

2022 ISS Logbook record Group A

Class	S2-01
Group	A
Names of Group members	Luke Yeo, Klifton Cheng, Jonathan Choo Jun Jie

Topic: (* Please categorise the topic in your daily log. Daily log should show a summary of daily discussion)

Project planning:

- **Project planning.** As you plan your science project, use your lab notebook to capture the **questions** you hope to investigate, your **hypothesis**, and your **variables**.

Research:

- **Research.** Record your **background research**, noting sources you use (including URLs or bibliographic data). Summarise articles and publications you review (or plan to review) during your background research, any interviews you conduct, and notes related to feedback, suggestions, or troubleshooting you receive from a teacher or mentor. This information will make compiling your **bibliography** much easier

Materials:

- **Materials.** Document the **materials** you use (including specific brands, quantities, and costs).

Experiments

- **Experimental design:** Record all details related to your **experimental design**. For each research question, there should be 1 hypothesis. For each hypothesis, there should be 1 experiment. How many levels are there for the independent variable (usually 6 for a significant evaluation of hypothesis)? How do you change the independent variable? How do you measure the dependent variable? Did you carry out a trial experiment? Did you repeat your experiment and take the average to improve accuracy? There are some designs that are unique to your experiment.
- **Experimental setup:** Record all details related to your **setup**. Include a diagram and any changes to the diagram subsequently if your setup should change during the experiment.
- **Experimental procedure.** Record all details related to your practice. Document your steps, trials, and observations to be made. Ensure that your practical design steps (e.g. levels of an independent variable, repeat experiment) are incorporated into the procedure section. You must

also list the Procedures on how you analyse the data, including a table that you will use to tabulate your data, a graph if your hypothesis is correct, and how you will arrive at a statement of how your hypothesis is verified or not.

- Be sure and note any modifications you make and any problems you encounter, including any mistakes. Even if it seems trivial or inconsequential, you should write it down in this paragraph.

Data Collection:

- **Data collection.** Your data is critical to your science project and the conclusions you will draw at the end of the project. Be careful to accurately enter *all* numbers, measurements, temperatures, calculations, or other data as you gather data. It is best to enter **all** data **directly** in your lab notebook. If you have data logged electronically, keep a list of log dates and file names and tape or glue printed copies into your lab notebook when possible. All trial data should be listed here besides the final set of data. The format of the data could be hand-written or digital.
- **Abnormal results:** There should be highlights of data that are anomalous, and the experiment is repeated and corrected.

Data Analysis:

- **Data analysis.** This section must show how your processed data (graphs or histograms) is compared to the hypothesis. There should be highlighted points where they are similar and different.
- **Discussion:** There should be some discussion on how the experimental data support or rejects the hypothesis or support it to a certain extent. Is there a modified theory behind this trend or behaviour?

Group Reflection: Consider the following questions

1. What are the local or global issues your project is trying to address?
2. How have your team made personal effectiveness during this project?
3. How have your team made progress in interpersonal effectiveness during this project?

Date	17/1/2022
Details of work done	We had seemed to hit a roadblock, and then we ended up trying to think of ways to apply our experiment to the community to get a band 4 for some more categories.

Research:

- **Research.** Record your **background research**, noting sources you use (including URLs or bibliographic data). Summarise articles and publications you review (or plan to review) during your background research, any interviews you conduct, and notes related to feedback, suggestions, or troubleshooting you receive from a teacher or mentor. This information will make compiling your **bibliography** much easier

Date	18/1/2022
Details of work done	<p>Thought of a new topic called 'investigation of the effect of temperature on the performance of Lithium-ion Rechargeable batteries' due to our topic becoming too vague</p> <p>Luke was at home sick that day, so he redid most of the proposal while at home</p>

Date	21/1/2022
Details of work done	<p>Finding all the References and Bibliography to be Cited in APA format to be put into the proposal. Clarified the circuit diagram and got the docs ready to be handed up.:D</p> <p>References:</p> <p><u>Journal Article</u></p> <p>Bandhauer³, T. M., Garimella⁵, S., & Fuller⁴, T. F. (2010, October 2). IOPscience. Journal of The Electrochemical Society. Retrieved January 21, 2022, from https://iopscience.iop.org/article/10.1149/1.3515880/meta</p> <p><u>Book</u></p> <p>Soto, Z. A., & Gonzalez, D. F. (2019). <i>Modelling of secondary batteries for the state of charge evaluation</i>.</p> <p><u>Website</u></p>

Allain, R. (2012, January 23). Are Expensive Batteries Worth the Extra Cost? Wired.

<https://www.wired.com/2012/01/are-expensive-batteries-worth-the-extra-cost/>

Battery University. (2021, October 27). *BU-410: Charging at high and low temperatures*. Battery University. Retrieved January 20, 2022, from

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Brookshire, B. (2020, August 14). *Let's learn about batteries*.

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Bibliography:

Book

Higgins, T. (2021). *Power play: Tesla, Elon Musk, and the bet of the century*. Doubleday.

Website

Prine-Robie, W. by M. (2021, September 8). *How does temperature affect battery performance?* CED Greentech. Retrieved January 20, 2022, from

<https://www.cedgreentech.com/article/how-does-temperature-affect-battery-performance>

Johnson, V. H., Pesaran, A. A., & Sack, T. (2001, January 10). *Temperature-dependent battery models for high-power lithium-ion batteries*. Temperature-Dependent Battery Models for High-Power Lithium-Ion Batteries (Conference) | OSTI.GOV.

Retrieved January 20, 2022, from

<https://www.osti.gov/biblio/775874>

Nature Publishing Group. (2021, June 29). *Lithium-ion batteries need to be greener and more ethical*. Nature News. Retrieved

	<p>January 20, 2022, from https://www.nature.com/articles/d41586-021-01735-z</p> <p>Bandhauer³, T. M., Garimella⁵, S., & Fuller⁴, T. F. (2010, October 2). IOPscience. Journal of The Electrochemical Society. Retrieved January 21, 2022, from https://iopscience.iop.org/article/10.1149/1.3515880/meta</p> <p>S. (2021, May 27). Different Types of Batteries: Their Uses and Applications. Wiltronics. https://www.wiltronics.com.au/wiltronics-knowledge-base/different-types-of-batteries/</p> <p>Ma, S., Jiang, M., Tao, P., Song, C., Wu, J., Wang, J., Deng, T., & Shang, W. (2018, November 28). <i>Temperature effect and thermal impact in lithium-ion batteries: A Review</i>. Progress in Natural Science: Materials International. Retrieved January 20, 2022, from https://www.sciencedirect.com/science/article/pii/S1002007118307536</p> <p><u>Youtube video</u></p> <p>YouTube. (2019). <i>YouTube</i>. Retrieved January 21, 2022, from https://www.youtube.com/watch?v=i2nelj3apTI.</p> <p>YouTube. (2021, May 20). <i>Correctly measure battery level - MAX17048 (ESP32 + Arduino series)</i>. YouTube. Retrieved January 25, 2022, from https://www.youtube.com/watch?v=mhmD-QA6kf0</p>
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Date	24/1/2022
Details of work done	Working on the SST ISS website for our ISS project. Making changes to the proposal based on science teacher comments

Date	27/1/2022
Details of work done	Double checking the document, making sure there are no errors, we also changed the topic <u>again</u> to make our lives easier, we changed the topic to the <i>Investigation of the effect of temperature on the performance of AA batteries</i> . So as the title suggests we are going to be using normal AA batteries and logging their performance on a graph.

Date	30/1/2022
Details of work done	Ms Teo said that most of the proposals were pretty bad, making crucial amendments to make it better based on her new comments, things like the hypotheses were wrong up until submission so that is one example

Date	3/2/2022
Details of work done	<p>Final research proposal submitted with Equipment list done up and ready to hand up</p> <p>Equipment list:</p> <p>4x AA Battery (energizer)</p> <p>4x AA Battery (Sony)</p> <p>4x AA Battery (GP)</p>

	4x AA Battery (Eveready) 4x AA Battery (Panasonic) 4x AA Battery (Daiso) 6x Breadboard (half size) 6x 10 ohms resistor 6x 2k ohms resistor 6x Arduino board
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Date	4/2/2022
Details of work done	Planning circuit layout for experiment

Date	7/2/2022
Details of work done	Finished the circuit layout, got the resistors from the equipment list, ready to start the experiment

Date	10/2/2022 (HBL TASK)
Details of work done	Started experiment, logging battery data at home

Date	10/2/2022
Details of work done	Updated battery brands to be tested

Date	17/2/22
Details of work done	Scrubbing the data and using Desmos to make big graph :o

Date	13/2/22 (HBL)
Details of work done	Tidying up and adding data into the report, running final round of battery testing...

Date	1/3/22
Details of work done	Doing the google site and doing the graph

Date	4/3/22
Details of work done	Tidying the report

Date	8/3/22
Details of work done	Making the video

Date	13/3/22
Details of work done	Finished poster and did a run-through of all documents