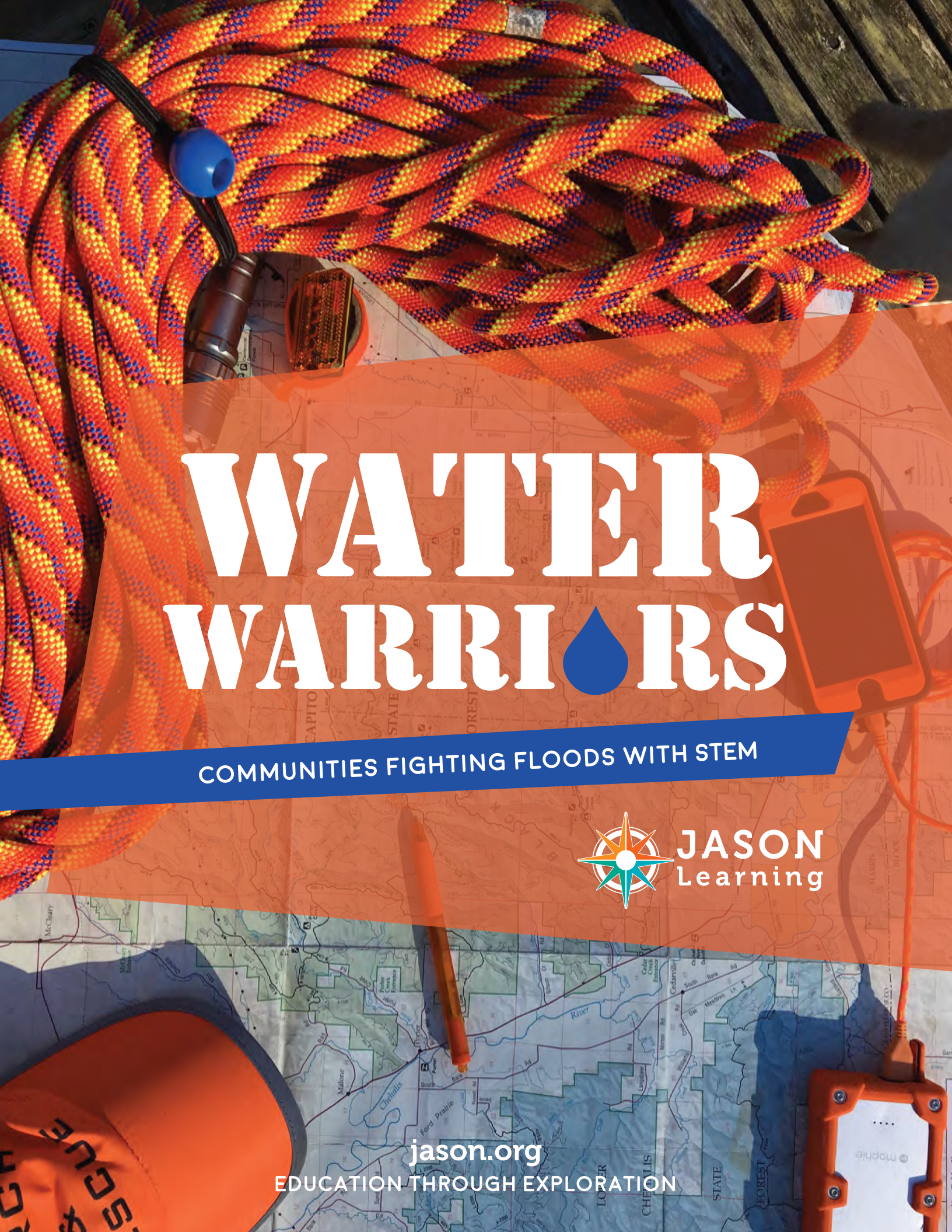

WATER WARRIORS

COMMUNITIES FIGHTING FLOODS WITH STEM

JASON Learning

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EDUCATION THROUGH EXPLORATION

ACTIVITY #1: TESTING FLOOD BARRIER MATERIALS

Our communities fight against floods in many different ways. Early warning systems and civil engineering plans are implemented to protect communities as a whole. And individuals can take their own adaptive measures to protect their personal property through barriers and other strategies.

Whether you are creating barriers for a whole community or your own house, a key aspect of designing the fight against flood is deciding which materials will best resist the water surge.

In this activity, your students will test the absorbency (ability to hold water) of different materials available in the classroom and use their data to suggest materials that will make the best flood barrier prototype.

LESSON PLAN

TIME: 1 - 2 instructional periods. 2 hours.

MATERIALS: 2 plastic cups-one of the cups should have a pencil size hole poked into it for drainage; 1 larger sized plastic cup; 1 Graduated Cylinder; Plastic bin or aluminum tray; Container of water; Stop Watch; Lab sheet for recording data; 5 different types of materials for the absorbency test (e.g. kitchen sponge, paper towels, cotton balls, styrofoam, craft foam, or other items in the classroom)

PRECAUTIONS: Make sure that water experiments are away from any power sources or electrical devices, and have paper towels ready for accidental spills.

ACTIVITY. TEST ABSORBENCY OF COMMON MATERIALS

Lab Set-up

Gather the materials for each group and set them aside. Before passing out the supplies, you will want to demonstrate the procedure for the experiment.

- Display the 3 cups, explain that the two cups of the same size are for the experiment-the cup with the hole it is your "Drainage Cup" and the solid cup is your "Reservoir Cup", the larger cup is to hold the drainage cup between tests
- Have the students choose a material to test - I suggest the styrofoam
- Place the material into the Drainage Cup. Then place this cup into your Reservoir cup.
- Fill the graduated cylinder with 50 ml of water. Demonstrate how to read it correctly.
- Have a student set the Stopwatch for 15 seconds, when the student says "GO" they will press the stopwatch and you will quickly pour the entire 50 ml of water into your Drainage cup. At 15 seconds, they will say "STOP" and you will pull the Drainage cup and place it into the larger cup.

- Take the "Reservoir Cup" and pour its contents back into the graduated cylinder.
- Record the measurement into your Absorbency Table.
- The formula for measuring the absorbence is
  50 ml - the new measurement = materials absorbency rate
  Fill in the Absorbence Data
- Students should record their observation of how each material behaved in water.
  Observations they will want to identify:

  - Which materials were most absorbent?
  - Did any materials repel water?
  - How did the material behave in water - did it float, sink, wash around in the cup?

  These observations will be helpful during the Engineering and Design Challenge.
- Then reset the experiment into your table

  - Pour the water in the Reservoir Cup back into the graduated cylinder
  - Lay out the absorbent material to dry for the next class or discard the item if it cannot be reused.
  - Fill the graduated cylinder to 50 ml again
  - Dry both the Drainage and Reservoir cups so that your measurements are exact.

Lab Procedure

Discuss possible areas for error in the experiment, make sure that each team knows and understands the procedure.

Have the lab teams decide on roles for each member:

- Data Collector-writes down all information into the table and performs calculations
- Timer-Runs the stop watch and supports quality control
- Quality Control-in charge of resetting the experiment*
- Water Specialist-pours the water and pulls the Drainage Cup at 15 seconds

** Quality Control will be in charge of bringing all supplies to the lab table and returning the materials at the end of the lab.*

Complete the Absorbency test for the 5 materials still needing to be tested. Students will enter their data into the the Absorbency table and then return all supplies so they are ready for a later class.

Discussion Ideas

What materials absorb water best? Which repel it best? Which would you like to use in your flood barrier prototype? Do you think absorbency is important to consider when building a flood barrier? Why or why not? What other attributes of materials do you think are important to consider when building your prototype, and later a real flood barrier (e.g. weight, cost, flexibility/ rigidity, etc.)?