

Envirothon – May 5, 2017

Soils & Land Use Test

Total score ___/50

BASIC SOIL SCIENCE

Team ID _____

- 1) Select the answer below that is TRUE about soil erosion: *(1 point)*
 - a) In dry areas, wind rarely causes erosion.
 - b) A hillslope will have less erosion potential than flat terrain.
 - c) Drought and poor soil health were not erosion factors during the Dust Bowl.
 - d) The NRCS Environmental Quality Incentive Program encourages livestock fencing to prevent erosion in creeks.
 - e) Long-term established vegetation causes erosion.

- 2) Cl, O, R, P, T is a mnemonic for remembering soil forming factors. Place the correct letter(s) in the space associated with the formation factor description. *(4 points)*
 - a) ____ Loess, colluvium, and sedimentary rock.
 - b) ____ Soil that evolves on a slope is shallow.
 - c) ____ Seasonal distribution of precipitation.
 - d) ____ Soil is a habitat; a food web.

- 3) Which horizon in a soil profile will generally have the greatest water holding capacity? *(1 point)*
 - a) C
 - b) B
 - c) O
 - d) A
 - e) R

- 4) A tilled soil will have a deeper O horizon than an untilled soil. *(1 point)*

Circle one: True or False

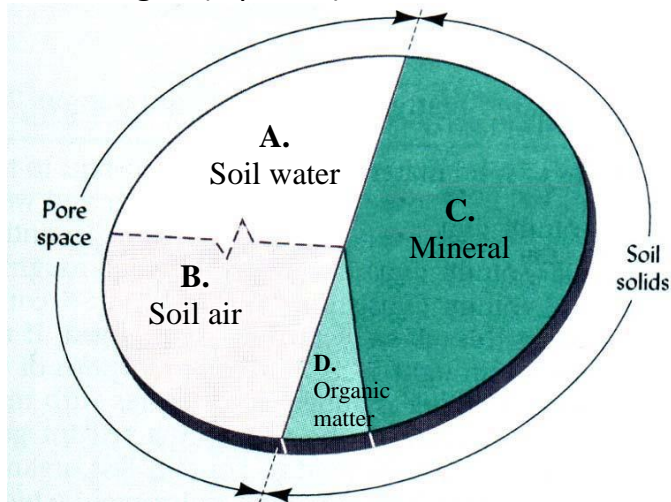
- 5) List two of the five main functions of soil. *(2 points)*

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- 6) Which texture of soil is least likely to retain **nutrients** after excess irrigation? (1 point)
- sand
 - loam
 - clay
 - silt loam

- 7) Below is a pie chart showing the relative proportions of the four components of a fertile soil. Match the pie chart components on the left to the list of soil descriptions on the right. (4 points)



- ___ Measurement of soil health.
- ___ Increases as soil dries.
- ___ Can carry fertilizer and pesticides to groundwater.
- ___ Derived from soil parent material.

- 8) There are four reasons to add lime to agricultural soil. Circle the statement below that is **NOT** a reason to add lime. (1 point)
- Make more nutrients available to plants.
 - Neutralize soil alkalinity (lower pH).
 - Improve soil biology habitat.
 - Increase crop yield and resilience.
- 9) A soil feature, such as oxidation of iron, that indicates changes in soil moisture, is called a: (1 point)
- Mottle
 - Pedon
 - Crotovina
 - pH
 - Midge

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SOILS/LAND USE

- 10) “Conservation cover” is when a landowner establishes and maintains a permanent vegetative cover, for example in an orchard alley. Circle the statement below that is **NOT** included in conservation cover design and management. (1 point)
- a) Select plants that will provide cover to reduce soil exposure to wind and water.
 - b) Reduce weed competition.
 - c) Plant non-native species that are known invasive weeds.
 - d) Time mowing to consider the reproductive period for wildlife species.
 - e) Spot spray weeds to protect native pollinators.
- 11) A grass seed-crimson clover-squash rotation is used to improve soil health. Circle **ALL** the additional benefits of crop rotation in the list below. (2 points)
- a) Reduce fertilizer needs.
 - b) Increase insect and weed pests.
 - c) Expose bare soil to rain.
 - d) Restrict farm revenue due to monocropping.
 - e) Provide a mix of food sources for soil biology.
- 12) Studies show that urban sprawl tends to happen on the better agricultural soils. Circle the **CORRECT** statement below. (1 point)
- a) On American farms, younger family members prefer to work the farm as opposed to selling the land at high real estate development prices.
 - b) Growing populations and expanding urban areas are important topics in the debate over sustainable development and food security.
 - c) Urban sprawl on prime farm land will lower the yield/acre demand on remaining farm land.
 - d) As farm land is encroached upon by urban development, food costs will decrease.
- 13) Soil organic matter provides the foundation of the soil food web. Circle the answer that is **NOT** true about soil organic matter. (1 point)
- a) Decomposes to release nutrients that plants can use.
 - b) Increases soil water holding capacity.
 - c) Is higher in tilled soil compared to the soil of a nearby grassy fence row.
 - d) Holds and protects nutrients.

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14) The Best Ever Soil & Water Conservation District has started an incubator farm to help new and beginning farmers learn best management practices and test crop varieties for market. The District needs to purchase compost for 10 farm plots and also to prepare 2 new beneficial insect habitat areas.

- 10 farm plots that are 180 feet long and 15 feet wide.
- 2 insectary plantings that are 75 feet long and 8 feet wide.
- All the areas will receive a 3-inch application of compost.
- Bagged compost is \$10.99/ 3 cubic feet
- Bulk compost is \$29/cubic yard.

Decide what type of compost is the least expensive is to buy, bulk or bagged.

To get credit for this problem you must show all your work!!!

a) Calculate the amount of compost needed.

i. Calculate area in cubic feet for 10 farm plots (2 points)

ii. Calculate area in cubic feet for 2 insectary plantings (2 points)

iii. Convert total cubic feet of farm plots plus insectary plantings to cubic yards (2 points)

Tip: 1 cubic foot = 0.037037 cubic yards

b) Bagged compost is \$10.99/ 3 cubic ft. What is the cost to cover all areas? (½ pt)
\$10.99/3-cubic feet

c) Bulk compost is \$29/cubic yard – what is the cost to cover all areas? (½ pt)

\$29/cubic yard

What type of compost is the least expensive is to buy, bulk or bagged? _____

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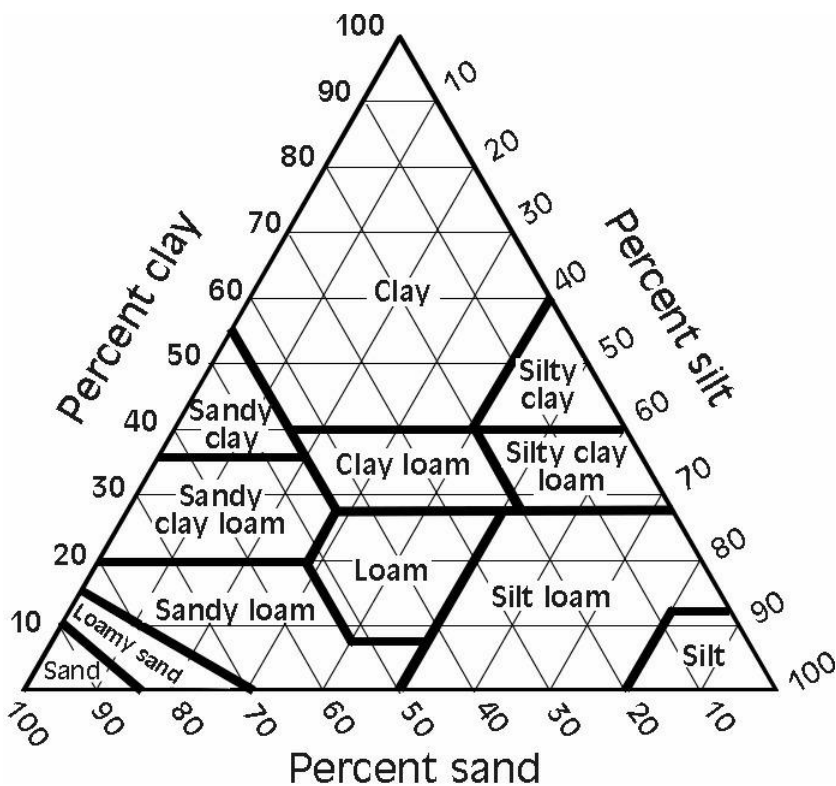
TEXTURE STATION

- 15) Determine the texture of Soil Sample A using the hand method.
Fill in the following table: (4 points)

Soil Sample	% Sand	% Silt	% Clay	Soil Texture
A				

- 16) Use the texture triangle below to name the soil texture with 40% silt and 47% sand? (1 point)

The texture is:



- 17) What is the percent clay in the soil described in the question above? (1 point).

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AGRICULTURAL SOIL AND WATER CONSERVATION STEWARDSHIP

- 18) Farmer McDonald has sowed crops right to the edge of the Willamette River for 10 years. Each year he loses 5 feet of his river bank soil to erosion. Fill in the right column in the table below to define the problem and **simple** objectives, resources, solutions, decisions, and briefly describe the evaluation that Farmer McDonald might experience in the Conservation Planning Process. (8 points)

Conservation Planning	Describe steps in soil problem
Identify soil resource problem	
Identify objectives	
Inventory resources	
Develop alternative solutions	
Evaluate alternative solutions	
Make your decisions	
Implement plan	
Evaluate plan success and adjust	

- 19) Soil degradation occurs when agricultural practices: (1 point)

- Protect soil structure.
- Deplete soil carbon.
- Maintain soil nutrient reserves.
- Support and enhance soil organisms.

- 20) A landowner can reduce bank erosion and enhance aquatic habitat by implementing which of these practices? (1 point)

- Spray herbicides during windy weather to ensure drift from cropland to buffer.
- Install bioengineering on banks, such as live willow cuttings.
- Allow livestock to cross streams during peak flow.
- Plant crops to the edge of the stream bank.

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e) SOIL SURVEY

To answer questions in this section, refer to the Web Soil Survey aerial screen shot and Map Unit descriptions provided on your table.

- 21) The screen shot shows an Area of Interest (AOI) defined by a thin blue line and the eight Map Units, outlined in orange, that have been surveyed in that AOI. The soil texture of one of the eight Map Units is very different compared to the other seven Map Units. Write the unique Map Unit Symbol, Name and the soil texture in the table below. (3 points)

Map Unit Symbol	
Map Unit Name	
Map Unit Texture	

- 22) What landscape feature corresponds with this soil texture. (1 point)
- 23) Compare the Map Unit Descriptions for #169 and #177.
Which one has a deeper C horizon and what is the max depth listed? (1 point)

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