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| **Lesson Title : Gathering Information** | **Unit #: 1** | **Lesson #:**  **1** | **Activity #:**  **1** |
| **Activity Title: Introducing the Big Idea** |

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| **Estimated Lesson Duration:** | **4 days** |
| **Estimated Activity Duration:** | **1 day** |

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| **Setting:** | **Classroom** |

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| **Activity Objectives:**  Students will   * Determine the Big Idea through a hook and class discussion * Brainstorm possible essential questions and pick one to drive challenge * Develop guiding questions to complete challenge |

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| **Activity Guiding Questions:**   * What can we do as a class to help conserve energy? * How does our cell phone relate to energy conservation? |

| **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)   * YouTube Video: “What Happens When the Oil Runs Out?”   <https://www.youtube.com/watch?v=A7imyDSHtV0>   * YouTube Video: “When Your Phone Dies at the Wrong Time”   <https://www.youtube.com/watch?v=P2w8s_9Kbso>   * Handout: Unit Guide |

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| **Teacher Advance Preparation:**   * Unit Guide Handout (Big Idea to the Guiding Questions) |

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| **Activity Procedures:**   1. Begin class by showing the short clip “What Happens When the Oil Runs Out?” 2. Give student teams 5 minutes to research using the internet information about the big idea (Depletion of Fossil Fuels, Energy Consumption, Energy Conservation). Student groups will jot down what they have found in list form and prepare to share out with the rest of the class. As student groups share what they have learned, teacher records information as a running document projected in front of the class. Group information into categories. Expected categories include depletion of fossil fuels, energy consumption, energy conservation, different types of energy, etc. 3. Generating Possible Essential Questions: After sharing what students know, students will share what they would still like to know through think-pair-share. Give students 3 minutes to individually write down questions they have, then share within their teams. Teams will share out to the class and the questions will be recorded for the entire class to see. Once questions are grouped and evaluated, use online poll to choose question on which to derive challenge.   (**What can we do to conserve energy to reduce the use of fossil fuels? Or How can we use math to conserve energy to reduce the use of fossil fuels?)**   1. Present the challenge:  * Watch YouTube Video “When Your Phone Dies at the Wrong Time” * Discuss scenarios when phone dies at the most inopportune times * Discuss how cell phone usage (electricity) is directly connected to fossil fuels (short clip on how electricity is generated <https://www.youtube.com/watch?v=GI7AhajfhWE> ) * Present the challenge along with constraints   **Challenge: Use mathematical evidence to develop three strategies for the student population to use to conserve phone battery life**   1. Guiding Questions: For homework, students will provide 3 to 5 responses to the following question: What information do we need to know to complete the challenge? |

**Formative Assessments:**

* Generating essential questions and selecting one
* Generating guiding questions

**Summative Assessments:** None.

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| **Differentiation:**  To differentiate the lesson, there were different methods for students to contribute to the discussion. For vocal students, there was in class discussion. For students who are less vocal, they shared their contributions with a partner and typed their responses on a shared Google Doc (an online discussion). |

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| **Reflection:**  Overall, the activity went as planned. The movement from introducing the Big Idea to the challenge went smoothly with the use of the video clips to help guide the students. The students seemed both interested and concerned about the limited supply of fossil fuel that is being used at an alarming rate. This connection to the real societal problem was important since it adds meaning and purpose to the rest of the unit. If I could do it again, I would have spent more time allowing the students to research the crisis surrounding limited renewable resources. This also would have been a great opportunity to explore careers and college level studies that work in this area. I should have also spent more time allowing the students to think and create questions. This would have made them feel as if they have more ownership in the project and as if the challenge is what they created. I rushed the process so I need to learn to be more comfortable and relaxed so that the students have time to think. |