

SAVVY ABOUT SOIL

FIELD STUDY TRIP

OUTCOMES:

1. Students will develop understanding of the role of mineral nutrients and pH in soil.
2. Students will know how to use a soil auger, examine soil visually and perform soil tests for pH, nitrogen, phosphorus and potassium.
3. Students will develop understanding for how biosolids (recycled solids from the wastewater treatment plant) can improve soil.

GRADE LEVEL: 5th – 8th

TIME: 4 hours

LOCATION: Tiger Mountain State Forest, High Point Parking Area

ESSENTIAL QUESTION:

What is the relationship between soil, water and the forests?

MATERIALS

ITEMS PROVIDED BY THE GREENWAY

EDUCATION PROGRAM:

3 backpacks containing clipboards, pencils, worksheets, augers, trowels, white plastic sheet, jeweler's loupes, maps of area, distilled water, sample of garden soil, Soil Guide Sheet, Land Use Goal Sheet and equipment listed below:

pH/soil preparation bag will include:

Directions
30 ml plastic tube
Floc-Ex tablets
pH dip sticks
Spoon

Nitrogen bag will include:

Directions
Pipet
10 ml tube
Nitrate tablet
Color chart

Phosphorus bag will include:

Directions
Pipet
10 ml tube
Phosphorus tablet
Color chart

Potassium bag will include:

Directions
Pipet
10 ml tube
Potassium tablet
Color chart

PROCEDURE:

1 Meet the group in the parking lot and board the bus. Welcome students and parents to Tiger Mountain and tell them to bring on the hike: warm clothes, raingear, drinks and food. This is the last chance for them to use the bathroom until we return to the bus. Explain that we will be out for at least 4 hours and they will need all the items mentioned. We will have a chance to eat lunch on the trail. After gathering their gear and using the bathroom, meet at the education shelter or parking lot pull-out. Demonstrate how to use a pipet while waiting. When all the students are present, go over trail etiquette: no litter, stay with chaperone, stay on trail, avoid stepping on plants, do not pick flowers. Thank parents for coming. Hand out chaperone sheet to parents.

2 Remind them they are in the Greenway. Show map. Ask what the purpose of the trip is. Remind them of the essential question: **What is the relationship between soil, water and the forests?** *Why do scientists need to answer this question?*

Apple exercise: Pretend that this apple is the planet Earth. The skin is hugging and protecting the surface, just like your skin or a bark of a tree protects. Water covers about 75% of the surface of the earth. Cut apple in quarters. Toss three away. Those three quarters represent all the water on earth: rivers, oceans, lakes, and streams. What is left represents the dry land. 50% of the land is desert, polar or mountainous where it is too hot, cold, wet, dry or high to be productive. Cut dry land quarter in half and toss one piece away. When 50 % is removed, this is what is left (12.5%) of the original apple. Of that 12.5%, 40% of soil is severely limited by terrain, fertility or excessive rainfall. It is too rocky, steep, shallow, poor or wet to grown crops. Cut 40% away. You are left with about 10% of the apple. Peel the skin from the remaining sliver. The remaining 10% (approximately) represents the soil we depend on for the worlds' food supply. So if we don't take care of the soil, the water, crops and trees suffer. What can we do to help protect the soil?

3 *Reiterate essential question. To help you answer the essential question I want you to observe soil samples, the land around you and measure the mineral nutrients in the soil. First we will hike examining soil samples along the way. You will be in three separate groups as you walk, trying to stay separate from the other groups. Teach them how to use the auger. I will show you where to go on the map and rotate between groups. While your group is waiting, please review the Soil Guide Sheet.*

At each stop described on the Guide Sheet, the students are to dig the soil, examine it using the jeweler's loupes, observe the forest around them and record their observations on the Trail Worksheet. Tell parent chaperones to make sure that the students are following directions and alternating jobs at each site. Divide the class into 3 groups. Walk to the map at the intersection of the trails with each small group and orient students and adults to the trail system. Emphasize the essential question with each group. They will walk until they reach the lunch spot.

LUNCH AND DISCUSSION:

4 During lunch meet with chaperones to go over how to use the auger, how to measure pH and the nutrients in the soil. After lunch is over, gather the group and ask them to describe the soil and forest that they observed on their hike. Explain that they are going to complete an activity that will give them an opportunity to gather information to help answer the essential question. Review essential question. Review what a mineral nutrient is and how trees/plants get mineral nutrients. They will compare the forest soil with a sample of garden soil amended with biosolids. The reason scientists study soil texture, pH, and nutrient level is to help make decisions on how to use the land and if there is any way the soil can be improved.

We are going to examine the texture, the pH and the mineral nutrients in the forest soil in a specific area, and compare it to a sample of garden soil in your pack. Digging Team: two members of your

group will take a forest soil sample and fill out the information sheet. Demonstrate the use of the auger and trowel and how to spread the soil on the white plastic sheet. pH Team: two to four members of the group will test for the pH of the forest soil. pH tests for the acid or base in the soil and helps determine if the plants can use the nutrients in the soil. Remember how we did the pH test in class! Nutrient Team: the remaining group members will measure the nutrient level in the forest soil or garden sample. You will be measuring either nitrogen, phosphorus or potassium. You will use the water from the pH tests. The directions for measuring the nutrients are in the bags. It is important to be precise and pay attention to the directions.

Each group will study a sample of garden soil that is in their backpack. They will test for pH, N, P, K.

After you have completed the study and filled out the worksheets, gather together and record all your information on the final data sheet. Be sure to compare the results between the forest soil and garden soil. Practice your presentation where you will report your findings to the whole class. When you have finished meet back at the lunch spot.

SOIL STUDY:

5 Pass out the backpacks with the materials to the groups. Tell them that you will assign them each a different place to complete the soil study. Groups should wait in the lunch spot until assigned. Each group will work for about 30 – 45 minutes collecting and recording data and practicing their presentations.

CONCLUSION:

6 Each group presents their data. What do the results show? How is the forest soil different from the garden soil that has been amended with biosolids? Why are they different (if they are)? Does either soil need to be improved? How could it be improved? Why would anyone want to change it? How do trees/plants get mineral nutrients? What have the students learned? What could be done to protect our soil? Summarize.



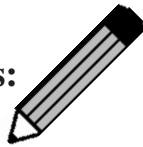
SAVVY ABOUT SOIL

DIGGING TEAM

DIRECTIONS:

1. Select a spot where you can dig to about 30 cm (1 foot).
2. Spread the white plastic sheet on the ground next to where you are going to dig.
3. Using the trowel dig an inch at a time and place the soil on the white sheet so that it forms a column. Be gentle and neat. If you hit rock and can't dig any further, try another spot nearby. Watch for differences in color, texture and moisture.
4. Try to dig a hole the depth and width of your trowel. After 10 minutes stop digging and use the soil you have to compare it to the sample of agricultural soil in your pack, and complete the rest of this worksheet.

Digging Team Observations and Results:



FOREST SOIL

Describe the site location: hillside, streamside, flat area, lakeside, forest

Describe the surface vegetation: bare soil, rocks, shrubs, trees, moss

Soil is: muddy, wet, moist, dry, very dry

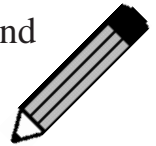
How does the soil change from the surface to one inch deep?

How does it change from one inch deep to the deepest spot you reach? Why does it change?

Turn Over

DIGGING TEAM, CONTINUED

Do you see any organic material in the soil? (Organic material was once alive and is now dead like leaves, roots, bark, twigs, animals.) Describe what you see and where you see it.



What is the texture of the forest soil? (Clay, silt, sand, clay/loam, sand/loam, or silt/loam)

What is the texture of the garden soil? (Clay, silt, sand, clay/loam, sand/loam, or silt/loam)

Record your findings on the FINAL DATA SHEET. As a whole group formulate an opinion about soil texture, pH and nutrient level. Prepare and practice a presentation of your results that you will give to the whole class. What might improve the health of the forest soil? Garden soil?

PLEASE REPLACE THE SOIL YOU HAVE REMOVED WITH THE TROWEL.



SAVVY ABOUT SOIL

PH TEAM FOREST SOIL

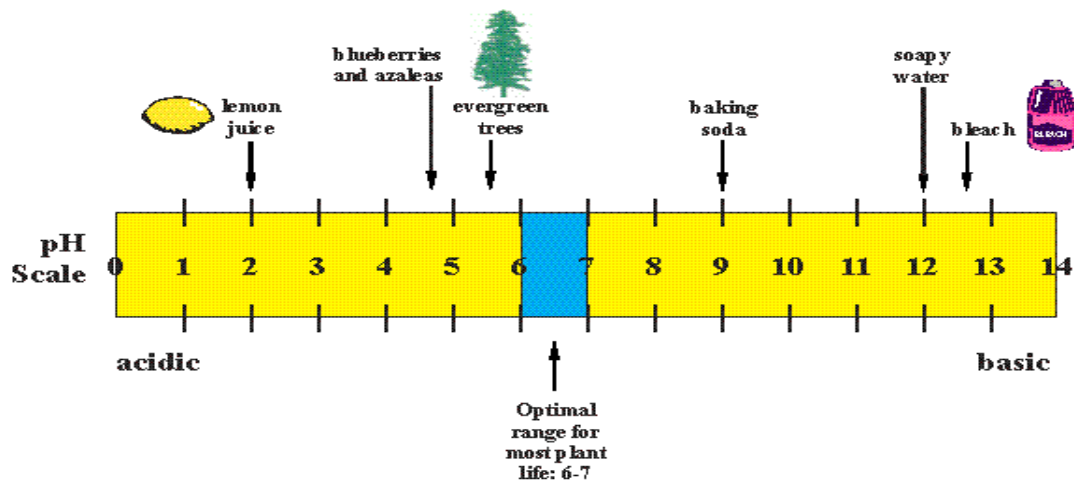
DIRECTIONS:

1. You are going to prepare a soil sample to test for pH. Take a soil sample from the forest soil dug by the Digging Team.
2. Follow the directions on the pH card to test for pH.
3. What are you measuring when you measure the pH of the soil? (see other side for help with this question) _____
4. The forest soil has a pH of _____
5. Our results show that the forest soil is (Circle one):

Acid 1-6.4

Neutral 6.5 – 8.5

Base 8.6 – 14



GIVE YOUR pH TUBE TO THE **FOREST SOIL NUTRIENT TEAM** TO USE FOR THEIR TESTING. THEY NEED TO USE THE WATER ABOVE THE SOIL TO COMPLETE THEIR STUDY.

Turn Over

6. How does pH affect the growth of plants? (See below for help.)

7. What can be added to change the pH level? Why would someone want to change the pH of their soil?

Record your findings on the FINAL DATA SHEET. As a group discuss the pH and nutrient level of your soil samples. Prepare and practice a presentation of your results that you will be giving to the whole class. What might improve the health of this soil? What can you do to help protect the soil?

pH determines how acidic or basic the soil is on a scale of 1 to 14. A result of 7 is called neutral since it is exactly in the middle of the scale. Neutral is neither acid nor base. pH is important to know because it helps determine whether or not plants can use the nutrients in the soil. If the pH is too acidic or too basic the nutrients stay locked in the soil and are unavailable for the plants to use. pH levels also help determine if microorganisms which are helpful to plants can grow in the soil. pH also has a direct effect on root cells and their ability to absorb nutrients and water. Most garden vegetables, flowers, grass and shrubs do best in soil between 6 – 7.5 pH. Some plants (called acid lovers) grow best in acidic soils with a pH between 4 – 6. These acid lovers include: blueberries, rhododendrons, azaleas, potatoes, and evergreen trees. If you want to change the pH to a higher number (less acid), you can add lime (from limestone) to the soil. If you want to change the pH to a lower number (more acid), you can add pine needles or peat moss. Soil that gets a lot of rainfall is usually acidic and areas of light rainfall are generally basic.



SAVVY ABOUT SOIL

pH TEAM GARDEN SOIL

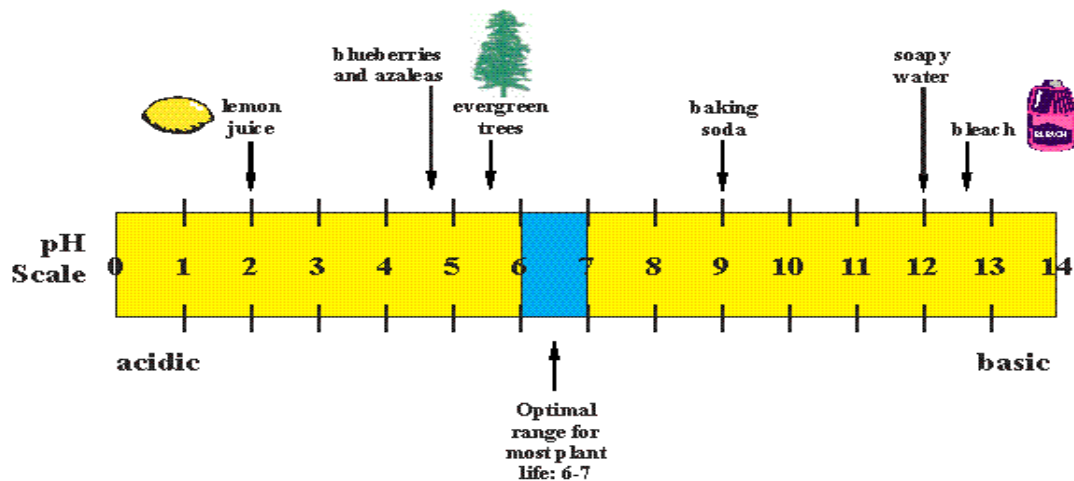
DIRECTIONS:

1. You are going to prepare a soil sample to test for pH. Find the jar with the garden soil in your Greenway backpack.
2. Follow the directions on the pH card to test for pH.
3. What are you measuring when you measure the pH of the soil? (see other side for help with this question) _____
4. The garden soil has a pH of _____
5. Our results show that the garden soil is (Circle one):

Acid 1-6.4

Neutral 6.5 – 8.5

Base 8.6 – 14



GIVE YOUR pH TUBE TO THE GARDEN SOIL NUTRIENT TEAM TO USE FOR THEIR TESTING. THEY NEED TO USE THE WATER ABOVE THE SOIL TO COMPLETE THEIR STUDY.

Turn Over

6. How does pH affect the growth of plants? (See below for help)

7. What can be added to change the pH level? Why would someone want to change the pH of their soil?

Record your findings on the FINAL DATA SHEET. As a group discuss the pH and nutrient level of your soil samples. Prepare and practice a presentation of your results that you will be giving to the whole class. What might improve the health of this soil? What can you do to help protect the soil?

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SAVVY ABOUT SOIL

NUTRIENT TEAM: NITROGEN (N)

FOREST SOIL

DIRECTIONS:

1. Get the **nitrogen** bag with your directions and read them.
2. While you are waiting for the water from the pH tube, answer the questions below.
3. What is a nutrient? _____
4. How do trees/plants absorb **nitrogen**? (see other side for help)

5. What does **nitrogen** do for the plants? (see other side for help)

6. How does **nitrogen** get into the soil?

7. Would you improve the soil you are testing? If so, how?

8. The **nitrogen** level is:

	HIGH	MEDIUM	LOW
Forest soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

Turn Over

NUTRIENT TEAM, CONTINUED

Nutrients provide necessary chemicals that plants need to grow. Three of the essential nutrients for plants carbon (C), oxygen (O) and hydrogen (H) are available from the air. The remaining 13 mineral nutrients must be absorbed by the plant's roots after dissolving in water in the soil. Three of the most important mineral nutrients (nutrients from the soil) are nitrogen (N), phosphorus (P) and potassium (K). Knowing the amounts of these in the soil, lets you know if plants/trees are getting enough nutrients. The mineral nutrients are necessary to help plants/trees grow. By adding fertilizer to the soil, the level of mineral nutrients is increased. Farmers and scientists will calculate how much fertilizer to add depending on the plants that will be grown. Biosolids (treated and recycled solids from the wastewater treatment plant) is one type of fertilizer used in the Pacific Northwest to add nutrients to the soil while at the same time improving the texture of the soil.

Nitrogen (N) is necessary for new plant growth and contributes to the healthy green color of leaves. Nitrogen comes from the atmosphere and organic matter in the soil. In order for it to be used by plants it must be changed by micro-organisms living in the soil into nitrates. Plants need more nitrogen than any other nutrient for healthy growth.

Phosphorus (P) helps with formation of seeds and root growth. Phosphorus also protects plants against disease. Phosphorus comes from decaying organic matter in the soil.

Potassium (K) comes from weathered rock that contains potassium. The amount of potassium in the soil depends on whether the original rocks had potassium in them. Potassium contributes to the overall health of plants specifically in helping them resist disease.

CAP TUBES AND PUT THEM BACK INTO THE BACKPACK. DO NOT DUMP OUT CONTENTS!



SAVVY ABOUT SOIL

NUTRIENT TEAM: PHOSPHORUS (P)

FOREST SOIL

DIRECTIONS:

1. Get the **phosphorus** bag with your directions and read them.
2. While you are waiting for the water from the pH tube, answer the questions below.
3. What is a nutrient? _____
4. How do trees/plants absorb **phosphorus**? (see other side for help)

5. What does **phosphorus** do for the plants? (see other side for help)

6. How does **phosphorus** get into the soil?

7. Would you improve the soil you are testing? If so, how?

8. The **phosphorus** level is:

	HIGH	MEDIUM	LOW
Forest soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

Turn Over

NUTRIENT TEAM, CONTINUED

Nutrients provide necessary chemicals that plants need to grow. Three of the essential nutrients for plants carbon (C), oxygen (O) and hydrogen (H) are available from the air. The remaining 13 mineral nutrients must be absorbed by the plant's roots after dissolving in water in the soil. Three of the most important mineral nutrients (nutrients from the soil) are nitrogen (N), phosphorus (P) and potassium (K). Knowing the amounts of these in the soil, lets you know if plants/trees are getting enough nutrients. The mineral nutrients are necessary to help plants/trees grow. By adding fertilizer to the soil, the level of mineral nutrients is increased. Farmers and scientists will calculate how much fertilizer to add depending on the plants that will be grown. Biosolids (treated and recycled solids from the wastewater treatment plant) is one type of fertilizer used in the Pacific Northwest to add nutrients to the soil while at the same time improving the texture of the soil.

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Phosphorus (P) helps with formation of seeds and root growth. Phosphorus also protects plants against disease. Phosphorus comes from decaying organic matter in the soil.

Potassium (K) comes from weathered rock that contains potassium. The amount of potassium in the soil depends on whether the original rocks had potassium in them. Potassium contributes to the overall health of plants specifically in helping them resist disease.

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SAVVY ABOUT SOIL

NUTRIENT TEAM: POTASSIUM (K)

FOREST SOIL

DIRECTIONS:

1. Get the **potassium** bag with your directions and read them.
2. While you are waiting for the water from the pH tube, answer the questions below.
3. What is a nutrient? _____
4. How do trees/plants absorb **potassium**? (see other side for help)

5. What does **potassium** do for the plants? (see other side for help)

6. How does **potassium** get into the soil?

7. Would you improve the soil you are testing? If so, how?

8. The **potassium** level is:

	HIGH	MEDIUM	LOW
Forest soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

Turn Over

NUTRIENT TEAM, CONTINUED

Nutrients provide necessary chemicals that plants need to grow. Three of the essential nutrients for plants carbon (C), oxygen (O) and hydrogen (H) are available from the air. The remaining 13 mineral nutrients must be absorbed by the plant's roots after dissolving in water in the soil. Three of the most important mineral nutrients (nutrients from the soil) are nitrogen (N), phosphorus (P) and potassium (K). Knowing the amounts of these in the soil, lets you know if plants/trees are getting enough nutrients. The mineral nutrients are necessary to help plants/trees grow. By adding fertilizer to the soil, the level of mineral nutrients is increased. Farmers and scientists will calculate how much fertilizer to add depending on the plants that will be grown. Biosolids (treated and recycled solids from the wastewater treatment plant) is one type of fertilizer used in the Pacific Northwest to add nutrients to the soil while at the same time improving the texture of the soil.

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SAVVY ABOUT SOIL

NUTRIENT TEAM: NITROGEN (N)

GARDEN SOIL

DIRECTIONS:

1. Get the **nitrogen** bag with your directions and read them.
2. While you are waiting for the water from the pH tube, answer the questions below.
3. What is a nutrient? _____
4. How do trees/plants absorb **nitrogen**? (see other side for help)

5. What does **nitrogen** do for the plants? (see other side for help)

6. How does **nitrogen** get into the soil?

7. Would you improve the soil you are testing? If so, how?

8. The **nitrogen** level is:

	HIGH	MEDIUM	LOW
Garden soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

Turn Over

NUTRIENT TEAM, CONTINUED

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SAVVY ABOUT SOIL

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5. What does **phosphorus** do for the plants? (see other side for help)

6. How does **phosphorus** get into the soil?

7. Would you improve the soil you are testing? If so, how?

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	HIGH	MEDIUM	LOW
Garden soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

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NUTRIENT TEAM, CONTINUED

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SAVVY ABOUT SOIL

NUTRIENT TEAM: POTASSIUM (K)

GARDEN SOIL

DIRECTIONS:

1. Get the **potassium** bag with your directions and read them.
2. While you are waiting for the water from the pH tube, answer the questions below.
3. What is a nutrient? _____
4. How do trees/plants absorb **potassium**? (see other side for help)

5. What does **potassium** do for the plants? (see other side for help)

6. How does **potassium** get into the soil?

7. Would you improve the soil you are testing? If so, how?

8. The **potassium** level is:

	HIGH	MEDIUM	LOW
Garden soil			

RECORD YOUR RESULTS ON FINAL DATA SHEET

Turn Over

NUTRIENT TEAM, CONTINUED

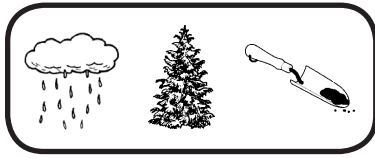
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SAVVY ABOUT SOIL

FINAL DATA SHEET

This sheet is to be used to record you final data and help you prepare for your presentation.

DIGGING TEAM:

1. What texture did you find? Sand, silt, clay, loam or name the combination

- Forest soil: _____
- Garden soil: _____

2. How did your forest soil change from top to bottom?

3. What did you notice about your soil? (Organic material? Moisture? Rocks? Etc.)

- Forest soil: _____
- Garden soil: _____

pH TEAMS:

4. Forest soil: pH _____ Was it acidic, neutral or basic? _____

Garden soil: pH _____ Was it acidic, neutral or basic? _____

5. Why do scientists test for pH?

NUTRIENT TEAM RESULTS:

6. The nutrient level is:

SOIL:	FOREST	GARDEN	FOREST	GARDEN	FOREST	GARDEN
	Nitrogen		Phosphorus		Potassium	
HIGH						
MEDIUM						
LOW						

FINAL DATA SHEET, CONTINUED

7. How do the nutrients nitrogen, phosphorus or potassium get into the soil?

8. How do the trees/plants absorb these mineral nutrients? You may draw or write your answer.

9. Why are mineral nutrients important?

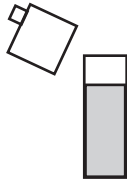
10. Should something be added to raise the level of nitrogen, phosphorus or potassium in the forest soil? In the garden soil? Why? What are some of the concerns about adding fertilizer to the soil?

11. Would you add biosolids to either the forest soil or the garden soil? Why or why not?


DIRECTIONS FOR SOIL PREPARATION AND pH TEST

SOIL PREPARATION - DIRECTIONS:


1 Fill the 30 ml clear plastic tube to the 30 ml line with distilled water.



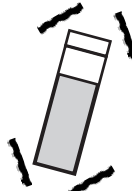
2 Add two Floc-Ex tablets. Cap the tube and shake hard until the tablets have dissolved.



3 Remove the cap. Add one teaspoonful of soil from the soil sample.



4 Cap the tube and shake for one minute.



5 Let the tube stand until the soil settles. The clear solution above the soil will be used for testing the pH.

You are testing the pH of the soil, not the water.

pH TESTING DIRECTIONS:

When you test for pH you are testing how acidic the soil is. See Soil Guide sheet for more information.

DIRECTIONS:

- 1) Dip the yellow end of the paper stick into the solution you just prepared.
- 2) Remove at once and shake off extra water.
- 3) Compare with color chart.

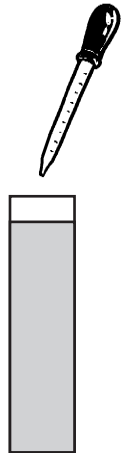


POTASSIUM

For Step #1 you will be using the water above the soil from the 30 mL tube that the pH team has prepared. **Do not use the water from the bottle.**

1.

Use the pipet to transfer the clear water above the soil in the pH tube to a square test tube until it is filled to the shoulder.



2.

Add one potassium tablet. Cap and mix until the tablet dissolves.



3.

Compare the cloudiness of the solution (water) in the test tube to the potassium color chart. Hold the tube over the black boxes in the left column and compare it to the shaded boxes in the right column.



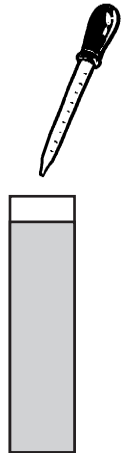


NITROGEN

For Step #1 you will be using the water above the soil from the 30 mL tube that the pH team has prepared. **Do not use the water from the big bottle.**

1.

Use the pipet to transfer the clear water above the soil in the pH tube to a square test tube until it is filled to the shoulder.



2.

Add one nitrogen tablet. Cap and mix until the tablet dissolves.



3.

Wait 5 minutes for the color to develop. Compare the pink color of the solution to the nitrogen color chart.





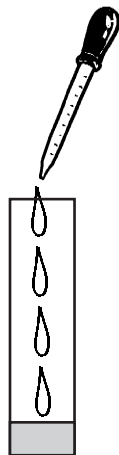
PHOSPHORUS

For Step #1 you will be using the water above the soil from the 30 mL tube that the pH team has prepared. **Do not use the distilled water from the big bottle.**

For Step #2 you WILL be using the large bottle of Distilled Water.

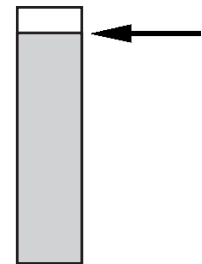
1.

Use the pipet to transfer 25 drops of the clear water above the soil in the pH tube to a square test tube.



2.

Fill the tube to the shoulder with **DISTILLED WATER** from the big bottle.



3.

Add one phosphorus tablet. Cap and mix until the tablet dissolves. Wait 5 minutes for color to appear.



4.

Compare the blue color of the solution to the phosphorus color chart.





SAVVY ABOUT SOIL

TRADITION LAKE TRAIL 1 WORKSHEET

At each site two students dig an egg-sized sample of soil from beneath the surface and share with the rest of the group. Use jeweler's loupes to look at the soil. Squeeze and smear the soil between your fingers. Use the Soil Guide if you need more information.

REPLACE SOIL WHEN DONE

Site #1 Walk on the trail until you come to a bench that has a post marked #3 by it. Go another 145 feet (measure it by walking toe to heel 145 times). Notice the little, somewhat muddy trail off to the right of the main trail. Take a soil sample here.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

Site #2 Walk to the bridge and look at the sides of the stream. Notice how the sides are carved out of the soil. What happened here? Name the natural process that carved the sides. If you said EROSION, you are right. Why is erosion harmful for the forest and stream?

Site #3 Walk to the What's Tradition Lake Up To? sign, go behind the bench and take a sample.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

TURN OVER

Site #4 Walk to the overlook. It is a little balcony off to your right. Look down at the lake and the forest slope in front of you. What is the problem here? How can we solve this problem?

Site #5 Walk until you reach the huge Western red cedar tree that is hollow. Take a sample from around the roots of the tree that has fallen down just next to the cedar tree.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

**SOIL TEXTURE REFERS TO PARTICLE SIZE
NOT WHETHER IT IS WET OR DRY**

Meet the rest of the group in the picnic area located beside the lake. Look for the large cedar trees and benches to identify this spot. If you get to the Powerline Road you have gone too far!



SAVVY ABOUT SOIL

TRADITION LAKE TRAIL 2 WORKSHEET

At each site two students dig an egg sized sample of soil from beneath the surface and share with the rest of the group. Use jeweler's loupes to look at the soil. Squeeze and smear the soil between your fingers. Use the trail guide if you need more information.

REPLACE SOIL WHEN DONE

Site #1 Walk until you come to a bench that has a post marked #3 by it. There is a paw print sign on the ground by the bench. On the opposite side of the trail go around the big Douglas fir. Take a soil sample here.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

Site #2 From post #3 go another 145 feet (measure it by walking toe to heel 145 times). Notice the little, somewhat muddy trail off to the right of the main trail. Take a soil sample here.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

Site #3 Go to the bridge and look at the sides of the stream. Notice how the sides are carved out of the soil. What happened here? Name the natural process that carved the sides. What is the impact on the environment? If you said EROSION, you are right. Why is erosion harmful for the forest and stream?

TURN OVER

Site #4 Walk to the overlook. It is a little balcony off to your right. Look down at the lake and the forest slope in front of you. What is the problem here? How can we solve this problem?

Site #5 Walk until you reach the huge Western red cedar tree that is hollow. Take a sample from around the roots of the tree that has fallen down just next to the cedar tree.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

**SOIL TEXTURE REFERS TO PARTICLE SIZE
NOT WHETHER IT IS WET OR DRY**

Meet the rest of the group in the picnic area located beside the lake. Look for the large cedar trees and benches to identify this spot. If you get to the Powerline Road you have gone too far!



SAVVY ABOUT SOIL

BUS TRAIL 1 WORKSHEET

At each site two students dig an egg-sized sample of soil from beneath the surface and share with the rest of the group. Use jeweler's loupes to look at the soil. Squeeze and smear the soil between your fingers. Use the trail guide if you need more information.

REPLACE SOIL WHEN DONE



Site #1 Walk to the intersection of the Bus Trail/Tiger 3 Summit Trail. Take a right onto the Bus Trail. There is a little ditch off the trail. Take a sample here.

- Describe the surface: Moss Rocks Bare earth Plants
- Dig a sample and use jeweler's loupes to look at the soil. The soil is:
Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
- The soil is: Wet Moist Dry Very dry
- Digging the soil sample is: Impossible Hard Medium Easy
- Is this site: Sunny Shaded Mixture sun/shade

Site #2 Go to the bridge and look at the sides of the stream. Walk to the bridge and look at the sides of the stream. Notice how the sides are carved out of the soil. What happened here? Name the natural process that carved the sides. If you said EROSION, you are right. Why is erosion harmful for the forest and stream?

Site #3 Walk to the next trail intersection, which is just past the broken down bus. Stay on the Bus Trail. Count 75 strides from the intersection and look for a little trail off to your right. Look carefully. Follow that little trail to some huge overturned trees and take a sample in the roots.

- Describe the surface: Moss Rocks Bare earth Plants
- Dig a sample and use jeweler's loupes to look at the soil. The soil is:
Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
- The soil is: Wet Moist Dry Very dry
- Digging the soil sample is: Impossible Hard Medium Easy
- Is this site: Sunny Shaded Mixture sun/shade

TURN OVER

Site #4 Walk until you are in a little clearing. A clearing is an area in the middle of a forest where there are no trees or the trees have fallen. Do you see any invasive plants or trees? What is the difference between invasives and natives? Name the invasive plants and/or trees you can see with the help of your invasive plant cards. Write them here:

Site #5 Walk about five minutes and take a sample from wherever the group thinks it looks interesting.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
 Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
3. The soil is: Wet Moist Dry Very dry
4. Digging the soil sample is: Impossible Hard Medium Easy
5. Is this site: Sunny Shaded Mixture sun/shade

**SOIL TEXTURE REFERS TO PARTICLE SIZE
NOT WHETHER IT IS WET OR DRY**

You will continue to walk on the Bus Trail until you reach a wooden gate. Go through the gate and WAIT for the rest of the class. In this clearing we will eat lunch and then complete our study of soil. Deer like to browse in this area so be on the lookout!



SAVVY ABOUT SOIL

BUS TRAIL 2 WORKSHEET

At each site two students dig an egg-sized sample of soil from beneath the surface and share with the rest of the group. Use jeweler’s loupes to look at the soil. Squeeze and smear the soil between your fingers. Use the trail guide if you need more information.

REPLACE SOIL WHEN DONE



Site #1 Walk to the intersection of the Bus Trail/Tiger 3 Summit Trail. Take a right on the Bus Trail and walk to the bridge. Walk to the bridge and look at the sides of the stream. Notice how the sides are carved out of the soil. What happened here? Name the natural process that carved the sides. If you said EROSION, you are right. Why is erosion harmful for the forest and stream?

Site #2 Keep walking on the Bus Trail. Stop at the first bench you see and take a sample off to the left of the trail.

- Describe the surface: Moss Rocks Bare earth Plants
- Dig a sample and use jeweler’s loupes to look at the soil. The soil is:
Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
- The soil is: Wet Moist Dry Very dry
- Digging the soil sample is: Impossible Hard Medium Easy
- Is this site: Sunny Shaded Mixture sun/shade

Site #3 Walk to the next trail intersection, which is just past the broken down bus. Take a sample from the left side of the trail at the intersection.

- Describe the surface: Moss Rocks Bare earth Plants
- Dig a sample and use jeweler’s loupes to look at the soil. The soil is:
Loam Sand Clay Silt Clay/Loam Sand/Loam Silt/Loam
- The soil is: Wet Moist Dry Very dry
- Digging the soil sample is: Impossible Hard Medium Easy
- Is this site: Sunny Shaded Mixture sun/shade

TURN OVER

Site #4 Walk until you are in a little clearing. A clearing is an area in the middle of a forest where there are no trees or the trees have fallen. Do you see any invasive plants or trees? What is the difference between invasives and natives? Name the invasive plants and/or trees you can see with the help of your invasive plant cards. Write them here:

Site #5 Walk about five minutes and take a sample from wherever the group thinks it looks interesting.

1. Describe the surface: Moss Rocks Bare earth Plants
2. Dig a sample and use jeweler's loupes to look at the soil. The soil is:
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5. Is this site: Sunny Shaded Mixture sun/shade

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You will continue to walk on the Bus Trail until you reach a wooden gate. Go through the gate and WAIT for the rest of the class. In this clearing we will eat lunch and then complete our study of soil. Deer like to browse in this area so be on the lookout!