

EARTH PROCESSES, SOIL AND AGRICULTURE REVIEW

Vocabulary

Igneous rock- rock type formed from magma (example- basalt, obsidian)

Sedimentary rock- rock type formed from remains of organic material (example- coal, limestone, shale)

Metamorphic rock- rock type formed from heat and pressure (example- marble, gneiss)

Continental Drift Theory- created by Alfred Wegener, the continents were at one time together in a giant landmass called Pangaea

Subduction- the movement of one crustal plate sinking under another plate

Richter scale- used to measure the intensity of earthquakes

Mercalli scale- used to measure the damage caused by earthquakes

Crust- top layer of the earth's surface

Mantle- largest layer of the earth- hot liquid part of the earth just below the crust

Core- center of the earth, iron and nickel

Plate tectonics- concept that the outer surface of the earth consists of large plates that are slowly moving

Lithosphere- the combination of the crust and mantle

Weathering- process of breaking down of rocks by physical or chemical means

Mechanical weathering- results from physical processes

Chemical weathering- involves that chemical alteration of the rock

Soil- a thin covering over the land consisting of a mixture of minerals, organic material, living organisms, air and water

Erosion- loosening and redistributing of particles

Parent material- ancient layers of rocks that is the basis for soil

Humus- organic component of soil

Soil texture- determined by the size of the mineral particles within the soil

Soil structure- refers to the way various soil particles clump together

Loam- ideal soil for agriculture

Friable- soil that crumbles easily

Soil profile- a series of horizontal layers in the soil that differ in chemical composition, physical properties, particle size and organic matter

Horizon- each soil layer is called a horizon

Leaching- process of carrying dissolved organic matter and minerals to lower level of soil

Contour farming- tilling at right angles to the slope of the land to prevent erosion

Strip farming- alternating strips of closely sown crops like hay or wheat with strips of row crops like hay or cotton to retard the flow of water and reduce erosion

Terraces- level areas constructed at right angles to the slope to retain water and reduce erosion

Monoculture- planting the same crop for efficient planting, cultivation and harvesting

Crop rotation- rotation of crops every year to prevent depletion of nutrients

Macronutrients- nutrients needed in large amounts (nitrogen, phosphorus, potassium)

Micronutrients- nutrients needed in small amounts (boron, zinc, manganese)

Persistent pesticide- pesticides that stay in the environment for a long time

Nonpersistent pesticide- pesticides that break down quickly

Chlorinated hydrocarbons- persistent pesticides, very stable, DDT is an example

Organophosphates- nonpersistent pesticide, interferes with the nervous system of pests

Carbamates- nonpersistent pesticides, interferes with the nervous system of pests

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)- governs regulation of pesticides

Auxins- mimic natural-growth regulators in plants

Bioaccumulation- process of accumulating higher and higher amounts of material within the body of an animal

Biomagnification- phenomenon of acquiring increasing levels of a substance in bodies of higher-trophic level organisms

Integrated pest management- uses a variety of methods to control pests, rather than relying on pesticides alone

GMO – genetically modified organism

Green Revolution- The introduction of new plant varieties and farming practices that increased agricultural production worldwide during the 1950s, 1960s and 1970s

Golden rice- Genetically modified crop that was developed to combat vitamin A deficiency

Strip mining- the process of removing the top of the land to mine the materials

Subsurface mining – a deep shaft must be dug or blasted into the area and a network of tunnels dug to mine

Reserves- known deposits from which materials can be extracted profitably with existing technology under certain economic conditions

Resource- naturally occurring substance to humans that can potentially be extracted using current technology

Practice questions

1. What are the pros and cons of genetically modified crops?
2. How might volcanic eruptions affect both short and long-term climate change?
3. What are the pros and cons of pesticide use?
 - a. What are three nonchemical methods of controlling pests?
 - b. What are common pests?
4. How do persistent and non-persistent pesticides differ?
5. Which soil type is most permeable? Impermeable? (clay, silt, sand...)
6. Describe three conservation practices that help to reduce soil erosion.

Practice Multiple Choice

1. The layer of the lithosphere that breaks off into large, slowly moving tectonic plates is called the
 - A. mantle.
 - B. magma.
 - C. crust.
 - D. core.
 - E. inner core.
2. Tectonic plates are moved by
 - A magnetic fields formed deep within the earth's mantle.
 - B convection currents from the hot core.
 - C. contractions of the crustal layer as it cools.
 - D. subductions of oceanic plates over continental plates.
 - E. none of the above.
3. Due to continental drift, in about 30 million years Los Angeles will
 - A. slowly ride past Mexico City.
 - B. slowly ride past San Francisco.
 - C. have sunk directly toward the center of the earth about 30 miles while staying in its present position.
 - D. be in the position of present day Pittsburgh.
 - E. none of the above.

4. Igneous rocks
 - A. are made from cooled magma.
 - B. can be basalts.
 - C. can be limestones.
 - D. can be shales.
 - E. A and B.
 - F. all of the above.
5. The Earth zone with the most volume and mass is the
 - A. lithosphere.
 - B. mantle.
 - C. core.
 - D. crust.
6. Which of the following is the source of most nonrenewable resources we use?
 - a. core
 - b. asthenosphere
 - c. crust
 - d. mantle
7. The majority of earthquakes and volcanoes occur
 - a. in the open ocean.
 - b. along the edge of continents.
 - c. in the interior of continents.
 - d. on oceanic islands.
8. The type of rock that covers most of Earth's land surface is
 - a. igneous.
 - b. sedimentary.
 - c. gemstones.
 - d. metamorphic.
9. The strength of an earthquake is measured on the _____ scale.
 - a. Miller
 - b. Richter
 - c. Mercalli
 - d. Geiger
10. Freshly fallen leaves, organic debris, and partially decomposed organic matter are indicative of the
 - a. surface litter.
 - b. parent material.
 - c. zone of leaching.
 - d. erosion
11. The dissolving of material from the upper layers of the soil and its movement to lower horizons is called
 - a. weathering.
 - b. leaching.
 - c. accumulation.
 - d. percolation.
12. Humus is
 - a. light colored or nearly white.
 - b. indicative of poor soils.
 - c. poisonous to soil microorganisms.
 - d. partially decomposed organic matter.
13. Which of the following types of soils has the least pore space?
 - a. silt
 - b. clay
 - c. loam
 - d. sand

14. Most soil erosion is caused by
 - a. wind.
 - b. moving water.
 - c. volcanoes.
 - d. earthquakes.
15. The United States has already lost about _____ of the original topsoil of the cropland in use today.
 - a. one-tenth
 - b. one-fifth
 - c. one-sixth
 - d. one-third
16. Irrigation often results in
 - a. high nutrient levels.
 - b. low pH.
 - c. waterlogging.
 - d. high pH.
17. Planting crops in alternating rows of close-growing plants
 - a. creates windbreaks.
 - b. increases erosion rates.
 - c. is called strip cropping.
18. Which of the following statements is true? As the average size of the soil particles decreases:
 - a. Workability will increase.
 - b. Water-holding capacity will decrease.
 - c. Aeration will decrease.
 - d. Infiltration will increase.
 - e. Nutrient-holding capacity will decrease.
19. According to the USDA classification of soil particles, the particles with the smallest diameter are:
 - a. rocks
 - b. pebbles
 - c. silt
 - d. sand
 - e. clay
20. The dark brown or black, soft, spongy material that remains after a pile of leaves has decomposed is:
 - a. humus
 - b. loam
 - c. castings
 - d. mycorrhizae
 - e. topsoil
21. The process of topsoil and underlying soil being washed and/or blown away is called:
 - a. aeration
 - b. percolation
 - c. leaching
 - d. erosion
 - e. weathering
22. Desertification is caused primarily by:
 - a. Human factors which are not preventable.
 - b. Climatic factors which are preventable.
 - c. Human factors which are preventable.
 - d. Climatic factors which are not preventable.
23. Which of the following will not result in reduced soil erosion?
 - a. Minimum-tillage or no-tillage practices.
 - b. Planting of trees in shelterbelts to act as wind breaks.
 - c. Traditional plowing and cultivation by heavy machinery.
 - d. Terracing to produce small earthen embankments on sloped land.
 - e. Restricting the number of animals grazing on the land.

24. The best general description of desertification is:
- Changing weather patterns because of the greenhouse effect.
 - Productive land becoming more and more desert-like.
 - Forests being clearcut.
 - Leaching of soil nutrients because of acid rain.
 - Soil becoming more and more salty.
25. Of the following, the most important resource for supporting human civilization is:
- iron ore
 - coal
 - crude oil
 - fertile soil
 - aluminum ore
26. A soil profile typically reveals four soil horizons. These are:
- Humus, organic-mineral soil, mineral soil, and volcanic ash.
 - Humus, silt, sand, and gravel.
 - The O Horizon, the A Horizon, the B Horizon, and the C Horizon.
 - The A Horizon, the B Horizon, the C Horizon, and the X Horizon.
27. Three attributes of a soil's ability to hold water are its:
- Nutrient-holding capacity, ion exchange capacity, and water-holding capacity.
 - Evaporation, transpiration, and sublimation.
 - Infiltration capacity, water-holding capacity, and evaporative water loss.
 - Depth, particle size, and organic content.
 - Irrigation, infiltration, and salinization.
28. Which of the following is not important for a soil to support a good crop?
- A good supply of nutrients.
 - A good supply of water.
 - Porous structure
 - Uniform particle size.
 - A pH near neutral.
29. Salinization is:
- The accumulation of salt in subsurface soil layers.
 - The accumulation of salts in local receiving waters.
 - The accumulation of salt on the surface of the soil.
 - The accumulation of salts in and on soil, to the point that plant growth is suppressed.
 - The accumulation of salts in irrigation water.
30. Which of the following is true about the traditional and/or modern method of agricultural practice?
- A: Crop rotation using leguminous plants tends to restore phosphorous to the soil.
B: The use of herbicides and pesticides tends to stabilize the crop year after year.
C: Fertilizers tend to restore trace minerals to the soil.
D: Planting a variety of crops in a field tends to increase the stability of the field.
E: Each year more land is put under cultivation than is removed from cultivation
31. The first Green Revolution crops were:
- A: the solution to feeding the world
B: resistant to insects and other pests
C: high-yield hybrid crops
D: dependent on inputs of fertilizers and pesticides
E: more than one of these is true
31. The slow and complex process of soil formation results from the interaction of organisms and an underlying substrate also known as the:
- A: parent material
B: soil horizon
C: natural capital
D: subsoil
E: soil profile

- 32: Which of the following is not one of the five major horizons recognized by soil scientists?
- A: litter layer
 - B: A horizon
 - C: C horizon
 - D: subsoil
 - E: S horizon
- 33: Why do valley floors tend to have rich, thick soil?
- A: their flatness
 - B: their proximity to steeper terrain
 - C: their ability to waterlog
 - D: a and b
 - E: a and c
- 34: Why is the B horizon known as the zone of accumulation?
- A: it has a dark, rich color
 - B: it is the zone where decomposition takes place
 - C: it collects minerals and nutrients leached from above
 - D: it lies between the parent material and soil layers above
 - E: it constitutes the topsoil
- 35: Which of the following is an attribute of natural erosion?
- A: it largely results from human activity
 - B: it occurs at a sustainable rate
 - C: it mainly occurs on dammed rivers in the northwest
 - D: it decreases soil fertility
 - E: it removes productive topsoil
- 36: When an excess of water is applied to farmland filling the air spaces in the soil and suffocating plants roots:
- A: water table rise
 - B: waterlogging
 - C: drought
 - D: root rot
 - E: salinization
- 37: Which of the following is a side effect of government subsidies?
- A: it encourages farmers to plant one or two crops
 - B: it encourages farmers to plant marginal land
 - C: it encourages monocultures
 - D: links indirectly to the use of toxic insecticides
 - E: all of the above
- 38: Crop monocultures are:
- : more resistant to drought
 - : multiple crops grown in the same field
 - : labor intensive
 - : resource intensive
 - : none of these is true
- 39: Eroded soil particles in surface waters:
- A: increase the volume of water in flooded streams
 - B: change fish habitat by filling and eroding stream bottoms
 - C: promote cultural eutrophication
 - D: fill water and power reservoirs
 - E: all of the above
- 40: What are chemicals that kill weeds?
- A: herbicides
 - B: pesticides
 - C: insecticides
 - D: genocides
 - E: b and c

- 41: Although synthetic fertilizers help boost food production there are consequences to their use. Which of the following is a negative attribute?
- A: the partially restore soil nutrients
 - B: they do not replenish organic matter
 - C: they cause soil fertility to decline over time
 - D: they can wash into streams
 - E: all of the above
- 42: Rows of trees planted along the perimeter of crops to help prevent wind erosion are called:
- A: terraces
 - B: strip crops
 - C: shelter belts
 - D: contours
 - E: gully reclamations
43. Which of the following affect(s) soil formation?
- A. Parent material.
 - B. Parent material and climate.
 - C. Parent material, climate and topography.
 - D. Parent material, climate, topography, living organisms and time.
44. The pH of a soil
- A. determines the types of plants it can support.
 - B. influences the uptake of nutrients by plants.
 - C. would decrease if sulfur were added to it.
 - D. all of the above.
45. A clay soil has
- A. good nutrient-holding capacity.
 - B. good water-holding capacity.
 - C. good water-infiltration capacity.
 - D. a and b but not c.
46. Worldwide, the three most important causes of soil degradation today are
- A. urban sprawl, hydro projects and highway construction.
 - B. mining, farming and water diversion projects.
 - C. deforestation, overgrazing and agricultural practices.
 - D. acid deposition, waterlogging and desertification.
47. Each year, an estimated tons of topsoil worldwide blows and washes away from the surface of the earth.
- A. 2.5 million
 - B. 2.5 billion
 - C. 25 million
 - D. 25 billion
48. According to the UN's Food & Agriculture Organization, the most severe soil degradation is occurring in
- A. Europe and North America.
 - B. Asia and Africa.
 - C. Africa and S. America.
 - D. Australia and S. America.
49. Plowing of the land.
- A. increases the short-term productivity
 - B. increases the long-term productivity
 - C. increases the short-term productivity but decreases the long-term productivity
 - D. decreases the short-term productivity but increases the long-term productivity
- 50: If the leading edges of colliding plates are both continental crust, the result may be the formation of
- A: mountains.
 - B: trenches.
 - C: earthquakes.
 - D: volcanoes.

- 51: Which of the following is true about origins?
- A: The universe is about five billion years old.
 - B: Our solar system is much younger than the universe.
 - C: The oceans have formed relatively late in the earth's history.
 - D: The earth's atmosphere was rich in oxygen during its formation.
- 52: Earthquakes
- A: have never killed more than 10,000 people.
 - B: are measured by the Mercalli scale in North America.
 - C: can now be predicted as accurately as the weather.
 - D: can be anthropogenic in origin.
53. What is the most important cause of human-induced earthquakes?
- A: dam and reservoir construction
 - B: oil drilling
 - C: liquid waste disposal
 - D: nuclear detonation
54. The metal consumed in the greatest quantity by world industry is
- A. aluminum.
 - B. iron.
 - C. copper.
 - D. manganese.
 - E. chromium.
55. According to the General Mining Law of 1872, mining companies
- A. don't pay anything for the minerals they take from public land beyond the price of the land itself.
 - B. pay the same price for exclusive claim to land as they did in 1872: \$2.50 to \$5.00 per acre.
 - C. are responsible for cleanup of any waste that is produced as a result of their operations.
 - D. A and B.
 - E. all of the above.
56. The process of strip mining causes which of the following environmental problems?
- A. erosion off of spoil banks
 - B. chemical and sediment pollution of rivers
 - C. soil compaction
 - D. A and B
 - E. all of the above
57. Volcanoes can have environmental effects because
- A. weathered volcanic material has created some of the earth's most fertile soils.
 - B. they often produce tsunamis.
 - C. a large eruption can produce a lot of sulfur dioxide which can cause global cooling.
 - D. A and C.
 - E. all of the above.
58. What types of human activities can increase the severity of flooding?
- A. clearing land and developing shopping malls around a city
 - B. building levees and straightening stream channels
 - C. retaining wetlands
 - D. A and B
 - E. A and C
 - F. all of the above
59. Which of the following types of agriculture is most characteristic of developing countries?
- a. traditional intensive agriculture
 - b. plantation agriculture
 - c. industrialized agriculture
 - d. traditional subsistence agriculture

60. Which of the following types of agriculture is most characteristic of developed countries?
- traditional subsistence agriculture
 - industrialized agriculture
 - plantation agriculture
 - traditional intensive agriculture
61. Industrialized agriculture requires large inputs of
- all of these answers.
 - fossil fuels.
 - inorganic fertilizers.
 - water.
62. All of the following factors contributed to a doubling of U.S. food productivity since 1940 except
- increased amount of cultivated land.
 - increased use of pesticides.
 - increased use of fossil fuels.
 - increased use of inorganic fertilizers.
63. The UNICEF program to sharply reduce childhood deaths from improper nutrition would include all of the following except
- discouraging breast-feeding.
 - preventing dehydration by giving infants sugar and salt in water.
 - providing family-planning services.
 - giving vitamin A capsules.
64. Agriculture can harm the land through
- soil erosion.
 - salinization.
 - reduction in microorganism diversity.
 - all of these answers.
65. Agricultural experts hope to increase food production by using all of the following plants except plants that
- make their own nitrogen fertilizer.
 - grow in salty soil.
 - are resistant to drought.
 - do not require light to produce their food.
66. Storing the world's varieties of seeds in seed banks, agricultural centers, and botanical gardens is least likely to be constrained by
- space and money.
 - power failures and fires.
 - varieties that do not store well.
 - lack of knowledge about how to store seeds.
67. Aquaculture supplies _____% of the world's commercial fish harvest.
- 15
 - 25
 - 5
 - 35
68. Fish ranching is useful for
- tilapia.
 - carp.
 - lake trout.
 - salmon.
69. Sustainable agriculture is characterized by all of the following except
- promoting monoculture.
 - lack of use of many artificial chemicals.
 - lack of requirements of massive amounts of fossil fuels.
 - conserving and building topsoil.

- 70: Which of the following statements about world hunger is most likely true?
A: World hunger problems would be solved if the political and social causes could be remedied.
B: World hunger problems exist because of a global food shortage.
C: World hunger persists because of inadequate distribution mechanisms.
D: World hunger problems are expected to decline as population continues to decline.
- 71: Grain production per capita reached a global high in
A: 1960
B: 1984
C: 1990
D: 1992
- 72: Which of the following is true about agricultural food supplies?
A: About ten percent of the world's grains is used to feed livestock.
B: Grain production worldwide is highly dependent on weather conditions.
C: Soybean production can greatly increase per acre with more intensive agricultural methods.
D: In recent years (since 1990) carryover grain stocks have depleted to zero.
- 73: Which of the following statements is true?
A: Each year more land is put under cultivation than is removed from cultivation.
B: The amount of grain harvested per person has remained roughly steady the past ten years.
C: The increase in the amount of grain per acre since 1950 is due to the Green Revolution.
D: Since 1950 the amount of land newly irrigated is one-tenth the population increase in that span.
- 74: Which of the following about the pioneer stage of agriculture is true?
A: The pioneer stage of ecological succession is less productive than the climax community.
B: Pioneer communities are inherently unstable.
C: Pioneer communities tend to replenish soil fertility.
D: Pioneer communities are resistant to drought, disease, and periodic flooding.
- 75: Which of the following is true about traditional and/or modern method of agricultural practice?
A: Crop rotation using leguminous plants tends to restore phosphorous to the soil.
B: The use of herbicides and pesticides tends to stabilize the crop year after year.
C: Fertilizers tend to restore trace minerals to the soil.
D: Planting a variety of crops in a field tends to increase the stability of the field.
- 76: Which of the following is true?
A: IPM, biological control of pests, and organic farming are environmentally sound but so far, economically infeasible.
B: The first genetically engineered whole food product to hit the market was the Flavor Save potato in 1994.
C: Bioengineering advantages are limited and restricted to only a few varieties of plants.
D: Bioengineered crops may not only provide a superior food but some can even be used to make plastics.
- 77: Which of the following is true about fishing?
A: The open ocean contains little life.
B: More species of animals live in the ocean than on land.
C: Overexploitation of the oceans could be solved with the use of driftnets.
D: Global fish catch continues to increase each year in spite of overexploitation.
- 78: Which of the following is true about soils?
A: Soils are lost faster through erosion than they are made.
B: Good agricultural soil contains decomposed rock, minerals but no or few microorganisms.
C: Most extreme soil degradation has occurred in North America.
D: Deforestation is the number one cause of soil degradation worldwide.
- 79: If 3.7 billion acres of land are currently under cultivation and if the population increases from 5.5 billion to 8 billion, how much more land would need to be cultivated, assuming everything remains unchanged?
A: 5.9 million
B: 9 million acres
C: 1.7 billion more acres
D: 3 billion more acres