use the master in the red section to open the master combo door via browning.
    - We could theoretically brown this from the outside, then come back later to open it.
- We can't use the master in the red area to open any doors except that one.
- The only way to get i of anything is with the cyan rotor key, blocked by an i master door.
    - There's no way to get any imaginary keys before opening this, so this will have to be browned and mastered.
- This now makes our goal to reach -1111 cyan or less.
- Now, the -1111 cannot come from the gray room directly, because of the 0 cyan gate.
- There's no normal door large enough to give -1111 of anything.
- Therefore, this has to come from a bicolored blast door.
- The only possible bicolored blast door is from the blue area, we can use SID 98, 99 or the door where input point 99 is, if we have a -master.
- Then we'll have to have 1111 or more of the inner color, which could come from the gray room, or those two keys in front of the gate, heavily suggesting that we need to use the door at input 99.
- Now, onto browning the required doors. The only source of brown is one of the glitch keys in the orange section.

    - We cannot use the salvaged doors due to the 0 brown gate.
    - We cannot use the gray room due to the 0 brown gate.
- As for the master key, we can only get it from the exact key next to the start, if we starred white at 0, or via a glitch key (you can also use the glitch signflip with -master).
    - We cannot get it from the red section because of the 0/negative master gates.
    - We cannot get it from the gray room because of the inf master 0 exact key.
    - We cannot get it from the salvaged doors because of the inf master 0 exact key.
- Now, how do we even get into the red section?
- We can't take the bottom path, as it's already established that the door will be opened after we get in.
- Therefore, we must open the 550 pure door, then bring 1 pure into the one-time use gate airlock.
- To get rid of the ice on the pure door, we'll need to unstar red, then collect a red key.
- The only unstar key viable for red is in the orange section: a glitch unstar. That'll have to be red.
    - Since this is the only unstar, if we ever star another color now, then that color is starred forever.
        - This means we can't cheese the top right rooms with pure starred at 0 until after we open this door.
    - To get mimic:red, we have to go to the green room.
        - We can't get it from the salvaged doors because we can't set the glitch color to a 0-ed color via the salvaged doors.
- This is 1/11 resources used.
    - Mimic:red.
- This pure key cannot come from the gray room, due to the pure blank lock.
- It also can't entirely come from the salvaged doors
    - It can't come from SID 96 - 99 because of the exact 0 pure
    - It can't entirely come from SID 95 because we can't bring any -masters unstarred to SID 95 due to the infinite exact 0 master key, and we can't star master at -1 because we need to +master key the master combo door to exit the purple region after opening the 550 pure door. At most we can get -1.
- Therefore, we'll have to use the glitch keys in the orange section for pure.
- All glitch keys in there add to an absolute value of 553, plus 1 from SID 95, and plus 1 from an exact keys in the top right rooms, so 555, but as established before, brown needs to come from one of these, so we'll have to exclude at least one of the 1 or 3 glitch key.
- Either way, we'll need to use all of the high value -glitch keys for pure. (-90 and -99).
- Now, all of these glitch keys are behind some hard-to-open doors and gates! Let's investigate how we get them.
- To reach the left half of the orange area, we first need to get 5 or more greens to remove erosion.
    - There are two approaches: getting 5 or more normally, or getting -5 or less, then using the glitch signflip.
    - 5 normally, not using glitch signflip:

        - The 4 stack above is not enough, so we'll need another way of getting positive greens.
        - This can be done with either the gray room or SID 97.
    - -5, then use glitch signflip:
        - To get -5 greens, we can use any of the positive salvaged doors or, again, the gray room.
    - In either case, we use up either an SID or a gray room usage.
    - This is another resources usage, bringing us to 2/11.
        - Mimic:red, 5+ greens.
- Then, we've got a 2 pure door to open! How?
    - We can get 1 from the infinite exact key, but to get an extra one, we'll have to use the 1 glitch key right before the door. All the other glitch keys either don't help, or are reserved for the final 550 pure.
    - This means brown will have to come from the 3 glitch key, and that we'll only have 549 (5*90+99) pures contributing to the 550 from these glitch keys.
        - We have now exhausted all glitch keys, so we now MUST get the positive master key next to spawn, which needs us starring white at 0 at some point.
        - So we must either star white as our first and only star key. Or star pure post-550 pure and star white afterwards. This means we cannot star any other color until post-550 pure.
        - This also means we have no more +master keys, and all remaining obstacles must be opened w/o it.
    - Therefore, we must get an extra +-1 pure for the final 550.
        - We can get this by using the pure exact key on the top right rooms.
            - This will require two signflips, one to go from 1 to -1, and one to go from -550 to 550. This will thus use the glitch signflip.
        - Or by using SID 95 as a bicolored door with pure outer color.
            - This will only require one signflip, to go from -550 to 550.
- Now, we seemingly need two sources of mimic:pure, one to get 1 pure key for the 2 pure door, and another to get the 550 pure keys (we must open at least one door between those two events), but we only have one way to get mimic:pure: the green room. So we'll have to get another instance of mimic:pure from the salvaged doors.
    - This will have to come from SID 95, or else would have to collect the exact 0 pure, meaning we'll be stuck inside because of the glitch all gate.
    - This correlates with the idea to use this to get our -1 pure, but this is not fully determined yet.
    - This adds 2 to our resources used, bringing us to 4/11.
        - Mimic:red, 5+ green, mimic:pure x2.
- Next off: Brown!
    - To get mimic:brown, we'll have to use the green room.
        - We can't use the salvaged doors to set the glitch color to a 0-ed color.
    - We have now used the green room 3 times and can no longer use it!

    - This also adds one to our resources used, but since the green room is now exhausted, we'll just exclude them from the count, bringing us to 2/8.
        - 5+ green, mimic:pure
- Then, we'll need to zero brown.
- We'll have 3, so we'll need to spend 3.
- We can't use the blue nor gray area because of the brown blank gate.
- We have an odd amount of browns, so we'll need to open an odd door.
- But all doors available to use right now are even, save for the -1 glitch door on the top right of the orange section.
- However, that door is behind a +1 glitch gate, so what we'll need to do is to preserve the -1 door with mimic:brown, then come back with -brown and a different mimic color.
    - Escape by peeking through the gate.
- And to get -browns, we can either use the glitch signflip, or curse the white signflip door and use that.
- Then, for the remaining 2, we can use it on either the 2 purple door or the 2 white door. This can also get us mimic:brown for the -1 glitch door.
- Now, let's consider the left side.
- To open the pink door, we'll need 15 or more pinks.
- There's not enough pink keys in the puzzle to get 15 or more, so that'll come from either a salvaged door, or the gray room.
    - In either case, we're using a resource, so we're now at 3/8.
        - 5+ green, mimic:pure, 15+ pink.
- For the 112 blues, since we can't star blue, we must use a salvaged blast door to zero them out, which will be either SID 98 or 99 (with two blast locks adding up to 112). In either case, a salvaged door is used.
    - We're now at 4/8 resources used.
        - 5+ green, mimin:pure, 15+ pink, 0 blue.
- Now for the -400 black, that amount will obviously come from the gray room (directly or indirectly) again.
    - To get black directly from the gray room, we'll need mimic:black, but there're no black doors, so doing this would require an additional salvaged door.
    - We could also get this from SID 98 or 99, and get 400+ (or 200+) of another color(s) from the gray room.
    - Either way, this is at least another resource used. At 5/8 now.
        - 5+ green, mimic:pure, 15+ pink, 0 blue, -400 black.
- Well, speaking of resources, we've got a purple 2, 12, and 44 door to open, but clearly not enough purples to do so. (We need at least 12+44=56, since the 2-door could be opened via brown)
    - Again, we can get it either from the gray room, or from a salvaged blast door. Though both salvaged blast doors will give negative keys, so you'll have to use the glitch signflip if going that way.
    - Either way, this is another resource used. At 6/8 now.
        - 5+ green, mimic:pure, 15+ pink, 0 blue, -400 black, 56+ purple.

- Now, with 6 resources expended, at least 3 must come from salvaged doors, but we only have 20 cyans keys, and we can't star cyan, so we only have 2 salvaged doors accessible.
- So we'll need to gain extra cyan keys (or browns, they also work), which must come from another salvaged door, bringing the resources used to 7/8.
    - 5+ green, mimic:pure, 15+ pink, 0 blue, -400 black, 56+ purple, extra cyans/browns.
- We can observe that every resource usage (except mimic:pure) require the use of either the gray room, or one of SID 97/98/99, and there are six of them and six resources available, so there can be no additional usages of the gray room or SID 97/98/99.
    - This also means that the value of these colors cannot be further modified using these resources.
- Now, let's consider how each of these resources are specifically allocated.
    - * means that this option requires the use of the glitch signflip.
- Mimic:pure
    - Must use a salvaged door, and since SID 97/98/99 is occupied, it must use SID 95/96.
- 0 blue
    - MUST use SID 98/99.
    - And then we must open another door in the blue area to escape, due to the glitch all gate.
- Extra cyans/browns
    - Can come from SID 97/98*/99*.
    - But actually, it MUST come from SID 97. (See 15+ pink section below)
- 5+ green
    - Can either use the gray room, or SID 98*/99*.
    - We cannot have any excess green, because any excess green can only be removed by another salvaged door (which we cannot use).
    - As such, we must reach exactly 5 |green| with whatever resource we use.
    - Getting mimic:green for usage of the gray room is non-trivial. There are no existing green doors, and the green room is now unavailable. So we must use another salvaged door, which must be one of SID 95/96.
- 15+ pink
    - Can either use the gray room, or SID 98*/99*.
    - Despite the pink blank gate on the left, the pink -blast allows us to dispose of an arbitrary amount of positive pink keys, with the use of the glitch signflip. So we can theoretically get any amount of pink greater than 15 and not worry about excess. This makes SID 97 theoretically viable.
    - But, if we did use SID 97 for pinks, we would need to use the glitch signflip for removing excess pinks, but then, the extra cyan/browns cannot use SID 97 and must use the glitch signflip as well, which is impossible.
    - This also makes getting extra cyan/browns now the only use of SID 97 in the 6 usages occupying SID 97/98/99 and the gray room, thus forcing us to use SID 97 for extra cyan/browns.

    - But actually, it MUST use the gray room. (See -400 black section below)
- 56+ purple
    - MUST use the gray room.
    - We cannot have any excess purple, because any excess purple can only be removed by another salvaged door (which we cannot use).
    - As such, we must have either 56 (12+44) or 58 (2+12+44) |purple|.
    - Because of this, we cannot use SID 98/99, as using those would require another color to have either a value of 56 or 58.
    - This cannot be green, because |green| = 5.
    - This cannot be black, because |black| >= 400. (See below)
    - This also cannot be pink, even though pink can theoretically be arbitrarily large, because making pink arbitrarily large requires the use of the glitch signflip, but using SID 98/99 for purple also needs the glitch signflip, but we only have one of those, so this is impossible.
    - With that, we have run out of colors that can use the gray room, so we cannot use SID 98/99 for purple.
- -400 black
    - Can use either the gray room or SID 98*/99*.
    - Usage of SID 98/99 requires having another color be at least 200, which must be reached via the gray room.
    - That color cannot be purple, because |purple| = 56 or 58, but could be pink, but that requires the use of the glitch signflip to remove the excess pink.
    - Getting mimic:black for usage of the gray room is non-trivial. There are no existing black doors, and the green room is now unavailable. So we must use another salvaged door, which must be one of SID 95/96.
    - Since this is the case for both green and black, and we only have 1 remaining resource, at least one of green and black must use SID 98/99, but because of 0 blue occupying one of SID 98/99, exactly one of green and black must use SID 98/99, meaning the remaining one must use the gray room.
        - In either case of SID 98/99 usage, the glitch signflip must be used. In the case of green, it's used for green, and in the case of black, it's used for pink.
        - This means that the glitch signflip cannot be used for pure, forcing us to use SID 95 for pure.
        - This also means that we cannot use the glitch signflip for brown, forcing us to use the white signflip door for brown.
    - And, the last resource (one of SID 95/96), must be used for mimic:green or black.
    - This also forces pink to use the gray room, as SID 98/99 is now fully occupied.
- So after all that mess, here what we have:
    - Gray room: 56/58 purple, 15+ pink, [5 green / -400 black].
    - SID 95: -1 pure key (for final 550) & mimic:pure
    - SID 96: mimic:[green/black] (for gray room).
    - SID 97: extra cyan/browns.
    - SID 98/99: 0 blue, [5 green / -400 black].

    - The glitch signflip is used for either green or pink.
- An aside: proving that we must open the big blank combo door via brown.
    - Due to the pure 2-door, we have to come in the orange section with 1 pure key already (which can come from the top right).
    - So we can only enter the orange section via the top path, the pure all gate.
    - Which means we're forced to pick up the red key by this point.
    - We must pick up the red key while unstarred, and we can't remove them ever, so we can only open the combo door normally before this point.
    - But until then, we're forced to pick up 20 white keys, and since we cannot use any resources to deal with white, the only way to zero them out is by using the 10 door at the bottom left, but that's past the pure door, so this is impossible.
    - We cannot open the blank combo door normally, and since it has a master lock, we can only brown it.
- Now, let's look at the -30 door we need to open for the extra cyan/browns. What color can we get -30 of?
- The only colors that can reach -30 (except pure) are orange, purple, pink, and black.
- Orange cannot be used because it is set to 0 when entering the blue room.
- Using either pink or black requires pink to be set to some large positive value via the gray room, and both can only become -30 or less after opening the black blast door in SID 98/99. (pink can only be signfliped after getting the black)
- This requires the first two SIDs to be opened up be 97 and 98/99.
- Entering the gray room requires 0 cyan due to the gate, but if all cyan is spent in the blue room, we can no longer leave due to the glitch all gate, since we cannot open either of the doors we just gained access to.
    - And we can't open the orange door at the entrance either, because then we'd run out of orange doors and can no longer access the blue room. (We don't have access to the -1 master key in the orange section yet, because we have yet to spend all cyan)
- As such, the only possible color we can use to open the -30 door is purple.
- In total, we can reach a minimum of -32 purple, so we can only afford to lose -2 purple.
- So, before opening the -30 door, we must:
    - Avoid the -20 door.
    - Collect the -20, -8, and the -4 stack.
- In doing so, we force white to become 8, while we need 10 to open the 10-door.
- So we'll also need to spend -2 purple (which is fine) to get 2 extra white. Just enough.
- With this, we now know that we cannot open the white 2-door, so that's the one that should be opened with brown!
    - This also means that we'll need to get 58 (not 56) purple from the gray room later, because the purple 2-door isn't opened by brown.
- Speaking of brown, there's still one more thing we need to consider with the brown process: which door do we open to get the mimic color for the glitch gate and spend the final -1 brown?
- By this point, we will have already opened the eroded pure 2-door, so we will have also opened the -20 purple door, and have finished up all of the steps to reach -30 purple.

- And, we'll have finished all the green business.
- And, we'll have opened everything up to the white signflip door and well as the glitch -1 door.
- With -1 brown, due to various blank brown gates, everything except for the orange section is unavailable.
- Additionally, we'll need to open access to the big combo blank door so that we can brown it.
- After all this, the number of remaining available doors is very low.
- The possibilities are:
    - The blank orange doors: If you can open these, then you have 0 oranges, which is not positive. You cannot go to the blue room for the exact orange (because you have brown), nor can you collect positive oranges anywhere in the orange section, as they would've all been collected by this point. Not viable.
    - The -11 and -10 orange doors: Same reasoning as the orange blank doors. Not viable.
    - The 7 orange door: You do not have enough positive oranges available to open this along with the other required doors (36 door, 16 door). Even with the orange exact keys in the blue room, with 3 pickups in total, you can only theoretically add +3 to the total positive oranges, which is still not enough. (You are 1 short). Not viable.
    - The negative pink doors: If you can open these, then you have negative or 0 pinks, which is not positive. Because of the brown blank gates, you cannot use the gray room to turn pinks positive after opening these. Not viable.
    - The -2 purple door: Same reasoning as the negative pink doors. Not viable.
    - The purple doors on the top left: Actually viable! By this point, you could have already set purple to 58 via the gray room, so you can definitely open these.
    - The purple/pink bicolored blank door: Also viable! Again, you could have set purple to 58 by this point, and you can definitely reach 0 pinks no problem.
- So the only viable options are the positive or the bicolored purple doors!
    - And notice how in both cases, we need to get our 58 purples before ever collecting brown, so that we can have positive purples, so we need to get our 58 purple right after opening all the negative purple doors.
- In both cases, pink will be zeroed, because now, we're forced to open every single -2 pink door, and well as spend at least -1 pink to gain access to the blank combo door.
- This totals up to at most -9 pink keys, which is all we have at the moment.
- This bring problems to the pink-to-black strategy, because to do that, we'll need to preserve the -pink blast door, and open another pink door to get mimic:pink, but after this, the best we can do is to save the -pink blast door, which is not enough, and makes this strategy impossible. (Finally)
- In fact, the only way to even get mimic:pink and be able to pass the glitch all gate into the gray room is to use the final -2 pink to open the -1 pink door, giving you -1 remaining and mimic:pink.
- Anyway, we have finally resolved the green/black ambiguity, and we can confirm that green must be gained via SID 98/99, and brought to positive via the glitch signflip key.

Also, the -400 black must come from the gray room, with mimic:black coming from SID 96.

- This means that we need to escape the blue room with mimic:black, meaning that we need to have non-zero black to pass the glitch all gate, meaning we must get the exact 1 black key.
- This also means that we must enter the blue room 3 times!
    - Once to open the -30 door. (This must be done before we open the 2 pure door, which is also before we can get the exact black key, since by that point, we don't have enough orange to open the 7 door)
    - Once more to leave with mimic:black.
    - And finally, once more to leave with mimic:pure for the 550.
- This forces us to use the -master key in the orange section on the orange doors at the entrance of the blue room to get an extra entry!
- Speaking of blue room entries, how do we even enter the blue room for the last 550 pure?
    - Since we need to maintain mimic:pure as we collect the 550, all glitch keys need to be accessible.
    - But, the glitch all gate becomes a problem! The glitch color as we enter needs to be a non-zero value!
    - Out of all the door colors in the orange section, purple must be 0, pink must be 0, all the white doors are gone by this point, so the only choice is orange.
    - The only orange door we can open after having dealt with brown and having gotten the black key is the blank orange door blocking the 1i orange key. By that point, we will have gone through the blue room for black already, which sets orange to 0, so if there were any extra orange key pickups, we can dispose of them then.
    - Then, we must use the 1i orange key to have non-zero orange, because all other orange pickups have been collected, due to us clearing access to the glitch keys for pure.
    - Conclusion: We don't need to worry about opening the blank door blocking the 1i orange key because it needs to be opened at the end anyway.
- Now that we know we need that black key, let's start talking about orange.
- Going into the blue room zeros orange, which can allow us to open a blank door, but this can only be done once prior to opening the 2 pure door, so this can only be used for the blank door behind the -10 door (the blank door behind the -11 door must be preserved, as mentioned before).
- Besides that, you can also just set orange to 1 via the infinite exact key.
- The most restrictive door here is the 7 door right before the black key. As mentioned before, that can only be opened once we have access to the 8 key stack past the brown key business.
- After picking up the 8 stack, assuming we have key count >= 7 (as we need), there's no way to decrease our key count to 0 other than by the 7 door (The exact key in the blue room can only decrease to 1).

- As such, we must reach exactly 7 keys after picking up the 8 or 9 keys to open the 7 door, which means we need to have -1 or -2 orange keys when we do pick it up.
- This also means that we must have already opened all the negative orange doors as well as the blank door behind the -10 door before picking up the 8 stack.
- In order to open both the -11 and the -10 door, we must have picked up the -7 stack.
- So, after picking up the -7, we will open either the -11 or -10 door.
- Then, after doing that, we will need to be at -1 or -2 key to prepare for the 7 door.
- But, we can't be opening the -10 door at that point, because then we wouldn't have a chance to reach 0 keys to open the blank door behind the -10 door before picking up the 8 or 9 keys, since we need to keep at -1 or -2.
- So we need to: pick up the -7, then have either -12 or -13 keys to be able to open the -11 door and have -1 or -2 remaining, so we need to pick up the -7 with either -5 or -6 keys.
- Before doing this, we need to have already opened the -10 door and the blank door behind it, which requires picking up the -12 stack, opening the -10, then reaching 0.
- If we were to pick up the -6 alongside the -12 to open the -10, then we'll end up having to zero it out, leaving us with no way to reach -5 or -6 later.
- So we need to pick up the -12 by itself, open the -10 door, reach 0 somehow, then pick up the -6 key with 0 or 1 keys.
- Now, we need to figure out how we're reaching 0 after opening the -10 door.
- Option 1: Reach 2 before picking up the -12, giving us exactly -10.
- For this analysis, we'll look at everything in mod 5.
- All the available key pickups (remember, the -6 is for later!) are 0 mod 5.
- And all the doors give 4/-1 mod 5, and there are 2 of them.
- We can reach 1 mod 5 via the exact key, but with only 2 -1 mod 5s, we can only reach {0,1,3,4} mod 5, so everything except 2.
- So we must use option 2: Pick up the -12, open the -10 door with either -12 or -11 keys, and somehow remove the excess -2 or -1 keys.
- With just the -1 mod 5 doors, we cannot reach 0 mod 5, so we must take advantage of the exact key to reach 1 mod 5 first.
- Then, we can use either of the -1 mod 5 doors to reach 0 mod 5.
    - 1+15 = 16, 1+15+30 = 36
- That, or we can enter the blue room (for the purpose of getting green and extra cyan/brown), which will also zero out orange.
- Unfortunately for this document, all three options are viable, and leads to a valid solution.
    - I'm not going through this case-by-case, it's just busywork.
- You cannot pick up the -12 with more than 2 keys, which does cause some trouble, but can easily be circumvented by using the infinite exact key or by not having more than 2 keys in the first place. Exactly which is determined by the case.
- In all cases, you can only pick up the lower 30 stack at the very beginning, prior to the first entry into the blue room, and no more than 5 positive keys can be removed due to the need to open all positive orange doors. This can cause a bit of trouble when combined with the above restriction, but still, this can easily be circumvented by just

entering the blue room before ever needing the lower 30 stack (which is possible in all cases where it's needed).

- Now, how exactly do we get the glitch color for the first entry into the blue room? Well, you can either get mimic:orange with any non-blank orange door whilst having excess orange, or get mimic:white with the 8 white door. For all three cases, at least 1 of those options are possible.
- Now that orange has been taken care off, let's talk about SID 98/99.
- This uncertainty is still here, and unfortunately, it will not be resolved, because both options will lead to a valid solution, much like the three cases for orange.
- But unlike for orange we will consider both cases individually, since this is a major decision.
- Case 1: SID 98 for blue, and SID 99 for green
    - Using SID 98 for blue makes things really simple, we just need to make it an ordinary blue blast door.
    - And for green, we need to get exactly -9 keys from SID 99, so the value from the locks needs to add to 9. Since 9 is not even, the color of the two locks cannot be the same.
    - So what can be the colors of the locks? Whatever the colors are, their values must be between 1 and 8 (inclusive), so that they can meet the requirement of the blast lock and add to 9.
    - This restricts the possibilities down to just white, red, green, and stone.
        - Master, orange, brown, and pure must be 0 when reaching SID 98.
        - Purple and pick are negative to start, and after using the gray room to set to 58/15 respectively, they're above 8, and cannot reach below 8 without becoming 0.
        - Cyan is always a multiple of 10, by our available cyan manipulation methods, so it cannot ever be between 1 and 8.
        - At this point, both black and blue cannot be reached.
    - Red can only be 1, green can only be 4, and stone can only be 1. Any two of these combined cannot reach 9, so white must be included.
    - From previous deductions, in the end, white will reach 10, for the purpose of opening the 10 door in the orange area.
    - But that is not between 1 and 8, so we must open this door a little earlier, before we pick up the extra 2 whites, when white was at 8, which is just low enough to work.
    - Which means the other colors must have a value of 1, which leaves us with either red or stone.
- Case 2: SID 98 for green, and SID 99 for blue
    - Using SID 98 for green forces us to use only 1 color to reach exactly 9 in lock value.
    - This forces us to have the lock be white, and reach exactly 9 white.
    - This is possible, by reaching 8 as in case 1, but then picking up the conspicuous extra white key at the bottom right of the orange section to reach 9.

    - The purple key is inconsequential. Since we're not picking up the 2 white right now, we don't need to spend the -2 purple, so we can pick up the extra 1 purple no problem.
    - Now for blue, we have two blast locks now, so we cannot just make a normal blue blast door.
    - Instead we need two values that add up to 112.
    - The highest value that comes close and does not exceed is the value we're setting purple to: 58.
    - And next highest is pink's 15, which when combined, is not enough to reach 112, so we must have both locks be purple.
    - So purple must reach 112/2 = 56, which is 100% possible! All we need to do is to open the purple 2 door, which is no problem.
- Now, almost everything has been taken care of, we just have a little loose end: what door do we open to get in the blue room for the 2nd visit (the 0 blue and mimic:black visit)?
- In case 2, white will be at 1 after opening the 10 door, so we can just use mimic:white to enter.
- But for case 1, white will be at 0, so we can't use mimic:white.
- But what we can do is to just open the 44 purple door, so even if we used the 2 door for the glitch color for brown, we can still do this.
    - And, since we're talking about case 1, we don't need to worry about keeping purple at 56 for blue, so that's no problem either.
- And with this entry into the blue room, we'll have 0 orange no matter what, allowing us to open the orange blank door blocking the 12 purple door regardless of cases.
- Now, finally, everything has been taken care of. No more loose ends. It's time for the 550 pure door to go down!
- Now we can star pure, and go wild!
- To get past the -8 purple door, we'll just get mimic:purple with green room and signflip with gray room.
- But before that, we'll have to star white at 0, since we don't have a way to remove white to pass the blank gate at this point,
    - In case 1, white is already 0, so this is no problem, but in case 2, white is 1 by this point, meaning you'll have to use the gray room to set white to +-8 (you can't use the gray room to zero a color), then use one of the +-8 doors to set white to 0.
- Then, we have a row of stone doors.
- We can't star stone for any of this, because then we'd be stuck behind the blank stone gates.
    - We can't pass the blank orange gate on the bottom either, because we can't star orange with all our star keys exhausted.
- Therefore, the -1 door must be taken care of by getting 1 from the exact key and using the signflip with mimic:stone.
- Then, we'll just have to keep getting 1 stone from the exact key to open the rest, and end it off by opening the blank after opening the all door.

- But since we're forced to get 6 orange keys each time we enter with 1 stone, we'll have to open the 6 orange door lots of times, definitely more than the 2 times we can get with the -1 master we just got.
- There're two ways to solve this: starring master at -1, or starring orange at 0. We'll figure out which later, after looking at the next 2 gates.
- Then we need to get from -99 reds to 24. We want to use the gray room for that, but we've already used the red lockess in the green room! What now?
- Well, there's still 1 red door remaining, and it's the one next to spawn! The door we salvaged for SID 97.
- Now that we have no more doors to open, we can open this safely, and get mimic:red!
- And for the final -1111i cyan, we can't use the gray room, because of the blank cyan gate.
- But what we do have, is a convenient cyan/purple|pink blast door next to spawn.
    - That's two salvages we need to avoid, as such we'll need to star the -1 master key.
    - The only way to get -masters now is with the one in the purple area. We can't use the gray room because of the exact 0 there.
    - To do that, you'll have to get mimic:master before getting the -1 master. Otherwise, the -1 would get removed by the infinite 0 exact key in the green room.
    - Before this, we'll need to master key the i master we cursed from before, so we'll just collect the master key next to spawn, now that we have white starred.
- And Kina has very nicely given us the exact right amount of pinks and purple to get -1111 cyan.
- So all we need to do now is open that door, and use the rotor key to get -1111i cyan.
- And finally, to get past the glitch blank requirement, we'll just open the orange door again, with our starred master key, getting 0 orange, and mimic:orange.
- And with that, this puzzle is finally…
- Solved!

Conclusion

This has been a wild ride.
If you read this entire thing, what's wrong with you? Heck, what's wrong with me, writing out all this?
But actually, I enjoyed writing this. Thank you Los Angeles Watson.
I give this game a rating of 3pi/10.