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PA State ENR CDE: Soil Component
Section 1 - Soil Texture Determination
100 Individual Points



Directions:

1. Conduct a Feel or Ribbon Test of the three samples of soil to determine soil Texture.
2. Use the resources, the [Soil Texture Triangle](#) and [Soil Texture Classification](#) to help answer the questions below.

Questions:

1. What are the textures and subclasses for the soils? Check only 1 box under each soil sample column.
(36 points - 12 pts each sample)

Soil #1	Soil #2	Soil #3	Subclass	Soil Texture
			Coarse	Sand
			Coarse	Loamy Sand
			Moderately Coarse	Sandy Loam
			Medium	Loam
			Medium	Silt Loam
			Medium	Silt
			Moderately Fine	Clay Loam
			Moderately Fine	Sandy Clay Loam
			Moderately Fine	Silty Clay Loam
			Fine	Sandy Clay
			Fine	Silty Clay
			Fine	Clay

2. Given the following textures of soil: (Hint: You can use the letters more than once.)

A. Loamy Sand B. Silty Clay Loam C. Clay

- I. Which soil would form into the longest ribbon? _____ (6 pts)
- II. Which soil would feel the grittiest? _____ (6 pts)
- III. Water would drain through which soil the fastest? _____ (6 pts)
- IV. Which soil would hold the most water? _____ (6 pts)

3. Calculate the % silt in a soil with a sample weight of 60 g with a 40 second reading of 28 grams of sand and a two hour reading of 14 grams of clay. _____ (6 pts)

A. 18% B. 23% C. 47% D. 30%

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4. Which texture would be better suited for a septic tank filter field and explain your reason briefly in a short statement? A. Silt Loam; B. Clay; or C. Sand

_____ (6 pts)

Explanation: (6 pts)

5-7: Use the Soil Texture Triangle to determine the type of soils with the following particle/texture percents:

5. _____ - 20% silt, 10% clay, 70% sand (6 pt)

6. _____ - 30% sand, 10% clay, 60% silt (6 pt)

7. _____ - 10% silt, 50% sand, 40% clay (6 pt)

8. Which of the following tools are necessary to collect a soil sample to determine soil texture? _____(4 pt)

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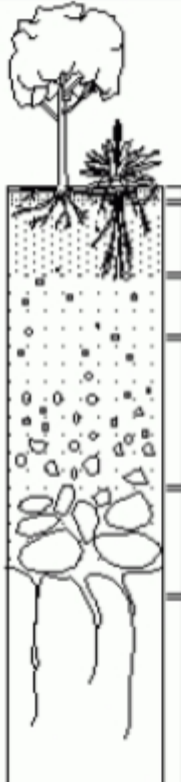


PA State ENR CDE: Soil Component
Section 2 - Determine Soil Use from
Monolith/Profile and Soil Data
100 Individual Points



Directions:

1. **Soil Profile:** Using the Soil Monolith and the measuring tape provided, determine the depth of each layer by noting your answer in inches on the diagram to the side. Also, identify each layer using the appropriate soil horizon letters.



Soil Layers (36 pts)

Letter: _____	Depth: _____ in
Letter: _____	Depth: _____ in
Letter: _____	Depth: _____ in
Letter: _____	Depth: _____ in
Letter: _____	Depth: _____ in
Letter: _____	Depth: _____ in

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When complete, answer the following questions:

1. How deep is the bedrock for this soil sample?
 _____ (7 pts)
2. How deep is the transition zone for this soil sample? _____ (7 pts)

2. **Soil Factor Checklist:** Using the soil monolith and the soil sample, fill-out the checklist below by identifying the DEPTH, TEXTURE AND PERMEABILITY of the soil sample by placing a checkmark in the box next to the correct answer. (26 pts)

Depth	Check One Box	Texture	Check One Box	Permeability	Check One Box
Deep		Coarse		Rapid	
Moderately Deep		Moderately Coarse		Moderate	
Shallow		Medium		Slow	
Very Shallow		Moderately Fine		Very Slow	
		Fine			

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Lime and pH Math:

3. Farmer Jones received the pH results for his 30-acre field. Tests indicated his pH is 5.1 and he needs to raise it to a pH of 6.4. Use the table provided from OSU Extension to determine the amount of lime needed per acre, then calculate to find the total amount for Farmer Jones' entire field. **(12 pts)**

- a. 66.1 ton b. 267.0 ton c. 153.4 ton d. 654.5 ton

4. Farmer Smith received the pH results for his 22-acre corn field. Tests indicated his pH is 5.6 and he needs to raise it to a pH of 6.0. He has a 7 inch tillage depth. Use the table provided from OSU Extension to determine the amount of lime needed per acre, then calculate to find the total amount for Farmer Smith's entire field. **(12 pts)**

- b. 27.6 ton b. 37.4 ton c. 101.2 ton d. 354.5 ton

Table 3.—Lime requirement test (SMP) interpretation.

	Desired soil pH		
	pH 5.6	pH 6.0	pH 6.4
Lime requirement test value (SMP)	Lime to apply to attain desired soil pH ^a (t/a)		
6.7	0	0	0
6.6	0	0	1.0
6.5	0	1.0	1.7
6.4	0	1.1	2.2
6.3	0	1.5	2.7
6.2	1.0	2.0	3.2
6.1	1.4	2.4	3.7
6.0	1.7	2.9	4.2
5.9	2.1	3.3	4.7
5.8	2.5	3.7	5.3
5.7	2.8	4.2	5.8
5.6	3.2	4.6	6.3
5.5	3.6	5.1	6.8
5.4	3.9	5.5	7.3
5.3	4.3	6.0	7.8
5.2	4.7	6.4	8.3
5.1	5.0	6.9	8.9
5.0	5.4	7.3	9.4
4.9	5.8	7.7	9.9
4.8	6.2	8.3	10.4

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Section 3 - Interpreting Soil Test Results
100 Individual Points



Part 1: Directions:

- Interpret three Soil Test Results. Answer Questions 1 - 15.

Questions:

- Which is the correct order of the three Soil Tests in order from most acidic to most alkaline? (5 pts)
a. 1-2-3 b. 1-3-2 c. 3-1-2 d. 3 - 2-1 e. 2-3-1
- Which soil test(s) had a legume crop? (5 pts)
a. Test 1 Only b. Test 2 Only c. Test 3 Only d. Test 1 and 3
- Looking at Soil Test #1, what would you recommend to plant in the field this coming year if soybeans was planted this previous year? (5 pts)
a. Field Corn b. Soybeans c. Potatoes d. Grass Hay
- Which field(s), based on their Soil Test Results, would you recommend adding lime to? (5 pts)
a. Field/Test #1 b. Field/Test #2 c. Field/Test #3 e. Field #1 and #3 d. None
- Looking at the Base % Saturation on each of the tests, this is a ratio of 5 nutrient groups (K, Ca, Mg, H, Na). The readings should add up to 100%. Which of the test(s) does **not** have an accurate lab reading?
a. Test #1 b. Test #2 c. Test #3 d. Test #2 and 3 e. None
- What does ppm stand for? (5 pts)
a. Parts per Minutes c. Phosphorus, Potassium, Magnesium
b. Parts per Million d. None of these
- Which is the correct order of the three Soil Tests for the highest holding capacity (of water, nutrients, pesticides, etc) to the lowest? (5 pts)
a. 2-1-3 b. 2-3-1 c. 3-1-2 d. 3- 2-1 e. 1-3-2 f. 1-2-3
- If you want to be able to tell roughly how much nitrogen your soil can hold at any one time, simply multiply 10 times your CEC. Which field can hold 117 pounds of N? (5 pts.)
a. Field/Soil Test #1 b. Field/Soil Test #2 c. Field/Soil Test #3 d. None
- Organic matter is known to improve the quality of the soil. Which soil sample indicates the best quality based on percent of OM? (5 pts.)
a. Test #1 b. Test #2 c. Test #3 d. They are all the same
- Soil tests for at least 2 of the fields indicate that nutrients should be "top dressed." What does that mean? (5 pts.)
a. All nutrients added should be applied via aerial application
b. All nutrients should be applied in liquid version
c. All nutrients should be applied by incorporating into the soil
d. All nutrients should be applied with equipment that would scatter them evenly across the vegetation or field.

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11. Which soil analysis should be repeated before the 2019 growing season? (2 pts)
- a. Test #1 b. Test #2 c. Test #3 d. All of them

Explain why: _____
_____. (3 pts)

12. Chlorophyll is necessary for plants to grow and produce energy. Which of the nutrients tested helps to indicate where there would likely be a reduction in production due to decreased chlorophyll in the crop? (5 pts.)
- a. Nitrogen b. Magnesium c. Potassium d. Phosphorus

13. If your soil is able to hold 150 pounds of Nitrogen at one time, and you plan to apply 200 pounds, what do you think happens to the excess Nitrogen? (5 pts)
- a. It is used by the crops. B. It precipitates out. c. It leaches out.

14. Indicate why a soil test would recommend that soils to be used as a pasture and/or to grow corn would need more N per acre applied than a soil to be used to grow soybeans: (5 pts)
- a. Pasture and corn are not able to use previously grown crop residue as "ready" nutrients"
- b. Most of the N is lost in harvest and cannot be replaced any other way
- c. Soybeans can create N on their own and add N to the soil while in production mode.
- d. The soil test made a mistake and should be repeated.

15. As a rule of thumb to convert ppm to lb/A multiply ppm x 2. If the Soil Test indicates 7000 pounds per acre of limestone should apply, what does that convert to in ppm? (5 pts)
- a. 7000 b. 3750 c. 3500 d. 14,000

Part 2: Directions - Soil Analysis Form:

- Read the following scenario/history of this field.
- Fill-out the [Penn State Extension - Soil Analysis Form](#) (25 pts)

Scenario/History:

There are 2 fields located on Lampeter-Strasburg School District property along Pioneer Rd. The school's the address is 1600 Book Road, PO Box 428, Lampeter, PA 17537. The phone number is 717-464-3311, the fax number is 717-464-4699, and the email is fieldmanger@l-spioneers.org. The FFA chapter has taken care of these fields for the past 17 years. The Field A has 11 acres and Field B has 2 acres for a total of 13 acres. Over the past 12 years, the fields have been completely no-till. We have rotated between grain corn, soybeans, and a winter wheat crop. This past year we harvested soybeans. Looking through the Lancaster County Soil Survey Manual - Our fields fall under LdB - Letort Silt Loam, 3-8 % slope. We would like to know the nutrient levels of our fields (N-P-K) and organic matter levels.



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PA State ENR CDE: Soil Component
Section 4 - Determine Soil Use from
Soil Maps and Photos
100 Individual Points



Directions:

- Use the provided materials to help answer the questions below:
 - Lancaster County Elevation View Photo, Aerial Soil Map, & Lancaster Co. Soil Survey Book
 - Adams County Elevation View Photo, Aerial Soil Map, & Adams Co. Soil Survey Book
 - Centre County Elevation View Photo, Aerial Soil Map, & Centre Co. Soil Survey Book
- 1. Look at each of the Elevation View Photos with the stakes and Calculate Slope of each of the selected plots of land:
 - a. Site #1 (Lancaster County): Over a distance of 100 feet, the reading of Stake A is 2 feet 4 inches and the reading of Stake B is 6 feet 7 inches. What is the percent slope of Site #1: _____ (10 pts)
 - a. 2.0% b. 4.3% c. 6.5% d. 9.1%
 - b. Site #2 (Adams County): Over a distance of 50 feet, the reading of Stake A is 3 feet 6 inches and the reading of Stake B is 7 feet 4 inches. What is the percent slope of Site #2: _____ (10 pts)
 - a. 3.8% b. 4.3% c. 7.7% d. 11.0%
 - c. Site #3 (Centre County): Over a distance of 100 feet, the reading of Stake A is 2 feet 1 inch and the reading of Stake B is 7 feet 11 inches. What is the percent slope of Site #3: _____ (10 pts)
 - a. 5.8% b. 5.01% c. 9.21% d. 90.79%
- 2. Look at the 5 tools. Which tool would be used to measure slope of a section of land? _____ (10 pts)
- 3. Using the Photos and Survey Soil Books, which of the three sites would be best suited for a septic tank filter field and explain your reason briefly in a short statement?

_____ (6 pts)

Explanation: (7 pts)

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4. With the use of the Soil Survey Books and the Aerial Photos, fill out the Soil Factors Checklist Below for **Site #1 - Lancaster County, PA** (47 pts)

Soil Factors – Part 1 (Check Appropriate Box)		Soil Factors – Part 1 (Check Appropriate Box)	
Points		Points	
	Slope <input type="checkbox"/> 1. Nearly Level0-1% <input type="checkbox"/> 2. Gently Sloping1-3% <input type="checkbox"/> 3. Moderate Sloping ..3-5% <input type="checkbox"/> 4. Strongly Sloping ...5-8% <input type="checkbox"/> 5. Steep8-15% <input type="checkbox"/> 6. Very Steep> 15% Erosion – Wind and Water <input type="checkbox"/> 1. None to Slight <input type="checkbox"/> 2. Moderate <input type="checkbox"/> 3. Severe <input type="checkbox"/> 4. Very Severe		Major Factors That Keep Area Out of Class 1 <input type="checkbox"/> 1. Texture <input type="checkbox"/> 2. Depth <input type="checkbox"/> 3. Slope <input type="checkbox"/> 4. Erosion <input type="checkbox"/> 5. Permeability <input type="checkbox"/> 6. Runoff <input type="checkbox"/> 7. Wetness <input type="checkbox"/> 8. Flooding <input type="checkbox"/> 9. None Land Capability Class <input type="checkbox"/> 1. Class I <input type="checkbox"/> 2. Class II <input type="checkbox"/> 3. Class III <input type="checkbox"/> 4. Class IV <input type="checkbox"/> 5. Class V <input type="checkbox"/> 6. Class VI <input type="checkbox"/> 7. Class VII <input type="checkbox"/> 8. Class VIII
Recommended Treatment – Part 1 (Check Appropriate Box)			
Points			
	Vegetative <input type="checkbox"/> 1. Row crop/occasional soil conserving crop <input type="checkbox"/> 2. Row crop/frequent soil conserving crop <input type="checkbox"/> 3. Row crops not more than 2 out of 4 years <input type="checkbox"/> 4. Row crops not more than 1 out of 5 years <input type="checkbox"/> 5. Return crop residue to the soil <input type="checkbox"/> 6. Practice conservation tillage <input type="checkbox"/> 7. Establish recommended grass or grasses and legumes <input type="checkbox"/> 8. Proper pasture and range management <input type="checkbox"/> 9. Protect from burning <input type="checkbox"/> 10. Control grazing <input type="checkbox"/> 11. Plant recommended trees <input type="checkbox"/> 12. Harvest trees selectively <input type="checkbox"/> 13. Use only for wildlife or recreation area Mechanical <input type="checkbox"/> 14. Control brush or trees <input type="checkbox"/> 15. Terrace and farm on contour <input type="checkbox"/> 16. Maintain terraces <input type="checkbox"/> 17. Construction diversion terraces <input type="checkbox"/> 18. Install drainage system <input type="checkbox"/> 19. Control gullies <input type="checkbox"/> 20. No mechanical treatment needed		