

Percolation Test

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topics: Water Percolation, Karst Topography, Pollution Filters

Summary: Students will examine the percolation rates of surface soil at various locations at the Leon Sinks Geological Area. Students will pour a measured amount of water through a measured amount of soil and record the amount of water that passes through the soil in a specified amount of time. Percolation will be related to soil particle size and recharge and runoff rates.

After completing the field lab, students will be able to:

Objective(s):

1. Compare the percolation rates of two area karst soils
2. Discuss how area karst lands affect pollution filtering

Ecosystem(s): Hammocks; Pinelands; Rivers/Springs

Equipment:

- 1 750 ml paint container per group
- 2 Large buckets with handles
- 2 one liter graduated containers per group
- GPS
- Data sheets and clipboards
- Tape measure
- Stopwatch per group
- Calculator per group
- Food Coloring
- Coffee Filters
- Towels
- Eye dropper

Background (Pre-field Classroom Activity)

1. References and Resources: Sedimentation tube; Project WET: *Get the Groundwater Picture*
2. Vocabulary: Percolation, Infiltration, Sand, Silt, Clay, Solution, Suspension, recharge, runoff
3. Equipment Training:

Procedure (Engage; Explore; Explain)

1. This field lab will take place on or near the boardwalk area at Big Dismal Sink. Sandy soil will be acquired by students near the boardwalk. Clay soil will be provided, obtained earlier from the area near Turner Sink. Only one group will test the clay soil per percolation test station. Water will also be provided, obtained earlier from Hammock Sink (Little Dismal). Before beginning the tests, ask students: Do you think water will percolate faster through sandy or clay soil? Do you think it will percolate faster through wet or dry soil? Have students complete the Hypothesis and Rationale
2. Record the GPS coordinates. Provide the coordinates for the clay soil sample location.
3. Have students obtain the soil they need. Record the soil sample texture and moisture.
4. Take 500 ml of soil and place it into a large coffee filter
5. Insert the coffee filter into the coffee can.
6. Place the can over a 500 ml plastic container (to capture the flow through water)
7. Measure 500 ml of water (add two drops of food coloring for pollution test)
8. Pour the tinted water into the soil in the can. Time this step via a stopwatch until liquid has passed through the soil sample. Record the elapsed time.
9. Measure the amount of water that flowed through the can, and the volume absorbed by the soil.
10. Calculate the percolation rate in ml/second. Percolation rate = 0.5 liters/percolation time
11. Repeat the test to obtain the wet percolation rate. Use the same (now wet) soil sample.
12. Remove the soil and observe the color of the filter
13. After both the dry and wet percolation tests are completed, dispose of the soil sample, throw the filters into a trash bag and clean the containers.

Sunshine State Standards

Science: SC.D.1.3.1; SC.G.2.3.4; SC.G.2.4.4; SC.H.1.3.6; SC.H.2.3.1

Mathematics: MA.A.1.3.1; MA.B.3.3.1; MA.B.4.3.1; MA.E.2.3.1; MA.E.3.3.1

Language Arts: LA.A.1.3.3; LA.C.1.3.1; LA.C.1.3.4 **Social Studies:** SS.A.6.3.2; SS.B.2.3.9

Percolation Test**Student Data Sheet****General Information**

Full Name:		Date:	
School (teacher):		Time:	

Student Hypothesis and Rationale

If the green food coloring represents pollution dissolved in the water, then it will be (choose one: filtered out, not filtered out, partially filtered out) as it passes through the sand, because . . . _____

Field Observations/Measurements/Data

Observation	Soil 1 (500 ml)	Soil 2 (500 ml)
Location where soil sample was taken (optional)	Lat: Long:	Lat: Long:
Soil Texture		
Soil Moisture		
Dry Percolation Time		
Volume of water poured		
Volume of water collected		
Volume absorbed by soil		
Calculate Rate (for Dry)		
Did filter capture color?		
Wet Percolation Time		
Volume of water poured		
Volume of water collected		
Volume absorbed by soil		
Calculate Rate (for Wet)		
Did filter capture color?		

- Moisture: Wet = if water squeezed out; Damp = if soil holds its shape; Dry = if sample will not hold its shape when squeezed Texture: Gritty = sand; Slippery = silt; Sticky = clay; or some combination sandy-silt
- Note: percolation rate = 500 ml / percolation time

Percolation Test *Assessment*

1. Why was there a difference between the dry percolation measurement and the wet percolation measurement?

2. What might explain the difference between the percolation rates among the different sites?

3. Did the food coloring pass through the soil and filter paper? If not explain what this might mean for pollutants that are dissolved in groundwater?

4. Under what conditions would the dry and wet percolation tests be very similar? Very different?

5. What explains the difference in percolation rates between the site along the path and the other two sites?
