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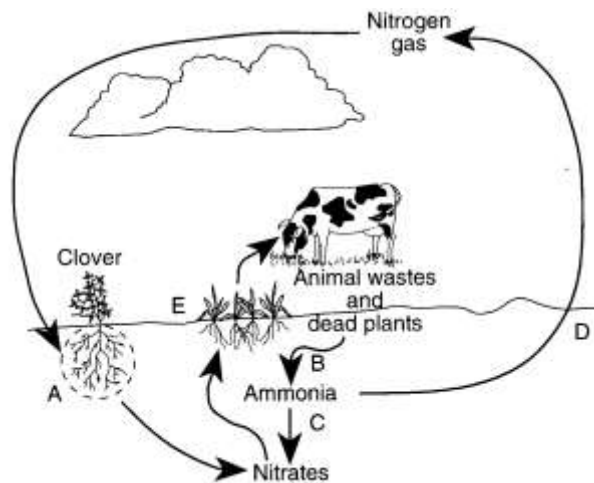
NUTRIENT CYCLES REVIEW

1. Which of the following chain of events would occur as a result of land clearing/deforestation?
(vocabulary check: efflux means flowing away)
- (A) nutrient efflux → water pollution → water runoff → soil erosion
 - (B) soil erosion → water runoff → nutrient efflux → water pollution
 - (C) water pollution → nutrient efflux → soil erosion → water runoff
 - (D) water runoff → water pollution → nutrient efflux → soil erosion
 - (E) water runoff → soil erosion → nutrient efflux → water pollution

Base your answers to **questions 2 and 3** on the diagram of the nitrogen cycle below. In the diagram, letters A through E represent organisms carrying on a process at that particular point in the cycle.

2. Nitrifying bacteria are represented by letter

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E



3. Letter B represents

- (A) inorganic nitrogen fixation
- (B) assimilation
- (C) decomposition by bacteria
- (D) nitrification
- (E) denitrification

4. Which of the following gases is the most abundant in the lower part of the atmosphere?

- (A) nitrogen
- (B) carbon dioxide
- (C) oxygen
- (D) argon
- (E) water vapor

5. In order to classify groundwater as a potentially renewable resource, which of the following must be true?

- (A) The rate of precipitation must be greater than the rate of transpiration.
- (B) The rate of infiltration must be greater than or equal to the rate of percolation.
- (C) The rate of infiltration must be greater than or equal to the rate of use.
- (D) The rate of seepage must be greater than the rate of evaporation.
- (E) The rate of evaporation must be greater than or equal to the rate of infiltration.

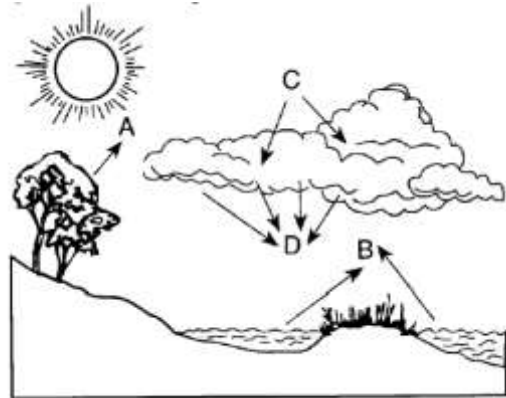
6. After which process can only decomposition by bacteria return nitrogen to the soil?
- (A) photosynthesis
 - (B) assimilation
 - (C) decomposition
 - (D) denitrification
 - (E) evapotranspiration
7. All of the following can lead to an increase in carbon dioxide and therefore climate change except
- (A) deforestation
 - (B) burning fossil fuels
 - (C) agricultural runoff
 - (D) wildfires
 - (E) slash and burn agricultural practices
8. Which of the following processes in the hydrologic cycle does not represent a phase transition of water?
- (A) condensation
 - (B) evaporation
 - (C) precipitation
 - (D) transpiration
 - (E) none of the above
9. Which of the following processes in the water cycle serve to move water back into the ground?
- I. evaporation
 - II. precipitation
 - III. infiltration
 - IV. percolation
- (A) I, II, and III only
 - (B) I, II, and IV, only
 - (C) II, III, and IV only
 - (D) III and IV, only
 - (E) I, II, III, and IV
10. Rhizobium bacteria in the root systems of legumes convert nitrogen into ammonia by the process of
- (A) ammonification
 - (B) assimilation
 - (C) denitrification
 - (D) nitrification
 - (E) nitrogen fixation
11. Which cycle does the human influence of combustion play a large role?
- (A) nitrogen
 - (B) carbon
 - (C) oxygen
 - (D) phosphorus
 - (E) water

12. Terrestrial plants _____ CO₂ in the atmosphere, aquatic plants _____ CO₂ in the water, and animals _____ CO₂ in the atmosphere.
- (A) remove, remove, remove
 - (B) remove, remove, replenish
 - (C) remove, replenish, replenish
 - (D) replenish, remove, replenish
 - (D) replenish, replenish, replenish
13. CaCO₃ is a compound of carbon that
- I. is found in the chemical composition of limestone
 - II. is found in the shells and skeletons of marine organisms
 - III. Is used by plants as a major source of nutrition
- (A) I only
 - (B) II only
 - (C) I and II, only
 - (D) I and III, only
 - (E) I, II, and III
14. Most evaporation from oceans and lakes is caused by
- (A) chemical energy from deep sea vents
 - (B) nuclear energy from deep sea vents
 - (C) radiant energy from condensed water on the surface of the Earth
 - (D) the gravitational pull of the Earth
 - (E) solar energy released by the Sun
15. What is the primary abiotic source of nitrogen in the nitrogen cycle?
- (A) the atmosphere
 - (B) plants
 - (C) salt-water environments
 - (D) rocks and minerals
 - (E) bacteria
16. The amount of dissolved oxygen that must be present in water in order for bacteria to decompose the organic matter in the water is known as
- (A) DOB
 - (B) BOD
 - (C) BO
 - (D) DO
 - (E) DOH

17. What is the percentage of nitrogen gas in the lower atmosphere?
 (A) 71%
 (B) 2%
 (C) less than 1%
 (D) 78%
 (E) 97%
18. Increased fossil fuel use has affected the nitrogen cycle by
 (A) decreasing the pH of precipitation through HNO_3 formation
 (B) decreasing NO_2 formation
 (C) increasing nitrous oxide formation
 (D) A and B, only
 (E) A and C, only
19. Carbon dioxide makes up less than 1% of Earth's atmosphere, and oxygen makes up about 21% percent. These percentages are maintained most directly by
 (A) respiration and photosynthesis
 (B) the ozone shield
 (C) assimilation and ammonification
 (D) carbonification and sedimentation
 (E) evaporation and precipitation
20. Processes involved in the water cycle are represented by letters in the diagram below.

In which group are these processes correctly identified?

- (A) A-precipitation; B-transpiration; C-condensation; D-evaporation
 (B) A-transpiration; B-evaporation; C-precipitation; D-condensation
 (C) A-condensation; B-precipitation; C-transpiration; D-evaporation
 (D) A-transpiration; B-evaporation; C-condensation; D-precipitation
 (E) A-transpiration; B-condensation; C-evaporation; D-precipitation



21. Which of the following is not a form of condensation?
 (A) clouds
 (B) rain
 (C) dew
 (D) fog
 (E) frost
22. Nodules on the roots of legumes contain
 (A) nitrogen-fixing bacteria, which help produce nitrates
 (B) denitrifying bacteria, which produce amino acids
 (C) bacteria that release ammonia into the soil
 (D) bacteria that produce protein for absorption by plants
 (E) nitrifying bacteria that produce toxic nitrites

23. Fossil fuels form by a process known as
- (A) sedimentation
 - (B) carbonification
 - (C) combustion
 - (D) decomposition
 - (E) B and C, only
24. Which organisms are capable of converting ammonia to nitrates?
- (A) legumes
 - (B) animals
 - (C) denitrifying bacteria
 - (D) nitrifying bacteria
 - (E) flowering plants
25. Which combination correctly pairs a product from a reaction in the nitrogen cycle with a molecule synthesized by plants using that product?
- (A) nitrates—proteins
 - (B) ammonia—carbohydrates
 - (C) nitrogenous wastes—nitrites
 - (D) atmospheric nitrogen—nitrates
 - (E) atmospheric nitrogen—ammonia
26. Saltwater intrusion can occur when
- (A) groundwater storage exists close to an ocean
 - (B) human extract freshwater from the ground for use
 - (C) precipitation and infiltration increases
 - (D) A and B, only
 - (E) A, B, and C
27. Water re-enters the atmosphere by the processes of
- (A) evaporation and precipitation
 - (B) evaporation and transpiration
 - (C) percolation and infiltration
 - (D) evaporation and condensation
 - (E) evapotranspiration and precipitation
28. Carbon exists in aquatic systems
- (A) in aquatic plants
 - (B) as carbonate ions
 - (C) as dissolved carbon dioxide
 - (D) incorporated in the shells of organisms
 - (E) all of the above
29. How do humans influence the carbon cycle?
- (A) agricultural practices
 - (B) extracting fossil fuels from the ground
 - (C) aquaculture
 - (D) releasing fertilizers into the environment
 - (E) all of the above

30. Which of the following is a greenhouse gas?

- (A) N_2
- (B) O_2
- (C) N_2O
- (D) NO_3
- (E) HCO_3^-

True or False

If the statement is false, write a new statement in the same context to make it true. (Do not just negate the statement!)

___ 31. Eutrophication is always caused by human activities.

___ 32. The largest storage of carbon is in the oceans.

___ 33. Burning fossil fuels only affects the carbon cycle.

___ 34. Runoff and soil erosion are only a significant part of the water cycle.

___ 35. Denitrification is carried out by aerobic bacteria in swampy, marshy environments.

___ 36. Plants assimilate nitrites to make DNA and amino acids.

___ 37. NH_3 is the chemical composition of ammonia.

___ 38. Allotropic means nutrient-poor.

___ 39. Natural diffusion adds dissolved CO_2 gas to the oceans.

___ 40. 97% of all of the water on the Earth surface is freshwater.

___ 41. Nitrogen is the only substance that contributes to cultural eutrophication.

___ 42. The chemical formula for the carbonate ions dissolved in seawater is $CaCO_3$.

___ 43. Lightning can cause nitrogen fixation.

___ 44. Eutrophication occurs when the BOD increases and therefore dissolved oxygen in water decreases.

___ 45. As runoff of water increases, the amount of water that infiltrates the ground decreases.

46. Humans contribute to the increased sulfur in the atmosphere by
- (A) adding hydrogen sulfide into commercial fertilizers
 - (B) burning coal and oil to produce electric power
 - (C) deforestation
 - (D) producing dimethyl sulfide as a commercial fertilizer
 - (E) being decayed by aerobic decomposers as dead matter and releasing hydrogen sulfide gas
47. Of the following, which are commonly found in the gaseous phase?
- I. Carbon
 - II. Phosphorous
 - III. Sulfur
 - IV. Nitrogen
- (A) I, II, and III only
 - (B) I, II, and IV, only
 - (C) I, III, and IV only
 - (D) III and IV, only
 - (E) I, II, III, and IV
48. Which gas pollutants from anthropogenic sources would be responsible for the formation of acid rain (acid deposition)?
- (A) NO_2 and N_2
 - (B) SO_2 and NO_2
 - (C) N_2 and CaCO_3
 - (D) NO_3 and CO_3^{2-}
 - (E) PO_4^{3-} and CaCO_3
49. Human influences have resulted in all of the following inputs of phosphorus except
- (A) acid rain
 - (B) runoff from private golf courses
 - (C) dumping of commercial fertilizer
 - (D) discharge from a city sewer
 - (E) runoff from commercial detergents
50. Which of the following elements would be the most influential limiting factors involving plant growth?
- (A) oxygen
 - (B) phosphorus
 - (C) hydrogen
 - (D) calcium
 - (E) potassium