

2008 Area 1-Northwest Ohio Envirothon TEST—SOILS STATION

Soils General Questions:

Use the tables provided to answer questions numbers 1 through 14.

- 1) The Envirothon Soil Pit Site is located on the edge of a Soil Map Unit that has BoA for the Map Symbol. According to “The Map Unit Legend Table”, what Soil does the Symbol, BoA represent?
 - A. Blount silt loam, 0 to 2 percent slopes
 - B. Blount silt loam, 2 to 6 percent slopes
 - C. Glynwood silt loam, 2 to 6 percent slopes
 - D. Glynwood silty clay loam, 6 to 12 percent slopes, eroded

- 2) Soil Map Units have inclusions of other soils in minor amounts which are termed “Minor Components”. According to “The Map Unit Description Table”, what Soil(s) are Minor Components of the BoB Map Unit?
 - A. Glynwood soils
 - B. Haskins soils
 - C. Pandora soils
 - D. Pewamo soils
 - E. All of the Above

- 3) According to “The Map Unit Description Table”, what percent of the “Minor Components” are included in the BoB Map Unit?
 - A. 5 percent
 - B. 10 percent
 - C. 15 percent
 - D. 20 percent

- 4) A toboggan run has been proposed starting at the Envirothon soil pit and running northwest down the slope, across the lane and ending at Sugar Creek. Tall poles will need to be placed in the ground to provide a starting platform. Your design engineers have specified that the bottoms of these poles need to be supported by a soil layer with Bulk Density range of 1.60-1.85 grams per cubic centimeter. According to “The Physical Properties Table”, which soil layer would meet these specifications for the BoA Map Unit?
 - A. 0-7 inches
 - B. 7-25 inches
 - C. 25-30 inches
 - D. 30-60 inches

Soils General Questions (continued):

Use the tables provided to answer questions numbers 1 through 14.

- 5) The toboggan run will need a compacted clay base under it. Engineers prefer the Unified Soil Classification System of "CL" (meaning Lean Clay) to compact. The proposed route will cross 3 different Soil Map Units (BoA, BoB and Sh). According to "The Engineering Properties Table", what Soil Map Units contain the Unified "CL" type soil in the surface layer?
- A. BoA
 - B. BoB
 - C. Sh
 - D. All of the Above
 - E. None of the Above
- 6) Frost heave within the soil is a safety and maintenance concern that engineers and insurance agents have expressed during the design of this project. Frost heave caused by a high water table during the winter months can create bumps and uneven surfaces that could cause the toboggans to fly out of the run and injure the passengers. The engineers have specified that there needs to be at least two feet between the top of the water table and the surface of the ground. According to the "Water Features Table", what soil could meet this requirement for the months of January and February?
- A. BoA
 - B. BoB
 - C. GwB
 - D. Sh
- 7) Water should be applied to the toboggan run to create a smooth glaze of ice. *Liquid Limit* is the percentage of water the soil can absorb before the soil *flows* like a liquid. Engineers have specified a Liquid Limit Range of 25-40. Anything lower could cause abrasive soil particles to become imbedded in the ice that would slow the toboggans, scratch them and possibly injure the riders. According to "The Engineering Properties Table", which soil would not match this Liquid Limit Range?
- A. BoA
 - B. BoB
 - C. Sh
 - D. All of the Above
 - E. None of the Above
- 8) The insurance agent now insists that the current farm lane must be improved to a road capable of supporting an EMS Vehicle back to the proposed toboggan run or he will drop your liability Insurance. The road will cross the BoA, BoB, GwB, and GxC2 Map Units. According to the "Roads and Streets, Shallow Excavations, and Lawns and Landscaping Table" what is the best rating any of these Map Units have for the "Roads and Local Streets" column?
- A. Not limited
 - B. Somewhat limited
 - C. Limited
 - D. Very limited

Soils General Questions (continued):

Use the tables provided to answer questions numbers 1 through 14.

- 9) The “Roads and Streets, Shallow Excavations and Lawns and Landscaping Table” has Numerical Ratings (Values) of 0 to 1.0 for the various limitations under the “Roads and Local Streets Column”. “0” is the best and “1.0” is the worst. Which Limitation for “Roads and Local Streets” has the worst “Value” for all the Map Units that the road would cross according to Question #7?
- A. Depth to saturated zone
 - B. Low strength
 - C. Shrink-swell
 - D. Too clayey
- 10) There needs to be a significant number of people using the toboggan run to pay for building it and the improvements on the access road. The local Health Department is going to require either a septic tank absorption field or a sewage lagoon because of the number of users involved. There are five Soil Map Units on this Property: BoA, BoB, GwB, GxC2 and Sh. According to the “Sewage Disposal Table”, what is the best rating for either the septic tank absorption field or sewage lagoons on any of these Map Units?
- A. Not limited
 - B. Somewhat limited
 - C. Limited
 - D. Very limited
- 11) A local environmental group is upset by the plans for the toboggan run. They are worried that the construction will cause soil water erosion, pollute Sugar Creek with sediment and kill an endangered mussel by smothering it with the sediment. The board Chairman tries to reassure the group by saying a grassed waterway, terrace or diversion will be built to control any possible erosion. According to the “Waterways, Terraces and Diversions and Drainage Table” What is the most “Limiting Feature” for building any of these conservation practices on the GwB Map Unit?
- A. Low strength
 - B. Restricted permeability
 - C. Shrink-swell
 - D. Water erosion

Soils General Questions (continued):

Use the tables provided to answer questions numbers 1 through 14.

- 12) Things are not going well for the planned toboggan run. Construction and maintenance costs are going to be more than expected because of poor soils and expensive fill to improve the access road. The Health Department will not approve a septic system for the new bathrooms; liability insurance is going to be raised; and the environmental group found a rare mussel in Sugar Creek and is suing the Board. Some on the Board now think that this area should just be a nature area with some new foot trails built for the public's enjoyment. To eliminate problems, the routes need to be carefully planned. According to the "Paths, Trails and Golf Fairways Table", what soil has the worst "Rating Class" for "Paths and Trails"?
- A. BoA
 - B. BoB
 - C. GwB
 - D. GxC2
 - E. Sh
- 13) The environmental group has agreed to withdraw its lawsuit if the Board withdraws its plan to build the toboggan run, and instead plants trees on the BoA soil where the initial footers were dug for the toboggan run. Both groups want these trees to grow as fast as possible. According to the "Windbreaks and Environmental Plantings Table", what type of tree can grow over 25 feet tall in 20 years on this BoA soil?
- A. Pin Oak
 - B. Green Ash
 - C. Austrian Pine
 - D. Eastern Red Cedar
- 14) To avoid further disputes about this area, both groups have agreed to share the cost of building a small picnic area where they can meet to discuss future uses of the area, such as having picnics and holding public meetings while enjoying the environment. According to the "Camp Areas, Picnic Areas and Playgrounds Table", what is the most limiting feature that needs to be overcome to build a picnic area on the BoA soil?
- A. Flooding
 - B. Slow water movement
 - C. Slope
 - D. Restricted permeability

Soils General Questions (continued):

- 15) What agencies provide Soil Survey information?
- A. Ohio Cooperative Extension Service
 - B. Ohio Department of Natural Resources
 - C. U.S.D.A. Natural Resources Conservation Service
 - D. All of the Above
- 16) Soil Survey information can be provided in a variety of formats. Which format would contain the most current and up-to-date information?
- A. Soil Survey Books
 - B. The NRCS Websites, "Soil Data Mart" and "Web Soil Survey"
 - C. Soil Survey CD's
 - D. Soil Survey DVD's
- 17) Ohio Soil Scientists provide on-site soil investigations through the federal and state governments, universities and private consulting practices. Many of these Soil Scientists belong to a professional association in Ohio to promote the wise use of our soil resources and provide continuing education credits to its members and others. What is the name of this Association?
- A. The Association of Ohio Pedologists (AOP)
 - B. The Association of Ohio Soil Classifiers (OSC)
 - C. The Association of Ohio Soil Inspectors (AOSIS)
 - D. The Association of Ohio Geologists (AOG)

Soils Site Specific Questions:

Refer to the Soils Pit for Questions #18 thru #27

- 18) Topsoil is one of the most fragile resources that is often destroyed or degraded during development for recreation uses. What is the depth of topsoil in the soil pit?
- A. 2 inches
 - B. 5 inches
 - C. 9 inches
 - D. 15 inches
- 19) Compaction of soil structure by recreational traffic impacts topsoil the most, because it is on the surface. What is the structure of the topsoil (A horizon) in this soil pit?
- A. Columnar
 - B. Granular
 - C. Platy
 - D. Sub Angular Blocky
- 20) Subsoil can also be compacted by recreational traffic and construction with disastrous affects on internal water movement. What is the structure of the subsoil at a depth of 18" from the surface of the soil pit?
- A. Columnar
 - B. Granular
 - C. Platy
 - D. Sub Angular Blocky
- 21) Finer textured soil can be more densely compacted. What is the texture of the topsoil?
- A. Loam
 - B. Silt loam
 - C. Silty clay loam
 - D. Silty clay
- 22) What is the texture of the subsoil at 18" of depth in the soil pit?
- A. Sandy loam
 - B. Silty clay loam
 - C. Clay
 - D. Clay loam
- 23) There are "flecks" or "stains" of a black mineral in the soil at 20 inches and 30 inches in depth from the top of soil pit. What is this mineral?
- A. Magnesium
 - B. Malachite
 - C. Manganese
 - D. Magnetite

Soils Site Specific Questions (continued):
Refer to the Soils Pit for the questions below.

- 24) When internal water movement in the soil slows down and perches water as a seasonal high water table, Manganese is often precipitated out of the soil solution. Is there any evidence in this soil pit that the internal water movement of the soil in this pit slows down in places?
- A. Yes, Manganese precipitates are present.
 - B. No, Manganese precipitates are not present.
- 25) Based on the evidence you found or did not find in Question 24, is there evidence of a seasonal high water table in this soil?
- A. Yes, there is evidence for a seasonal high water table.
 - B. No, there is no evidence of a seasonal high water table.
- 26) At what depth from the top of the soil pit does the parent material or "C" Horizon begin?
- A. 10 inches
 - B. 15 inches
 - C. 18 inches
 - D. 25 inches
- 27) What type of parent material is the "C" Horizon in this soil pit?
- A. Aeolian
 - B. Colluvium
 - C. Glacial Till
 - D. Lacustrine

2008 Area 1-Northwest Ohio Envirothon ANSWER KEY—SOILS STATION

- 1) A
- 2) E
- 3) C
- 4) D
- 5) D
- 6) C
- 7) C
- 8) D
- 9) B
- 10) D
- 11) D
- 12) D
- 13) A
- 14) B
- 15) D
- 16) B
- 17) A
- 18) C
- 19) B
- 20) D
- 21) B
- 22) A
- 23) C
- 24) A
- 25) A
- 26) D
- 27) C