

On the Trail of the Dust Demon

Understanding soil erosion with TurfMutt



Essential Question: What is *erosion* and how can you keep it from damaging your local environment?

Materials: Student Worksheet 1 TurfMutt's Erosion Experiment; experiment supplies, including: three identical plastic water bottles; three clear plastic cups; potting soil; collection of twigs, barks, leaves, or roots; seeds for fast-growing herbs or small plants; scissors; twine or yarn; water; hole punch; sunny ledge; journals; watering can

Time Recommended:

Three class periods (This experiment is designed to be done as a class, but may be modified for smaller groups of three to five students.)

Engage Identify the Villain

- 1 Create** the outline of a word web on your board, with the word "erosion" in the center oval. Using existing knowledge, help students define erosion as the gradual wearing away of something by natural agents. Explain that this class will focus on soil erosion.
- 2 Identify** various natural agents that cause erosion, including wind, running water, ice, snow, etc., and write them on the lines extending from your word web.
- 3 Ask:** *Where would you expect to see soil erosion around our school?* (Around drainpipes, around the edges of high-traffic areas like sidewalks and areas of dirt that are not covered with grass, trees, or other plants.)
- 4 Take** students on a walk around the outside of your school. Encourage them to use their journals to make note of the soil erosion that they observe. Direct students to pay special attention to windy areas, spots with water runoff, and areas with unpaved, bare ground.
- 5 Ask:** *What do the erosion areas have in common?* (Erosion tends to be worse in places without plants.) Were there any spots where you expected to find erosion and didn't? Why do you think that happened? (A plant's roots can help hold down the soil even when it's windy or wet.)
- 6 Create** a map that identifies your erosion trouble spots!

Explore Make a Super Soil-Saving Plan

- 7 Ask:** *Why is soil erosion a problem for our town, city, or neighborhood?* (Blowing soil creates air pollution and causes problems for allergy and asthma sufferers. It also allows nutrient-rich topsoil to blow or wash away, which means that plants can't grow in these areas.)
- 8 Explain** to students that they are going to conduct an experiment to discover how to combat soil erosion.
- 9 Distribute** Student Worksheet 1 TurfMutt's Erosion Experiment and prepare the experiment together. (Note: If desired, you may purchase plants for Bottle C instead of growing plants from your own seeds, but be sure that roots have dug into the soil before you begin.)

Engage Test Your Erosion-Proofing Theory

- 10 Add** equal, measured amounts of water to each of the three bottles and observe them carefully. What happened? (The water from the plant-filled bottle will hold the soil in place best, followed by the leaf- and twig-filled bottle. This is because the plant's roots dig into the soil, holding it in place.)

Elaborate and Evaluate Be a Backyard Superhero

- 11 Pull** out your class's erosion map from step 6. Make a plan to plant locally grown ground cover or dirt to help keep the topsoil in place.

TURFMUTT'S EROSION EXPERIMENT



TURFMUTT

PSSSTTT! Hi, I'm TURFMUTT—maybe you've seen me sniffing around the neighborhood lately. *Shhhhh!* I know I look like an ordinary dog but I'm actually a superhero and I need your help.

I've been tracking some damage caused by a real bad guy—**DUST DEMON**. Ever heard of him? He's making the soil around here disappear and polluting the air by a process called *erosion*.

Every year Dust Demon (alongside other sources of erosion) throws dirt, pollutants, and other particles into the air, and swipes nearly 6 billion tons of soil, making it even tougher for green things to grow. Luckily, I know a thing or two about how to fight him!

MATERIALS

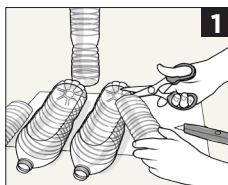
- ☐ 3 identical plastic water bottles
- ☐ 3 clear plastic cups
- ☐ potting soil
- ☐ collection of twigs, bark, leaves, and roots
- ☐ seeds for fast-growing herbs or small plants
- ☐ scissors
- ☐ twine or yarn
- ☐ water
- ☐ hole punch
- ☐ watering can



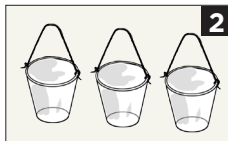
DUST DEMON

WHAT TO DO

1. Cut off the top sections of all three bottles as shown in the illustration. (Save one of these tops to use as a cover for the bottle that contains the seeds. It will make a mini-greenhouse and help the seeds to germinate faster.)



2. Punch holes in both sides of each cup. String the twine through the holes so that each cup becomes a tiny bucket.

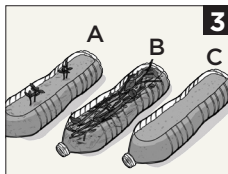


3. Fill the three bottles with an equal amount of potting soil. Next steps:

Bottle A: Add potting soil only.

Bottle B: Add potting soil and twigs, bark, leaves, roots, and other dead or dry material.

Bottle C: Plant the seeds by pressing them lightly into the potting soil. Water them and place the bottle in a sunny spot. Once the plants have grown, continue to the next step of this experiment.



4. Arrange the bottles as shown and remove the caps. Hang the cups from the top of each bottle.



SCIENCE INVESTIGATION

Make a Hypothesis!

1. Which bottle will keep the soil in place best?

Why? _____

2. What happens if you change the slope of the soil in the bottles? _____

Report on the Results

1. Observe the water. What differences do you see in each of the cups that are hanging from the bottles? _____

AT HOME

Research one of these examples of erosion to present in class:

- Wind erosion in Arizona resulting in sand dunes
- Wind and water erosion in North Carolina at the Cape Hatteras lighthouse
- Soil erosion in Iowa

Describe how erosion has changed the landscape in the example. Then answer these questions in your presentation: *What might happen over time if these conditions continue? What are humans doing to help stop erosion?*