

CS50 Presents

# CS50x Puzzle Day 2023

with thanks to our friends at Meta

**March 31 – April 3, 2023**

- This packet contains 10 puzzles. The first puzzle is an optional practice puzzle, to prepare you for subsequent puzzles. The next 8 puzzles are independent of one another. The final puzzle is a metapuzzle: it requires answers from the previous 8 puzzles in order to solve it.
- The answer to each puzzle (but not the metapuzzle!) is a single word or name in English.
- You may use the internet and any other resources at your disposal.
- You are encouraged (but not required) to work on a team with 1, 2, or 3 classmates or friends, either in person or online; if you gather in person, you must follow your local COVID-19 protocols. You may not share hints or answers with other teams.
- Take photos while you work on the puzzles (or screenshots of your team collaborating online)! Share them at <https://cs50.ly/photos> if you'd like!
- Submit your answers at <https://cs50.ly/submit> by 23:59 on Monday, 3 April 2023. If working on a team, only one member of your team should submit. If you submit multiple times, we'll consider your only most recent submission, which should contain all of your answers together.
- See <https://cs50.ly/puzzles> for all rules.
- Have fun and good luck!

# Meta Puzzle Hunt 2022

Welcome to your first day in the Multiverse, new recruits! We've been seeing some strange disturbances in the multiverse lately, and it'll be up to you to investigate them! Please head to <https://youtu.be/ySb5TWzqr08> for your introductory mission assignments!

## FAQ:

### **What kind of puzzles should I expect? How do I solve puzzles?**

All regular puzzles in this hunt have a single word as the answer. You should never have to brute force, randomly anagram, or read any code in order to solve any of the puzzles.

Each puzzle in the hunt is unique, and usually has a specific or clever insight needed to solve. Once you deduce or organize the patterns within the puzzle, you should be able to extract a clear word or phrase from the puzzle. Puzzles come in all sorts of different shapes and sizes, won't necessarily come with clear instructions; it's up to you to figure out what the puzzle wants from you! If you're new to puzzles and puzzlehunts, you can read more about them at <https://blog.vero.site/post/puzzlehunts>.

We also have a practice puzzle, including a solution, from an old CS50 Puzzlehunt. We've attached it as the first puzzle in this packet.

### **What's the format of this puzzlehunt?**

As you explore the Multiverse, you're likely to encounter various challenges and puzzles on your way. In total, there are eight puzzle challenges for you to complete, along with a metapuzzle. We only recommend attempting the metapuzzle once you have solved at least six(6) of the eight regular puzzles. You'll need to use parts of the first eight puzzles in order to solve the metapuzzle. The more regular puzzles you solve, the easier the metapuzzle becomes!

### **How can I check my answers?**

We've built a special tool to allow you to view and check answers to puzzles! Feel free to visit the website here: <https://metalink-puzzlehunt.webflow.io/>. You can test out the tool by submitting answers to the practice puzzle at <https://metalink-puzzlehunt.webflow.io/practice>. Once the hunt starts, you'll be able to find all the puzzles in this packet on the website.

Note that the tool **does not submit any answers to us**: please make sure to still submit your answers via the Google Form once you've checked them during the hunt.

### **What resources can I use to solve puzzles?**

You can feel free to use any tools you have available, including collaborative sheets or searching the internet to help you solve any of the puzzles in the hunt. No puzzle in the hunt will require you to brute force any answers or look at source code to solve. Puzzles sometimes use codes or ciphers for letters of the alphabet. We've attached a code sheet from Puzzled Pint with this document (the sheet is not a puzzle). You'll find it useful for at least one of the puzzles in this hunt.

NATO	Letter	Decimal (base 10)	Binary (base 2)	Ternary (base 3)	Hex (base 16)	Letter	Morse	Braille	Semaphore	Pigpen
Alfa	<b>A</b>	<b>1</b>	00001	001	01	<b>A</b>	•—	•○ ○○ ○○	↖	_
Bravo	<b>B</b>	<b>2</b>	00010	002	02	<b>B</b>	—•••	•○ ○○ ○○	→	□
Charlie	<b>C</b>	<b>3</b>	00011	010	03	<b>C</b>	—•—•	•○ ○○ ○○	↘	_
Delta	<b>D</b>	<b>4</b>	00100	011	04	<b>D</b>	—••	•○ ○○ ○○	↓	□
Echo	<b>E</b>	<b>5</b>	00101	012	05	<b>E</b>	•	•○ ○○ ○○	↙	□
Foxtrot	<b>F</b>	<b>6</b>	00110	020	06	<b>F</b>	••—•	•○ ○○ ○○	→	□
Golf	<b>G</b>	<b>7</b>	00111	021	07	<b>G</b>	——•	•○ ○○ ○○	↖	_
Hotel	<b>H</b>	<b>8</b>	01000	022	08	<b>H</b>	••••	•○ ○○ ○○	↗	□
India	<b>I</b>	<b>9</b>	01001	100	09	<b>I</b>	..	○○ ○○ ○○	➢	□
Juliett	<b>J</b>	<b>10</b>	01010	101	0A	<b>J</b>	•----	○○ ○○ ○○	↳	_ .
Kilo	<b>K</b>	<b>11</b>	01011	102	0B	<b>K</b>	—•—	•○ ○○ ○○	↓	□.
Lima	<b>L</b>	<b>12</b>	01100	110	0C	<b>L</b>	•—••	•○ ○○ ○○	↖	.
Mike	<b>M</b>	<b>13</b>	01101	111	0D	<b>M</b>	---	•○ ○○ ○○	↙	□.
November	<b>N</b>	<b>14</b>	01110	112	0E	<b>N</b>	--•	•○ ○○ ○○	↖	□.
Oscar	<b>O</b>	<b>15</b>	01111	120	0F	<b>O</b>	----	•○ ○○ ○○	⤳	□.
Papa	<b>P</b>	<b>16</b>	10000	121	10	<b>P</b>	•----•	•○ ○○ ○○	→	_ .
Quebec	<b>Q</b>	<b>17</b>	10001	122	11	<b>Q</b>	----•-	•○ ○○ ○○	↖	.
Romeo	<b>R</b>	<b>18</b>	10010	200	12	<b>R</b>	•--•	•○ ○○ ○○	→	.
Sierra	<b>S</b>	<b>19</b>	10011	201	13	<b>S</b>	•••	○○ ○○ ○○	⤳	▽
Tango	<b>T</b>	<b>20</b>	10100	202	14	<b>T</b>	-	○○ ○○ ○○	⤳	➢
Uniform	<b>U</b>	<b>21</b>	10101	210	15	<b>U</b>	••—	•○ ○○ ○○	⤳	<
Victor	<b>V</b>	<b>22</b>	10110	211	16	<b>V</b>	•••—	•○ ○○ ○○	⤳	△
Whiskey	<b>W</b>	<b>23</b>	10111	212	17	<b>W</b>	•---	•○ ○○ ○○	⤳	▽
X-ray	<b>X</b>	<b>24</b>	11000	220	18	<b>X</b>	—••—	•○ ○○ ○○	⤳	➢
Yankee	<b>Y</b>	<b>25</b>	11001	221	19	<b>Y</b>	—•——	•○ ○○ ○○	⤳	<
Zulu	<b>Z</b>	<b>26</b>	11010	222	1A	<b>Z</b>	——••	•○ ○○ ○○	⤳	△

## Practice Puzzle: Look Up

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			Louis Armstrong	U.S.A.
			Juscelino Kubitschek de Oliveira	Brazil
			Rick Husband	U.S.A.
			Amado Nervo	Mexico
			Tenzing Norgay, Sir Edmund Hillary	Nepal
			John August Earl Bergstrom	U.S.A.
			Ben Elbert Douglas, Sr.	U.S.A.
			Guadalupe Victoria	Mexico
			Vicente Almandos Almonacid	Argentina
			William Mitchell	U.S.A.
			Edward Lawrence Logan	U.S.A.
			Francisco Bangoy	Philippines
			William P. Hobby	U.S.A.
			Abelardo L. Rodríguez	Mexico
			Luis Muñoz Marín	Puerto Rico
			Abraham Lincoln	U.S.A.
			Sukarno, Mohammad Hatta	Indonesia
			Albert Bond Lambert	U.S.A.
			John Wayne	U.S.A.
			Charles McGhee Tyson	U.S.A.

Answer: \_\_\_\_\_

Solution: <https://youtu.be/8oUozluQRio>

# Pixelated Tomato

*Darn, I wanted to post this to my Nonogram profile, but it came out all blurry...*

19

A 10x10 grid puzzle. The top row contains the following sequence of numbers: 1, 1, 1, 1, 3, 3, 1, 2, 3, 1. The second row contains: 1, 1, 2, 1, 2, 2, 1, 2, 4, 2. The third row contains: 1, 1, 1, 1, 1, 3, 1, 1, 1, 1. The fourth row contains: 5, 8, 11, 11, 11, 10, 10, 10, 11, 11. The fifth row contains: 5, 2, 1, 1, 1, 1, 1, 1, 1, 1. The bottom row contains: 1, 1, 1, 1, 1, 1, 1, 1, 1, 1. The grid itself is filled with various numbers and colored shapes (yellow, green, red). The numbers in the grid follow a pattern where they increase from left to right and then decrease back to the start. The colors represent different regions or paths within the grid. The number 19 is written in red at the top right corner of the grid.

~~This puzzle is also available as an online spreadsheet.~~

Go to <https://tinyurl.com/pixelated-puzzle> and click File > Make a copy to get your own version.

# Problematic Conundrums

Let's just look at the benefits and drawbacks.

construct

Google competitor  
Took ownership of  
Subject of many myths, like Genesis  
Combination of multiple cuisines  
Metric unit of mass  
Location  
Hip hop group "A Tribe Called \_\_\_\_"  
Scored out of five stars  
Biology or physics  
Fibonacci, for instance  
Shoe bottom  
Software release

~~pro~~ Bing  
~~pro~~ Claimed  
~~pro~~ Creation  
~~con~~ Fusion  
~~pro~~ gram  
~~pro~~ Position  
~~con~~ Quest  
~~pro~~ Grade rat~~ed~~  
~~con~~ Science  
~~con~~ Sequence  
~~con~~ Sole  
~~con~~ Version

---

Misunderstanding while questioning  
Suggestion xbox?  
Partial change?  
Artificial intelligence  
Overpopulation, perhaps  
Declared victory

Confusion Probing	[4,5]
proposition console	[7,6]
Prorated conversion	[8,9]
Conscience program	[5,7]
Procreation Consequence	[5,5]
Proclaimed, Conquest	[4,8]

1 2 3 4 5 6 7 8 9

# Metaverse Hospital

*These Californian patients are ailing from a variety of issues. Can you figure out what they are before they start to code?*

- |   |   |  |  |  |  |  |   |      |
|---|---|--|--|--|--|--|---|------|
| 1 |     | (10, 4, 6)   | Phlegmasia alba dolens   |        |  |  |   |      |
| 2 |     | (6, 6)   | hallux valgus  |  |  |  |   |      |
| 3 |      | (13)   | Hydrocephalus  |  |  |  |   |      |
| 4 |     | (9)  | Tularemia  |  |  |  |   |      |
| 5 |     | (6, 10, 14)  | Bovine spongiform encephalopathy   |  |  |  |   |      |
| 6 |      | (7)  | tetanus  |  |  |  |   |      |
| 7 |     | (11, 13)   | Tuberculous lymphadenitis  |  |  |  |   |      |
| 8 |     | (6, 4, 6)  | Sickle cell anemia   |  |  |  |   |      |
|   | rEd   | orangE   | Yellow   | bLue   |  |  |   |      |
|   |    | [2],  | [6],  | [1],  | [2],  |      |  | [1], |
|   |    |       |       | [7],  |       | [5],  |   | [1]  |
|   | pink  |  |  | silvEr   |  |  | White   |      |

aetysmmp  
symptame

# Rules are Rules Rebounds



This just in - a transcript of the latest edition of SportCenter's radio coverage of Calvinball!

You can listen to the audio version here:

<https://metalink-puzzlehunt.webflow.io/puzzles/rules-are-rules>

**Watts:** Welcome back to SportsCenter. Plenty of great Calvinball action this week, right Billy?

**Billy:** Absolutely, Watts, and we've got all the highlights for you right here, right now.

[CUT]

**Watts:** After a brief 4-minute break, Jennifer is serving, hoping to win a point for the Spacemen! This is match-point, so you know the Tigers will pounce if she shows even the slightest sign of weakness!

**Billy:** Aaaand an ace smash for Jennifer, she's been in top form tonight! Her coach is coming over to congratulate her on their victory, and..

**Watts:** Well, hold on a moment, Billy, Hobbes of the Tigers seems to be arguing with the ref! It seems he has something in his hand...is that Jennifer's birth certificate??

**Billy:** Wow, it seems like she's only 13! I'd never believe a kid her age could have so much talent if I hadn't seen it with my own eyes.

**Watts:** Unfortunately, Billy, kids aren't allowed to play in a major - it seems it's against the rules for tournaments to accept players under age 14, so Jennifer will be disqualified. If only her birthday was a month earlier, she'd be eligible for this match. You'd really think they'd have figured this all out before starting play!

**Billy:** Tough break for the Spacemen, Watts, but I'm really looking forward to seeing what she can do next year! The Tigers may have won this match, but they better be looking for an ace up their sleeve next year!

REB OUN

4  
Tennis  
Jennifer  
Capriati  
97

3

[CUT]

Hockey

**Watts:** With the Tigers holding on to a safe 3 goal lead over the Spacemen, they are looking to cruise towards an easy win.

Sean Avery

**Billy:** What's that, Watts? Sean is standing in front of the goalie with his back to the play, waving his stick in front of the poor goalie's face!

2008

**Watts:** Hobbes is calling the referees over, and yes, that's going to be a minor penalty against Sean. Have fun in the box, kid!

[CUT]

**Watts:** Deep in their own territory, the Tigers are going to need to get something going here.

**Billy:** Tom takes the snap and drops back. He's looking downfield for someone open... but defenders are closing in. He spins to avoid the first one, but he'll be grabbed by the ankles and taken down at the 1 yard line.

**Watts:** But there's a flag down on the play. Looks like the Spacemen defender was already on the ground when he dove at the quarterback's lower legs. Instead of losing yards, the Tigers will move downfield on the penalty.

[CUT]

**Watts:** Welcome back folks, we have an exciting game on our hands. Thanks to some stellar work by the Spacemen, they have narrowed the gap, but are still trailing with only 3 minutes left to play.

**Billy:** The Spacemen have possession right now, but those Tigers are out for blood tonight, and now Tony has a steal and is on a breakaway. He squares up a shot and-

**Watts:** What a save by Martin! The puck careens onto the ice behind the goal line! Martin skates after it, gains possession, then fires a pass down the ice to Spiff.

**Billy:** Now the refs are signaling a delay-of-game against Martin! Looks like he handled the puck outside the trapezoid behind the goal, and we all know goalies can't do that!

**Watts:** Rough night to be a Spacemen fan tonight, Billy.

[CUT]

**Watts:** As the whistle blows for timeout early in the 2nd period, the Spacemen huddle up on the ice. The Spacemen seem to be pulling their goalie and, what's this?! They're putting their captain, Bill, into the net! It'll be hard to get anything past him, but the Tigers seem to be making a plan of their own over there.

**Billy:** I've never seen Bill in front of the net, what do we have to look forward to tonight, Watts?

**Watts:** It's been a few years, but the last time he goalkept for the Spacemen, the Tigers couldn't score a single goal. It'll be a rare shot that gets in with him playing the goalie for the rest of the night.

**Billy:** What's this? They ought to be lining back up to resume play, but now the ref is coming out on the ice?

**Watts:** Oh...Oh, I see. It turns out captains are forbidden from also serving as goalies, so it looks like the Spacemen will have to make a snap decision, as that was their last timeout.

**Billy:** That hardly seems fair, Watts. What an obscure rule, there must be quite the story behind that one!

[CUT]

**Billy:** We're here at the Pro Bowl on this beautiful morning, ready to see the Spacemen and the Tigers go head-to-head!

Football

8

Shawne  
Merriman

2007

**Watts:** I'm fired up, Billy! I can't wait to see what Shawne of the Spacemen does in this game. He has been a sack machine this season!

**Billy:** He really is the GOAT. I almost feel bad for the Tigers, I really don't see them having a chance with Shawne in top form today.

**Watts:** I wouldn't count the Tigers out just yet, Billy - they always have a trick up their sleeves.

The match hasn't even started yet, and Hobbes is already talking to the ref about something.

**Billy:** This just in, Watts, and...I can't believe it! They aren't going to allow Shawne to play! After testing positive for banned substances 8 months ago, he's disqualified and the Pro Bowl will have to go on without him!

**Watts:** What did I tell you, Billy? This match just got a lot less predictable! I hope you didn't put down too much money on the Spacemen!

[CUT]

Football

**Watts:** The Tigers' drive has stalled at the Spacemen's 6 yard line, so they'll attempt to extend their lead by kicking a field goal.

**Billy:** Hobbes is not a very good placekicker, so despite the short distance this is far from a chip shot for him. Morris will line up deep in the end zone, maybe to attempt a return if the kick falls short.

**Watts:** The Tigers snap it, and the kick from Hobbes is low - will it clear the goalposts?

**Billy:** No! Morris leaps up in the back of the end zone, stretches his hand out above the crossbar, and swats the ball down before it can go through the uprights. What an amazing play!

**Watts:** But there's a flag down on the field, and it looks like the referees are conferring - they're going to give the Tigers the points anyway, Billy. Have you ever seen anything like this?!

**Billy:** Apparently goaltending like that is against the rules.

[CUT]

**Watts:** So that'll bring the Tigers' power-hitting Hobbes to the plate.

**Billy:** All the bases except 1st base are loaded. Spiff is going to need to pitch to him carefully.

**Watts:** That won't be easy. Hobbes has been locked in so far tonight, looking like *nothing* can rattle him.

**Billy:** Spiff looks in for the sign and - hey, where'd Eddie come from? He's meant to be in the outfield, but he seems to be warming up behind the pitcher's mound. Is this really the time to be doing jumping jacks, Eddie? Your team needs you!

**Watts:** Actually, Billy, I think he's trying to distract Hobbes - see how his eyes keep shifting up every time Eddie waves his arms? That's gotta hurt his focus.

**Billy:** The Tigers manager is coming out to talk to the umpires – looks like they're disputing whether Eddie should be allowed to distract Hobbes like that. It does seem a bit dirty, and, yes, looks like the umps agree. They're throwing Eddie out of the game!

**Watts:** Love to see the competitive spirit, but you've got to know the rules.

[CUT]

[OUTRO]

**Watts:** That's a wrap for this week, folks! I'm Watts -

**Billy:** And I'm Billy -

**Watts:** And don't forget to tune back into SportsCenter next week for another exciting highlight reel!

[END]

Morris  
Stroud

1978

baseball

Eddie  
Stanky

1951

# Liar Liar

spider

*You come across a group of helpful folks who give you advice to solve the puzzle. However, not all of them are telling the truth.*

T Bob (Male): I agree with Jason. The answer is a car model.

Carla (Female): If you ask him, Marcus would say I'm a truth-teller. The answer was featured in the 2018 YouTube rewind.

Edward (Male): Don't trust people with short names! Everyone whose name is less than 5 letters long is a liar. The answer is one of the previous winning words of the national spelling bee.

Elliott (Male): There are 2 more liars than truth-tellers. The letters of the answer are in alphabetical order.

Eric (Male): All the women are liars. The answer is a Pokemon.

Isabelle (Female): I am single. I've never been married! Marcus is a liar!! The answer has exactly 7 letters.

Jason (Male): There are an even number of truth-tellers. There is a greater number of the answer than humans globally.

John (Male): All liars' names start with vowels. The answer is larger than a cat.

Laura (Female): Exactly one of myself, Eric, and Bob is a liar. The answer can be anagrammed into at least one other six-letter English word.

Marcus (Male): I am married to Isabelle. The answer has exactly 6 letters.

Oliver (Male): There are exactly 5 liars. The answer is a cereal brand.

Paul (Male): Everyone whose name begins with E is a liar. The answer has planar symmetry.

Rachel (Female): Isabelle, Laura, and myself are all liars. The answer consists only of one-point tiles in Scrabble.

Rebecca (Female): There are an odd number of liars. The answer is an animal.

Sam (Male): Bob, Jason, and Rebecca are either all truth-tellers or all liars. A superhero is named after the answer.

# Catewordle

operetta

This puzzle is also available as an online spreadsheet.

Go to <https://tinyurl.com/catewordle-puzzle> and click File > Make a copy to get your own version!

Wordle 6/7: Weight of a liter of water



Kilogram

Blue	scd
Envy	uite
Second	I
Jupiter	ur
Blue	a
Europe	e
Water	s
Water	suluaes
Envy	
Touch	
Bashful	
Second	
Bashful	
Jupiter	

BEAUE

Wordle 7/8: Roman god of the sea



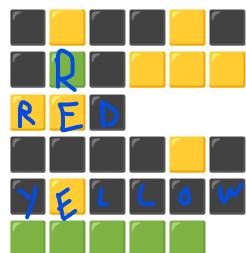
Jupiter

opereta

URANUS

Neptune

Wordle 6/7: Eco-friendly



Green

Wordle 6/7: Canada and mexico are part of it



North America

Units

Planets

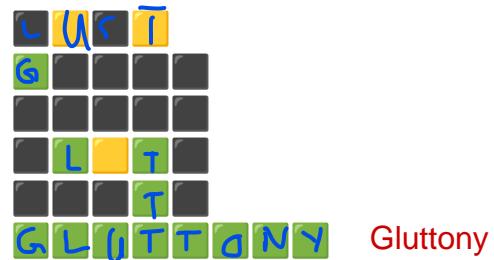
Color

Cont

Elements Wordle 3/4: Dismiss from a job



Wordle 6/7: Habitual or excessive eating



Senses Wordle 4/5: Palate

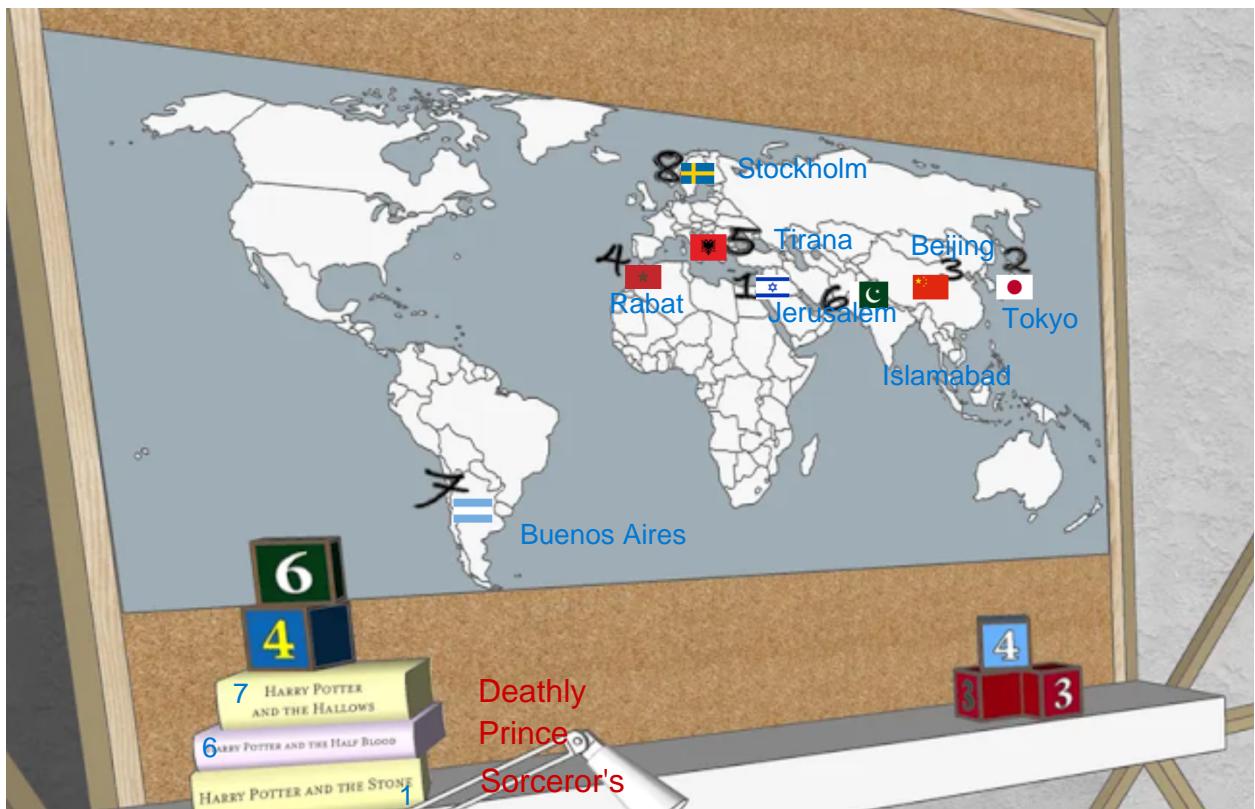


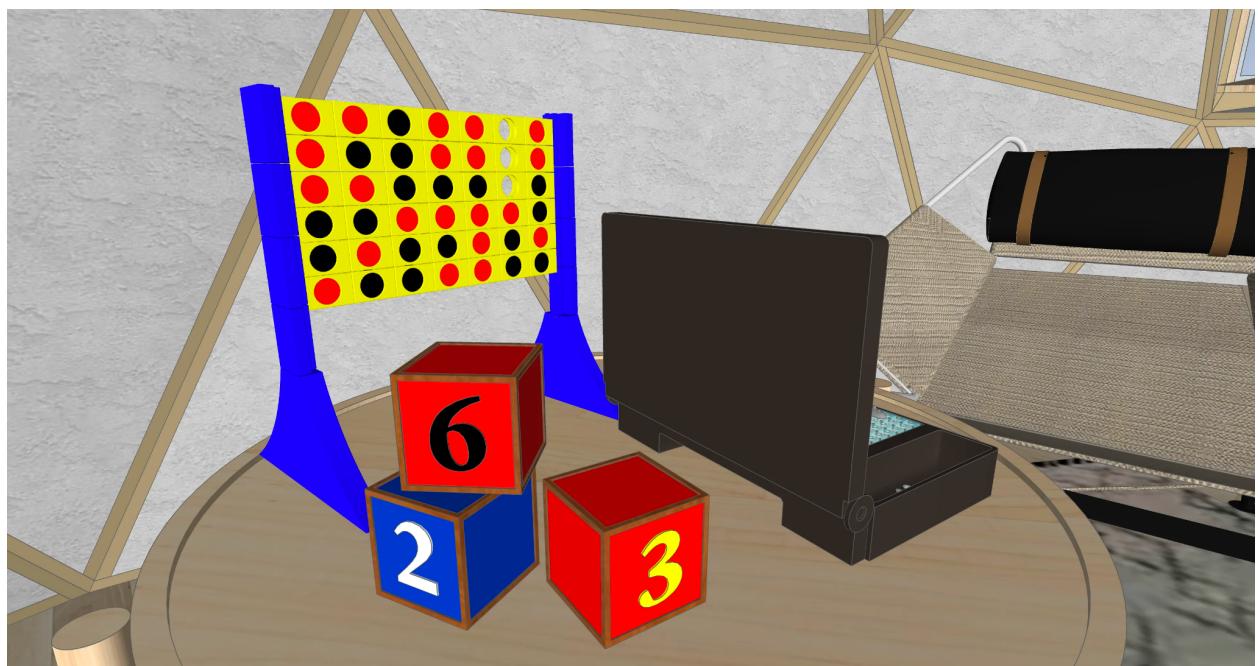
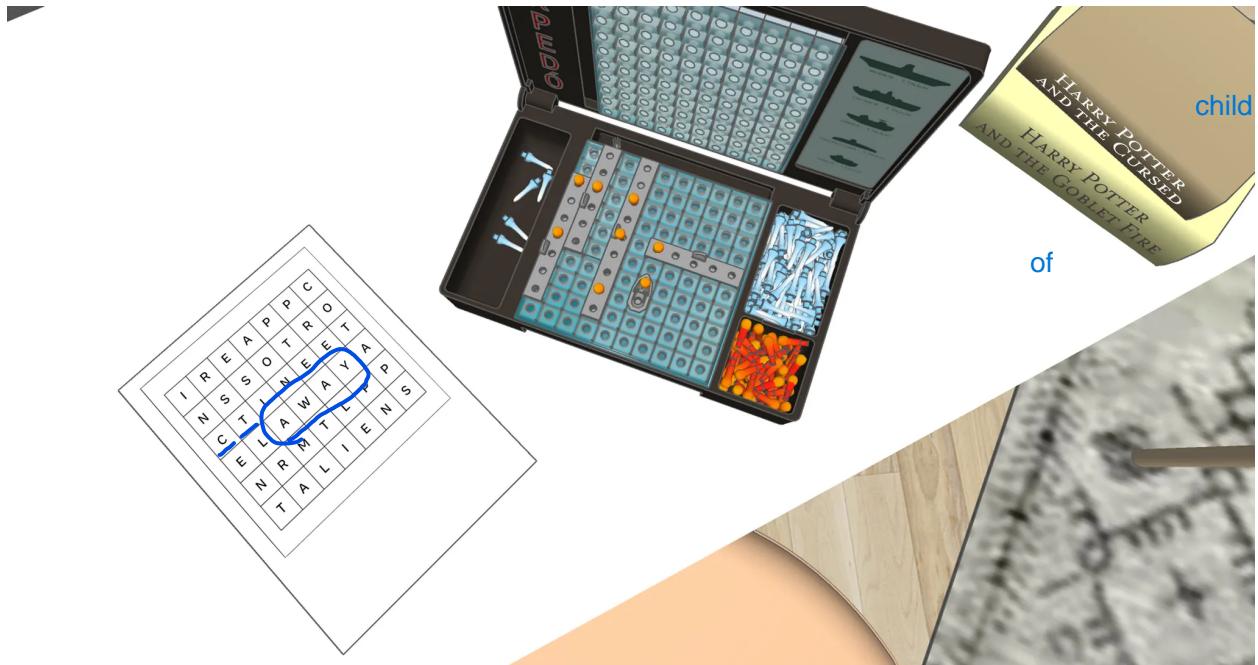
Wordle 6/7: Euphoric



# Game Room MIYAZAKI

This is no time for games! There are puzzles we need to solve. Wait, what? The games ARE the puzzle? WHAT? There are 3 puzzles just in this room? Well in that case, get to work!





# Mixed Signals

# Heartbroken

I'm not always good at expressing myself, so I wrote you a song.

<https://tinyurl.com/mixedsignals2022>

R B R B B R B B R R R R  
I B T H N N K R O V E W  
B B R R R B B R R R R R  
E X D U J U S T O U H W A  
B B B R R R B B B B B B  
N T I M D H E F E R E N T N  
R R R B B B B S B P R B R  
R T T A I N G S T N I N G E V  
R R B B B R R R R R B B B  
I E R I F E E V F N I T H S R I G H T  
B R R R B B  
Y O U N O T

D I L F O K g R V E S  
IB THHNK ROVE WE YOU JUST OUT WANT IM DIFEERENT NKT TAING SININL EVER IF E\_N ITH

RIGHT YOU NOT

bhrekalenh

# Metalinkshell

*While we were distracted by the individual puzzle worlds, it looks like the Puzzlemaker has managed to twist the very fabric of the multiverse into a puzzle! We've managed to map out each of the separated segments of the Multiverse as best we can, saving their precise locations into our patented Metadex software. Metamultiversal puzzle links (metalinks for short) travel in  $19032 + 12935i$  dimensions, but luckily we've managed to project that down to just the four cardinal directions onto your tablet.*

*From what we can tell, the separate segments should cover the whole multiverse, and never overlap or cross. All that's left is to figure out how to bring them back together! Use all the data we've gathered so far to figure out the final step — how can we fix this bug in the fabric of the multi-mega-metaverse?*

Visit <https://metalink-puzzlehunt.webflow.io/puzzles> and click on “[META] Metalinkshell” to begin. If you haven’t used the answer checker before this point, you may need to check and input your previous puzzle answers before getting started!