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| **Lesson Title : Connecting physics to our lives** | **Unit #: 1** | **Lesson #:**  **1** | **Activity #:**  **2** |
| **Activity Title: Making Connections with Physics** |

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| **Estimated Lesson Duration:** | **3 days of class time, over the course of 9 weeks** |
| **Estimated Activity Duration:** | **1 day** |

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| **Setting:** | **College classroom** |

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| **Activity Objectives:** |

Students will be able to:

1. Identify course content that is relevant to their chosen topic of study.
2. Apply course content to their chosen topic.
3. Keep records of relevant course content in an engineering notebook, complete with annotated figures and witness signatures.

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| **Activity Guiding Questions:** |

1. Can I relate today’s lesson to my chosen topic?
2. What notes do I need to take in order to remember what I learned today and relate it to my chosen topic?
3. Can I go beyond what I learned today and actually apply it to my chosen topic?
4. Can I understand what my other team members have written in their engineering notebooks?

| **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):** |

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

1. Engineering notebooks. I am using regular quadrille notebooks with a stamp (1.1.2c) across the bottom.

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| **Teacher Advance Preparation:** |

1. Have engineering notebooks ready, or notebooks and a stamp for students to use to make their own.
2. Have a place to store engineering notebooks in the classroom, so students can’t take them home and forget to bring them to class.
3. Have one page of an engineering notebook filled out as an example—this could be an online resource.

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| **Activity Procedures:** |

1. Show a completed page of an engineering notebook on the screen, and point out the components and reasons for having such a notebook.
2. Give students a sample problem to solve in their engineering notebooks (for example, you are going to open a pizzeria, selling pizzas that everyone will want to come and buy because there is no place else in the world that has pizzas like this; design this unusual pizza that will bring in the customers). Students have to sign their own pages, witness another student’s page, and submit the notebook for evaluation.
3. For the next 8 weeks, students will collect their notebooks at the beginning of class and return them at the end. They will record information relevant to their chosen topic in the notebooks, including things presented in class and their own thoughts of how to use the material. The notebooks must be witnessed by another team member after they have understood the material.
4. A minimum of three times over the eight weeks the students will notify the instructor that they have a record to be graded, and the date of the record. These entries will be graded according to the rubric in 1.0.0d. Each student will be allowed to have four entries graded, in which case the lowest score will be dropped.
5. Once over the next eight weeks, each student will be approached by the instructor and asked to explain a page that they have witnessed in another student’s engineering notebook, and this explanation will also be graded as a part of the rubric 1.0.0d.

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

Entries in engineering notebooks

**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.

The summative assessment will be the final presentation at the end of the unit.

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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. |

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson. |

This lesson went well. Several students really enjoyed having the engineering notebooks, and they were useful for keeping project-related items in the same place for this unit that lasted for almost a whole semester. Allowing the students to have four graded entries worked well, because it generally made the first one a practice run.

I am not sure how useful it was to have students explain pages that they signed. My hope was that it would make them really read each others’ pages before signing, but that didn’t really happen. In the next iteration I may require them to provide me with a 2-sentence summary of what each page they signed actually said.