

SOIL FORMATION



READING PRACTICE SETS

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TOEFL iBT READING PRACTICE SET

Directions: Read the passage and answer the questions. Give yourself 18 minutes to complete this practice set.

SOIL FORMATION

1 Living organisms play a fundamental role in soil formation. Numerous species of prokaryotes, protists, fungi, plants, and animals living in the soil release minerals from the parent material from which soil is formed, supply organic matter, aid in the translocation and aeration of the soil, and help protect the soil from erosion. The types of organisms growing or living in the soil greatly influence the soil's physical and chemical characteristics. In fact, for mature soils found in many parts of the world, the predominant type of natural vegetation is considered the most important direct influence on soil characteristics. For this reason, a soil scientist can tell a great deal about the attributes of the soil in any given area simply from knowing what kind of flora the soil supports. Thus, prairies and tundra regions, which have characteristic types of vegetation, also have characteristic soils.

2 By far the most numerous and smallest of the organisms living in soil are bacteria and other prokaryotes, which are simple, unicellular organisms that lack a membrane-bound nucleus, mitochondria, or any other membrane-bound organelle. Under favorable conditions, a million or more of these tiny organisms can inhabit each cubic centimeter of soil. It is the bacteria, more than any other organisms, that enable rock or other parent material to undergo the gradual transformation to soil. Some bacteria produce organic acids that directly attack parent material, breaking it down and releasing plant nutrients. Others decompose organic litter, or debris, to form nutrient-rich organic matter, or humus. A third group of bacteria inhabits the root systems of plants called legumes. These include many important agricultural crops, such as alfalfa, clover, soybeans, beans, peas, and peanuts. In a process known as nitrogen fixation, the bacteria that legumes host within their root nodules (small swellings on the root) change nitrogen gas from the atmosphere into nitrogen compounds that plants are able to metabolize, which makes the soil more fertile.

3 Other microscopic organisms, such as protists and fungi, also are indispensable in soil development. Protists, an assemblage made up of protozoa, unicellular algae, and slime molds, play a significant role in mineralizing nutrients, making them available for use by plants and other soil organisms. When they graze on bacteria, protists stimulate growth of the bacterial population and, in turn, decomposition rates and soil aggregation. Fungi perform important services related to water dynamics, nutrient cycling, and disease suppression. In highly acidic soils, where only a few bacteria can survive, fungi frequently become the chief decomposers of organic matter. Like bacteria, fungi are important for immobilizing, or retaining, nutrients in the soil.

4 Plants play several vital roles with respect to the soil. [A] Grasses, trees, and other large plants supply the bulk of the soil's humus. [B] The minerals that are released as these plants decompose on the surface constitute a vital nutrient source for succeeding generations of plants as well as for other soil organisms. [C] In addition, trees are able to extend their roots deep within the soil and bring up nutrients from far below the surface. [D] These nutrients eventually enrich the surface soil when the tree drops its leaves or when it dies and decomposes. Finally, trees and other woody plants perform the crucial function of slowing water runoff and holding the soil in place with their root systems, thereby combating erosion. The increased erosion that often accompanies agricultural use of sloping land is principally caused by the removal of its protective cover of natural vegetation.

5 Animals also influence soil formation. Among numerous soil-dwelling animals, the earthworm is probably the most important. Under exceptionally favorable conditions, as many as a million earthworms with a total body weight exceeding 1,000 pounds may inhabit an acre of soil. Earthworms ingest large quantities of soil, chemically alter it, and excrete it as organic matter called casts. The casts form a high-quality natural fertilizer. In addition, earthworms mix soil both vertically and horizontally, improving aeration and drainage. Insects such as ants and termites also can be exceedingly numerous under favorable climatic and soil conditions. In addition, mammals such as moles, field mice, gophers, and prairie dogs sometimes are present in sufficient numbers to have a significant impact on the soil. These animals primarily work the soil mechanically. As a result, the soil is aerated, broken up, fertilized, and brought to the surface, which hastens soil development.

1. According to paragraph 1, which of the following factors is the most important in determining the characteristics of a mature soil?
 - (A) The kinds of minerals in the parent material
 - (B) The extent of erosion in the surrounding area
 - (C) The amount of air that circulates through the soil
 - (D) The kind of vegetation associated with the soil

2. Which of the sentences below best expresses the essential information in the highlighted sentence in paragraph 2? Incorrect choices change the meaning in important ways or leave out essential information.
 - (A) Legumes make the soil more fertile by hosting bacteria in their root nodules.
 - (B) Nitrogen fixation makes compounds that plants and bacteria in legumes can metabolize.
 - (C) Bacteria that live in the roots of legumes make the soil more fertile by producing nitrogen compounds that plants can metabolize.
 - (D) The root nodules of legumes contain bacteria, nitrogen gas from the atmosphere, and nitrogen compounds that plants can metabolize.

3. In paragraph 3, why does the author mention the activity of fungi in acidic soils?
 - (A) To demonstrate that fungi are capable of nitrogen fixation under certain conditions
 - (B) To support the claim that microscopic organisms besides bacteria contribute to soil development
 - (C) To show that fungi play a different role from bacteria in decomposing organic matter
 - (D) To account for the survival rate of microscopic plants in highly acidic soils

4. The word **bulk** in the passage is closest in meaning to
 - (A) composition
 - (B) largest part
 - (C) richest part
 - (D) quality

5. According to paragraph 4, how do trees benefit other plants?
 - (A) Trees make deep-lying nutrients available to plants whose roots do not extend very far into the soil.
 - (B) When trees decompose, they release nutrients and minerals deep into the soil.
 - (C) Humus from trees provides nutrients for plants with roots that extend deep within the soil.
 - (D) When trees die and decompose, they make available a large space for generations of other plants to grow.

6. Which of the following inferences about the effect of vegetation on soil does paragraph 4 support?
 - (A) The root systems of most crops are unable to prevent erosion on sloping ground.
 - (B) Without a cover of vegetation, fast-running water is likely to disappear from the ground surface before it can erode much of the soil.
 - (C) The roots of trees and other large plants remove much water from the ground, making the soil dry and likely to be eroded by the wind.
 - (D) Areas that naturally have little vegetation, such as deserts, are more easily eroded than is agricultural land that has been cleared of its natural vegetation.

7. According to paragraph 5, earthworms do all the following to help soils develop EXCEPT
- (A) eat waste matter
 - (B) mix the soil in different directions
 - (C) change the chemistry of the soil
 - (D) create a natural fertilizer
8. According to paragraph 5, in which of the following ways do some mammals help the soil develop?
- (A) They prevent insects from feeding on nutrients that enrich the soil.
 - (B) They break up the soil as they move through it.
 - (C) They remove waste matter that would otherwise contaminate the soil.
 - (D) They ensure that fertilizer remains in the soil.
9. Look at the four squares [A-D] that indicate where the following sentence could be added to the passage.

Nutrients obtained by these deep roots nourish the trees and are preserved within them.

Where would the sentence best fit?

10. **Directions:** An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. **This question is worth 2 points.**

Plants, animals, and many other organisms play an important role in soil development.

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Answer Choices

- (A) Small organisms such as prokaryotes, protists, and fungi create and enrich soils by breaking down rocks and organic matter.
- (B) Such agricultural crops as alfalfa, clover, soybeans, peas, and peanuts provide nutrients and minerals to the soil as they die and decompose.
- (C) Trees and other large plants aid soil development by providing natural fertilizer as they decompose, and by protecting the soil against erosion.
- (D) Prairie and tundra soils can be found in those areas where conditions are generally not favorable for soil development.
- (E) Certain species of animals inhibit soil development by digging holes in the ground, which prevents nutrients from reaching some areas of the soil.
- (F) Small mammals, earthworms, and other soil-dwelling animals contribute to soil development by aerating, fertilizing, and mixing the soil.