Name: _____ Class: _____ Date: _____ ID: A

4.A Formatives

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. Which of the following best explains why energy cannot cycle through an ecosystem?
a. the law of conservation of energy
b. the second law of thermodynamics
c. the competitive exclusion principle
d. the green world hypothesis
e. the principle of biomagnification

____ 2. The difference between net and gross primary productivity would likely be greatest for
a. phytoplankton in the ocean.
b. corn plants in a farmer's field.
c. prairie grasses.
d. an oak tree in a forest.
e. sphagnum moss in a bog.

____ 3. Which of these ecosystems accounts for the largest amount of Earth's net primary productivity?
a. tundra
b. savanna
c. salt marsh
d. open ocean
e. tropical rain forest

____ 4. Which of these ecosystems has the highest net primary productivity per square meter?
a. savanna
b. open ocean
c. boreal forest
d. tropical rain forest
e. temperate forest

____ 5. How is it that the open ocean produces the highest net primary productivity of Earth's ecosystems, yet net primary productivity per square meter is relatively low?
a. It contains greater concentrations of nutrients.
b. It receives a greater amount of solar energy per unit area.
c. It has the greatest total area.
d. It contains more species of organisms.
e. Its producers are generally much smaller than its consumers.

____ 6. Aquatic primary productivity is often limited by which of the following?
a. light
b. nutrients
c. pressure
d. A and B only
e. A, B, and C

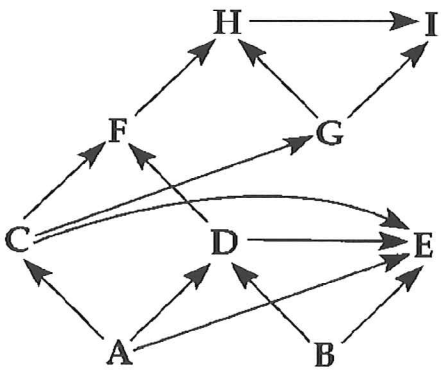
____ 7. Aquatic ecosystems are unlikely to be limited by insufficient
a. nitrogen.
b. carbon.
c. phosphorus.
d. iron.
e. sodium.

____ 8. Which of the following organisms fix nitrogen in aquatic ecosystems?
a. cyanobacteria
b. chemoautotrophs
c. phytoplankton
d. legumes
e. fungi

____ 9. Organisms in which of the following groups can be primary producers?
a. cyanobacteria
b. zooplankton
c. flowering plants
d. A and C only
e. A, B, and C

____ 10. In general, the total biomass in a terrestrial ecosystem will be greatest for which trophic level?
a. producers
b. herbivores
c. primary consumers
d. tertiary consumers
e. secondary consumers

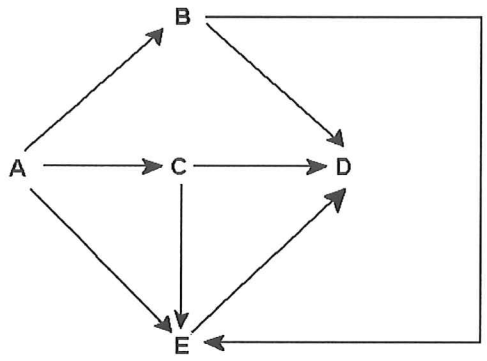
Refer to the figure below, a diagram of a food web, for the following questions. (Arrows represent energy flow and letters represent species.)



____ 11. If this were a marine food web, the smallest organism might be
a. A.
b. F.
c. C.
d. I.
e. E.

____ 12. For most terrestrial ecosystems, pyramids of numbers, biomass, and energy are essentially the same-they have a broad base and a narrow top. The primary reason for this pattern is that
a. secondary consumers and top carnivores require less energy than producers.
b. at each step, energy is lost from the system as a result of keeping the organisms alive.
c. as matter passes through ecosystems, some of it is lost to the environment.
d. biomagnification of toxic materials limits the secondary consumers and top carnivores.
e. top carnivores and secondary consumers have a more general diet than primary producers.

Use the figure below to answer the following questions. Examine this food web for a particular terrestrial ecosystem. Each letter is a species. The arrows represent energy flow.



____ 13. Which species is autotrophic?
a. A
b. B
c. C
d. D
e. E

____ 14. Which species is most likely the decomposer?
a. A
b. B
c. C
d. D
e. E

____ 15. A toxic pollutant would probably reach its highest concentration in which species?
a. A
b. B
c. C
d. D
e. E

____ 16. Species C is toxic to predators. Which species is most likely to benefit from being a mimic of C?
a. A
b. B
c. C
d. D
e. E

____ 17. Excluding the decomposer, biomass would probably be smallest for which species?
a. A
b. B
c. C
d. D
e. E

____ 18. All of the following are likely results of land-clearing operations such as deforestation and agricultural activity *except*
a. destruction of plant and animal habitats.
b. erosion of soil due to increased water runoff.
c. leaching of minerals from the soil.
d. rapid eutrophication of streams and lakes.
e. decreased carbon dioxide in the atmosphere.

____ 19. Burning fossil fuels releases oxides of sulfur and nitrogen. Ultimately, these are probably responsible for
a. the death of fish in Norwegian lakes.
b. rain with a pH of 3.0.
c. calcium deficiency in soils.
d. B and C only
e. A, B, and C

____ 20. You have a friend who is wary of environmentalists' claims that global warming could lead to major biological change on Earth. Which of the following statements can you truthfully make in response to your friend's suspicions?
a. We know that atmospheric carbon dioxide has increased in the last 150 years.
b. Through measurements and observations, we know that carbon dioxide and temperature were correlated even in prehistoric times.
c. Global warming could have significant effects on United States agriculture.
d. A and C only
e. A, B, and C

____ 21. Estimates of current rates of extinction
a. indicate that we have reached a state of unstable equilibrium in which speciation and extinction rates are approximately equal.
b. suggest that one-half of all animal and plant species may be gone by the year 2100.
c. indicate that rates may be 1,000 times higher than at any other time in the last 100,000 years.
d. B and C only
e. A, B, and C

____ 22. Although extinction is a natural process, current extinctions are of concern to environmentalists because
a. more animals than ever before are going extinct.
b. most current extinctions are caused by introduced species.
c. the rate of extinction is unusually high.
d. current extinction is primarily affecting plant diversity.
e. none of the above

____ 23. Which of the following most directly relates to the current biodiversity crisis?
a. increased atmospheric carbon dioxide
b. ozone depletion
c. overexploitation of species
d. habitat destruction
e. zoned reserves

____ 24. Overexploitation encourages extinction and is most likely to affect
a. animals with restricted habitats.
b. large animals with low intrinsic reproductive ratios.
c. most organisms that live in the oceans.
d. A and B only
e. A, B, and C

____ 25. Which of the following does *not* represent a potential threat to biodiversity?
a. importing a European insect into the United States to control an undesirable weed
b. building a new mall on a previously unoccupied piece of midwestern prairie
c. letting previously used farmland go fallow and begin to fill with weeds and shrubs
d. harvesting all of the oysters from an oyster bed off the Atlantic coast
e. shooting wolves because they pose a threat to ranch cattle

____ 26. Which of the following statements is consistent with the competitive exclusion principle?
a. Bird species generally do not compete for nesting sites.
b. The density of one competing species will have a positive impact on the population growth of the other competing species.
c. Two species with the same fundamental niche will exclude other competing species.
d. Even a slight reproductive advantage will eventually lead to the elimination of inferior species.
e. Evolution tends to increase competition between related species.

____ 27. The presence of all of the following tend to increase species diversity *except*
a. competitive exclusion.
b. keystone predators.
c. patchy environments.
d. moderate disturbances.
e. migration of populations.

____ 28. According to the competitive exclusion principle, two species cannot continue to occupy the same
a. habitat.
b. niche.
c. territory.
d. range.
e. biome.

____ 29. The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its
a. habitat.
b. logistic growth.
c. biotic potential.
d. microclimax.
e. ecological niche.

____ 30. Two barnacles, *Balanus* and *Chthamalus*, can both survive on the lower rocks just above the low-tide line on the Scottish coast, but only *Balanus* actually does so, with *Chthamalus* adopting a higher zone. Which of the following best accounts for this niche separation?
a. competitive exclusion
b. predation of *Chthamalus* by *Balanus*
c. cooperative displacement
d. primary succession
e. mutualism

____ 31. A species of fish is found to require a certain water temperature, a particular oxygen content of the water, a particular depth, and a rocky substrate on the bottom to thrive. These requirements are part of its
a. dimensional profile.
b. ecological niche.
c. prime habitat.
d. resource partition.
e. home base.

____ 32. Dwarf mistletoes are flowering plants that grow on certain forest trees. They obtain nutrients and water from the vascular tissues of the trees. The trees derive no known benefits from the dwarf mistletoes. Which of the following best describes the interactions between dwarf mistletoes and trees?
a. mutualism
b. parasitism
c. commensalism
d. facilitation
e. competition

____ 33. Evidence shows that some grasses benefit from being grazed. Which of the following terms would best describe this plant-herbivore interaction?
a. mutualism
b. commensalism
c. parasitism
d. competition
e. predation

____ 34. Which of the following terms best describes the interaction between termites and the protozoans that feed in their gut?
a. commensalism
b. mutualism
c. competitive exclusion
d. ectoparasitism
e. endoparasitism

____ 35. The species richness of a community refers to the
a. number of food chains.
b. number of different species.
c. energy content of all species.
d. relative numbers of individuals in each species.
e. total number of all organisms.

____ 36. To measure species diversity in a community, you need to know
a. the number of species.
b. the relative abundance of each species.
c. the physical size of each species.
d. both A and B
e. A, B, and C

____ 37. With a few exceptions, most of the food chains studied by ecologists have a maximum of how many links?
a. 2
b. 3
c. 5
d. 10
e. 15

____ 38. Which of the following members of a marine food chain is most analogous to a grasshopper in a terrestrial food chain?
a. phytoplankton
b. zooplankton
c. detritivore
d. fish
e. shark

____ 39. In a tide pool, 15 species of invertebrates were reduced to eight after one species was removed. The species removed was likely a(n)
a. community facilitator.
b. keystone species.
c. herbivore.
d. resource partitioner.
e. mutualistic organism.

____ 40. Elephants are not the most common species in African grasslands. The grasslands contain scattered woody plants, but they are kept in check by the uprooting activities of the elephants. Take away the elephants, and the grasslands convert to forests or to shrublands. The newly growing forests support fewer species than the previous grasslands. Elephants can be defined as what type of species in this community?
a. redundant
b. dominant
c. keystone
d. dominant and keystone
e. none of the above

____ 41. When lichens grow on bare rock, they may eventually accumulate enough organic material around them to supply the foothold for later rooted vegetation. These early pioneering lichens can be said to do what to the later arrivals?
a. tolerate
b. inhibit
c. facilitate
d. exclude
e. concentrate

____ 42. Disturbances to ecological communities
a. are frequently related to human activities.
b. can remove organisms and alter resource availability.
c. can create vacated ecological niches that other species can colonize.
d. All of the above are true.
e. Only A and B are true.

Refer to the list of terms below to answer the following questions. Each term may be used once, more than once, or not at all.

A. parasitism
B. mutualism
C. inhibition
D. facilitation
E. commensalism

____ 43. the relationship between ants and acacia trees
a. A
b. B
c. C
d. D
e. E

____ 44. the relationship between legumes and nitrogen-fixing bacteria
a. A
b. B
c. C
d. D
e. E

____ 45. successional event in which one organism makes the environment more suitable for another organism
a. A
b. B
c. C
d. D
e. E

____ 46. the relationship between the larvae of small wasps and caterpillars
a. A
b. B
c. C
d. D
e. E

____ 47. Species richness increases
a. as one travels north from the equator.
b. as one travels north from the South Pole.
c. on islands as distance from the mainland increases.
d. as rates of evapotranspiration decrease.
e. as community size decreases.

____ 48. In the logistic equation $dN/dt = rN, \frac{(K-N)}{K}$, r is a measure of the population's intrinsic rate of increase. It is determined by which of the following?
a. birth rate
b. death rate
c. density
d. A and B only
e. A, B, and C

____ 49. Carrying capacity (K)
a. is calculated as the product of annual per capita birth rate (r).
b. remains constant in the presence of density-dependent population regulation.
c. differs among species, but does not vary within a given species.
d. is often determined by energy limitation.
e. is always eventually reached in any population.

Use the following choices to answer the question below. Each choice may be used once, more than once,or not at all.

A. $\frac{rN}{K}$
B. rN
C. $rN(K+N)$
D. $rN\frac{(K-N)}{K}$
E. $rN\frac{(N-K)}{K}$

____ 50. Exponential growth of a population is represented by dN/dt =
a. A
b. B
c. C
d. D
e. E

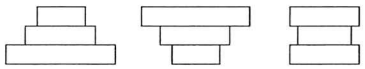
____ 51. Logistic growth of a population is represented by dN/dt =
a. A
b. B
c. C
d. D
e. E

____ 52. As N approaches K for a certain population, which of the following is predicted by the logistic equation?
a. The growth rate will not change.
b. The growth rate will approach zero.
c. The population will show an Allee effect.
d. The population will increase exponentially.
e. The carrying capacity of the environment will increase.

____ 53. Often the growth cycle of one population has an effect on the cycle of another-as moose populations increase, wolf populations also increase. Thus, if we are considering the logistic equation for the wolf population,$dN/dt = rN, \frac{(K-N)}{K}$, which of the factors accounts for the effect on the moose population?
a. r
b. N
c. rN
d. K
e. dt

____ 54. In models of sigmoidal (logistic) population growth,
a. population growth rate slows dramatically as *N* approaches *K*.
b. new individuals are added to the population most rapidly at intermediate population sizes.
c. density-dependent factors affect the rate of population growth.
d. All of the above are true.
e. Only A and C are true.

The following questions refer to the figure below, which depicts the age structure of three populations.



____ 55. Which population is in the process of decreasing?
a. I
b. II
c. III
d. I and II
e. II and III

____ 56. Which population appears to be stable?
a. I
b. II
c. III
d. I and II
e. II and III

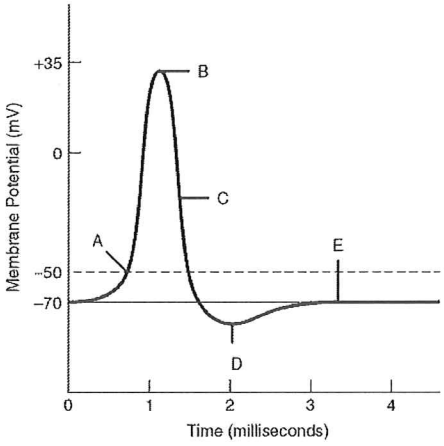
____ 57. Assuming these age-structure diagrams describe human populations, which population is likely to experience zero population growth (ZPG)?
a. I
b. II
c. III
d. I and II
e. II and III

____ 58. The general functions of the nervous system include which of the following?
I. integration
II. motor output
III. sensory input

a. I only
b. II only
c. III only
d. I and II only
e. I, II, and III

____ 59. Which of the following is a *correct* statement about a resting neuron?
a. It releases lots of acetylcholine.
b. The membrane is very leaky to sodium.
c. The membrane is equally permeable to sodium and potassium.
d. The membrane potential is more negative than the threshold potential.
e. The concentration of sodium is greater inside the cell than outside.

For the following questions, refer to the graph of an action potential in the figure below and use the letters to indicate your answer.



____ 60. The sodium gates open.
a. A
b. B
c. C
d. D
e. E

____ 61. Repolarization occurs, sodium gates close, and some potassium gates reopen.
a. A
b. B
c. C
d. D
e. E

____ 62. The membrane is at resting potential.
a. A
b. B
c. C
d. D
e. E

____ 63. Where do synaptic vesicles discharge their contents by exocytosis?
a. dendrite
b. axon hillock
c. nodes of Ranvier
d. postsynaptic membrane
e. presynaptic membrane

____ 64. Neurotransmitters are released from presynaptic axon terminals into the synaptic cleft by which mechanism?
a. osmosis
b. active transport
c. diffusion
d. endocytosis
e. exocytosis

____ 65. Which of the following offers the best description of neural transmission across a mammalian synaptic gap?
a. Neural impulses involve the flow of K^+ and Na^+ across the gap.
b. Neural impulses travel across the gap as electrical currents.
c. Neural impulses cause the release of chemicals that diffuse across the gap.
d. Neural impulses travel across the gap in both directions.
e. The calcium within the axons and dendrites of nerves adjacent to a synapse acts as the neurotransmitter.

____ 66. Neurotransmitters affect postsynaptic cells by
a. initiating signal transduction pathways in the cells.
b. causing molecular changes in the cells.
c. affecting ion-channel proteins.
d. altering the permeability of the cells.
e. all of the above

____ 67. If a molecule of CO_2 released into the blood in your left toe travels out of your nose, it must pass through all of the following structures *except* the
a. right atrium.
b. pulmonary vein.
c. alveolus.
d. trachea.
e. right ventricle.

____ 68. Which of the following occurs with the exhalation of air from human lungs?
a. The volume of the thoracic cavity decreases.
b. The residual volume of the lungs decreases.
c. The diaphragm contracts.
d. The epiglottis closes.
e. The rib cage expands.

____ 69. At the summit of a high mountain, the atmospheric pressure is 380 mm Hg. If the atmosphere is still composed of 21% oxygen, what is the partial pressure of oxygen at this altitude?
a. 0 mm Hg
b. 80 mm Hg
c. 160 mm Hg
d. 380 mm Hg
e. 760 mm Hg

Use the data shown below to answer the following questions.

Blood entering a capillary bed of a vertebrate was measured for the pressures exerted by various factors.

	Arterial End of Capillary Bed	Verous End of Capillary Bed
Hydrostatic pressure	8 mm Hg	14 mm Hg
Osmotic pressure	26 mm Hg	26 mm Hg
P_{O_2}	100 mm Hg	42 mm Hg
P_{CO_2}	40 mm Hg	46 mm Hg

____ 70. For this capillary bed, which of the following statements is *correct*?
a. The pH is lower on the arterial side than on the venous side.
b. Oxygen is taken up by the erythrocytes within the capillaries.
c. The osmotic pressure remains constant due to carbon dioxide compensation.
d. The hydrostatic pressure declines from the arterial side to the venous side because oxygen is lost.
e. Fluids will leave the capillaries on the arterial side of the bed and re-enter on the venous side.

____ 71. The site of this capillary bed could be all of the following *except* the
a. pancreas.
b. muscle tissue.
c. medulla.
d. alveoli.
e. kidneys.

____ 72. Which of the following is *false* concerning the hemoglobin molecule?
a. It contains amino acids.
b. It contains iron.
c. It is composed of four polypeptide chains.
d. It can bind four O_2 molecules.
e. It is found in humans only.

____ 73. Which of the following is a characteristic of *both* hemoglobin and hemocyanin?
a. found within blood cells
b. red in color
c. contains the element iron as an oxygen-binding component
d. transports oxygen
e. occurs in mammals

____ 74. To leave the digestive tract, a substance must cross a cell membrane. During which stage of food processing does this take place?
a. ingestion
b. digestion
c. hydrolysis
d. absorption
e. elimination

____ 75. Intracellular digestion is usually immediately preceded by which process?
a. hydrolysis
b. endocytosis
c. absorption
d. elimination
e. secretion

____ 76. Most enzymatic hydrolysis of the macromolecules in food occurs in the
a. small intestine.
b. large intestine.
c. stomach.
d. liver.
e. mouth.

____ 77. Which one of the following statements about digestion is *false*?
a. Digestion is catalyzed by enzymes.
b. Digestion cleaves nucleic acids into nucleotides.
c. Digestion cleaves fats into glycerol and fatty acids.
d. During digestion the essential macromolecules are directly absorbed.
e. During digestion polysaccharides and disaccharides are split into simple sugars.

____ 78. Which of the following is *not* a nutritional monomer that can be transported in the blood?
a. sucrose
b. glucose
c. fatty acid
d. amino acid
e. nucleotide

____ 79. Why are cattle able to survive on a diet consisting almost entirely of plant material?
a. They are autotrophic.
b. Cattle, like the rabbit, reingests its feces.
c. They manufacture all 15 amino acids out of sugars in the liver.
d. Cattle saliva has enzymes capable of digesting cellulose.
e. They have cellulose-digesting, symbiotic microorganisms in chambers of their stomachs.

____ 80. How do animal structures well suited to specific functions come about?
a. Natural selection favors the most functional structures for a particular environment.
b. Mutations arise to provide required structures for survival in a particular environment.
c. An animal that needs a new function will develop a new structure to provide it.
d. Animals invent structural designs that enhance their functions.
e. Animals continually improve their structures in order to improve their functions.

____ 81. Which of the following ideas is *not* consistent with our understanding of animal structure?
a. The environment imposes similar problems on all animals.
b. The evolution of structure in an animal is influenced by its environment.
c. All but the simplest animals demonstrate the same hierarchical levels of organization.
d. Different animals contain fundamentally different categories of tissues.
e. Short-term adjustments to environmental changes are mediated by physiological organ systems.

____ 82. What is the common functional significance of the extended number of cells making up such seemingly different human structures as the lining of the air sacs in the lungs and the wavy lining of the intestine?
a. increased oxygen demand from their metabolic activity
b. increased exchange surface provided by their membranes
c. greater numbers of cell organelles contained within their cytoplasm
d. greater protection due to increased cellular mass
e. lowered basal metabolic rate due to cooperation between cells

____ 83. Cells are to tissues as tissues are to
a. organs.
b. membranes.
c. organ systems.
d. organelles.
e. organisms.

____ 84. In a typical multicellular animal, the circulatory system interacts with various specialized surfaces in order to exchange materials with the exterior environment. Which of the following is *not* an example of such an exchange surface?
a. lung
b. muscle
c. skin
d. intestine
e. kidney

____ 85. What is the term for the physical processes that give rise to the shape of an organism?
a. morphogenesis
b. differentiation
c. totipotency
d. pluripotency
e. mitosis

____ 86. In animals, embryonic stem cells differ from adult stem cells in that
a. embryonic stem cells are totipotent, and adult stem cells are pluripotent.
b. embryonic stem cells are pluripotent, and adult stem cells are totipotent.
c. embryonic stem cells have more genes than adult stem cells.
d. embryonic stem cells have fewer genes than adult stem cells.
e. embryonic stem cells are localized to specific sites within the embryo, whereas adult stem cells are spread throughout the body.

____ 87. Which of the following statements is *not* true about stem cells?
a. Stem cells can continually reproduce themselves.
b. Stem cells can differentiate into specialized cells.
c. Stem cells are found in bone marrow.
d. Stem cells are found in the adult human brain.
e. Stem cell DNA lacks introns.

____ 88. What is considered to be the first evidence of differentiation in the cells of an embryo?
a. cell division
b. the occurrence of mRNAs for the production of tissue-specific proteins
c. determination
d. changes in the size and shape of the cell
e. changes resulting from induction

____ 89. In most cases, differentiation is controlled at the level of
a. replication of the DNA.
b. nucleosome formation.
c. transcription.
d. translation.
e. post-translational activation of the proteins.

____ 90. The MyoD protein
a. can promote muscle development in all cell types.
b. is a transcription factor that binds to and activates the transcription of muscle-related genes.
c. was used by researchers to convert differentiated liver cells into muscle cells.
d. B and C only
e. A, B and C

____ 91. The general process that leads to the differentiation of cells is called
a. determination.
b. specialization.
c. identification.
d. differentialization.
e. cellularization.

____ 92. Which of the following comparisons between prokaryotic and eukaryotic cells is *incorrect*?
a. The lack of organelles in prokaryotes means that they are structurally less complex than eukaryotes.
b. The lack of internal membranes means that prokaryotes cannot compartmentalize function to the same extent as eukaryotes.
c. All membrane function in prokaryotes is accomplished in the plasma membrane, while in eukaryotes, these functions are more distributed among the organelles.
d. The specialization of function in organelles suggests that eukaryotes will contain a wider variety of phospholipids than prokaryotes.
e. The lack of organelles in prokaryotes means that the basic cellular functions are different in prokaryotes than in eukaryotes.

____ 93. Which of the following does *not* contain functional ribosomes?
a. a prokaryotic cell
b. a plant mitochondrion
c. a chloroplast
d. an animal mitochondrion
e. a nucleolus

____ 94. Large numbers of ribosomes are present in cells that specialize in producing which of the following molecules?
a. lipids
b. starches
c. proteins
d. steroids
e. glucose

____ 95. Which of the following organelles is not a common destination for small vesicles that bud off the Golgi apparatus?
a. plasma membrane
b. lysosomes
c. vacuole
d. endoplasmic reticulum
e. all of the above

____ 96. Which structure is the site of the synthesis of proteins that may be exported from the cell?
a. rough ER
b. lysosomes
c. plasmodesmata
d. Golgi vesicles
e. tight junctions

____ 97. The Golgi apparatus has a polarity or sidedness to its structure and function. Which of the following statements *correctly* describes this polarity?
a. Transport vesicles fuse with one side of the Golgi and leave from the opposite side.
b. Proteins in the membrane of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
c. Lipids in the membrane of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
d. Soluble proteins in the cisternae (interior) of the Golgi may be sorted and modified as they move from one side of the Golgi to the other.
e. All of the above correctly describe polar characteristics of the Golgi function.

____ 98. In animal cells, hydrolytic enzymes are packaged to prevent general destruction of cellular components. Which of the following organelles functions in this compartmentalization?
a. chloroplast
b. lysosome
c. central vacuole
d. peroxisome
e. glyoxysome

Refer to the following five terms to answer the following questions. Choose the most appropriate term for each phrase. Each term may be used once, more than once, or not at all.

A. lysosome
B. vacuole
C. mitochondrion
D. Golgi apparatus
E. peroxisome

____ 99. produces and modifies polysaccharides that will be secreted
a. A
b. B
c. C
d. D
e. E

____ 100. contains hydrolytic enzymes
a. A
b. B
c. C
d. D
e. E

____ 101. helps to recycle the cell's organic material
a. A
b. B
c. C
d. D
e. E

____ 102. one of the main energy transformers of cells
a. A
b. B
c. C
d. D
e. E

____ 103. contains its own DNA and ribosomes
a. A
b. B
c. C
d. D
e. E

____ 104. a compartment that often takes up much of the volume of a plant cell
a. A
b. B
c. C
d. D
e. E

____ 105. contains enzymes that transfer hydrogen from various substrates to oxygen, producing H_2O_2
a. A
b. B
c. C
d. D
e. E

____ 106. Of the following, what do both mitochondria and chloroplasts have in common?
a. ATP is produced.
b. DNA is present.
c. Ribosomes are present.
d. B and C only
e. A, B, and C are correct.

____ 107. Which of the following are capable of converting light energy to chemical energy?
a. chloroplasts
b. mitochondria
c. leucoplasts
d. peroxisomes
e. Golgi bodies

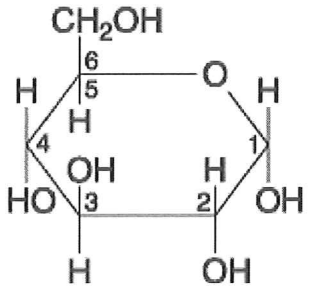
____ 108. Which of the following is *not* one of the four major groups of macromolecules found in living organisms?
a. glucose
b. carbohydrates
c. lipids
d. proteins
e. nucleic acids

____ 109. Polymers of polysaccharides, fats, and proteins are all synthesized from monomers by which process?
a. connecting monosaccharides together (condensation reactions)
b. the addition of water to each monomer (hydrolysis)
c. the removal of water (dehydration reactions)
d. ionic bonding of the monomers
e. the formation of disulfide bridges between monomers

____ 110. Which of the following best summarizes the relationship between dehydration reactions and hydrolysis?
a. Dehydration reactions assemble polymers, and hydrolysis breaks down polymers.
b. Hydrolysis only occurs in the urinary system, and dehydration reactions only occur in the digestive tract.
c. Dehydration reactions can occur only after hydrolysis.
d. Hydrolysis creates monomers, and dehydration reactions break down polymers.
e. A and C are correct.

____ 111. A molecule with the chemical formula $C_{16}H_{32}O_{16}$ is probably a
a. carbohydrate.
b. lipid.
c. protein.
d. nucleic acid.
e. hydrocarbon.

____ 112. If 128 molecules of the general type shown in the figure below were covalently joined together in sequence, the single molecule that would result would be a



a. polysaccharide.
b. polypeptide.
c. polyunsaturated lipid.
d. monosaccharide.
e. disaccharide.

____ 113. Consider a polysaccharide consisting of 576 glucose molecules. The total hydrolysis of the polysaccharide would result in the production of
a. 575 glucose molecules.
b. 575 water molecules.
c. 576 glucose molecules.
d. A and B only
e. B and C only

____ 114. Lactose, a sugar in milk, is composed of one glucose molecule joined by a glycosidic linkage to one galactose molecule. How is lactose classified?
a. as a pentose
b. as a hexose
c. as a monosaccharide
d. as a disaccharide
e. as a polysaccharide

____ 115. Which of the following are polysaccharides?
a. glycogen
b. starch
c. chitin
d. A and B only
e. A, B, and C

____ 116. Which of the following is *true* of both starch and cellulose?
a. They are both polymers of glucose.
b. They are geometric isomers of each other.
c. They can both be digested by humans.
d. They are both used for energy storage in plants.
e. They are both structural components of the plant cell wall.

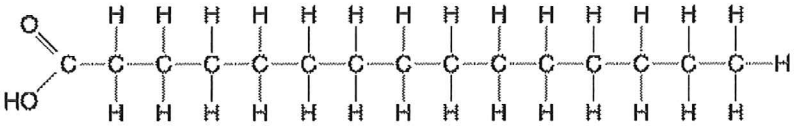
____ 117. Humans can digest starch but not cellulose because
a. the monomer of starch is glucose, while the monomer of cellulose is galactose.
b. humans have enzymes that can hydrolyze the beta (β) glycosidic linkages of starch but not the alpha (α) glycosidic linkages of cellulose.
c. humans have enzymes that can hydrolyze the alpha (α) glycosidic linkages of starch but not the beta (β) glycosidic linkages of cellulose.
d. humans harbor starch-digesting bacteria in the digestive tract.
e. the monomer of starch is glucose, while the monomer of cellulose is maltose.

____ 118. Which of the following is (are) *true* for the class of large biological molecules known as lipids?
a. They are insoluble in water.
b. They are an important constituent of cell membranes.
c. They contain twice as much energy as an equivalent weight of polysaccharide.
d. Only A and B are correct.
e. A, B, and C are correct.

____ 119. Triacylglycerol is a
a. protein with tertiary structure.
b. lipid made with three fatty acids and glycerol.
c. lipid that makes up much of the plasma membrane.
d. molecule formed from three alcohols by dehydration reactions.
e. carbohydrate with three sugars joined together by glycosidic linkages.

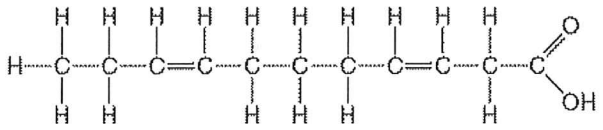
____ 120. Saturated fatty acids
a. are the predominant fatty acid in corn oil.
b. have double bonds between carbon atoms of the fatty acids.
c. have a higher ratio of hydrogen to carbon than do unsaturated fatty acids.
d. are usually liquid at room temperature.
e. are usually produced by plants.

____ 121. What is the molecule illustrated in the figure below?



a. a saturated fatty acid
b. an unsaturated fatty acid
c. a polyunsaturated triacylglyceride
d. a trans polyunsaturated triacylglyceride
e. a steroid similar to cholesterol

____ 122. The molecule shown in the figure below is a

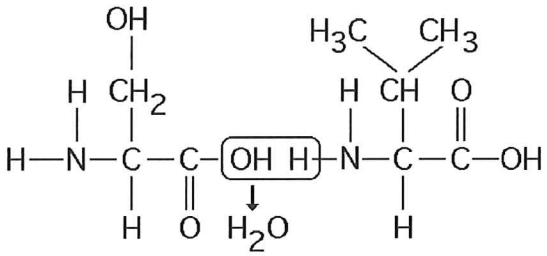


a. polysaccharide.
b. polypeptide.
c. saturated fatty acid.
d. triacylglycerol.
e. unsaturated fatty acid.

____ 123. The hydrogenation of vegetable oil would result in which of the following?
a. a decrease in the number of carbon-carbon double bonds in the oil (fat. molecules
b. an increase in the number of hydrogen atoms in the oil (fat. molecule
c. the oil (fat. being a solid at room temperature
d. A and C only
e. A, B, and C

____ 124. A polypeptide can best be described as a
a. monomer of a protein polymer.
b. polymer containing 20 amino acid molecules.
c. polymer containing 19 peptide bonds.
d. polymer containing 20 peptide bonds.
e. polymer of amino acids.

____ 125. The chemical reaction illustrated in the figure below results in the formation of a (an)



a. ionic bond.
b. peptide bond.
c. glycosidic linkage.
d. ester linkage.
e. phosphodiester linkage.

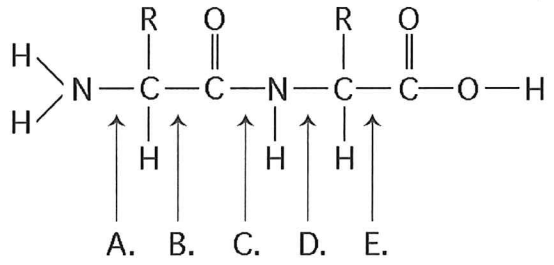
____ 126. The bonding of two amino acid molecules to form a larger molecule requires which of the following?
a. removal of a water molecule
b. addition of a water molecule
c. formation of an ionic bond
d. formation of a hydrogen bond
e. both A and C

____ 127. Polysaccharides, lipids, and proteins are similar in that they
a. are synthesized from monomers by the process of hydrolysis.
b. are synthesized from monomers by dehydration reactions.
c. are synthesized as a result of peptide bond formation between monomers.
d. are decomposed into their subunits by dehydration reactions.
e. all contain nitrogen in their monomer building blocks.

____ 128. Dehydration reactions are used in forming which of the following compounds?
a. triacylglycerides
b. polysaccharides
c. proteins
d. A and C only
e. A, B, and C

____ 129. Upon chemical analysis, a particular protein was found to contain 556 amino acids. How many peptide bonds are present in this protein?
a. 139
b. 554
c. 555
d. 556
e. 558

Use the figure below to answer the following questions.



____ 130. Which bond is closest to the N-terminus of the molecule?
a. Bond A
b. Bond B
c. Bond C
d. Bond D
e. Bond E

____ 131. Which bond is closest to the C-terminus of the molecule?
a. Bond A
b. Bond B
c. Bond C
d. Bond D
e. Bond E

____ 132. How many different kinds of polypeptides, each composed of 12 amino acids, could be synthesized using the 20 common amino acids?
a. 412
b. 1220
c. 125
d. 20
e. 2012

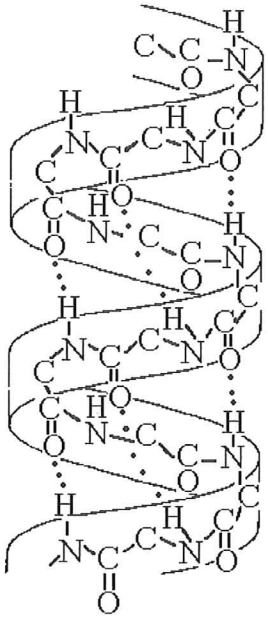
____ 133. Which bonds are created during the formation of the primary structure of a protein?
a. peptide bonds
b. hydrogen bonds
c. disulfide bonds
d. phosphodiester bonds
e. A, B, and C

____ 134. What maintains the secondary structure of a protein?
a. peptide bonds
b. hydrogen bonds
c. disulfide bonds
d. ionic bonds
e. phosphodiester bonds

____ 135. Which type of interaction stabilizes the alpha (α) helix and the beta (β) pleated sheet structures of proteins?
a. hydrophobic interactions
b. nonpolar covalent bonds
c. ionic bonds
d. hydrogen bonds
e. peptide bonds

____ 136. The α helix and the β pleated sheet are both common polypeptide forms found in which level of protein structure?
a. primary
b. secondary
c. tertiary
d. quaternary
e. all of the above

____ 137. The figure below best illustrates the



a. secondary structure of a polypeptide.
b. tertiary structure of a polypeptide.
c. quaternary structure of a protein.
d. double helix structure of DNA.
e. primary structure of a polysaccharide.

____ 138. A strong covalent bond between amino acids that functions in maintaining a polypeptide's specific three-dimensional shape is a (an)
a. ionic bond.
b. hydrophobic interaction.
c. van der Waals interaction.
d. disulfide bond.
e. hydrogen bond.

____ 139. At which level of protein structure are interactions between the side chains (R groups. *most* important?
a. primary
b. secondary
c. tertiary
d. quaternary
e. all of the above

____ 140. The R group or side chain of the amino acid serine is $-CH_2-OH$. The R group or side chain of the amino acid alanine is $-CH_3$. Where would you expect to find these amino acids in a globular protein in aqueous solution?
a. Serine would be in the interior, and alanine would be on the exterior of the globular protein.
b. Alanine would be in the interior, and serine would be on the exterior of the globular protein.
c. Both serine and alanine would be in the interior of the globular protein.
d. Both serine and alanine would be on the exterior of the globular protein.
e. Both serine and alanine would be in the interior and on the exterior of the globular protein.

____ 141. The globular protein transthyretin results from the aggregation of four polypeptide subunits. Each of the subunits is a polypeptide chain with an α helix region. Which structure(s) must the transthyretin protein have?
a. primary structure
b. primary and secondary structure
c. primary, secondary, and tertiary structure
d. primary, secondary, tertiary, and quaternary structure
e. primary, secondary, tertiary, quaternary, and alpha structure

____ 142. What would be an unexpected consequence of changing one amino acid in a protein consisting of 325 amino acids?
a. The primary structure of the protein would be changed.
b. The tertiary structure of the protein might be changed.
c. The biological activity or function of the protein might be altered.
d. Only A and C are correct.
e. A, B, and C are correct.

____ 143. Altering which of the following levels of structural organization could change the function of a protein?
a. primary
b. secondary
c. tertiary
d. quaternary
e. all of the above

____ 144. All of the following molecules are proteins *except*
a. hemoglobin.
b. transthyretin.
c. collagen.
d. lysozyme.
e. glycogen.

____ 145. What is the term used for a change in a protein's three-dimensional shape or conformation due to disruption of hydrogen bonds, disulfide bridges, or ionic bonds?
a. hydrolysis
b. stabilization
c. destabilization
d. renaturation
e. denaturation

____ 146. What is the term used for a protein molecule that assists in the proper folding of other proteins?
a. tertiary protein
b. chaperonin
c. enzyme protein
d. renaturing protein
e. denaturing protein

____ 147. Of the following functions, the major purpose of RNA is to
a. transmit genetic information to offspring.
b. function in the synthesis of protein.
c. make a copy of itself, thus ensuring genetic continuity.
d. act as a pattern or blueprint to form DNA.
e. form the genes of higher organisms.

____ 148. Which of the following *best* describes the flow of information in eukaryotic cells?
a. DNA → RNA → proteins
b. RNA → proteins → DNA
c. proteins → DNA → RNA
d. RNA → DNA → proteins
e. DNA → proteins → RNA

____ 149. Which of the following are nitrogenous bases of the pyrimidine type?
a. guanine and adenine
b. cytosine and uracil
c. thymine and guanine
d. ribose and deoxyribose
e. adenine and thymine

____ 150. Which of the following are nitrogenous bases of the purine type?
a. cytosine and guanine
b. guanine and adenine
c. adenine and thymine
d. thymine and uracil
e. uracil and cytosine

____ 151. All of the following nitrogenous bases are found in DNA *except*
a. thymine.
b. adenine.
c. uracil.
d. guanine.
e. cytosine.

____ 152. A double-stranded DNA molecule contains a total of 120 purines and 120 pyrimidines. This DNA molecule could be comprised of
a. 120 adenine and 120 uracil molecules.
b. 120 thymine and 120 adenine molecules.
c. 120 cytosine and 120 thymine molecules.
d. 240 adenine and 240 cytosine molecules.
e. 240 guanine and 240 thymine molecules.

____ 153. The difference between the sugar in DNA and the sugar in RNA is that the sugar in DNA
a. is a six-carbon sugar and the sugar in RNA is a five-carbon sugar.
b. can form a double-stranded molecule.
c. has a six-membered ring of carbon and nitrogen atoms.
d. can attach to a phosphate.
e. contains one less oxygen atom.

____ 154. Which of the following statements *best* summarizes the structural differences between DNA and RNA?
a. RNA is a protein, whereas DNA is a nucleic acid.
b. DNA is a protein, whereas RNA is a nucleic acid.
c. DNA nucleotides contain a different sugar than RNA nucleotides.
d. RNA is a double helix, but DNA is single-stranded.
e. A and D are correct.

____ 155. In the double helix structure of nucleic acids, cytosine hydrogen bonds to
a. deoxyribose.
b. ribose.
c. adenine.
d. thymine.
e. guanine.

____ 156. The two strands making up the DNA double helix molecule
a. cannot be separated.
b. contain ribose and deoxyribose in opposite strands.
c. are held together by hydrogen bonds.
d. are attached through a phosphate to hold the strands together.
e. contain uracil but not thymine.

____ 157. If one strand of a DNA molecule has the sequence of bases 5'ATTGCA3', the other complementary strand would have the sequence
a. 5'TAACGT3'.
b. 3'TAACGT5'.
c. 5'UAACGU3'.
d. 3'UAACGU5'.
e. 5'UGCAAU3'.

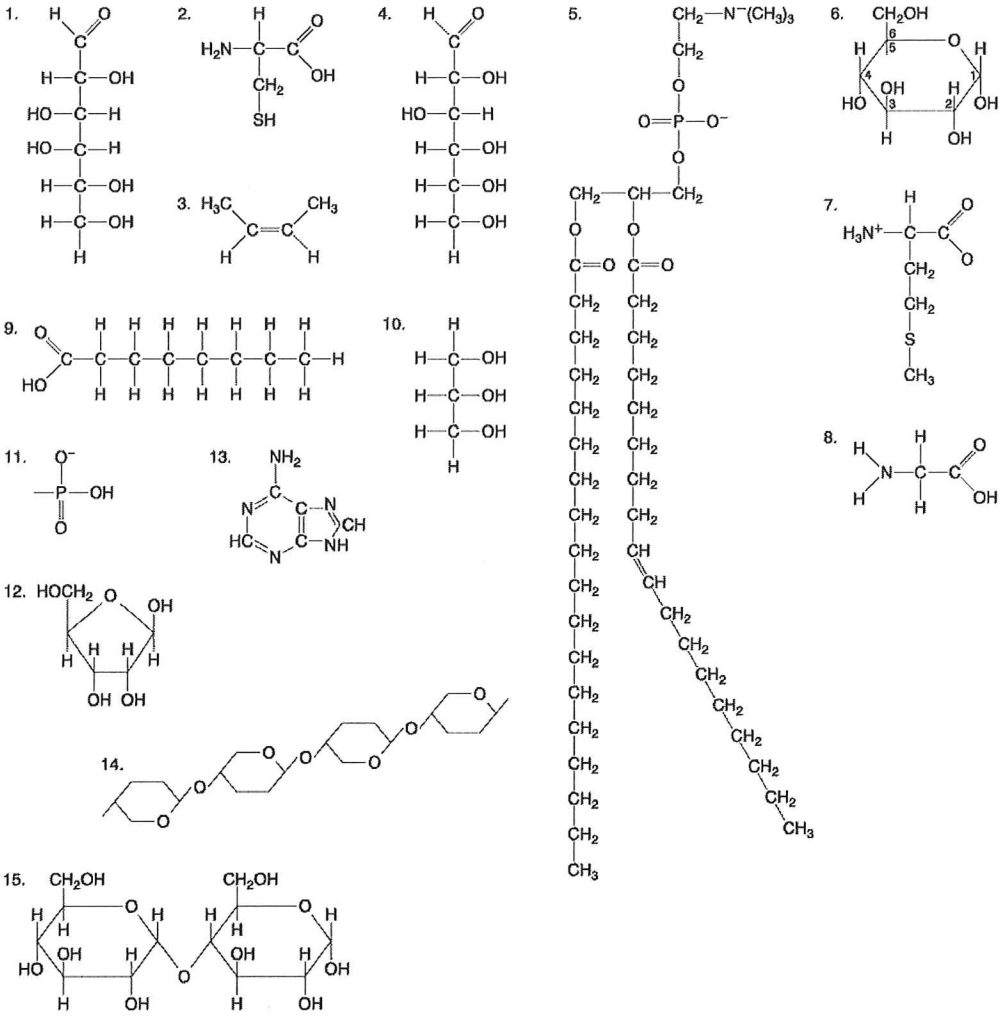
____ 158. The structural feature that allows DNA to replicate is the
a. sugar-phosphate backbone.
b. complementary pairing of the nitrogenous bases.
c. disulfide bonding (bridging) of the two helixes.
d. twisting of the molecule to form an á helix.
e. three-component structure of the nucleotides.

____ 159. A new organism is discovered in the forests of Costa Rica. Scientists there determine that the polypeptide sequence of hemoglobin from the new organism has 72 amino acid differences from humans, 65 differences from a gibbon, 49 differences from a rat, and 5 differences from a frog. These data suggest that the new organism
a. is more closely related to humans than to frogs.
b. is more closely related to frogs than to humans.
c. may have evolved from gibbons but not rats.
d. is more closely related to humans than to rats.
e. may have evolved from rats but not from humans and gibbons.

____ 160. Which of the following is an example of hydrolysis?
a. the reaction of two monosaccharides, forming a disaccharide with the release of water
b. the synthesis of two amino acids, forming a peptide with the release of water
c. the reaction of a fat, forming glycerol and fatty acids with the release of water
d. the reaction of a fat, forming glycerol and fatty acids with the utilization of water
e. the synthesis of a nucleotide from a phosphate, a pentose sugar, and a nitrogenous base with the production of a molecule of water

____ 161. Large organic molecules are usually assembled by polymerization of a few kinds of simple subunits. Which of the following is an *exception* to this statement?
a. a steroid
b. cellulose
c. DNA
d. an enzyme
e. a contractile protein

The following questions are based on the 15 molecules illustrated below. Each molecule may be used once, more than once, or not at all.



____ 162. Which of the following molecules are structural isomers?

a. 1 and 4
b. 5 and 14
c. 6 and 12
d. 12 and 13
e. 14 and 15

____ 163. Which of the following combinations could be linked together to form a nucleotide?

a. 1, 2, and 11
b. 3, 7, and 8
c. 5, 9, and 10
d. 11, 12, and 13
e. 12, 14, and 15

____ 164. Which of the following molecules contain(s) an aldehyde type of carbonyl functional group?
a. 1
b. 4
c. 8
d. 10
e. 1 and 4

____ 165. Which of the following molecules is (are) a carbohydrate?
a. 1 and 4
b. 6
c. 12
d. 5 and 14
e. all of the above

____ 166. Which of the following molecules is a saturated fatty acid?
a. 1
b. 5
c. 6
d. 8
e. 9

____ 167. Which of the following molecules is an amino acid with a hydrophobic R group or side chain?
a. 3
b. 5
c. 7
d. 8
e. 12

____ 168. Which of the following molecules could be joined together by a peptide bond as a result of a dehydration reaction?
a. 2 and 3
b. 3 and 7
c. 7 and 8
d. 8 and 9
e. 12 and 13

____ 169. A fat (or triacylglycerol) would be formed as a result of a dehydration reaction between
a. one molecule of 9 and three molecules of 10.
b. three molecules of 9 and one molecule of 10.
c. one molecule of 5 and three molecules of 9.
d. three molecules of 5 and one molecule of 9.
e. one molecule of 5 and three molecules of 10.

____ 170. Which of the following molecules could be joined together by a phosphodiester type of covalent bond?
a. 3 and 4
b. 3 and 8
c. 6 and 15
d. 11 and 12
e. 11 and 13

____ 171. Which of the following molecules is the pentose sugar found in RNA?
a. 1
b. 4
c. 6
d. 12
e. 13

____ 172. Which of the following molecules contains a glycosidic linkage type of covalent bond?
a. 4
b. 6
c. 12
d. 13
e. 15

____ 173. Which of the following molecules has (have) a functional group that frequently is involved in maintaining the tertiary structure of a protein?
a. 2
b. 3
c. 9
d. 11
e. 9 and 11

____ 174. Which of the following molecules consists of a hydrophilic "head" region and a hydrophobic "tail" region?
a. 2
b. 5
c. 7
d. 9
e. 11

____ 175. Which of the following statements is *false*?
a. 1 and 4 could be joined together by a glycosidic linkage to form a disaccharide.
b. 9 and 10 could be joined together by ester bonds to form a triacylglycerol.
c. 2 and 7 could be joined together to form a short peptide.
d. 2, 7, and 8 could be joined together to form a short peptide.
e. 14 and 15 could be joined together to form a polypeptide.

4.A Formatives
Answer Section

MULTIPLE CHOICE

1. ANS: B TOP: Concept 54.1
2. ANS: D TOP: Concept 54.2
3. ANS: D TOP: Concept 54.2
4. ANS: D TOP: Concept 54.2
5. ANS: C TOP: Concept 54.2
6. ANS: D TOP: Concept 54.2
7. ANS: B TOP: Concept 54.2
8. ANS: A TOP: Concept 54.2
9. ANS: D TOP: Concept 54.3
10. ANS: A TOP: Concept 54.3
11. ANS: A TOP: Concept 54.3
12. ANS: B TOP: Concept 54.3
13. ANS: A TOP: Concept 54.1
14. ANS: E TOP: Concept 54.1
15. ANS: D TOP: Concept 54.5
16. ANS: B TOP: Concept 54.1
17. ANS: D TOP: Concept 54.3
18. ANS: E TOP: Concept 54.5
19. ANS: E TOP: Concept 54.5
20. ANS: E TOP: Concept 54.5
21. ANS: C TOP: Overview
22. ANS: C TOP: Concept 55.1
23. ANS: D TOP: Concept 55.1
24. ANS: D TOP: Concept 55.1
25. ANS: C TOP: Concept 55.1
26. ANS: D TOP: Concept 53.1
27. ANS: A TOP: Concept 53.1
28. ANS: B TOP: Concept 53.1
29. ANS: E TOP: Concept 53.1
30. ANS: A TOP: Concept 53.1
31. ANS: B TOP: Concept 53.1
32. ANS: B TOP: Concept 53.1
33. ANS: A TOP: Concept 53.1
34. ANS: B TOP: Concept 53.1
35. ANS: B TOP: Concept 53.2
36. ANS: D TOP: Concept 53.2
37. ANS: C TOP: Concept 53.2
38. ANS: B TOP: Concept 53.2
39. ANS: B TOP: Concept 53.2

40. ANS: C TOP: Concept 53.2
41. ANS: C TOP: Concept 53.2
42. ANS: D TOP: Concept 53.3
43. ANS: B TOP: Concept 53.1
44. ANS: B TOP: Concept 53.1
45. ANS: D TOP: Concept 53.3
46. ANS: A TOP: Concept 53.1
47. ANS: B TOP: Concept 53.4
48. ANS: D TOP: Concept 52.3
49. ANS: D TOP: Concept 52.4
50. ANS: B TOP: Concept 52.3
51. ANS: D TOP: Concept 52.4
52. ANS: B TOP: Concept 52.4
53. ANS: D TOP: Concept 52.4
54. ANS: D TOP: Concept 52.4
55. ANS: B TOP: Concept 52.6
56. ANS: C TOP: Concept 52.6
57. ANS: C TOP: Concept 52.6
58. ANS: E TOP: Concept 48.1
59. ANS: D TOP: Concept 48.2
60. ANS: A TOP: Concept 48.3
61. ANS: C TOP: Concept 48.3
62. ANS: E TOP: Concept 48.3
63. ANS: E TOP: Concept 48.4
64. ANS: E TOP: Concept 48.4
65. ANS: C TOP: Concept 48.4
66. ANS: E TOP: Concept 48.4
67. ANS: B TOP: Concept 42.2, Concept 42.6
68. ANS: A TOP: Concept 42.6
69. ANS: B TOP: Concept 42.6
70. ANS: E TOP: Concept 42.3, Concept 42.5, Concept 42.6
71. ANS: D TOP: Concept 42.6
72. ANS: E TOP: Concept 42.7
73. ANS: D TOP: Concept 42.7
74. ANS: D TOP: Concept 41.3
75. ANS: B TOP: Concept 41.3
76. ANS: A TOP: Concept 41.4
77. ANS: D TOP: Concept 41.4
78. ANS: A TOP: Concept 41.4
79. ANS: E TOP: Concept 41.5
80. ANS: A TOP: Concept 40.1
81. ANS: D TOP: Concept 40.1
82. ANS: B TOP: Concept 40.1
83. ANS: A TOP: Concept 40.2

84. ANS: B TOP: Concept 40.2
85. ANS: A TOP: Concept 21.1
86. ANS: A TOP: Concept 21.2
87. ANS: E TOP: Concept 21.2
88. ANS: B TOP: Concept 21.2
89. ANS: C TOP: Concept 21.2
90. ANS: D TOP: Concept 21.2
91. ANS: A TOP: Concept 21.2
92. ANS: E TOP: Concept 6.2
93. ANS: E TOP: Concept 6.3
94. ANS: C TOP: Concept 6.3
95. ANS: D TOP: Concept 6.3
96. ANS: A TOP: Concept 6.4
97. ANS: E TOP: Concept 6.4
98. ANS: B TOP: Concept 6.4
99. ANS: D TOP: Concept 6.4
100. ANS: A TOP: Concept 6.4
101. ANS: A TOP: Concept 6.4
102. ANS: C TOP: Concept 6.5
103. ANS: C TOP: Concept 6.5
104. ANS: B TOP: Concept 6.4
105. ANS: E TOP: Concept 6.4
106. ANS: E TOP: Concept 6.5
107. ANS: A TOP: Concept 6.5
108. ANS: A TOP: Overview
109. ANS: C TOP: Concept 5.1
110. ANS: A TOP: Concept 5.2
111. ANS: A TOP: Concept 5.2
112. ANS: A TOP: Concept 5.2
113. ANS: C TOP: Concept 5.2
114. ANS: D TOP: Concept 5.2
115. ANS: E TOP: Concept 5.2
116. ANS: A TOP: Concept 5.2
117. ANS: C TOP: Concept 5.2
118. ANS: E TOP: Concept 5.3
119. ANS: B TOP: Concept 5.3
120. ANS: C TOP: Concept 5.3
121. ANS: A TOP: Concept 5.3
122. ANS: E TOP: Concept 5.3
123. ANS: E TOP: Concept 5.3
124. ANS: E TOP: Concept 5.4
125. ANS: B TOP: Concept 5.4
126. ANS: A TOP: Concept 5.4
127. ANS: B TOP: Concept 5.1, Concept 5.4

128. ANS: E TOP: Concept 5.1, Concept 5.4
129. ANS: C TOP: Concept 5.4
130. ANS: A TOP: Concept 5.4
131. ANS: E TOP: Concept 5.4
132. ANS: E TOP: Concept 5.4
133. ANS: A TOP: Concept 5.4
134. ANS: B TOP: Concept 5.4
135. ANS: D TOP: Concept 5.4
136. ANS: B TOP: Concept 5.4
137. ANS: A TOP: Concept 5.4
138. ANS: D TOP: Concept 5.4
139. ANS: C TOP: Concept 5.4
140. ANS: B TOP: Concept 5.4
141. ANS: D TOP: Concept 5.4
142. ANS: E TOP: Concept 5.4
143. ANS: E TOP: Concept 5.4
144. ANS: E TOP: Concept 5.4
145. ANS: E TOP: Concept 5.4
146. ANS: B TOP: Concept 5.4
147. ANS: B TOP: Concept 5.5
148. ANS: A TOP: Concept 5.5
149. ANS: B TOP: Concept 5.5
150. ANS: B TOP: Concept 5.5
151. ANS: C TOP: Concept 5.5
152. ANS: B TOP: Concept 5.5
153. ANS: E TOP: Concept 5.5
154. ANS: C TOP: Concept 5.5
155. ANS: E TOP: Concept 5.5
156. ANS: C TOP: Concept 5.5
157. ANS: B TOP: Concept 5.5
158. ANS: B TOP: Concept 5.5
159. ANS: B TOP: Concept 5.5
160. ANS: D TOP: Concept 5.1, Concept 5.4
161. ANS: A TOP: Concept 5.1, Concept 5.4
162. ANS: A TOP: Concept 5.2
163. ANS: D TOP: Concept 5.5
164. ANS: E TOP: Concept 5.2
165. ANS: E TOP: Concept 5.2
166. ANS: E TOP: Concept 5.3
167. ANS: C TOP: Concept 5.4
168. ANS: C TOP: Concept 5.4
169. ANS: B TOP: Concept 5.3
170. ANS: D TOP: Concept 5.3
171. ANS: D TOP: Concept 5.5

172. ANS: E TOP: Concept 5.2
173. ANS: A TOP: Concept 5.4
174. ANS: B TOP: Concept 5.3
175. ANS: E TOP: Concept 5.2, Concept 5.4