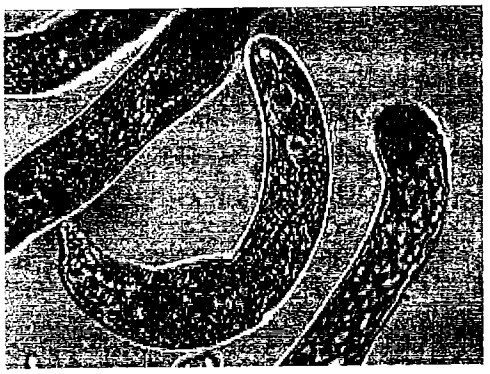
Practice Test #2

Practice Questions

1. During a laboratory investigation, biology students were asked to classify organisms on prepared slides as either eukaryotes or prokaryotes. Which of the following features should the students be able to observe in BOTH types of cells?

a. ribosomes
b. mitochondria
c. nucleus
d. Golgi apparatus

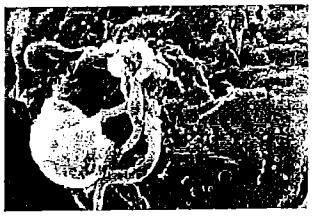
2. The euglena, shown in the image below, is a unicellular organism often found in ponds and puddles that must maintain homeostasis to survive. The euglena's environment can be described as a hypotonic solution.



Which of the following BEST describes the mechanism used by the euglena to prevent bursting?

a. The stiff pellicle prevents water from diffusing through the cell membrane.
b. The motion of the flagellum prevents water from diffusing through the cell membrane.
c. The chloroplasts continually consume water, which prevents the cell from bursting.
d. The contractile vacuole excretes water out of the cell to prevent the cell from bursting.

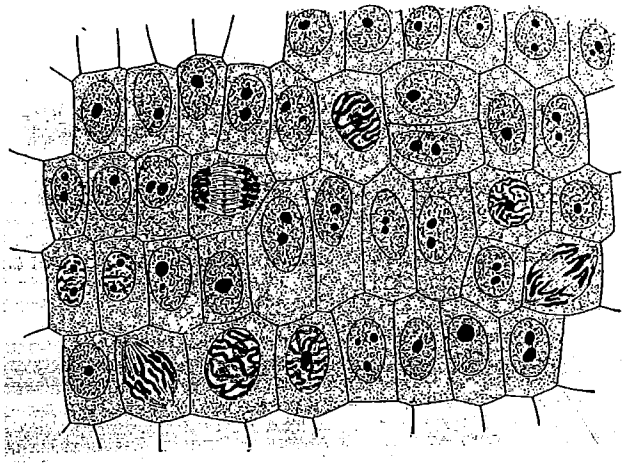
3. In 1982, HIV was identified when it was observed that certain patients' immune systems were not fighting infections. Once this virus enters the body, it attacks lymphocytes. The image below is a scanning electron micrograph showing HIV budding from a lymphocyte.



Which of the following is NOT true of the reproduction process of the HIV virus?

a. When the reproduction process is complete, new HIV particles leave the host cell to infect other cells.
b. The HIV virus has its own ribosomes, which it forces the host cell to utilize.
c. The HIV virus needs a host cell in order to reproduce or replicate.
d. The HIV virus's single-stranded RNA must be converted to double-stranded DNA.

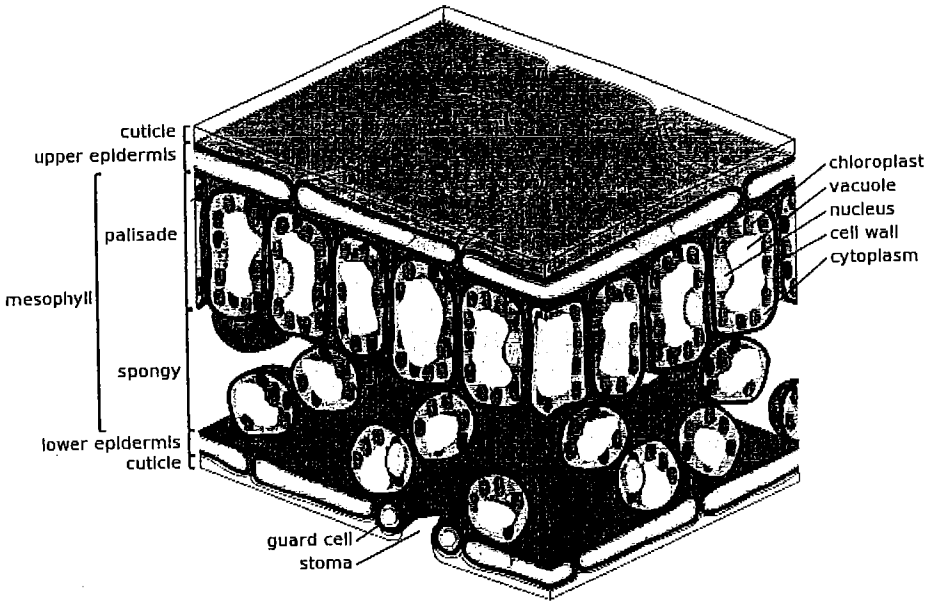
4. The diagram below shows the various stages of the cell cycle in onion root tip cells.



MOST of the plant cells in this diagram are in which of the following stages of the cell cycle?

a. telophase
b. prophase
c. anaphase
d. interphase

5. The diagram below shows the structure of a leaf.



Which of the following BEST describes the function of the guard cells shown in the diagram?

a. They reduce water loss due to evaporation by trapping water vapor near the plant's surface.
b. They conduct water and dissolved minerals from the roots.
c. They open and close pores to allow for the exchange of gases between the atmosphere and the leaf.
d. They are full of chloroplasts, and are located where photosynthesis mainly takes place.

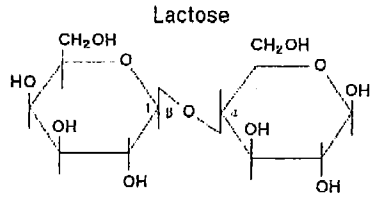
6. Scientists must be able to recognize limitations to science to conduct effective research. Which of the following is NOT a limitation of science?

a. Scientific experiments can be fully controlled.
b. Science cannot answer questions about values or morality.
c. Scientific observations may be faulty.
d. Science must deal with testable, repeatable phenomena.

7. Cells must maintain homeostasis to survive. One method cells use to ensure a stable internal environment is facilitated diffusion. Which of the following is NOT true of facilitated diffusion?

a. Facilitated diffusion is a type of passive transport.
b. Facilitated diffusion occurs down a concentration gradient.
c. Facilitated diffusion is slower than simple diffusion.
d. Facilitated diffusion does not require extra energy.

8. The diagram below shows the structural formula for lactose. Lactose, a compound of two simple sugars, is the type of sugar found in milk. About 40 million Americans are lactose intolerant, meaning they are unable to digest this milk sugar. People who suffer from lactose intolerance do not produce enough of the protein lactase.



Which of the following statements is MOST LIKELY true about the biomolecule lactase?

a. Lactase is a steroid that regulates metabolism.
b. Lactase is a hormone that sends a signal to the digestive system to secrete digestive juices.
c. Lactase is an antibody that acts as a catalyst in the digestive process of lactose.
d. Lactase is an enzyme that acts as a catalyst in the digestive process of lactose.

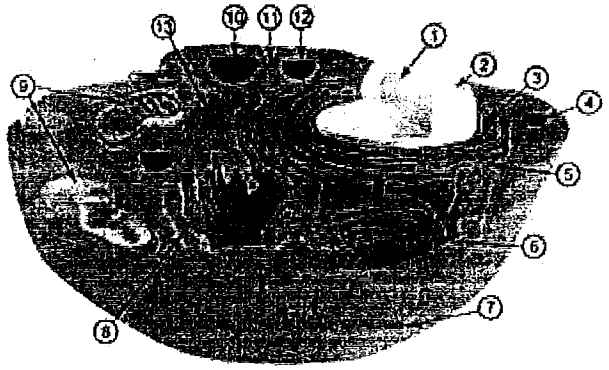
9. A biology student examines a prepared slide of blood under a microscope. He observes two types of cells, and documents his observations in the following table.

Cells	Color	Nucleus	Number	Size
Type 1	pink with a huge, dark purple center	Yes	3	approximately twice as large as type 2
Type 2	pink with a dark edge	No	677	smaller than type 1

Which of the following is a reasonable assumption based on the student's observations?

a. Both the type 1 and type 2 cells are red blood cells.
b. Both the type 1 and type 2 cells are white blood cells.
c. The type 1 cells are white blood cells, and the type 2 cells are red blood cells.
d. The type 1 cells are red blood cells, and the type 2 cells are white blood cells.

10. An animal cell is shown in the figure below.



In which of the following structures does protein synthesis occur?

a. 3
b. 7
c. 9
d. 11

11. A biology student is studying the effects of acid rain on tomato plants. He plants four tomato plants in identical pots, using the same type of soil to fill each pot. He places the pots together in the same location. They receive the same amount of sunlight and water each day. The only difference is the pH of the water used to water the plants. The first plant receives water with a neutral pH of 7, which will allow the student to better determine the effects of giving plants water that is more acidic. The second plant receives water with a pH of 5. The third receives water with a pH of 3. The fourth receives water with a pH of 1. Which of the following is a serious flaw in the design of this experiment?

a. The experiment has only one variable.
b. The experiment has several constants.
c. The experiment has no repetition.
d. The experiment has no control.

12. Genetic information is contained in deoxyribonucleic acid (DNA) molecules, which are primarily located in the nuclei of most organisms. Each DNA molecule has a double helix shape, and consists of two strands connected by base pairs at regular intervals. Which of the following BEST describes how bases are paired in DNA molecules?

a. Adenine always pairs with thymine, and guanine always pairs with cytosine.
b. Adenine always pairs with guanine, and thymine always pairs with cytosine.
c. Adenine always pairs with uracil, and guanine always pairs with cytosine.
d. Adenine always pairs with guanine, and uracil always pairs with cytosine.

13. Organisms are classified as eukaryotes or prokaryotes based on their basic body structure. Which of the following is true of organisms and the type of genetic information they contain?

a. Both eukaryotes and prokaryotes contain DNA enclosed in membrane-bound nuclei.
b. Both eukaryotes and prokaryotes contain DNA, but prokaryotes typically only have a single, circular chromosome.
c. All eukaryotes and most prokaryotes contain DNA, but Archaebacteria only contain RNA.
d. All eukaryotes contain DNA, and all prokaryotes contain only RNA.

14. In order to survive, cells must be able to synthesize molecules from their DNA templates. Which of the following BEST describes the process of translation?

a. During translation, amino acids are joined together in chains to form complex carbohydrates.
b. During translation, amino acids are joined together in chains to form proteins.
c. During translation, sugars are joined together in chains to form complex carbohydrates.
d. During translation, sugars are joined together in chains to form proteins.

15. Which of the following occurs during the phase of mitosis known as telophase?

a. A nucleus forms in each daughter cell.
b. The centrioles move to opposite ends of the cell.
c. The cell's DNA is replicated.
d. The chromosomes attach to the spindle apparatus.

16. Mutations refer to changes in an organism's DNA. One type of mutation is translocation, which occurs during meiosis. Which of the following BEST describes translocation?

a. Two nonhomologous chromosomes exchange genetic information.
b. Two homologous chromosomes exchange genetic information.
c. A segment of a chromosome breaks off and reattaches at the same position, but the order of the genes is reversed.
d. A segment of a chromosome breaks off, and does not reattach.

17. A genetics student performs the same experiment completed by Gregor Mendel with pea plants. The Punnett square below shows the possible genetic combinations when she crosses two pea plants that are heterozygous for the gene associated with round seeds (Rr).

	R	**r**
R	RR	Rr
r	Rr	??

Which of the following correctly completes the square?

a. Rr
b. rR
c. rr
d. RR

18. Both living species of elephants, the African elephant and the Asian elephant, have 56 chromosomes in their body cells. If one of these cells undergoes meiosis, how many chromosomes will each of the daughter cells have?

a. 7
b. 14
c. 28
d. 56

19. DNA fingerprinting was first developed in England in 1985 by Sir Alec Jeffreys. Since that time, DNA fingerprinting has been used for paternity testing. It has also been used to identify victims of crime and to convict criminals. Which of the following BEST describes the technique of DNA fingerprinting?

a. DNA fingerprinting compares stem cells from different individuals.
b. DNA fingerprinting compares entire DNA molecules from different individuals.
c. DNA fingerprinting compares segments of DNA molecules from different individuals.
d. DNA fingerprinting compares specific amino acids from different individuals.

20. In horses, black hair is dominant, and light-colored hair is recessive. If a white stallion is crossed with a mare that is homozygous for the gene for black hair, what is the probability that ALL of the offspring will have black hair?

a. 100%
b. 50%
c. 25%
d. 0%

21. A biology student prepared the following chart listing the four major types of biomolecules and their functions.

Type of Biomolecule	Major Function(s)
1	short-term energy storage; intermediate-term energy storage
2	form structures; regulation
3	form cell membranes; long-term energy storage
4	store information

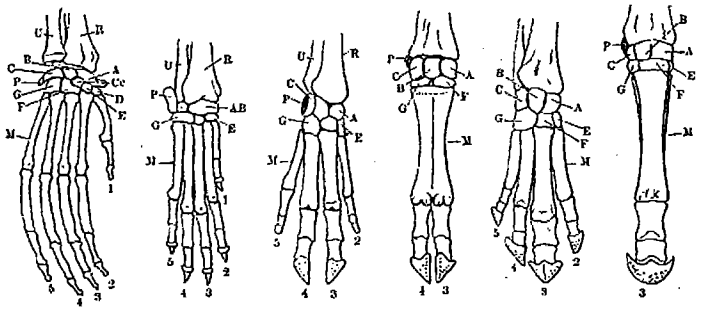
Which of the following correctly identifies the biomolecules described in the chart, from 1 to 4?

a. carbohydrates, lipids, proteins, and nucleic acids
b. carbohydrates, proteins, lipids, and nucleic acids
c. lipids, proteins, carbohydrates, and nucleic acids
d. nucleic acids, proteins, carbohydrates, and lipids

22. The flowering plant known as the snapdragon produces white, yellow, and crimson flowers. When a snapdragon that is homozygous for the gene for white flowers is crossed with a crimson snapdragon that is homozygous for the gene for crimson flowers, heterozygous offspring with pink flowers are produced. Which of the following terms correctly describes this phenomenon?

a. Mendelian inheritance
b. polygenic inheritance
c. pleiotropy
d. incomplete dominance

23. The figure below shows the forelimbs of various mammals. Which of the following BEST explains why the similar forelimbs shown below are considered homologous structures?



a. They are all forelimbs.
b. They have similar structures.
c. They have a common underlying anatomy that was also seen in their last common ancestor.
d. They evolved from a common ancestor, as did all other vertebrates.

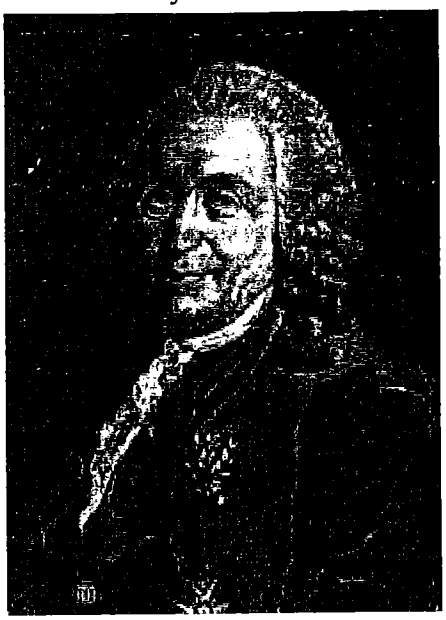
24. Punctuated equilibrium and gradualism are both models for evolutionary change, but they are very different theories. Which of the following statements is true of the evolutionary theory known as gradualism?

a. Several closely related species from isolated populations evolve rapidly.
b. Fossils showing intermediate changes will not necessarily be found.
c. Evolution occurs in spurts of rapid change.
d. Speciation occurs gradually.

25. Rat snakes are constrictors found throughout much of the Northern Hemisphere, and they live in all types of terrains. Rat snakes can be a wide variety of colors, including black, orange, and green. Some also have yellow stripes. Which of the following BEST explains the role of natural selection in the development of these different colors?

a. Rat snakes developed different colors because they relied on different foods for survival.
b. Rat snakes that were different colors survived in different locations because they were best suited to specific environments.
c. Rat snakes that were a specific color killed off the snakes that were different colors.
d. Rat snakes that were a specific color only mated with snakes of the same color.

26. In 1753, a Swedish botanist named Carolus Linnaeus (pictured below) developed a scientific binomial naming system that is still used today.



According to the naming system developed by Linnaeus, which of the following is the MOST SPECIFIC category of classification?

a. phylum
b. order
c. family
d. class

27. Many modern biologists use a six kingdom system to classify organisms. These six kingdoms are **Animalia, Plantae, *Fungi, Protista, Archaea,* and *Bacteria.*** Which of the following is true of organisms that are part of Kingdom Animalia (animals)?

a. They are multicellular and autotrophic.
b. They are multicellular and heterotrophic.
c. They are unicellular and autotrophic.
d. They are unicellular and heterotrophic.

28. According to modern taxonomic classification, which of the following organisms are MOST CLOSELY related?

a. ferns and lichens
b. apes and squids
c. bacteria and algae
d. conifers and mushrooms

29. When the six kingdom classification system is used, many eukaryotes are classed as members of Kingdom Protista. Which of the following BEST describes organisms that are part of Kingdom Protista (protists)?

a. All protists are microscopic and unicellular.
b. All protists are macroscopic and multicellular.
c. All protists are microscopic and autotrophic.
d. Protists may be unicellular and microscopic, or may be multicellular and macroscopic.

30. Which of the following correctly arranges the categories that comprise the modern classification system used today from most inclusive to least inclusive?

a. domain, kingdom, phylum, order, class, family, genus, and species
b. kingdom, domain, phylum, order, class, family, genus, and species
c. domain, kingdom, phylum, class, order, family, genus, and species
d. species, genus, family, order, class, phylum, kingdom, and domain

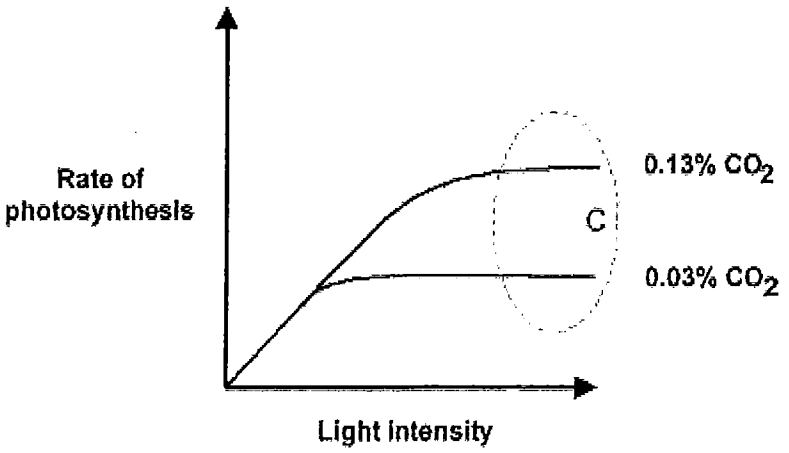
31. Species is one of the seven categories that comprise the classification system devised by Carolus Linnaeus, who is now considered the father of taxonomy. Which of the following is NOT true of the category known as species?

a. Species is the major subdivision of the genus category.
b. Members of the same species typically have many common characteristics.
c. Species are non-changing, and can never split into additional groups.
d. Members of a species are able to breed and produce viable, fertile offspring.

32. Food chains consist of many different types of organisms. Which of the following organisms could be categorized as primary consumers?

a. tapeworms
b. toadstools
c. plant parasites
d. lions

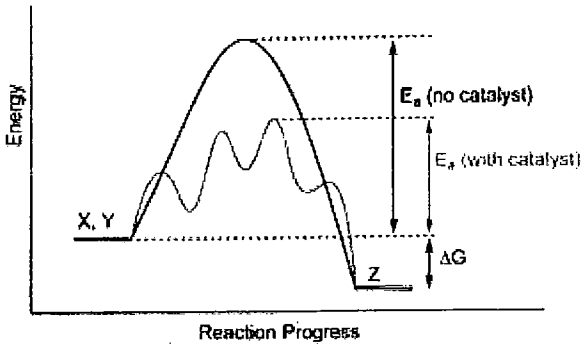
33. The rate of photosynthesis in green plants is affected by several factors. Two of these factors are represented in the graph below.



Which of the following statements correctly interprets the information presented in the area labeled "C"?

a. The rate of photosynthesis is unaffected by CO_2 concentration.
b. The rate of photosynthesis increases as the concentration of CO_2 increases.
c. The rate of photosynthesis increases as light intensity increases.
d. The rate of photosynthesis is unaffected by light intensity.

34. A potential energy diagram showing the effect of an enzyme on a biological reaction is shown below.



Which of the following BEST describes the role of enzymes in biological reactions?

a. Enzymes are biological catalysts that lower the potential energy of the reactants in a biological reaction.
b. Enzymes are biological catalysts that lower the required activation energy for biological reactions.
c. Enzymes are biological catalysts that lower the potential energy of the products of a biological reaction.
d. Enzymes are biological catalysts that are consumed during biological reactions.

35. In mammals, blood pH must be kept fairly constant (very close to 7.4) in order for these animals to survive. Which two organs play the MOST IMPORTANT role in regulating blood pH in mammals?

a. kidneys and lungs
b. heart and lungs
c. kidneys and liver
d. liver and lungs

36. Yaks are especially well suited to their natural environment in the Himalayas. Which of the following adaptations is MOST helpful in allowing yaks to deal with the low oxygen content in their mountain environment?

a. thick fur
b. small number of sweat glands
c. broad hooves
d. large lungs

37. All heterotrophs use cellular respiration to obtain the energy needed to survive. Which of the following statements about cellular respiration is true?

a. Energy released during cellular respiration is stored as ATP.
b. Energy released during cellular respiration is stored as NADPH.
c. Glucose produced during cellular respiration is stored as glycogen.
d. Glucose produced during cellular respiration is stored as starch.

38. Vascular tissue in plants is responsible for the upward movement of water and minerals from the root hairs to the rest of the plant. Which of the following is NOT partially responsible for the upward movement of material in vascular tissue?

a. adhesion
b. cohesion
c. Brownian motion
d. capillary action

39. During a laboratory investigation, students examined live *Elodea* submerged in a test tube of pond water to determine the effect of the distance from a light source on the rate of photosynthesis. The rate of photosynthesis was measured by determining the number of bubbles produced in a 30-second period. The results were then recorded in the table below.

Distance (cm)	**Number of bubbles produced in 30 seconds**
10	94
20	69
30	59
40	56
50	50

Which of the following can be inferred based on the results shown in the data table?

a. The rate of photosynthesis increases exponentially as the distance from the light source increases.
b. The rate of photosynthesis is unaffected by the distance from the light source.
c. The rate of photosynthesis increases as the distance from the light source increases.
d. The rate of photosynthesis decreases as the distance from the light source increases.

40. Photosynthesis is a process whereby energy from the sun is converted to a form plants can use. Which of the following lists two reactants that are needed for photosynthesis to occur?

a. water and glucose
b. water and carbon dioxide
c. oxygen and glucose
d. oxygen and carbon dioxide

41. Angiosperms are flowering plants that use seeds to reproduce. Which choice lists the processes associated with angiosperm reproduction in the order in which they occur?

a. pollination, fertilization, seed formation, and seed dispersal
b. fertilization, pollination, seed formation, and seed dispersal
c. pollination, seed formation, fertilization, and seed dispersal
d. pollination, seed dispersal, seed formation, and fertilization

42. A biology student places one end of a stalk of celery into a beaker containing a solution of red food coloring for several hours. When she removes the celery from the beaker, she notices that parts of the celery are now red. Which of the following BEST explains why this occurred?

a. The red food coloring moved through the stomata as a result of osmosis.
b. The red food coloring moved up the root hairs as a result of capillary action.
c. The red food coloring moved up the phloem as a result of capillary action.
d. The red food coloring moved up the xylem as a result of capillary action.

43. A biology student is investigating tropisms in plants. The student observes the response of the roots of radish seedlings to a light source placed to the right of the roots. All of the roots grow away from the light source. Which of the following tropisms is the student MOST LIKELY investigating?

a. gravitropism
b. thigmotropism
c. hydrotropism
d. phototropism

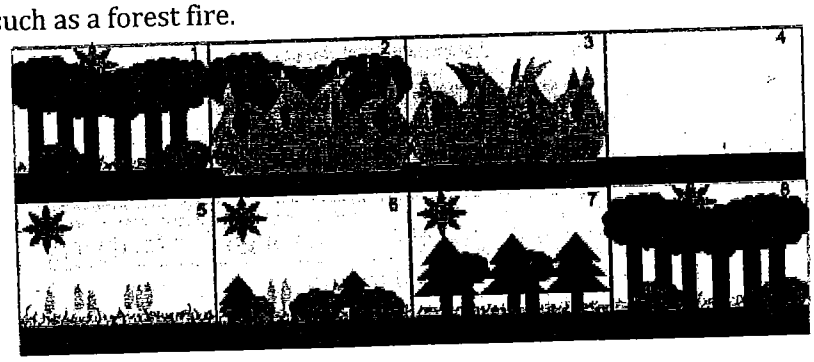
44. Environmental factors that affect organisms are classified as either abiotic or biotic. Which of the following lists ONLY abiotic factors that can affect organisms?

a. humidity, amount of carbon dioxide, and soil density
b. temperature, types of bacteria, and soil pH
c. amount of oxygen, soil salinity, and types of heterotrophs
d. soil nitrogen content, amount of sunlight, and types of decomposers

45. Decomposers, which include bacteria, fungi, and various other microorganisms, make up a special category of consumers in an ecosystem. Which of the following BEST describes the role of decomposers in an ecosystem?

a. Decomposers are autotrophs that convert sunlight into sugars needed by other organisms.
b. Decomposers produce over half of the needed oxygen for an ecosystem.
c. Decomposers play a vital role in breaking down plant and animal material to release nutrients needed for healthy soils.
d. Decomposers fix nitrogen from the atmosphere into a form that other organisms in an ecosystem can use.

46. A gradual change in an ecosystem over a period of time is known as ecological succession. The figure below shows the ecological succession of vegetation in a temperate deciduous forest after a natural disaster such as a forest fire.



Based on the figure above, which of the following is the BEST description of ecological succession?

a. Succession is a rapid process, and all stages of development occur simultaneously.
b. Succession is a rapid, ordered progression.
c. Succession is a gradual, ordered progression.
d. Succession is a gradual, random process.

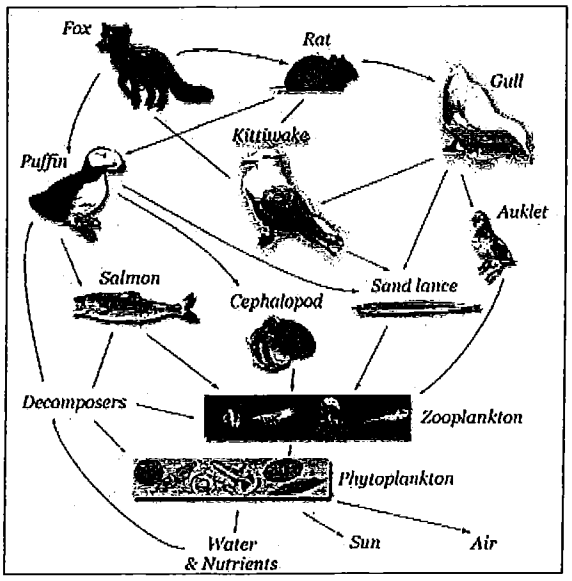
47. Many different relationships exist between organisms that are part of an ecosystem. For example, an interesting relationship exists between an African bird and rhinos. The birds follow the rhinos and eat the insects that the rhinos disturb as they amble along. The insects are helped, but the rhinos are neither helped nor harmed by this relationship. Which of the following terms BEST describes this relationship?

a. commensalism
b. mutualism
c. parasitism
d. amensalism

48. All organisms on Earth can be arranged into five levels of organization. Which of the following correctly organizes these levels from most exclusive to least exclusive?

a. biosphere, ecosystem, population, community, and species
b. species, population, community, ecosystem, and biosphere
c. biosphere, ecosystem, community, population, and species
d. species, community, population, ecosystem, and biosphere

49. A marine food web for an ecosystem in Alaska is illustrated below.



Which of the following describes how energy might flow through this food web?

a. fox → gull → auklet → zooplankton → phytoplankton
b. phytoplankton → zooplankton → kittiwake → rat → fox
c. fox → kittiwake → sand lance → zooplankton → phytoplankton
d. phytoplankton → zooplankton → cephalopod → puffin → fox

50. Information about an ecosystem can be represented using several types of pyramids. Which of the following pyramids can NEVER be inverted?

a. biomass pyramids
b. number pyramids
c. both biomass pyramids and number pyramids
d. energy pyramids

51. Many types of symbiosis exist in nature. Which of the following is NOT an example of symbiosis?

a. predation
b. mutualism
c. parasitism
d. commensalism

52. Environmental changes such as climate changes can greatly impact an ecosystem. Which of the following is NOT an example of how climate changes could impact ecosystems?

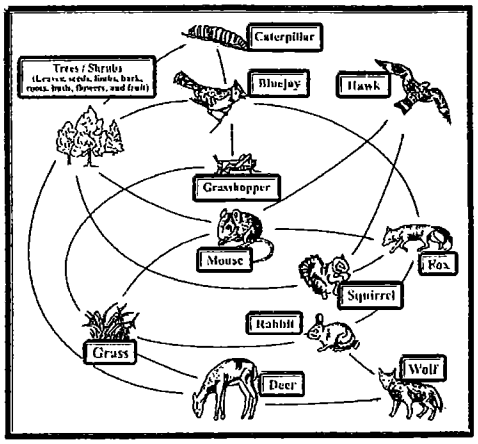
a. Warming could force species to migrate to higher latitudes and altitudes.
b. Warming could lead to birds migrating and nesting earlier.
c. Warming could lead to a loss of sea ice as a habitat for particular species.
d. Warming could increase a species' resistance to disease.

53. The kangaroo rat has many adaptations that allow it to survive in its harsh desert environment.

Which of the following adaptations does NOT help the kangaroo rat escape from predators?

a. the ability to obtain needed water from seeds
b. excellent hearing
c. large back legs
d. sandy fur color

54. Grasshoppers are insects that are members of the order *Orthoptera*. Grasshoppers play an important role in this food web, as they are a food source for birds.



Which of the following terms BEST describes the role of grasshoppers in this food web?

a. producers
b. predators
c. carnivores
d. herbivores