

**CLASSROOM ACTIVITY**

Water Repellent!

GRADE RANGE

6–8

OBJECTIVES

Students will be able to:

- **Hypothesize** materials that are likely to be water-repellent.
- **Perform** an experiment to test their hypothesis.
- **Evaluate** their results.
- **Discuss** and summarize why petroleum products repel water.

OVERVIEW

This activity will guide students in exploring water repellency. Students will begin by predicting whether different materials are likely to repel water. They will then experiment to test their hypothesis and discuss whether their predictions were correct. They will reflect on which materials surprised them, and they will learn why a crayon-covered piece of paper was able to serve as waterproof protection.

MATERIALS

- Enough of the following for groups of three:
 - **Testing Squares** (cut out in advance), six per group
 - Materials for groups to cut out one 2-inch x 2-inch square of:
 - Fabric
 - Plastic wrap
 - Foil
 - Paper (Note: groups will need two squares)
 - Additional materials, such as:
 - Felt
 - Plastic tablecloths
 - Cardboard
 - Spray bottle filled with water, one
 - Scissors, one
 - **Waterproof It!** handout, one
- For the class to share:
 - Permanent markers
 - Crayons

NATIONAL STANDARDS

Next Generation Science Standards

- **MS-ETS1-2:** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

English Language Arts Common Core Standards

- **CCSS.ELA-LITERACY.CCRA.SL.1:** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

PROCEDURE

Engage

- Begin by bringing students' attention to the materials you have assembled: fabric, plastic wrap, foil, paper, paper, markers, crayons, etc.
- Ask students to turn to a partner and discuss: Which of these materials are likely to be water repellent? If needed, explain that water-repellent items are not easily penetrated by water. Rather than soaking the water in, it pushes the water away.

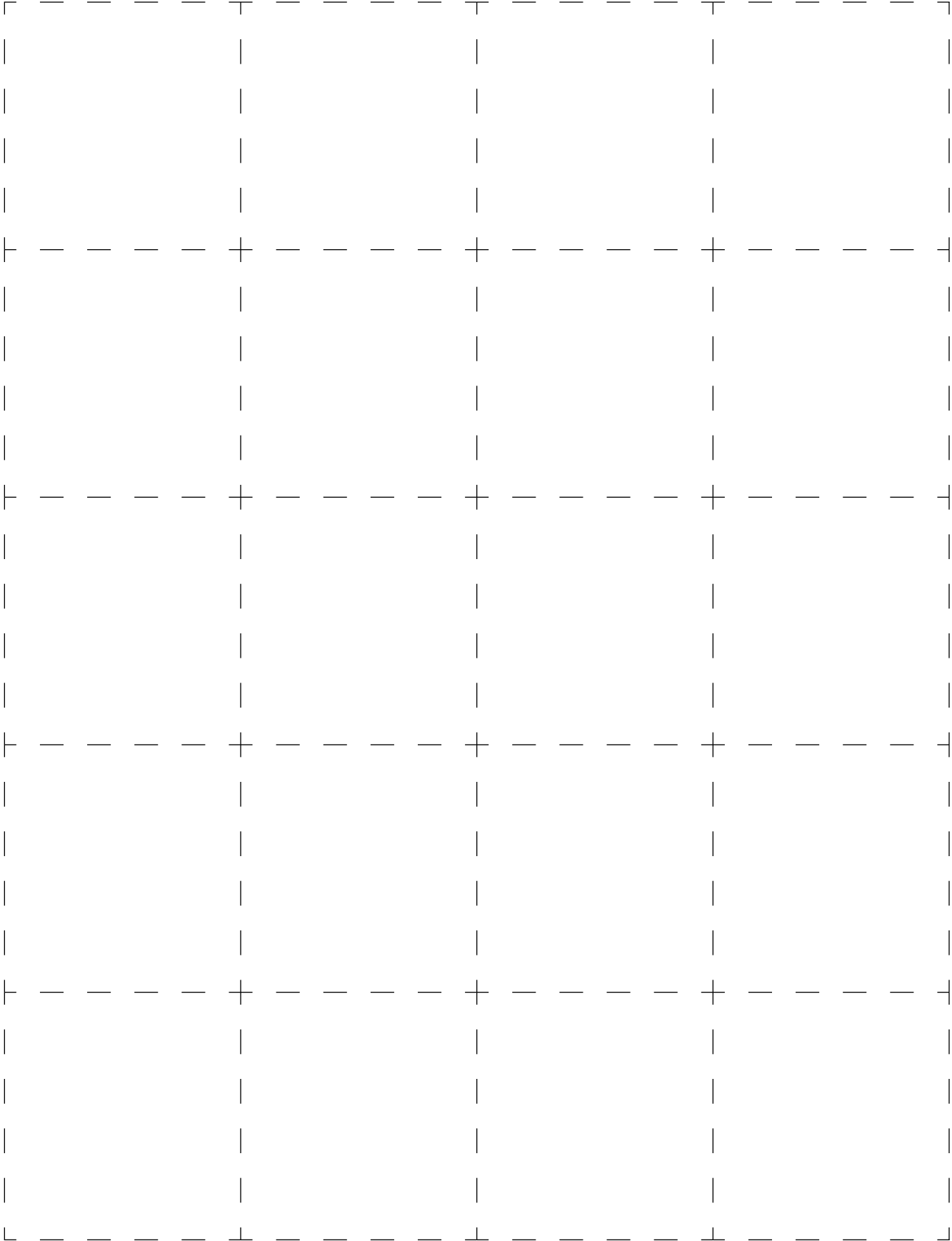
Explore

- Tell students they are about to test each of these materials and divide the class into small groups of three or four.
- Give each group six small squares of paper, one pair of scissors, and the **Waterproof It!** handout.
- Review the activity sheet's instructions together and answer questions as needed. Be sure students understand that the sixth material should be a material of their choice.
- Then encourage students to begin their experiment and complete the activity sheet.

Apply

- Once students have the results of their experiment, encourage them to share any findings that surprised them.
- Ask and discuss: Why do you think your crayon-covered piece of paper was water-repellent? After hearing students' thoughts, explain that crayons are made from two main materials: paraffin wax and color pigment. Paraffin wax is made, or refined, from petroleum.
- Help students understand that:
 - Petroleum is a fossil fuel.
 - It is called a fossil fuel because it forms underground from the remains of ancient marine organisms like algae and plants.
 - Humans can get petroleum by using drilling machines that go deep into the Earth.
 - Once petroleum is removed from the ground in the form of crude oil, it is sent to a refinery or industrial plant where it is cleaned and separated into different useable parts... including wax!

- Then tell the class that the discovery of petroleum being water-repellent was made by others long ago! Asphalt, another product made from petroleum, was used to waterproof houses more than five thousand years ago.
- Conclude by asking the class to consider what properties of petroleum may make it water-repellent. Lead students toward understanding that because petroleum is made from oil, it is *not* water-soluble (which means it cannot be dissolved in water). If they were to put water and petroleum into a glass, they would not mix! This is why petroleum-based products tend to repel water even when mixed with other ingredients.



Directions

1. Cut out each of the materials listed below, so they are just a little larger than the paper squares. These materials will be placed *on top* of the paper squares—they don't need to wrap around them.

Materials

- Square of fabric or cloth
 - Square of aluminum foil
 - Square of plastic wrap
 - Square of paper that is completely colored in with a marker
 - Square of paper that is completely colored in with a crayon
 - A sixth material of your choice
2. Fill out the *Hypothesis* section of the chart below.
 3. Place the cloth square over the paper square, and spray the cloth square with water ten times.
 4. Then remove the cloth square, observe the paper square underneath, and fill out the *Results* and *Observations* section of the chart below.
 5. Repeat Steps #3 and 4 with each of the materials.

Material	Hypothesis: Will this material protect your piece of paper from getting wet?	Results: Did this material protect your piece of paper from getting wet?	Observations: What happened? Why do you think this happened?
Cloth			
Plastic wrap			
Foil			
Paper covered with marker color			
Paper covered with crayon color			