

Identify the letter of the choice that **best** completes the statement or answers the question. If you feel that the question is worded in a confusing way - please ask!

In order to get full credit, you must put your name on both the answer sheet and this question set, and turn both in together.

1. Paradigm shifts occur when ethical considerations are incorporated into scientific theory.
 - A. True
 - B. False

2. An important value of science is that it provides the methodology to prove that a theory is correct.
 - A. True
 - B. False

3. Productivity in an ecosystem has measures
 - A. Its longevity
 - B. The combined metabolic rate of the biological communities
 - C. Its rate of producing biomass
 - D. The number of different species living in the ecosystem
 - E. The efficiency of its primary producers

4. The sum total of a population's use of the biotic and abiotic resources of its habitat constitutes its
 - A. distribution.
 - B. environment.
 - C. niche.
 - D. range.

5. Most of the energy input in a food chain is
 - A. in the form of heat.
 - B. converted to biomass.
 - C. degraded to low-quality heat.
 - D. recycled as it reaches the chain's end

6. Phosphorus cycles through the Earth's ecosystems
 - A. Very rarely
 - B. Very slowly
 - C. Only when activated by human activity
 - D. Extremely quickly
 - E. Quickly when humans burn large amounts of fossil fuels

7. The damage to an ecosystem caused by a hurricane or flood can be referred to as
 - A. Equilibrium in nature
 - B. An open system
 - C. A disturbance
 - D. An emergent property
 - E. Negative feedback loop

8. A change in the genetic composition of a population over successive generations is called
 - A. evolution.
 - B. emigration.
 - C. natural selection.
 - D. mutation.

9. Most substances shrink when they freeze. What would happen if water shrank when it froze?
 - A. Plant cells would freeze solid, and most would not survive winter.
 - B. Nothing different, water does shrink when it freezes.
 - C. Lakes and seas would freeze solid

10. Excess nitrogen in rivers and lakes can lead to which of the following processes?
 - A. denitrification
 - B. leaching
 - C. weathering
 - D. eutrophication

11. Experiments in which conditions are deliberately altered and all other variables are held constant are known as _____ experiments.
 - A. Hypothetical
 - B. Probability
 - C. Manipulative
 - D. Natural
 - E. Double-blind

12. Nitrogen is an essential component of
 - A. The hydrologic cycle
 - B. Amino acids and proteins
 - C. Carbohydrates
 - D. Sugars, the product of photosynthesis
 - E. Organic molecules

13. Proof in science is always
- A. Beyond question
 - B. Changing very quickly
 - C. Firmly established
 - D. Open to question or new evidence
14. Which of the following statements regarding tectonics is true?
- A. When oceanic plates collide with continental plates, the oceanic plate usually rides up over the continental plate
 - B. When continental plates collide with continental plates, both plates usually subside
 - C. Because of tectonic movements, Europe and Africa are drifting slowly toward the Americas
 - D. Because of tectonic movements, California is slowly increasing in size
 - E. When oceanic plates collide with continental plates, the continent usually rides up over the seafloor
15. _____ is the study of the environment and our place in it.
- A. Geology
 - B. Environmental science
 - C. Biology
 - D. Landscape architecture
16. Resource partitioning tends to lead to a high degree of _____ in species.
- A. Generalization
 - B. Convergent evolution
 - C. Specialization
 - D. Divergent evolution
 - E. Evolution
17. Energy enters a system as sunlight and a producer is able to produce 10 kilograms of tissue. If eaten, the producer would produce about _____ kilograms of consumer tissue that would provide about _____ kilograms of tissue for a secondary consumer.
- A. 100; 10
 - B. 10; 1
 - C. 100; 1
 - D. 1; 0.1
 - E. 10; 0.1
18. Which of the following biogeochemical cycles does not have an atmospheric phase?
- A. Carbon cycle
 - B. Nitrogen cycle
 - C. Phosphorous cycle
 - D. Hydrologic cycle
 - E. Sulfur cycle

19. Isotopes differ from each other by their number of
- A. atoms.
 - B. neutrons.
 - C. protons.
 - D. ions.
20. A mineral is composed of
- A. Organic material
 - B. Inorganic elements
 - C. Other minerals
 - D. A metal and a crystal
 - E. Noncrystalline elements
21. The process of photosynthesis and cellular respiration are similar in that they both
- A. Occur in all living organisms
 - B. Store energy in ATP, an energy currency for the cell
 - C. Capture energy from the sun
 - D. Capture energy in the form of sugar
22. Rocks are _____ in the process called the rock cycle.
- A. Broken down and re-formed
 - B. Moved from place to place
 - C. Incorporated into living organisms
 - D. Cycled through the core and mantle
 - E. Cycled through the crust and core
23. Which of the following does not cycle repeatedly through the Earth's ecosystems?
- A. Energy
 - B. Matter
 - C. Water
 - D. Nitrogen
 - E. Carbon
24. The monarch butterfly has developed a chemical defense against predation from birds. This adaptation has led to increased survival from predators overall and therefore is driving _____.
- A. Mutation
 - B. Natural selection
 - C. Genetic Drift
 - D. Migration

25. Intraspecific competition is competition among _____ for resources.
- A. Members of a single species
 - B. Predators and prey
 - C. Both plants and animals
 - D. Members of different species
 - E. Producers, consumers and detritivores
26. Predators have many adaptations that make them more efficient at catching prey. In response, prey evolve many adaptations to help them escape from predators. When species exert this type of selective pressure on each other, we call it:
- A. coevolution
 - B. allopatric evolution
 - C. autoevolution
 - D. sympatric evolution
27. Which statement can NOT be explained in terms of the second law of thermodynamics?
- A. You can never really throw anything "away" because atoms are continually recycle
 - B. Incoming solar radiation is high energy light, while the re-released energy is lower intensity heat.
 - C. Fuel use will always include some unavoidable energy waste.
 - D. We could feed more people if we would eat grain rather than feeding it to livestock.
28. According to the second law of thermodynamics, the energy "lost" by a system is
- A. converted into an equal amount of matter.
 - B. converted to lower-quality energy.
 - C. equal to the energy the system creates.
 - D. returned to the system as carbohydrates.
29. Which of the following statements is true?
- A. In a parasitic relationship both partners are adversely affected
 - B. In a commensalistic relationship one partner benefits and the other is adversely affected
 - C. In a mutualistic relationship both partners benefit from the relationship
 - D. In a commensalistic relationship both partners benefit equally
 - E. In a mutualistic relationship one partner benefits and the other is neither harmed nor helped
30. The term "toxic colonialism" has been used in describing
- A. Lax environmental regulations for toxic wastes
 - B. Rulings that toxins must not be exported to wealthy nations
 - C. The exportation of toxic wastes to poor communities
 - D. The high level of toxic pesticide use by wealthy nations
 - E. The high level of toxic waste production by wealthy nations

31. When a New England farm is abandoned, its formerly plowed fields first become weedy meadows, then shrubby areas, and finally forest. This sequence of plant communities is an example of
- A. secondary succession.
 - B. genetic drift.
 - C. a trophic chain.
 - D. evolution.
32. The organisms that are classified as primary consumers are the
- A. herbivores.
 - B. omnivores.
 - C. detritivores.
 - D. carnivores.
33. A giant sea swell known as a tsunami is caused by
- A. Lunar gravity
 - B. A strong wave during an exceptionally high tide
 - C. Earthquakes
 - D. Typhoons
 - E. Unusual tides combined with seasonal storms
34. Subduction is the process of a tectonic plate
- A. Falling freely into the mantle
 - B. Being forced below another plate
 - C. Sliding alongside another plate
 - D. Being sucked into the outer core
 - E. Melting without moving
35. What is the fundamental difference between covalent and ionic bonding?
- A. Covalent bonds form between atoms of the same element; ionic bonds form between atoms of different elements.
 - B. In covalent bonding, both partners end up with filled outer electron shells; in ionic bonding, one partner does and the other does not.
 - C. In a covalent bond, the atoms share a pair of electrons; in an ionic bond, atoms with a positive charge attract atoms with a negative charge
 - D. Covalent bonding involves only the outermost electron shell; ionic bonding also involves the next electron shell inside the outermost shell.

36. Most environmental problems result from
- A. Technological development problems
 - B. Global warming
 - C. Complex, interrelated problems
 - D. Political differences
 - E. Urban degradation
37. The motion of water flowing over a dam is known as _____ energy.
- A. mechanical
 - B. kinetic
 - C. chemical
 - D. potential
38. All members of a species that live in the same area at the same time make up a(an)
- A. Species
 - B. Biome
 - C. Population
 - D. Ecosystem
 - E. Community
39. Identify the example of competition
- A. A wolf eating a sheep
 - B. Sheep and cows grazing in a field
 - C. A tick on the ear of a deer
 - D. A protozoan in the gut of a termite
40. If you want your exam to be graded with the correct key, please answer “A” for this question.
41. One way to decrease the size of our ecological footprint is to
- A. Decrease consumption rates
 - B. Increase consumption rates
 - C. Increase the development in the region
 - D. Reduce the size of a biologically productive area in the region
 - E. None of these, it is not possible to change the size of an ecological footprint
42. If a scientist talks about a scientific hypothesis, how sure is she about her explanation?
- A. She's really just guessing.
 - B. She's hoping she's right; a hypothesis is a tentative, testable explanation.
 - C. She's pretty sure; a hypothesis is widely accepted
 - D. She's very certain; a hypothesis describes something that always acts predictably

43. A simple linked feeding series such as grass-rabbit-wolf is known as a(n)
- A. Carbon cycle
 - B. Energy cycle
 - C. Food cycle
 - D. Food web
 - E. Food chain
44. Evolution by natural selection occurs as a result of
- A. A population's physiological modification
 - B. An individual's physiological modification
 - C. The discovery of a desirable characteristic in a population
 - D. Environmental change that forces modification in a resident species
 - E. Better survival or reproduction rates by individuals with a particular characteristic
45. Earthquakes are sudden movements that occur along _____, which are planes of weakness between two rock masses.
- A. Epicenters
 - B. Intrusions
 - C. Faults
46. Rock formed from magma extruded to the surface through volcanic vents is classified as
- A. Metamorphic
 - B. Lava
 - C. Weathered rock
 - D. Sedimentary
 - E. Igneous
47. Photosynthesis is the process of converting _____ into _____ energy.
- A. solar electrical energy; heat
 - B. solar energy; kinetic
 - C. sunlight; chemical bond
 - D. chemical bond energy; kinetic
48. All of the following increase the amount of carbon dioxide in the atmosphere except
- A. decomposition.
 - B. respiration.
 - C. combustion.
 - D. photosynthesis.

49. Match each type of energy to an example

- | | |
|-----------------|---|
| _____ potential | A. energy stored in molecular bonds |
| _____ kinetic | B. stored energy, as in a rock poised on top of a hill |
| _____ Heat | C. energy in moving objects |
| _____ chemical | D. energy stored as kinetic energy of molecules; can be transferred between objects of different temperatures |

50. Match the system science terms to their correct definitions.

- | | |
|-------------------|--|
| _____ state shift | A. An event that changes a system |
| _____ resilience | B. A large-scale change to a system due to multiple disturbances |
| _____ disturbance | C. The ability of a system to recover from a change |
| _____ homeostasis | D. Tendency for a system to remain stable |

51. Match the species abundance with the corresponding environmental gradient.

- | | |
|--------------------------|---------------------------------|
| _____ Species abundant | A. Zone of physiological stress |
| _____ Species infrequent | B. Zone of intolerance |
| _____ Species absent | C. Optimal range |

52. What is the difference in the adaptation of a sled dog's (such as a Husky) thick coat of hair to help it withstand the cold temperatures of Arctic winters and a dog that adapts to cold temperatures in the fall by growing a thickened coat?

53. List the four biogeochemical cycles discussed in your text. For each cycle, discuss one way that humans have altered the cycle. Then describe the ways that all four cycles are similar

54. Why is most of the energy captured by producers unavailable for consumers? Does this fact violate the laws of thermodynamics? Why or why not? Be sure and mention both the first and second laws in your answer.

55. Which of the following are considered to be core concepts in sustainable development? (**Select all that apply**)

_____ Ecosystem services is a term for goods, products, and services we rely on.

_____ Relieving extreme poverty is an aim of sustainable development

_____ An increase in affluence will bring about positive environmental change

_____ Shared resources and ecosystem services can be described as commons

56. Which of the following statements about systems and feedback are true? **(Select all that apply)**

Both positive and negative feedback can lead to system instability and collapse.

A system is essentially a network, with materials and energy flowing from one component to another.

With positive feedback, an increase in a state variable leads to further increases in that same variable.

With negative feedback, an increase in a state variable leads to further increases in that same variable.

All systems are closed.

57. Which of the following correctly describe a river's emergent properties **(Select all that apply)**

It carries sediment and nutrients to river floodplains, increasing the land's fertility

It is a flowing body of water

It provides a habitat for numerous aquatic organisms