2025 Iowa Envirothon State Soils Exam Team_____
Each Question is worth three points – 75 points possible

1. The ___ factor is the soil loss tolerance used in the Revised Universal Soil Loss Equation, Version 2 (RUSLE2). This factor is defined as an estimated maximum rate of annual soil erosion that will permit crop productivity to be sustained economically and indefinitely.
   A. "A"
   B. "SL"
   C. "R"
   D. "T"

2. A homeowner determines that the steepest area in his/her garden has an 18" drop over a horizontal distance of 50 feet. This area of the garden belongs to which "slope class"? (See Figure 22)
   A. nearly level
   B. gently sloping
   C. sloping
   D. strongly sloping
   E. moderately steep
   F. steep

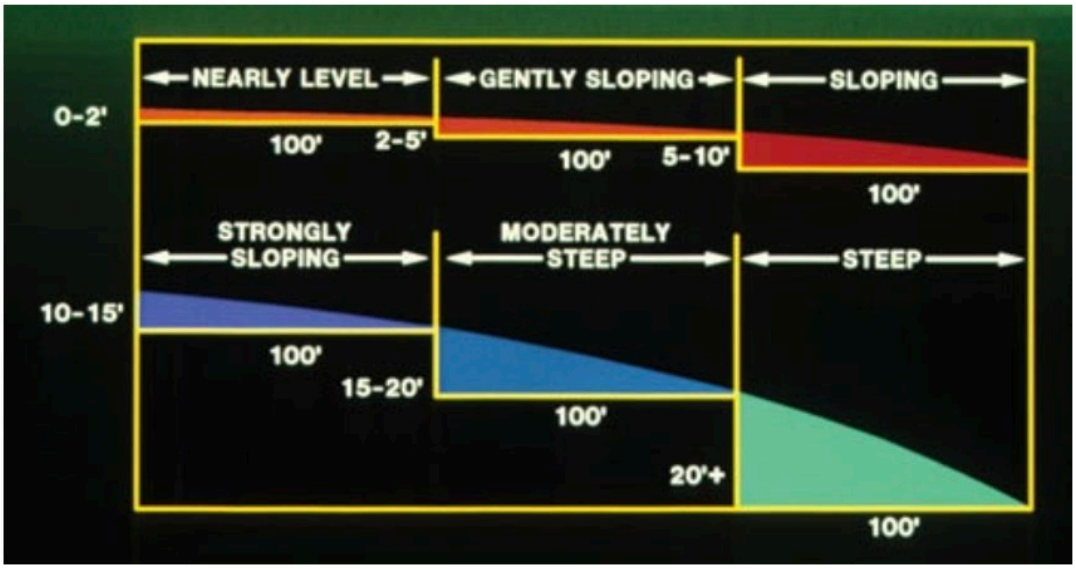
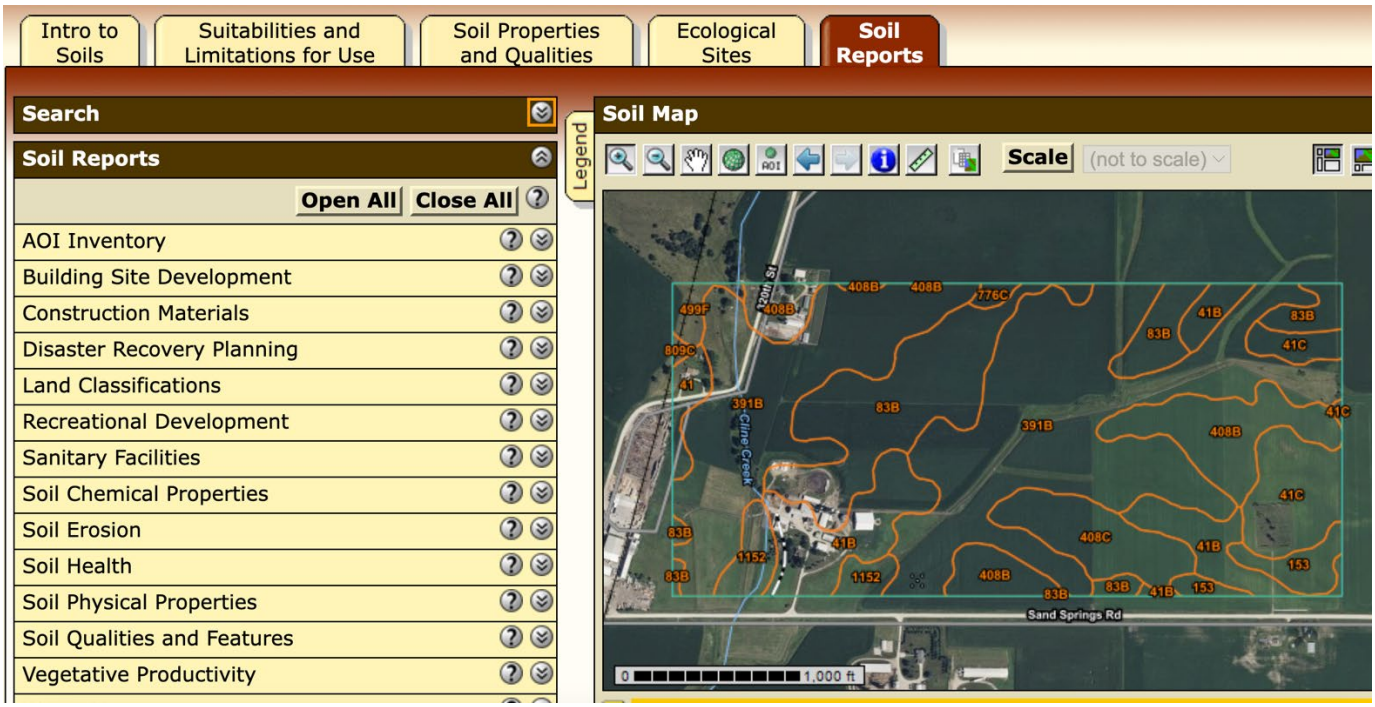


Figure 22.—Slope classes.

3. Earthworms currently in North America include species that are _____.
   A. native to non-glaciated areas of North America
   B. non-native species from Europe and Asia
   C. classified into three groups based on their preferred habitat
   D. all of these are correct

4. The soil report and map shown below is from what source?
   A. ArcGIS Online hosted by Esri
   B. County Soil Survey books printed by Iowa State University
   C. Soil Web: An Online Soil Survey Browser hosted by the University of California at Davis
   D. Web Soil Survey which is hosted by the NRCS and the USDA



5. What is the slope of a hill when in 40 feet of run the elevation drops 5 feet?
   A. 6%
   B. 8%
   C. 9.5%
   D. 10%
   E. 12.5%

6. Which of the following is a subsurface horizon, unless significant erosion has occurred, but also has soil structure and is a zone of accumulation?
   A. A horizon
   B. B horizon
   C. C horizon
   D. R horizon
   E. E horizon

7. _____ soil structures are significantly taller than they are wide.
   A. Blocky
   B. Granular
   C. Massive
   D. Platy

E. Prismatic

8. In the photo below, similar clay soil samples were collected under two different cropping systems. Which of the following statements best describes the cause of the differences that are observed in the left tray from the field producing dry beans, versus the right tray from the walnut orchard?
   A. With the reduced organic matter content of the soil from the walnut orchard, there is less slaking than the samples collected from the field producing dry beans.
   B. With the increased organic matter content of the soil from the walnut orchard, there is less slaking than the samples collected from the field producing dry beans.
   C. With the reduced organic matter content of the soil from the walnut orchard, there is more slaking than the samples collected from the field producing dry beans.
   D. With the increased organic matter content of the soil from the walnut orchard, there is more slaking than the samples collected from the field producing dry beans.



These photos were taken from fields near Davis, California. The soil contains clay with slight to moderate swelling potential. Left: Soil aggregates were collected from a field used to produce dry beans in rotation using organic management. Soil organic matter helps the aggregates resist slaking. Right: Soil aggregates collected from a conventional walnut operation are much less stable and burst apart when rapidly wetted. The walnut orchard is cultivated frequently, which destroys plant residue and prevents accumulation of organic matter.

9. What native vegetation group is associated with soils developed under grass vegetation and usually have thick, dark, or moderately dark A horizon.
   A. Forest
   B. Marsh
   C. Prairie
   D. Taiga
   E. Transition

10. A calcareous soil is _____.
   A. high in lime
   B. high in salt content
   C. sandy
   D. high in organic material and dark in color

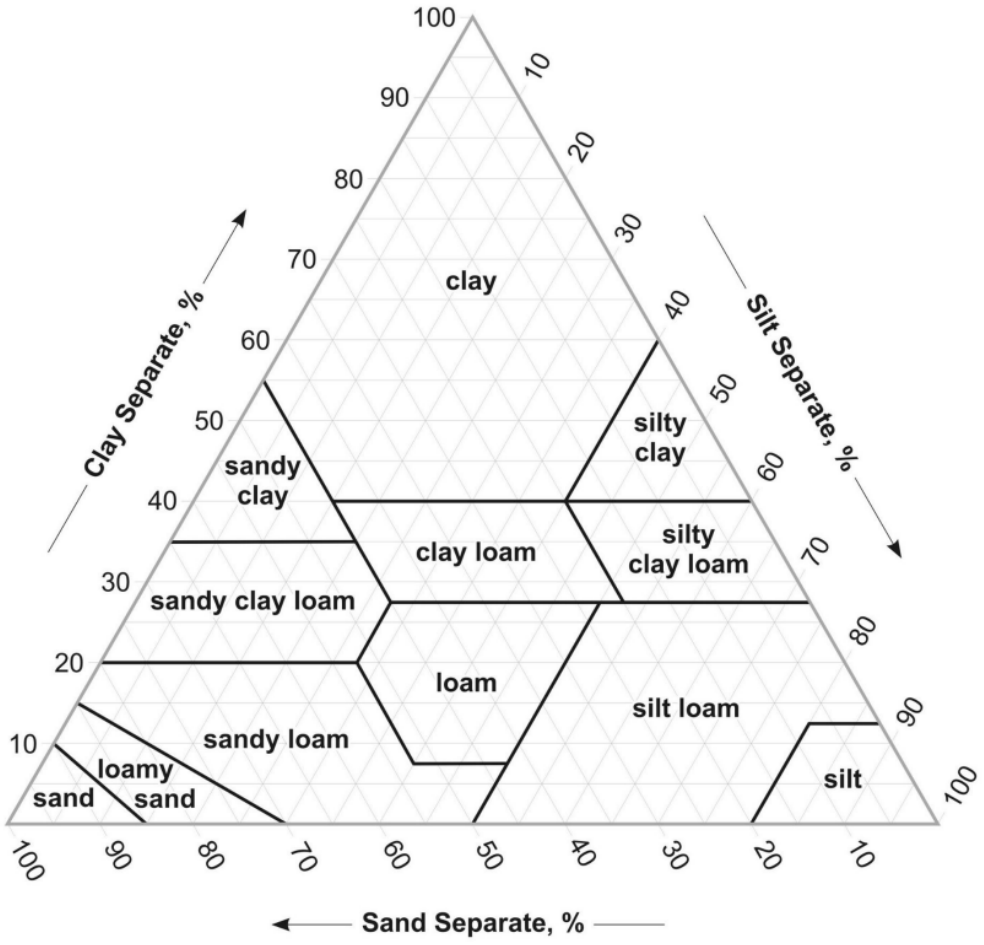
11. Dark colored soils are associated with soils that have _____.
   A. higher organic matter and more fertile conditions
   B. lower organic matter and more fertile conditions
   C. lower organic matter and lower fertile conditions
   D. higher organic matter and lower fertile conditions

12. The Iowa Loess Hills _____.
   A. contain some of Iowa's last remaining unplowed prairies and a diversity of plant and animal life dependent on them
   B. were formed as loess dropped to the ground and accumulated in thick deposits when winds whipped fine silt particles out of the floodplains of the Missouri River which was a major pathway for glacial meltwater at the end of the last ice age
   C. are a steep network of hills with sharp ridges located almost entirely located near Iowa's western border
   D. are the best example in the United States of this rare landform.
   E. All of these are correct

13. Which is a true statement regarding accurately determining "soil health" ?
   A. Soil health can be determined by measuring only a single factor such as crop yield or water quality.
   B. Soil health can be measured directly with a soil health barometer.
   C. Soil health can be determined by using indicators that measure properties of soil and/or plants that provide clues about how well the soil can function.
   D. All of these statements are true.

14. What conservation practice utilizes strips of grass or a mixture of grasses and legumes that run along the contour of a farmed field? (These strips alternate down the slope of a field with wider cropped strips).
   A. Contour buffer strips
   B. Crop rotation
   C. No-till/Strip-till
   D. all of these are correct

15. What is the texture classification for a soil that is 50% sand, 20% silt, and 30% clay? (see texture chart)
    A. Sandy clay loam
    B. Clay
    C. Silt loam
    D. Loam



Questions 16-19:
Use the soil sample buckets and the "Guide to Texture by Feel chart" at this station to answer these questions.

Use the Soil Sample Buckets, the Guide to Texture by Feel chart, and the Munsell color chart to answer questions 16-19.

16. What is the texture of the A Horizon? **(Use bucket A)**
    A. sandy loam
    B. clay loam
    C. silty clay loam
    D. loam
    E. silt loam

17. What is the texture of the B Horizon? **(Use bucket B)**
    A. sandy loam
    B. clay loam
    C. silty clay loam
    D. loam
    E. silt loam

18. What is the soil structure in the sample provided with grass and roots?
    A. Platy
    B. Structureless
    C. Prismatic
    D. Granular

19. What is the matrix color of the B Horizon from this location using the Munsell Color Book? Choose the color chip which fits the best. **Hint:** Always moisten the soil before determining the color! **(Use bucket B)**
    A. 10YR 2/1
    B. 10YR 4/4
    C. 2/5Y 4/2
    D. 5Y 4/1

Questions 20-22:
Soil Survey Books of Polk County, Iowa - Part I and Soil Map sheet #41

20. In the block diagram Figure 4 on page 24 of Part 1, what soil developed from loess and is most likely found in the summit, shoulder, or backslope landscape position for a typical Sharpsburg-Shelby-Lamoni soil association, that is pictured?
    A. Shelby
    B. Lamoni
    C. Sharpsburg
    D. Colo-Judson
    E. Downs

21. Which of the following is "True" regarding the series description for the Clarion Soils Series in Polk County? (See Part one, page 44)
    A. The Clarion Series is a very poorly drained, organic material soil.
    B. The Clarion Series is a somewhat poorly drained, organic material soil.
    C. The Clarion Series is a moderately well drained, glacial till soil.
    D. The Clarion Series is a well-drained, alluvial soil.
    E. The Clarion Series is a very poorly drained, aeolian sand soil.

22. There are 55 soil maps included with the Polk County Soil Survey. Use Soil Map Sheet #41 – Des Moines SE NW Quadrangle, to answer this question. What is the Soil Map Unit (SMU) symbol for the State Capitol Building on the map Des Moines SE NW Quadrangle?
    A. 65F
    B. 4000
    C. 4138B
    D. 4946
    E. 1220

Questions 23-25:
Web Soil Survey – Custom Soil Resource Report for Polk County, Iowa

Use the <u>Housing Development</u> Report to answer question 23

23. A family is planning to build a new house in Polk County and is concerned about the limitations for installing a home with a basement on the property. The Polk County Soil Survey indicates that the area where the home will likely be installed has a L138B soil type. What would be the rating reason for this location?
    A. Depth to saturated zone
    B. Shrink-swell
    C. This soil type has no limitations.
    D. Shallow Soils
    E. Flooding

Use the <u>Sweet Corn</u> Report to answer questions 24-25

24. A farmer is concerned about the production of sweet corn on their land in Polk County. They see that their organic matter has been decreasing and are interested in the application of biochar to increase the carbon content in the soil. Which soil map unit(s) would see a Good or Excellent response?
    A. 175C – Dickinson fine sandy loam, 5 to 9 percent slopes
    B. 259 – Biscay clay loam, 0 to 2 percent slopes
    C. 828C2 – Zenor sandy loam, 5 to 9 percent slopes, moderately eroded
    D. 27B – Terril loam, 2 to 6 percent slopes
    E. A and C are both correct

25. Corn Suitability Rating (CSR) is an index procedure developed in Iowa to rate each different kind of soil for its potential row-crop productivity. What soil map unit on the Sweet Corn property has the highest potential for productivity?
    A. 175C – Dickinson fine sandy loam, 5 to 9 percent slopes
    B. L138B – Clarion Loam, Bemis moraine, 2 to 6 percent slopes
    C. 259 – Biscay clay loam, 0 to 2 percent slopes
    D. 108 – Wadena loam, 0 to 2 percent slopes
    E. 828C2 – Zenor sandy loam, 5 to 9 percent slopes, moderately eroded