**ASHFORD PARK ELEMENTARY SCHOOL**

STEM Challenge Unit

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| **Grade Level:** 4th | **Challenge Title:** Oil Spill Cleanup | | | **Duration:** 3 hours |
| **Primary Subject Area:**  Reading/ELA  Math  Science  Social Studies | | **Primary Content Area:**    Ecosystems | | |
| **Standards Addressed in this Unit** | | | | |
| **Science** | S4E3b Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation).  S4L4c Predict how changes in the environment would affect a community (ecosystem) of organisms. | | | |
| **Mathematics** | MGSE4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. | | | |
| **ELA** | ELAGSE4RL7: Make connections between the text of a story or drama and a visual or oral presentation of the text identifying similarities and differences.  ELAGSE4RI1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. | | | |
| **Social Studies** | SS4Ga Locate major physical features of the United States: the Atlantic Coastal Plain, the Great Plains, the Continental Divide, the Gulf of Mexico, the Mississippi River, and the Great Lakes. | | | |
| **Technology** | <https://www.youtube.com/watch?v=lHNtcqksWwg>  (Gulf Oil Spill Kills Thousands of Animals) | | | |
| **Materials**   * Collecting removingoil * Water * Measuring cup * Newspaper * Disposable aluminum pie pans (3 per team) * Rocks (3 per team) * Plastic plants (3 per team) * Pipe cleaners to represent animals * Resealable plastic sandwich bags containing these supplies:   - spoon  - fork  - 50 cm of yarn  - 20 cm strip of nylon stocking  - large cotton ball  - disposable pipettes  - coffee filter  - 5 cm wide strip of paper towel | | | **Resources**   * *Oil Spill* by Melvin Berger * *Picture-Perfect Science Lessons* by Karen Ansberry and Emily Morgan (pgs. 177-188) * Internet | |
| **Primary Content Area STEM Activity** | | | | |
| **Content Area Knowledge to be delivered before activity begins:**   * What is a runoff? * What is an ecosystem? * How do oil spills harm birds, fish, and sea mammals? * How can oil spills be prevented?   **Vocabulary Relevant for Unit:**   * Runoff * Ecosystem * Populations * Environment * Rescuer * Inference * Natural Disaster * Harmful * Strategy * Benefits * Measurement   **Understandings Relevant for the Unit:** Oil spills are extremely difficult to clean up and cause many problems in affected animal environments. The key to keeping it from happening in the first place is to monitor the dumping of it into the sewage or garbage because it can end up in the waterways which can affect our own water resource. Since students are going to create their own oil spill, students will be able to see how it affects their animals and how important it is to clean the oil up quickly to avoid detrimental damage to the animals and their own environment.  **Prerequisites**   * Understanding of runoffs and the purpose of the water cycle * Understanding of how the changes in the environment affect animals * Knowing the 5 parts of a letter   **Activity:**  In groups of three, students should take teacher notes for this material on the right side of their Stem Interactive  Notebooks. Students should complete their designs, plans, evaluations, and conclusion on the left side pages of their STEM interactive notebooks once animals are cleaned from the oil spill.  **Overview:**  When oil spills occur, different types of agencies and volunteer organizations participate in cleanup efforts. Depending on the type of beach or type of oil, different cleanup methods may need to be used. As those organizations help purify the water, animal rescuers are needed to help the fish, mammals, or birds survive these harsh conditions, by treating them and returning them back to their safe environment.  **Challenge:** You all are members of a response team and an oil spill has just occurred in your region affecting many animals. You must spring into action to find out which methods will work best to clean up the oil that has affected the animals.  **Criteria/Constraints:**   * Only three materials can be used to clean up oil * Have the clearest and most water left after testing materials   **Engineering Design Process:**  **Ask Steps**   * **Student will describe the problem in their own words.** * **Students will receive materials to analyze in relation to the problem presented.** * **Students will determine constraints**   **Imagine Steps**   * **Students will brainstorm ideas and explore the materials to see which three materials will clean up the oil the quickest.** * **Students may work individually before collaborating as a group to share original ideas.**   **Plan Steps**   * **Students will draw their plans and include information about why their materials will remove the most oil from the pan.** * **The group will collaborate to come up with one idea to be included in the individual STEM Interactive Notebooks.**   **Create Steps (according to the STEM problem)**   * **Step 1** Have students predict how oil spills harm fish, birds, and sea mammals before reading *Oil Spill.* Once predictions are jotted in journals, read *Oil Spill* aloud. * **Step 2** Students will cover working area with newspaper and construct their beaches using aluminum pans (beach), rock (shore), plant (shoreline), and pipe cleaners (3 animals). Place each animal on the edge of the each rock. * **Step 3** Students will fill pan with water and black oil (premade by teacher)**.** * **Step 4** Students will test each material for cleaning up oil spill. * **Step 5** Students will decide which material cleaned up the most oil and measure the water left in pan.   **Improve Step**   * Students will analyze the group design for strengths and weakness and begin the EDP to rework the design**.** | | | | |
| **Secondary Content Area Activity** | | | | |
| **Aligned to the general curriculum standards**  **Reading/ELA:** Students will write a letter to an animal rescue organization about how their material cleaned up the most oil compared to the one material used in the story*Oil Spill***.** The letter will also include a request of information about how people can prevent oil spills from happening.  **Social Studies:** Label the 4 oceans and 7 seas of the world. Pick one of those bodies of water and explain how that can impact the area it’s located near if an oil spill were to occur. | | | | |
| **Additional Comments or Considerations**   * In advance make black oil by mixing 2 tsp of powdered black tempera paint and 750 ml of vegetable oil (makes enough for 10 teams) * Assign role cards to each group | | | | |