Due to my logbook being damaged, I had to rewrite the logbook based on everything I could recover and remember about my science fair project.

September:

During September, I primarily focused on coming up with ideas for my project steps and plans and how I was going to go on about my project. Originally, my project was going to be titled 'Rewriting Pain: Using CRISPR to Cure Endometriosis.' A project that proposes a theoretical but science-backed cure using CRISPR gene editing, something not innovative or experimental, which posed an issue later on. I did research during that month and tried to deepen my understanding of CRISPR, endometriosis, and how genetics worked by watching YouTube videos, reading research pages, and taking insightful notes related to the topic. I also began doing research on possible mentors and people with a strong background in subjects related to my science project, and didn't yet reach out to any until October.

October:

I was going back and forth emailing my science teacher, Ms.Hosemann, to try to come up with a project that either fell into the innovative category or the experimental category. The previous idea I had for my project was more based on combining CRISPR gene editing and immune therapy to treat endometriosis. It was difficult to simulate as a student project, and my school was not going to send any research projects, so I had to switch and adapt. My project also lacked a specific testable focus. With that feedback, I came up with another title, "Rewriting Pain with CRISPR: A Future Path to Endometriosis Therapy," which then focused more solely on the gene-editing aspect of the disease. I explored a more targeted innovation using CRISPR-Cas9 as a theoretical model to correct genetic mutations (like WNT4 and HOXA10) that contribute to endometrial tissue misplacement and inflammation. That change to my project made it more realistic and research-focused while still being innovative. And also aligned better with CYSF's innovation category, as it emphasizes the creation of a theoretical future therapy model and utilizes simulations, diagrams, and a 3D prototype to demonstrate the concept. I messaged a few mentorship programs to try to connect me to a mentor who can assist and guide me through my project. They claimed to offer a mentorship program for youth science research. But I did not receive any response from them whatsoever, and just set the goal to find a mentor aside. I shifted my focus to build a strong foundation of my knowledge for CRISPR, genetics, and endometriosis research before I advanced further into my project. In October, I did a lot of planning. I then decided to build a digital simulation that models how CRISPR could "fix" a mutation in an endometriosis-linked gene (e.g., HOXA10), plus a small physical "before & after" model that visually shows the same concept. Which together, they explain the therapy idea, show simulated results, and make the science obvious. My end goal was to be able to make a working simulation that can load a short DNA sequence, mark a mutation, simulate a CRISPR edit, and plot a simple outcome (e.g., theoretical "lesion growth index" over time before vs after edit). And also exportable figures: (a) DNA diagram before/after, (b) lesion-size vs time plot, (c) bar chart of "simulated symptom index" pre/post. I've decided to use ChatGPT (OpenAI GPT-5) as a mentor instead to help me learn coding concepts, simulation design, and to organize the steps of my CRISPR gene-therapy model project. I ensured that all interpretations and writing reflected my own understanding, and that all ideas, project direction, and concepts were developed by me. I didn't want the AI to generate my hypothesis, data, or conclusions. And

intended to talk to my science teacher more about that to see whether how I was using ChatGPT is in line with the CYSF policies and my school science fair policy to prevent any cheating or academic dishonesty.

November:
After reflecting on my science project, I realized I had overestimated my ability to master multiple complex concepts at once, such as CRISPR, molecular biology, biomedical modelling, coding, and physical prototyping, especially without a mentor in those fields. I also underestimated the time required to build and debug a strong simulation and construct a working physical model as a beginner. My original project combined too many elements (CRISPR gene editing, immune retraining, pump prototypes, simulations, and gene target biology), which made it overly theoretical, unfocused, and lacking in deeply mastered, actionable components. To improve it, I narrowed my focus to one clear mechanism: CRISPR correction of a specific gene linked to endometriosis. My redesigned project centers on a digital simulation that models a single cell or small tissue area, demonstrating a normal vs. mutated gene, the CRISPR cut, DNA repair, and restored ("fixed") cellular behaviour. Instead of building a complex Arduino pump, my physical model will now conceptually visualize targeted delivery using a simple syringe or colored water demonstration. My presentation board will include CRISPR mechanism flowcharts, simplified diagrams explaining gene therapy in endometriosis, and charts generated from the simulation. Although I briefly considered switching topics to something potentially easier, like cerebral palsy, I chose to remain committed to endometriosis and CRISPR. I clarified my learning goals: deeply understanding the CRISPR mechanism, explaining how gene correction affects cellular behaviour, and demonstrating innovation through simulation and visualization. I created a 60-day timeline covering foundational research, gene target selection, simulation design and coding, model building, and presentation practice, aiming to finish by early January. I also recognized that my project is not truly experimental, since I am not editing real genes or testing on actual cells, but rather building a simulation model. To address this, I brainstormed two possible experimental components and consulted my science teacher for feedback. I plan to finalize the project structure soon so I can begin purchasing materials and moving forward efficiently.

December:
I continued doing more research, taking extensive notes and seeing how I could improve my project. Towards the end of December, I began filling out my ethics and care form and got approval without any complications. I started trying to try and start planning the coding part of my project. My new science fair project was titled "Rewriting Pain with CRISPR: Modelling Gene Therapy for Endometriosis." Chose to focus on the HOXA10 gene for its strong correlation with endometriosis. Went over everything I actually needed to know for this project and didn't want to waste time trying to focus on anything unrelated to the research that will be needed for my project. Also searched up ways CRISPR helped other diseases and how it can help endometriosis. Had a goal of modelling the "correction" of HOXA10 in lesion cells to see hypothetically how it reduces lesion burden. I came up with independent and dependent variables, and a hypothesis, which finally made my project experimental. Identified why I was making a computational model (e.g., ethical reasons and complications). And came up with the

idea of making a physical demo using syringes instead of complex Arduino pumps, adjusting to the amount of time I had left and my coding skills.

January:
I was able to start coding with the help of various AI coding sources due to my lack of coding knowledge, which, over time, I was able to work on and understand more. I used Google Colab, a free website that allows users to write and execute Python code through their web browser without any app downloads necessary, which helped me a lot because my computer does not have enough storage space to be able to run a coding app. I chose Google Colab because of how it's particularly well-suited for data analysis, which is just what I needed. Unfortunately, sometime over the winterbreak one, half of my paper logbook got wrecked, which I only came to find out about during the month of january which was a major setback because it was a key part of my project, as I also took extensive notes. Luckily, I still remember a lot of parts, and I'm able to reconstruct it to the best of my abilities without making things up that I don't remember. I was able to get the code running and going by the end of January, and as I already had all my variables and hypotheses ready, it only took me a day or so to run it. I will be citing all the AI machines as I asked it to teach me how to code based on what I wanted it do. I didn't use it to analyze my data or interpret my results, and followed the CYSF policies regarding AI use. And mapped out everything I needed for my tri-fold and began typing things up to get it ready for print as soon as I got my tri-fold.

February:
With only one week left, I started building my trifold, worked on citations, printing everything out and making finishing changes for my code. Practiced presenting everything and trying to build my confidence to present on February 9. I hope all goes well, and I'll put in my all to do my best on Monday.