Water Infiltration - Getting Water Where It's Needed!

Essential Question:
How can we measure the rate at which water penetrates soil?

At a Glance: Learners discover that different soils have different capacities to hold moisture by pouring water through a can (cut open on both ends) and timing the absorption rate at different locations at their site.

Location: Outside in several locations (garden, wooded area, sports field)

Objectives: *Learners will*
1) measure the water-holding properties of soil.

Skills: data collection, observation, analysis, communication, inference

Supplies:
- pencils
- blank maps – one for each learner
- three buckets
- tin cans with both ends removed (one for each site if measurements are to be taken simultaneously)
- watering can
- stop watch or a watch with a second hand
- data sheet

Subjects: Science, math

Time: 20 minutes

Background Information:
One of the important functions of soil is to absorb and hold water, so it can be taken up by plants when needed. Quick absorption of water is important, especially during heavy rainstorms, because rainfall could run off the soil surface before it has time to pass into the soil.

The speed with which water is absorbed by soil is called the infiltration rate. Two properties of soil affect infiltration rate 1. compaction and 2. soil particle size.

1. **Compaction:** When heavy objects repeatedly pass over soil, soil particles get squeezed more tightly together. The air spaces between the soil particles get smaller. The presence of large air spaces helps soil absorb water easily, so compacted soils can't absorb much water.
2. **Soil particle size:** Remember that soils are composed of different materials, such as sand, clay, and organic material. Sand particles are relatively large and have large air spaces between the particles in the soil. Clay particles in the soil are much smaller and create smaller air spaces in the soil. Organic matter has an irregular shape and can absorb water between the particles. The composition of the soil, that is, the relative amounts of sand, clay, and organic material, will influence the infiltration rate of water. Sandy soil will absorb water relatively quickly and clay absorbs water slowly. The presence of organic matter will slow down the infiltration rate of sandy soil and will speed the uptake of water in clay soils.

Getting Ready:
This investigation is considered part of a baseline data set, so plan to keep the *Water Infiltration* data sheet and place it in your Logbook. This data can be used and analyzed over several years.

Procedure:
1. Explain to learners that in this baseline data check, they will measure the rate at which water is absorbed by the soil.
2. Start at Checkpoints and walk two paces to the north, south, east or west. Mark your location on the Standards Check data sheet.

3. Learners should remove any vegetation from the soil surface, leaving the roots in place.
4. Push a tin can (with both ends removed) into the soil to a depth of about 1/2 inch (approximately 2 cm.). (If the soil is very dry and you can't get the can in, wet the soil with a small amount of water first.)
5. Using a watering can or bucket, fill the tin can to the rim with water.
6. Using a stop watch or a watch with a second hand, record the amount of time it takes for all the water to be absorbed by the soil. Perform this test multiple times (at least three) in different areas at each of the three sites. Average the results and record them in the *Water Infiltration* Standards Check data sheet.

Discussion/Assessment:

Discuss the data that was collected.

How do the rates of infiltration compare in the sample sites you have chosen?

Can you think of reasons why these rates might differ?

What could you do that would change the soil infiltration rates?

Soil and Recycling Department
ECO-STANDARDS CHECK

WATER INFILTRATION

Team Members _____Date _____Time _____

Checkpoint # or Name _____Direction (circle): N NE NW S SE SW E W

Weather Conditions: Temperature _____ Cloud Cover/Sun _____ Wind _____

INSTRUCTIONS: From your checkpoint, walk two paces to the north, south, east or west of your checkpoint as instructed by your club leader. Press your can into the ground; pour 8 ounces of water into the can and time how long it takes for water to drain into the soil.

Time: 5-8 minutes

Checkpoint # and Direction	**Start Time**	**End Time**	**Total Infiltration Time**