

INSTRUCTIONS FOR TEACHERS

Activity 1: **Right Plant, Right Place**

Understanding the role grass plays in a healthy ecosystem

Essential Question: How does grass help keep our water and air clean and the planet cooler?

Materials: *Student Worksheet 1 Be a Super Observer*, drawing supplies, construction paper

Time Recommended: Two class periods

Engage: **Right Plant, Right Place**

- 1 Get** students thinking about your local environment! What does it look like? What makes it unique?
Share a copy of Student Worksheet 1 *Be a Super Observer* with each student and complete it together. Point out and celebrate the differences of your natural surroundings and others around the country.
- 2 Ask** students what they know about grass. Make a list of their answers on the board and name places nearby that are grass-covered.
- 3 Explain** the important role that native grass plays in your local ecosystem. Use the details below in a manner that is appropriate to your students' level:
 - a. Grass Cools the Planet:** Each grass blade acts like a mini cooler, producing moisture and absorbing heat. On a really hot day, lawns can be 86 degrees Fahrenheit cooler than asphalt and 57 degrees cooler than bare soil. Read the experiment below to learn more.
 - b. Grass Cleans Water:** Grass absorbs rainwater and can make it 10 times less acidic than water running off a hard surface. This protects our rivers and streams. We'll explore this more in Activity 2.
 - c. Grass Cleans Air:** Grass takes carbon dioxide from the air and stores it, leaving behind the oxygen we need to breathe (photosynthesis). In the United States, turfgrass grabs and stores more than 8 million tons of carbon every year.
 - d. Grass Makes Soil Stick:** Grass is a great defense against erosion. It holds the soil better than any other plant because of its giant root system. A single grass plant can have more than 300 feet of roots!
- 4 Remind** students that grass is a very hard worker. The blades above the ground are important, but so are the roots. Ask: *Does grass have a few roots or lots of roots?* Remind students that a single grass plant can have more than 300 feet of roots. Also explain that grass that isn't watered as often and turns brown will spring back naturally, and may even have stronger roots than grass that is watered frequently. Why would this be helpful to the environment? What color would students expect this stronger, dryer grass to be?

Explore: **Find Heat Islands**

- 5 Hold up** an outdoor thermometer and ask: *Who knows what this is? Does anyone know how it works?* Explain that a thermometer measures temperature (or how warm or cold something is). Point out the red line within the tube and the measurement lines along the side. Explain that the red line is a liquid (alcohol). As the air outside the thermometer warms up, the liquid in the tube expands and rises, making the red line rise. When the outside air is cool, the liquid contracts and the red line goes down.
- 6 Announce** that students are now ready to find out how grass helps keep Earth cool. Explain that heat islands are bare spots like parking lots and built-up parts of cities that absorb the sun's heat and then give it off into the air. Heat islands can raise the air temperature 22 degrees above that of nearby planted, grassy areas—and increase air pollution.
- 7 Take** students outside to demonstrate the difference a heat island can make in air temperature.
 - a. Place** an outdoor thermometer in a sunny, paved area, away from plants and grass.
 - b. Place** a second outdoor thermometer in a sunny, grassy area.
 - c. Wait** 10 to 20 minutes. Record and chart the final temperatures.

Explain: **What Happened?**

- 8 Ask:** *What were the results of our experiment? (Answer: The paved area was much hotter.) Why is the plant- and tree-covered area cooler? (Answer: Plants and trees act like natural air conditioners producing moisture and providing shade while absorbing heat.)*
- 9 Search** for more heat islands! As homework, challenge students to work with their families to identify three more heat islands in the community.

Name _____

BE A SUPER OBSERVER



WOOF! I'M TURFMUTT. Did you know that grass, trees, and other plants help fight off the evil forces that attack our green Earth, our clean blue waters, and our sparkling air? It's true, and I'm here to help them. I know I look like an ordinary dog, but *shhhhh*...I'm actually a superhero!

You can help, too, but first you need to look around outside and really open your eyes.

1. Finish these sentences about your town or city.

My state's name is _____.

My town or city's name is _____.

Number of people who live in my town or city: _____

2. What changes do you observe during each season? _____

3. Look out your window. What do you see? Check the boxes. Remember to look near and far!

tall mountains

small trees (most are smaller than houses)

pavement

rolling hills

tall buildings

flat plains

fruit trees

houses

farmland

green grass

water (rivers, lakes, streams)

tall trees (most are taller than houses)

brown grass

rocky or **bare** ground

What three things on this list do you see the *most*? Circle them.

4. Turn this page over and draw a picture of what you see out your window.

WORDS TO KNOW

bare (adjective): not covered

pavement (noun): the hard top of a road or driveway

Activity 2: **The Power of Grass**

Understanding how grass can help fight water pollution

Essential Question: Can plants help to make rivers and lakes healthier?

Materials: Sink or empty basin; watering can; **Student Worksheet 2 *Run Away, Dr. Runoff!***; crayons; two clear jars for each team of students; litmus paper

Time Recommended: Two class periods

Engage: **Compare and Contrast**

- 1 Have** one student cup his or her hands over a sink or empty basin. Using a pitcher or watering can, pour water into his or her hands until it overflows and drains into the empty basin.
- 2 Ask:** *What happened when too much water was poured into the student's hands?* (Answer: It overflowed.) Explain that when it rains, extra water flows over the land, down streets, and into drains that lead to different bodies of water, including streams, ponds, rivers, etc. This is called **runoff**. Runoff is a source of pollution. As water travels through and over bare ground and pavement, it picks up litter, fertilizer, and chemicals on the ground along the way. The water carries these pollutants into lakes and rivers.
- 3 Distribute** Student Worksheet 2 *Run Away, Dr. Runoff!* and complete it together.

Explore: **Experiment**

- 4 Ask:** *Do you think that green grass stops pollution better than brown grass?* (Answer: Brown grass is "resting grass"—it's a slowing down of grass's natural growing cycle. Brown grass actually does help stop pollution [it slows, retains, and absorbs water], but it is not as effective as green grass.)
- 5 Walk** around the outside of your school together and identify two places with runoff. One should be a paved area, the other grassy.
- 6 Go** outside after the next rainstorm and collect water samples in two clean clear jars. Label the jars carefully.
- 7 Use** litmus paper to test the acidity of both water samples. Explain that litmus paper has a special dye in it that will demonstrate how acidic—or polluted—the water is. Polluted (acidic) water will turn the paper red; alkalis (bases) will turn it blue. Chart your results.

Explain: **What Happened?**

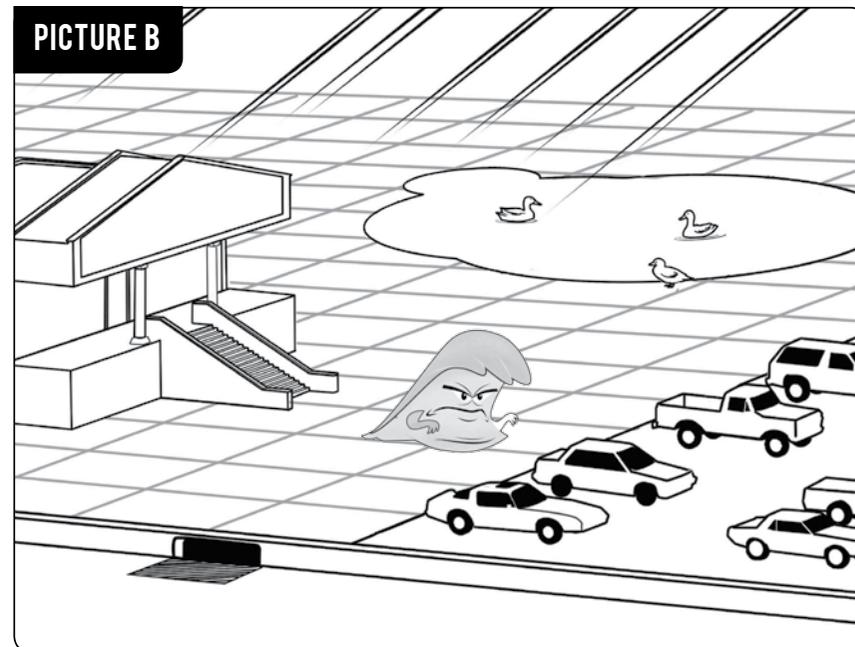
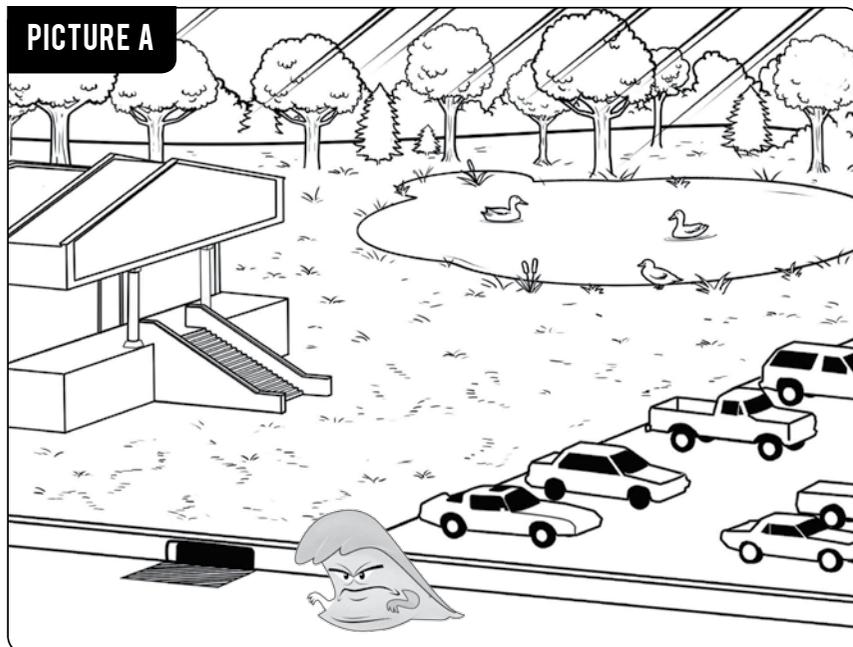
- 8 Explain** that runoff is a big cause of water-quality problems. Rainwater "runs off" hard surfaces, such as roads and parking lots, carrying contaminants (like chemicals) into waterways.
- 9 Ask:** *What should we do to reduce water pollution in our community?* (Answer: Plant grass over dirt-covered areas.) As homework, ask students to draw a picture of what their community would look like if grass grew over paved areas!



Name _____

RUN AWAY, DR. RUNOFF!

HEY, IT'S ME AGAIN, TURFMUTT! Rain helps plants grow and fills up our lakes and rivers so we have clean drinking water. But when Dr. Runoff's around, that water can become polluted.



In both pictures:

- 1. Color** the trees and grass to match your local environment. Remember, not all grass is green!
- 2. Draw a blue rectangle** around the duck pond.
- 3. During a rainstorm**, extra water flows into drains, down streets, and into rivers and ponds. **Circle** the drain and pond.

Make a guess:

Water pollution is caused by bad chemicals or by litter on the ground. Guess which pond has more pollution. **Circle** the answer.

Picture A

Picture B