Top Secret Research Facility (solution)
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This puzzle is in the form of a text adventure game that solvers must assume the role of the player to navigate and complete. Each solver plays in an independent instance of the game, even if they are in the same team. The thematic reference hinted by the puzzle title, and flavortext words "enrichment center", "inter-dimensional wormholes", "test subjects/chambers" and "cake" is the popular video game series Portal. The text adventure game uses the same setting, where the player navigates between 10 different test chambers via portals, and has to help the test subjects encountered in each of the chambers.

There is another theme referenced by the portals - the test chambers themselves are modeled after specific scenes from MCU movies where portals have been opened by Masters of the Mystic Arts, and the test subject is one of the characters in that scene. To help solvers in identifying the test subjects and as confirmation, the code number for each test subject is the enumeration of the full name of the character. Each test subject requires that the player bring him/her an item that the character might have needed. Each of these items requires 3 other different component items to create, and the component items can be found in other test chambers. The items can be assembled by combining the component items in the logical order (although the stated order in each pair being combined does not matter). There are three cases of items which can only be taken when an appropriate receptacle is being carried (whereupon the two components are automatically combined). There are also two cases of required items which need to be lit using matches as the third component step, and this can only be done in front of the respective test subject (who will automatically receive the completed item).

There are two unique features of this particular text adventure game. First, the default listing of items in a test chamber has been disabled. This forces solvers to read the given descriptions carefully for potentially useful items to examine or take. Second, there are hidden items that need to be specifically searched for at certain locations, in order to be found. This forces solvers to first figure out in some cases what are the items needed and potential component items which could be found at these search locations.

To navigate between the test chambers, there are two colored portals in each of them - a blue portal and an orange portal. Going through the orange portals successively will loop through all 10 test chambers in a certain order. Going through the blue portals successively will loop through only half the test chambers in two separate loops. By mapping out how these portals lead from one test chamber to another, solvers can see that the test chambers are topologically equivalent to the faces of a pentagonal trapezohedron, or more commonly, a 10-sided die. The test chambers can be ordered in reverse chronological order based on their depicted scenes in the MCU timeline, with the first test chamber that the player appears in being the most recent amongst these. This ordering of the test chambers, when laid out on a 10-sided die using its standard arrangement, fits the loop order for both the blue and orange portals. The blue portals form two separate loops for the odd and even numbered test chambers, going from left to right. The orange portals form a single zigzag loop going from right to left. So successively going through a sequence of blue, orange, orange portals will always bring you back to the same test chamber.

After a test subject is given his/her needed item, the Companion cube in that test chamber will now display a number upon examination. Use each of these numbers as an index into the respective test subject's name to extract a letter. Putting all the extracted letters in reverse chronological order of the MCU movie scenes gives the clue word CYNOMOLGUS. When all the test subjects have been given their items, the cube will give a further hint that the puzzle answer is synonymous with "test subject" with enumeration (10 6). Solving the clue word with these information gives the thematic puzzle answer **LABORATORY MONKEY**.

The 10 test chambers, movie scenes, test subjects, items needed and components are summarized in the table below:

Test Chamber	Movie	Scene	Test Subject	Item Needed	Components
1) NY Sanctum Library	Shang-Chi and The Legend of the Ten Rings	Mid-credits stinger	Xu Shang-Chi	Hanging rack	set of hockey sticks, sword, curved tent pole
2) San Francisco Restaurant	Shang-Chi and The Legend of the Ten Rings	Mid-credits stinger	Katy Chen	Chinese takeout	paperboard placemat, Origami book, dim sum
3) Avenger Compound Ruins	Avengers: Endgame	Avengers assemble	Tony Stark	Chilled ice cream	mini cooler, ice shards, Stark Raving Hazelnuts
4) Antarctica	Avengers: Infinity War	After fight with Wong	Cull Obsidian	Large snowshoes	tennis rackets, bindings, oversized boots
5) Greenwich Village	Avengers: Infinity War	Fight with Doctor Strange	Ebony Maw	Prising tools	candle, tent pole, hammer
6) Central Park	Avengers: Infinity War	Doctor Strange visits Tony Stark	Pepper Potts	RSVP envelopes	feather, ink bottle, plain envelopes
7) Falling Loki	Thor: Ragnarok	Trapped in loop by Doctor Strange	Loki Laufeyson	Huge fluffy pillow	goose down, bivy tent, twine
8) Street outside HK Sanctum	Doctor Strange	Fight outside HK Sanctum with Kaecilius	Wong	Upper body armor	helmet, chest pad, shield
9) London Sanctum	Doctor Strange	Attack on London Sanctum	Kaecilius	Lit Molotov cocktail	bottle of Absinthe, sock, box of matches
10) Mount Everest	Doctor Strange	Learning to master Sling Ring	Stephen Strange	Lit brazier	brazier, coals, box of matches

And how all of these components can found in each of the 10 test chambers are summarized in the table below:

Test Chamber	Components
1) NY Sanctum Library	(After examining the table): candle, ink bottle, box of matches (After searching the bookshelves for Origami book): Origami book
2) San Francisco Restaurant	(After examining the kitchen): mini cooler, kitchen twine (After examining the bar): bottle of Absinthe (After examining the table): paperboard placemat
3) Avenger Compound Ruins	(After searching the ruins for sword): sword (After searching the ruins for shield): shield (After searching the ruins for hammer/Mjolnir): hammer
4) Antarctica	(After examining the bedrock): ice shards, coals
5) Greenwich Village	(After examining the shop): plain envelopes (After searching the shop for socks): sock (After searching the shop for boots): oversized boots
6) Central Park	(After taking the geese): feather, goose down (After searching the ice-cream stand for Stark Raving Hazelnuts): Stark Raving Hazelnuts
7) Falling Loki	(After examining the ground): helmet
8) Street outside HK Sanctum	(After examining the food stalls): dim sum, brazier
9) London Sanctum	(After searching the walls for tennis): tennis rackets (After searching the walls for hockey): set of hockey sticks, chest pad
10) Mount Everest	(After examining the collapsed shelter): bivy tent, tent pole, curved tent pole, bindings

Constructor's notes:

As usual, the starting point for this puzzle was the required answer, which gave the idea of test subjects and is something creepy that would already fit the Round 2 Inside Out theme. A relatively well-known usage of test subjects is in the popular Portal video game series, and this this led to the idea of using a text adventure game (for the first time in SGPH) to simulate the portal teleportation and going to different test chambers. The puzzle challenge within the game itself was based on another portal reference, this time to portal scenes in MCU movies. This provided quite a fun writing experience coming up with thematic requests that were in character, and with component items that could be found in the other scenes. And some of the item requests required some context of the scenes to understand or help figure out what exactly is needed. E.g. One was a trivia in a memorable dialogue from Avengers: Infinity War on the fictional Ben & Jerry's ice-cream flavor named after Tony Stark. Two unique elements were also added to the text adventure game to make it more challenging and interesting. But at the same time, I also made sure to improve the game experience by disabling irrelevant default actions, providing a help message (thematically, from the Companion cube), and including hints in some of the item descriptions on how they could be used. This is the first SGPH puzzle that is a text adventure game, so hoped that it was both fun and manageable for everyone. But fittingly, there is no cake at the end which was originally promised.