



SUPER SEEDS



BENCHMARK and TASKS

SC.D.1.2.1 The student knows that larger rocks can be broken down into smaller rocks, which in turn can be broken down to combine with organic material to form soil.

- The student demonstrates that smaller rocks come from the breaking and weathering of bedrock and larger rocks.
- The student observes that soil is made partly from weathered rock, partly from plant remains, and also contains many living organisms.

KEY QUESTION

What changes occur when natural forces act against rocks?

BACKGROUND INFORMATION

The forces of **weathering** and **erosion** have been at work on earth for four billion years. The earth's crust is continuously being broken down in various ways. The most common causes of erosion are wind, water, and ice, but plants and chemicals can also affect the amount of erosion in an area.

Wind can carry particles of sand. The particles wear away material, which, in turn, is carried by the wind. Water can carry materials in suspension. Particles can break apart by bouncing against each other and by scraping against rocks. Dirt and rocks are worn away along the way. Temperature changes can also cause erosion. Water will infiltrate cracks and rocks. When the temperature falls below 0 degrees Celsius, the water freezes, expands and breaks away weakened rock along the cracks. Chemical reactions can also take place in the earth and cause erosion. Sometimes minerals in rocks will dissolve and the liquid will carry away pieces of rock. Plants can produce substances that will erode rock. Plants can also cause things to change in other ways (e.g., the roots of a tree can break a sidewalk).

MATERIALS

Per group

3-4 rocks
1 coffee can with lid
3 plastic vials with lids, labeled A, B, and C
seeds to fill two vials: black-eyed peas or split peas
masking tape
1 small tray
1 marker
water
soil sample
1 sifting screen
newspaper

Per student

journal
hand lens

Teacher

“rock” music

TEACHING TIPS

1. After the activity has been set up, students will need to wait several hours before discussing the results.
2. The coffee can lids may need to be taped in place during the Engage part of the activity.

ENGAGE

1. Have students form groups of 3 - 4. Distribute the supplies.
2. Have each group place the rocks in the coffee can, snap the lid on, and then take turns shaking the can vigorously. (You could play “rock” music to help students keep the beat while they shake their containers.)
3. After 5 minutes of shaking, ask students to open the cans and observe the rocks, and discuss what they see:
What happened to the rocks when they hit against each other?
What happens to rocks that travel in a river or in a stream?
What are some other forces that might break apart rocks?
Do you think seeds have enough power to break apart rocks?
4. Have students make written predictions in their journals about whether or not seeds can break rocks.

EXPLORE

1. Have each group use masking tape and a marker to label three vials, A, B, and C.
2. Tell groups to fill vial A to the top with seeds and to add water until the seeds are covered.
3. Fill vial B to the top with seeds only (no water).
4. Fill vial C to the top with water only (no seeds).
5. Students should firmly snap the lids on all three vials and set them aside.
6. Ask students to predict what (if anything) will happen to each vial during the next several hours and to record the predictions in their journals.
7. Have students observe the vials periodically, watching carefully for any changes. (You will want to have students work on another activity while they observe the vials.)

EXPLAIN

What happened to the vials?

Which vial underwent the most noticeable change?

Why did the most noticeable changes occur in vial A?

What happened inside vial A? (The water moved into the seed cells through the seed walls. This caused the seeds to swell and put pressure on the container. That is why the container either cracked or the lid popped up.)

What might happen if seeds collected in cracks of rocks or in a sidewalk?

How is the germination of seeds in the cracks of a sidewalk similar to the activity we just did with the seeds and water in the plastic vials? (Seeds absorb moisture in order to germinate.)

EXTEND/APPLY

1. Supply each group with newspaper to cover the work area, a soil sample, and a hand lens. Students should sift the soil samples through a screen or piece of stocking to sort out larger sand particles from the smaller particles. Have students explore and classify the various materials found in the soil.

Discuss:

Were all the particles the same size, shape, and consistency?

How did you classify the various particles found in the soil? (roots, rock pieces, mineral particles)

Did you discover any living organisms in your sample?

What is soil?

2. Take students on a walk around the school looking for places where seeds or plants have exerted enough force to break apart rocks. Look for sidewalks, fences, or roads broken by trees or other plants.

EXTENSIONS

1. Repeat this activity using different types of seeds.
2. To test the effects of chemicals on the erosion of rocks, have students place limestone and/or marble chips in water with a small amount of vinegar. Ask them to observe the amount of sediment present when the chips are left for a short while. Try other kinds of rocks in this solution to see the effects, if any, on the surfaces.
3. Investigate how freezing temperatures change the earth. Freeze a liter bottle of water and note the changes.

ASSESSMENT

Have students explain two forces that can break apart rocks.