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| **Lesson Title :** Rearranging and Creating Equations | **Unit #: 1** | **Lesson #: 1** | **Activity #: 2** |
| **Activity Title:** Gathering MacBook Information |

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| **Estimated Lesson Duration:** | 3 days |
| **Estimated Activity Duration:** | 1 day |

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| **Setting:** | Classroom with MacBooks |

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| **Activity Objectives:** |

We will introduce MacBook applications to understand the battery life and usage of our MacBooks.

I will be able to analyze the battery charge and usage of my MacBook battery.

 (this can be measured/recorded by students being able to create a Google Spreadsheet and write in their MacBook’s individual theoretical, initial capacity. These Google Spreadsheets will be shared with the teacher to allow for formative checks.)

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| **Activity Guiding Questions:** |

* How does the age of the MacBook affect the number of cycles?
* How often is the real time data refreshing?
* Does the data from the applications get applied to equations?
* Can other applications be used besides System Information, Battery Health, Activity Monitor, and Coconut Battery?
* To create an equation, which information from the applications is related?
* What does mAh stand for?

| **Next Generation Science Standards (NGSS)**  |
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| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| ✔ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☐ Developing and using models | ☐ Cause and effect |
| ☐ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ✔ Analyzing and interpreting data | ☐ Systems and system models |
| ✔ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function.  |
| ☐ Engaging in argument from evidence | ✔ Stability and change.  |
| ✔ Obtaining, evaluating, and communicating information  |  |

| **Ohio’s Learning Standards for Science (OLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☐ Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Ohio’s Learning Standards for Math (OLS) and/or** **Common Core State Standards -- Mathematics (CCSS)** |
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| **Standards for Mathematical Practice (Check all that apply)** |
| ☐ Make sense of problems and persevere in solving them | ✔ Useappropriate tools strategically |
| ✔ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ✔ Model with mathematics | ✔ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, OLS and/or CCSS):** |

A-CED Creating Equations-A: 1-4----Students will learn to create equations in one variable to solve problems, create equations in 2 or more variables to represent relationships between quantities, represent constraints in equations, and rearrange formulas to highlight a quantity of interest.

F-BF Building Functions-A:1----Students will write a function to describe a relationship between 2 quantities.

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

PowerPoint: Created to mirror handout to assist with understanding of applications

First slide of PowerPoint will be list assigned groups. Groups will then assign roles.

Handout: *To be used for entirety of Unit.*

 Data will be recorded into Google Sheets. Handout will show instructions to ease the use of Google Sheets and clearly outline data to be collected.

Participation rubric: to be completed by reflector (see roles below in activity procedures) and turned in daily.

Resources:

Applications to be used: System information and Activity Monitor

Applications to be downloaded: Battery Health 1 & Battery Health 2

Applications to be used via internet: Coconut Battery, Google Sheets

Supplies: School supplied MacBooks (students are assigned MacBooks at the start of the school year)

Will use Apple TV to screen mirror teacher MacBook and mirror applications as students become accustomed to information supplied in these applications.

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| **Teacher Advance Preparation:** |

* Based upon pre-test results from question #1, group students accordingly based upon the use of their MacBooks.
* Ensure applications can be downloaded using the school WiFi.
* Ensure students are able to access System Information and Activity Monitor on their MacBooks.
* Create/modify PowerPoint as described above.
* Copy handout and participation rubric. Modify as needed.

 -Participation rubric to be available and submitted online

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| **Activity Procedures:** |

Gathering of information about the MacBooks’ batteries. This activity will specifically involve utilizing the applications on the MacBooks: System Information, Activity Monitor, Battery Health 1 & 2, and Coconut Battery.

1. PowerPoint is projected showing assigned groups.
2. Handouts are distributed.
3. Each group assigns roles:
* Manager: This student will manage the group by helping to ensure the group stays on task and ensures there is room for everyone in the conversation.
* Recorder: This student will record information into the Google Sheets Spreadsheet.
* Runner: This student will communicate directly with the teacher. The runner will also record questions, concerns, and misconceptions the group may have that need to be brought to the teacher’s attention.
* Reflector: This student will keep a record of those who are in the group, and the roles that each student will play in the group. The reflector will also complete the participation rubric to give to teacher at the end of each day. This rubric will likely be available via paper copy or via Google Forms. (Google Forms will be the preferred submission)

 [Participation Rubric](https://goo.gl/forms/bOKWB9v0y1olpCoL2)

* Time keeper: This student will prompt the recorder to record data at designated time intervals of 5 minutes. I will recommend the time keeper uses a phone for proper record keeping. The time keeper will work with the manager to stay on task given the class time.
1. Introduction to System Information and Activity Monitor. Each student follows along on their MacBooks as teacher screen mirrors.
2. Downloading of Battery Health applications. Students follow along as teacher screen mirrors.
3. Recorder of each group, using Google Sheets, records the initial information about the group’s MacBooks (cycles and age). Google spreadsheet is then shared with teacher.
4. Students use information from applications and knowledge from previous day to substitute actual data into equations and solve for a variable.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

Once each group has created their spreadsheet on Google Sheets, the groups will share with teacher. Successful creation and sharing of spreadsheet = formative completion grade.

Participation rubric

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

None

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.Refer to Activity Template for details. |

* Create longer handout containing more screen shots. (visual learners)
* Create a video to post onto Schoology will audio. Handout to act as guided notes during video. (auditory learners)

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson.Overall this lesson/activity was completed as planned. The student groups worked together successfully by choosing their battery draining source and beginning testing. I would change how effectively and consistently I followed through with the roles of the students. I circulated throughout all classes and ideally I should have better adhered to what the roles duties were but overall the groups did a nice job assigning roles and completing the daily participation survey. This survey was an absolute great addition to assist with knowing what students were not holding up their duties.  |