**NGSS Lesson Planning Template**

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| **Grade: 3rd** | **Topic: Earth and Human Activity: Impact of Weather Hazards**  **Engineering Practices** | **Lesson (number/title): Guard the Garden** |
| **Brief Lesson Description: *Introduction/Foundational Lesson***  Students will create and test structures that will reduce the effects of weather hazards on garden plants. | | |
| **Performance Expectation(s):**  3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.\*  3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. | | |
| **Specific Learning Outcomes:**   * I can explain how local weather hazards will impact plants in our school garden. * I can list ideas to solve this problem and research which ideas would work best. * I can plan and build a structure based on my research. * I can decide whether my structure was successful by comparing its performance to others. * I can reflect on what made my structure successful and what needs to be modified. * I can make modifications to my structure based on my reflections. | | |
| **Narrative / Background Information** | | |
| **Prior Student Knowledge: How do different weather hazards impact the environment?** | | |
| **Science & Engineering Practices:**   * Engaging in Arguments from Evidence * Asking Questions and Defining Problems | **Disciplinary Core Ideas:**  [**ESS3.B: Natural Hazards**](http://www.nap.edu/openbook.php?record_id=13165&page=192)   * [A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.](http://www.nap.edu/openbook.php?record_id=13165&page=192)   [**ETS1.A: Defining and Delimiting Engineering Problems**](http://www.nap.edu/openbook.php?record_id=13165&page=204)   * [Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.](http://www.nap.edu/openbook.php?record_id=13165&page=204) | **Crosscutting Concepts:**   * Cause and Effect * [Influence of Science, Engineering, and Technology on Society and the Natural World](http://www.nap.edu/openbook.php?record_id=13165&page=212) * Science is a Human Endeavor |
| **Possible Preconceptions/Misconceptions**  Students need to be able to explain how different weather hazards can affect the growth and health of plant systems specifically. | | |
| **LESSON PLAN – 5-E Model** | | |
| **ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions**   * What kinds of weather hazards do we experience in Kansas? | | |
| **EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions**   * Students will identify a weather hazard and explain how this hazard could affect garden plants. * Students will generate possible solutions to reduce the effects of the weather hazard. * Students will conduct internet research to see if their solutions have been used successfully before, understanding that they will be deciding which method to use and actually constructing an example, so they need to use the following questions to evaluate which method would be most feasible:   -What made this possible solution more effective than others?  -What kinds of materials were used? Could I access those materials or substitute something that I  would have access to?  -Was the structure built to be used on a larger scale? If it is larger scale, can I adapt this  method to a smaller scale to protect an individual plant? | | |
| **EXPLAIN: Concepts Explained and Vocabulary Defined**   * Students create a plan to build their structure, collect materials and construct. * Students implement their structures in the garden and observe and collect data over time. * Students evaluate the success of their structure by comparing the data they collected to classmates’ data and deciding which structure worked best. * Students analyze which parts of their structure were unsuccessful and create a plan to modify the structure to be more successful   **Closing if done for the day:** | | |
| **ELABORATE: Applications and Extensions**  ***Day 2 (optional)***  Students modify their structures based on their modified plans and collect data to decide if their improvements have been successful  **Closing:** | | |
| **EVALUATE:**  **Formative Monitoring (Questioning / Discussion):**   * Can students identify problems and clearly explain reasons why structures were successful or not?   **Summative Assessment (Quiz / Project / Report):** | | |
| **Elaborate Further / Reflect:** | | |

**Materials Required for This Lesson/Activity**

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| **Quantity** | **Description** | **Potential Supplier (item #)** | **Estimated Price** |
|  | **Milk cartons, soda bottles, popsicle sticks, cardboard, other construction materials** |  |  |
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