Soil Horizons and Slope Teacher's Guide

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

Topics: Percent Slope, Soil Horizons, Karst Features

Summary: Students will examine a soil core and measure the slope of a dry sink at the Leon Sinks Geological Area.

Objective(s): After completing the field lab, students will be able to:

1. Calculate percent slope and examine soil core samples.
2. Relate their data to the development and age of sinkholes (karst features).

Ecosystem(s): Hammocks; Pinelands;

Equipment:

- Auger
- GPS
- Munsell Charts (7.5, 10 YR)
- Sand Gauge
- Data Sheets and clipboards
- Tape measure
- String/line
- Line Level
- PVC posts

Background:

- Vocabulary: Percent slope, Angle of Slope, soil horizon
- Reference Material: Every Soil has a Story: http://soil.gsfc.nasa.gov/story/story1.htm
  Review math: Slope
- Equipment Training: Auger, GPS

Procedure (Engage; Explore; Explain)

Slope Measurement

1. Half the students in the group will work on the nature trail near a dry sink (Turner).Ask the students: How can you tell the age of a sink by its relative slope? Have the students complete the Hypothesis and Rationale.
2. Hold posts at two points down the slope at about 5 meters apart (along the trail is fine);
3. Run string from the bottom of the uphill post to the lower post and use line level to ensure the string is level.
4. Measure the horizontal distance of the string (run)
5. Measure the vertical distance from the bottom of the lower post to the string (rise)
6. Calculate percent slope (rise/run x 100)
7. Repeat measurement over a somewhat longer horizontal distance and compare your results.
8. Once your data is complete, proceed to the Soil Horizon study.

This field lab was produced jointly by the Florida Department of Environmental Protection, UF-IFAS Leon County Extension (Natural Resource Management) and Riversprings Middle School.

Procedure (Engage; Explore; Explain) Cont.

Soil Horizons

1. Half of the students in the group will work off the trail mid-way down the sink. Ask the students: Compare soil horizons to tree rings. What might they tell you about the ground underfoot? Have the students complete the Hypothesis and Rationale.
2. Find a ground area that is free of obvious roots. Sweep away any surface leaves, etc.
3. Each student will take a turn using the soil auger.
4. Extract soil cores/buckets and lay them horizontally on the ground until one auger length has been obtained. The handle of the auger should always be closest to you when laying down core sections.
5. Be careful to keep each soil core/bucket as close to the size extracted from the ground. This will help to prevent elongating the core once laid out.
6. Use the metric tape to mark where each horizon begins and ends.
7. Observe soil color and texture for any obvious changes and note the depth at which the change occurs. Use the Munsell Color Chart(s) and the Sand Gauge.
8. Record on your data sheet the number of horizons.
9. Complete observations for each distinct layer/horizon.
10. Put the soil back in the hole you augured.
11. Tamp the hole to make sure it is refilled. Recover the ground with any leaf litter (as you first saw it).
12. Switch with the other half group and measure slope.

Sunshine State Standards:

Science: SC.A.1.3.1; SC.D.1.3.1.2; SC.H.1.3.4-7; SC.H.2.3.1
Language Arts: LA.A.1.3.3; LA.C.1.3.1, 4
Mathematics: MA.A.3.3.3; MA.B.1.3.2; MA.B.2.3.1; MA.B.3.3.1; MA.B.4.3.2
Social Studies: SS.A.6.3; SS.B.2.3.9

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Soil Core and Slope Student Data Sheet

General Information

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

Slope- Student Hypothesis and Rationale

If the slope of a sinkhole is related to its age, then an older sinkhole will have a (choose one: steep or gradual) slope, because . . . _____

_____

Slope- Field Observations/Measurements/Data

Segment	Rise	Run	Percent Slope (Rise/Run x 100)
Segment 1			
Segment 2			
Segment 3 (optional)			

Soil Core- Student Hypothesis and Rationale

If soil horizons can be compared to tree rings then examining soil horizons could inform us about… _____

_____

Soil Core- Field Observations/Measurements/Data

Horizon Number	Depth	Description (texture, moisture, color)

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Soil Core and Slope **Assessment**

1. Did the soil horizons change as depth increased? Why do you think it changed?

2. Did the percent slope vary between segments or did it stay more or less the same?

3. Do you think it would be better to measure the soil's slope over a short or a long segment? And why?

4. Do you think you can use the same procedure to look at soil horizons on a rocky mountain? Explain why or why not.

5. If people build trails that go straight down a steep slope, what is likely to happen when it rains? How can this problem be avoided?

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Soil Core and Slope — Portfolio Journal Prompt

Pretend that you have been hired by a contractor to choose a site for an organic vegetable farm. As a soil scientist, you use almost all of your senses to classify soil types. Explain how you would gather your data--be specific about what senses you would use. Why might you want to take along a team of scientists to record their own observations?

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