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| **Lesson Title:** Build a Levee | | |  |
| **Grade Level:** 5 | **Quarter:** 1st |  |
| **Standards:**  **Science:**  **S5E1. Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive &/or destructive processes.**  a. Construct an argument supported by scientific evidence to identify surface features as being caused by constructive &/or destructive processes.  b. Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive &/or destructive processes.  c. Ask questions to obtain information on how technology is used to limit &/or predict the impact of constructive & destructive processes.  **Math:**  **MGSE.5.MD.1** Convert among different sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversations in solving multi-step, real world problems. | | |
| **Lesson Essential Question:**   * How do levees help control the constructive and destructive process of flooding? * How do I convert among different sized standard measurements? | **Vocabulary:**  Flood  Levee  Dam  Flood control | |
| **Lesson Materials**  Water source  Empty Gallon Jug to hold water for testing  Plastic Bins or Plastic Shoe Boxes  Sand (about 1-2 cups per team)  Craft sticks  Sponges  Cotton balls  Zip-top bags  Rocks  Duct Tape  Ruler | **Lesson Assessment:**  Student STEM Journal  Teacher Observations | |
| **STEM Challenge Overview:**  Students will build a levee to prevent water from one side of plastic container from reaching the other side. | | |
| **Teacher Background:**  Students work in groups of three or four people.  Access to water is necessary for this lab. If water is not available, use pre-filled gallon jugs to test levees.  This lab works well outdoors but can be performed indoors if necessary. | | |
| **INSTRUCTION** | | |
| 1. **Ask/Engage**   **Day 1 (20 min)** | | |
| * Show video of Flooding in Washington: <http://youtu.be/Z8wgkg3sYUE> * Discuss with the class the ways in which humans use technology to control destructive forces of flooding. * Discuss examples from the video or from previous books / experiences. * Introduce the challenge and provide students with the STEM journal pages. Allow time for independent brainstorming and planning. Students should think about what materials are available and which to choose for building their levee.   Challenge:  Help! Water is flooding your town and the mayor has asked for your engineering skills. You need to design and build a levee which will prevent rising flood waters from reaching the opposite side of the town.   * Have students complete the ask/engage part on their student journal. | | |
| 1. **Imagine/Brainstorm**   **Day 2 (5-10 min)** | | |
| **Criteria:**  1. The levee must be contained inside the box  2. The levee must prevent flood waters from reaching the opposite side of the box  3. The levee must be constructed from approved materials  4. Measure each side of the levee using two different types of measurement: cm and m  5. Calculate the area and perimeter of the levee.  **Constraints:**  1. Use materials provided  2. Complete the challenge in the time allotted  Have students individually think of a solution to the problem and draw and label their design. | | |
| 1. **Plan/Design**   **Day 2 (20 min)** | | |
| Each student presents their ideas to their team. Student teams collaborate to develop a final design plan. Students draw and label their final design plan and make a list of needed supplies.  Groups can design their levee using a drawing app or make a video of their final product and narrate what they did. They may take pics if their levee and use the pics for Picwall to create a pamphlet about their levee. | | |
| 1. **Create / Test**   **Day 3 (25 minutes)** | | |
| Student teams build their design according to their design plan. Students test their design plan using the gallon jug and pour water until the levee fails, when water reaches the other side of the levee. It is helpful to record how much of the gallon each team used by marking the jug with a permanent marker at the point the levee failed. Label with a team number. You may wish to accurately measure the amount of water each levee holds (this will take more time) but labeling the jug is a quick reference to which levee held the most water. Allow students to record data. | | |
| 1. **Evaluate/Improve –** and repeat Steps 1-5   **Day 3 (25 min)** | | |
| Students evaluate their design for success. Did it meet the established criteria? Did their final design match their planned design? How would students improve their design? If time allows, provide students an opportunity to redesign according to their improvement plans. | | |

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Build a Levee STEM Challenge

5th Grade

**Challenge**:

Help! Water is flooding your town and the mayor has asked for your engineering skills. You need to design and build a levee which will prevent rising flood waters from reaching the opposite side of the town.

**Criteria:**

1. The levee must be contained inside the box
2. The levee must prevent flood waters from reaching the opposite side of the box.
3. The levee must be constructed from approved materials
4. Measure each side of the levee using two different types of measurement: cm and m.
5. Calculate the area and perimeter of the levee.

**Constraints:**

1. Use the materials provided
2. Complete the challenge in the allotted time

**Materials:**

Sand

Rocks

Plastic Bag

Sponges

Craft Sticks

Cotton Balls

Duct Tape

Ruler

1. **ASK / ENGAGE:** What is the problem you are being asked to solve?

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1. **IMAGINE/BRAINSTORM:** What are some possible solutions to the problem that you are trying to solve? After you brainstorm, draw and label your ideas below.

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| **Idea #1** | **Idea #2** |

1. **PLAN/DESIGN:** Share your ideas with your group and collaborate to decide on a final design plan. Draw your team’s design below and make a list of the materials that you will need to complete your design.

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| **Team Design Plan** | **Materials List** |

1. **CREATE/TEST**: Use your Final Design Plan to create and build your solution. Test your design. Did it work? Why or Why not?

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1. **EVAULATE/IMPROVE:**  How well did your design work? Did your solution solve the problem within the given constraints?

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How can you improve your design? How can you make it better? Draw and label your improved design below.

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| **Improved Design Plan** |