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

4.B-C Formatives

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

____ 1. 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.

____ 2. Which of the following is *true* of cellulose?
a. It is a polymer composed of sucrose monomers.
b. It is a storage polysaccharide for energy in plant cells.
c. It is a storage polysaccharide for energy in animal cells.
d. It is a major structural component of plant cell walls.
e. It is a major structural component of animal cell plasma membranes.

____ 3. 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.

____ 4. 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.

____ 5. 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

____ 6. The 20 different amino acids found in polypeptides exhibit different chemical and physical properties because of different
a. carboxyl groups attached to an alpha (α) carbon
b. amino groups attached to an alpha (α) carbon
c. side chains (R groups).
d. alpha (α) carbons.
e. asymmetric carbons.

____ 7. The tertiary structure of a protein is the
a. bonding together of several polypeptide chains by weak bonds.
b. order in which amino acids are joined in a polypeptide chain.
c. unique three-dimensional shape of the fully folded polypeptide.
d. organization of a polypeptide chain into an á helix or â pleated sheet.
e. overall protein structure resulting from the aggregation of two or more polypeptide subunits.

____ 8. 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.

____ 9. 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.

____ 10. 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

____ 11. 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.

____ 12. Which of the following is *not* true of enzymes?
a. Enzyme catalysis is dependent on the pH and temperature of the reaction environment.
b. Enzyme catalysis is dependent on the three-dimensional structure or conformation of the enzyme.
c. Enzymes provide activation energy for the reaction they catalyze.
d. Enzymes are composed primarily of protein, but they may bind nonprotein cofactors.
e. Enzyme activity can be inhibited if the enzyme's allosteric site is bound with a noncompetitive inhibitor.

____ 13. Which of these statements regarding enzymes is *false?*
a. Enzymes are proteins that function as catalysts.
b. Enzymes display specificity for certain molecules with which they interact.
c. Enzymes provide activation energy for the reactions they catalyze.
d. The activity of enzymes can be regulated by other molecules.
e. An enzyme may be used many times over for a specific reaction.

____ 14. Many different things can alter enzyme activity. Which of the following underlie all types of enzyme regulation?
a. changes in the activation energy of the reaction
b. changes in the active site of the enzyme
c. changes in the free energy of the reaction
d. A and B only
e. A, B, and C

____ 15. What is a nonprotein "helper" of an enzyme molecule called?
a. accessory enzyme
b. allosteric group
c. coenzyme
d. functional group
e. enzyme activator

____ 16. Which of the following is true of enzymes?
a. Enzymes may require a nonprotein cofactor or ion for catalysis to take place.
b. Enzyme function is reduced if the three-dimensional structure or conformation of an enzyme is altered.
c. Enzyme function is influenced by physical and chemical environmental factors such as pH and temperature.
d. Enzymes increase the rate of chemical reaction by lowering activation energy barriers.
e. All of the above are true of enzymes.

____ 17. Zinc, an essential trace element for most organisms, is present in the active site of the enzyme carboxypeptidase. The zinc most likely functions as a(n)
a. competitive inhibitor of the enzyme.
b. noncompetitive inhibitor of the enzyme.
c. allosteric activator of the enzyme.
d. cofactor necessary for enzyme activity.
e. coenzyme derived from a vitamin.

____ 18. Consider the following: Succinate dehydrogenase catalyzes the conversion of succinate to fumarate. The reaction is inhibited by malonic acid, which resembles succinate but cannot be acted upon by succinate dehydrogenase. Increasing the ratio of succinate to malonic acid reduces the inhibitory effect of malonic acid. Which of the following is correct?
a. Succinate dehydrogenase is the enzyme, and fumarate is the substrate.
b. Succinate dehydrogenase is the enzyme, and malonic acid is the substrate.
c. Succinate is the substrate, and fumarate is the product.
d. Fumarate is the product, and malonic acid is a noncompetitive inhibitor.
e. Malonic acid is the product, and fumarate is a competitive inhibitor.

____ 19. The regulation of enzyme function is an important aspect of cell metabolism. Which of the following is *least likely* to be a mechanism for enzyme regulation?
a. allosteric regulation
b. cooperativity
c. feedback inhibition
d. removing cofactors
e. reversible inhibition

____ 20. Which type of organelle is primarily involved in the synthesis of oils, phospholipids, and steroids?
a. ribosome
b. lysosome
c. smooth endoplasmic reticulum
d. mitochondrion
e. contractile vacuole

____ 21. 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

____ 22. 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.

____ 23. Which of the following cell components is *not directly involved in synthesis or secretion?*
a. ribosome
b. rough endoplasmic reticulum
c. Golgi body
d. smooth endoplasmic reticulum
e. lysosome

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

____ 24. produces and modifies polysaccharides that will be secreted
a. A
b. B
c. C
d. D
e. E

____ 25. contains hydrolytic enzymes
a. A
b. B
c. C
d. D
e. E

____ 26. helps to recycle the cell's organic material
a. A
b. B
c. C
d. D
e. E

____ 27. one of the main energy transformers of cells
a. A
b. B
c. C
d. D
e. E

____ 28. contains its own DNA and ribosomes
a. A
b. B
c. C
d. D
e. E

____ 29. a compartment that often takes up much of the volume of a plant cell
a. A
b. B
c. C
d. D
e. E

____ 30. contains enzymes that transfer hydrogen from various substrates to oxygen, producing H_2O_2
a. A
b. B
c. C
d. D
e. E

____ 31. A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
a. a bacterium.
b. an animal, but not a plant.
c. a plant, but not an animal.
d. a plant or an animal.
e. any kind of organism.

____ 32. Which of the following is *not* a known function of the cytoskeleton?
a. to maintain a critical limit on cell size
b. to provide mechanical support to the cell
c. to maintain the characteristic shape of the cell
d. to hold mitochondria and other organelles in place within the cytosol
e. to assist in cell motility by interacting with specialized motor proteins

____ 33. Cells can be described as having a cytoskeleton of internal structures that contribute to the shape, organization, and movement of the cell. All of the following are part of the cytoskeleton *except*
a. the nuclear envelope.
b. microtubules.
c. microfilaments.
d. intermediate filaments.
e. actin.

____ 34. Hydrangea plants of the same genotype are planted in a large flower garden. Some of the plants produce blue flowers and others pink flowers. This can be best explained by
a. environmental factors such as soil pH.
b. the allele for blue hydrangea being completely dominant.
c. the alleles being codominant.
d. the fact that a mutation has occurred.
e. acknowledging that multiple alleles are involved.

____ 35. What does the operon model attempt to explain?
a. the coordinated control of gene expression in bacteria
b. bacterial resistance to antibiotics
c. how genes move between homologous regions of DNA
d. the mechanism of viral attachment to a host cell
e. horizontal transmission of plant viruses

____ 36. The role of a metabolite that controls a repressible operon is to
a. bind to the promoter region and decrease the affinity of RNA polymerase for the promoter.
b. bind to the operator region and block the attachment of RNA polymerase to the promoter.
c. increase the production of inactive repressor proteins.
d. bind to the repressor protein and inactivate it.
e. bind to the repressor protein and activate it.

____ 37. The tryptophan operon is a repressible operon that is
a. permanently turned on.
b. turned on only when tryptophan is present in the growth medium.
c. turned off only when glucose is present in the growth medium.
d. turned on only when glucose is present in the growth medium.
e. turned off whenever tryptophan is added to the growth medium.

____ 38. The lactose operon is likely to be transcribed when
a. there is more glucose in the cell than lactose.
b. the cyclic AMP levels are low.
c. there is lactose but no glucose in the cell.
d. the cyclic AMP and lactose levels are both high within the cell.
e. both C and D

____ 39. An increase in which of the following parameters is most important in the evolution of specialized exchange surfaces such as the linings of the lungs or intestines?
a. surface area
b. body thickness
c. number of cell layers
d. metabolic rate of component cells
e. volume of component cells

____ 40. 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

____ 41. Two genes that are evolutionarily related by gene duplication are likely to have which of the following properties?
a. They will often have related functions.
b. Their sequences will be similar or identical.
c. They will often be located near each other in the genome.
d. Only A and B are correct.
e. A, B, and C are correct.

The table below indicates the exons present in six different genes. Gene 1, for example, contains exons A, B, C, and D, in this order, and gene 2 has a similar structure, although exons A and B have been replaced by related but distinct versions called A' and B'.

Gene	Exons
1	A-B-C-D
2	A'-B'-C-D
3	A-B'-C-D
4	A-A-B-C-D
5	A-B-C-D'
6	E-F-B-G

____ 42. The structural similarity seen in genes 1 through 5 suggests that they were most likely produced by
a. gene duplication.
b. exon shuffling.
c. exon duplication.
d. translocation.
e. polyploidy.

Use the information below to answer the following question.

A large population of laboratory animals has been allowed to breed randomly for a number of generations. After several generations, 36% of the animals display a recessive trait (*aa*), the same percentage as at the beginning of the breeding program. The rest of the animals show the dominant phenotype, with heterozygotes indistinguishable from the homozygous dominants.

____ 43. What is the most reasonable conclusion that can be drawn from the fact that the frequency of the recessive trait *(aa) has not changed over time?*
a. The population is undergoing genetic drift.
b. The two phenotypes are about equally adaptive under laboratory conditions.
c. The genotype *AA is lethal.*
d. There has been a high rate of mutation of allele *A to allele a.*
e. There has been sexual selection favoring allele *a.*

____ 44. What is the estimated frequency of allele *a* in the gene pool?
a. 0.18
b. 0.40
c. 0.60
d. 0.70
e. 0.80

____ 45. What proportion of the population is probably heterozygous *(Aa) for this trait?*
a. 0.18
b. 0.36
c. 0.48
d. 0.60
e. 0.72

____ 46. All of the following are criteria for maintaining Hardy-Weinberg equilibrium involving two alleles *except*
a. the frequency of all genotypes must be equal.
b. there should be no natural selection.
c. matings must be random.
d. populations must be large.
e. gene flow from other populations must be zero.

____ 47. In a Hardy-Weinberg population with two alleles, *A* and *a,* that are in equilibrium, the frequency of the allele a is 0.7. What is the percentage of the population that is homozygous for this allele?
a. 3
b. 9
c. 30
d. 42
e. 49

____ 48. In a Hardy-Weinberg population with two alleles, *A* and *a,* that are in equilibrium, the frequency of allele a is 0.7. What is the percentage of the population that is heterozygous for this allele?
a. 3
b. 9
c. 21
d. 30
e. 42

____ 49. In a population with two alleles, *A* and *a,* the frequency of a is 0.50. What would be the frequency of heterozygotes if the population is in Hardy-Weinberg equilibrium?
a. 1.00
b. 0.75
c. 0.50
d. 0.25
e. 0.10

____ 50. In a population with two alleles, *A* and *a*, the frequency of *A* is 0.2. Organisms that are homozygous for *A* die before reaching sexual maturity. In five generations, what would be the frequency of individuals with *aa* genotypes?
a. less than 0.04
b. 0.04
c. 0.32
d. 0.64
e. greater than 0.64

____ 51. You sample a population of butterflies and find that 42% are heterozygous for a particular gene. What would be the frequency of the recessive allele in this population?
a. 0.09
b. 0.30
c. 0.49
d. 0.70
e. Allele frequency cannot be estimated from this information.

Use the information below to answer the following questions.

In a hypothetical population of 1,000 people, tests of blood-type genes show that 160 have the genotype *AA*, 480 have the genotype *AB*, and 360 have the genotype *BB*.

____ 52. What is the frequency of the *A allele?*
a. 0.001
b. 0.002
c. 0.100
d. 0.400
e. 0.600

____ 53. What is the frequency of the *B allele?*
a. 0.001
b. 0.002
c. 0.100
d. 0.400
e. 0.600

____ 54. What percentage of the population has type O blood?
a. 0
b. 10
c. 24
d. 48
e. 60

____ 55. If there are 4,000 children born to this generation, how many would be expected to have AB blood under the conditions of Hardy-Weinberg equilibrium?
a. 100
b. 960
c. 1,920
d. 2,000
e. 2,400

Refer to the information below to answer the following questions.

You are studying three populations of birds. Population 1 has ten birds, of which one is brown (a recessive trait) and nine are red. Population 2 has 100 birds. In that population, ten of the birds are brown. Population 3 has 30 birds, and three of them are brown. Use the following options to answer the questions:

A. Population 1
B. Population 2
C. Population 3
D. They are all the same.
E. It is impossible to tell from the information given.

____ 56. In which population is the frequency of the allele for brown feathers highest?
a. A
b. B
c. C
d. D
e. E

____ 57. Which population is *most* likely to be subject to the bottleneck effect?
a. A
b. B
c. C
d. D
e. E

____ 58. Which factor is the *most* important in producing the variability that occurs in each generation of humans?
a. mutation
b. sexual recombination
c. genetic drift
d. nonrandom mating
e. natural selection

____ 59. Genetic recombination is a crucial process in evolution. This statement is supported by the continuous existence of which of the following in evolving populations?
a. sexual reproduction
b. bacterial conjugation
c. exchange of chromosome regions in meiosis (crossing over)
d. A and C only
e. A, B, and C

____ 60. Which is true regarding genetic variation in prokaryotes, where cell reproduction occurs via binary fission?
a. Prokaryotes lack any ability to increase their genetic variation.
b. Prokaryotes are limited to the rare-chance mutation to increase their genetic variation.
c. Only when binary fission occurs by meiosis do prokaryotes have the ability to undergo genetic recombination.
d. Prokaryotic genomes can experience increased genetic variation via both mutation and genetic recombination.
e. Prokaryotic genomes gain genetic variation solely through the action of bacteriophages.

____ 61. The following important concepts of population genetics are due to random events or chance *except*
a. mutation.
b. the bottleneck effect.
c. the founder effect.
d. natural selection.
e. sexual recombination.

____ 62. Natural selection is most nearly the same as
a. diploidy.
b. gene flow.
c. genetic drift.
d. nonrandom mating.
e. differential reproductive success.

Use the information below to answer the following questions.

In the year 2500, five male space colonists and five female space colonists (all unrelated to each other) settle on an uninhabited Earthlike planet in the Andromeda galaxy. The colonists and their offspring randomly mate for generations. All ten of the original colonists had free earlobes, and two were heterozygous for that trait. The allele for free earlobes is dominant to the allele for attached earlobes.

____ 63. Which of these is closest to the allele frequency in the founding population?
a. 0.1 *a*, 0.9 *A*
b. 0.2 *a*, 0.8 *A*
c. 0.5 *a*, 0.5 *A*
d. 0.8 *a*, 0.2 *A*
e. 0.4 *a*, 0.6 *A*

____ 64. If one assumes that Hardy-Weinberg equilibrium applies to the population of colonists on this planet, about how many people will have attached earlobes when the planet's population reaches 10,000?
a. 100
b. 400
c. 800
d. 1,000
e. 10,000

____ 65. If four of the original colonists died before they produced offspring, the ratios of genotypes could be quite different in the subsequent generations. This is an example of
a. diploidy.
b. gene flow.
c. genetic drift.
d. disruptive selection.
e. stabilizing selection.

____ 66. Which statement about variation is most true?
a. All phenotypic variation is the result of genotypic variation.
b. All genetic variation produces phenotypic variation.
c. All nucleotide variability results in neutral variation.
d. All new alleles are the result of nucleotide variability.
e. All geographic variation results from the existence of clines.

____ 67. A proficient engineer can easily design skeletal structures that are more functional than those currently found in the forelimbs of such diverse mammals as horses, whales, and bats. That the actual forelimbs of these mammals do not seem to be optimally arranged is because
a. natural selection has not had sufficient time to create the optimal design in each case, but will do so given enough time.
b. natural selection operates in ways that are beyond the capability of the human mind to comprehend.
c. in many cases, phenotype is not merely determined by genotype, but by the environment as well.
d. though we may not consider the fit between the current skeletal arrangements and their functions excellent, we should not doubt that natural selection ultimately produces the best design.
e. natural selection is generally limited to modifying structures that were present in previous generations and in previous species.

____ 68. In what way were conditions on Earth more than 2 billion years ago different from those on Earth today?
a. The early Earth had water vapor in its atmosphere.
b. The early Earth was intensely bombarded by large space debris.
c. The early Earth had an oxidizing atmosphere.
d. Less ultraviolet radiation penetrated the early atmosphere.
e. The early atmosphere had significant quantities of ozone.

____ 69. Arrange these events from earliest to most recent.
1. emission of lava in what is now Siberia at time of Permian extinctions
2. emission of lava that solidified at the same time as iron-bearing terrestrial rocks began to rust
3. emission of lava that solidified at the same time as the first banded iron formations formed
4. emission of lava in what is now India at time of Cretaceous extinctions

a. 3, 1, 2, 4
b. 3, 2, 1, 4
c. 3, 1, 4, 2
d. 1, 3, 2, 4
e. 1, 2, 3, 4

____ 70. What is the correct sequence of these events, from earliest to most recent, in the evolution of life on Earth?
1. origin of mitochondria
2. origin of multicellular eukaryotes
3. origin of chloroplasts
4. origin of cyanobacteria
5. origin of fungal-plant symbioses

a. 4, 3, 2, 1, 5
b. 4, 1, 2, 3, 5
c. 4, 1, 3, 2, 5
d. 4, 3, 1, 5, 2
e. 3, 4, 1, 2, 5

____ 71. A major evolutionary episode that corresponded in time most closely with the formation of Pangaea was the
a. origin of humans.
b. Cambrian explosion.
c. Permian extinctions.
d. Pleistocene ice ages.
e. Cretaceous extinctions.

____ 72. Resource partitioning is best described by which of the following statements?
a. Competitive exclusion results in the success of the superior species.
b. Slight variations in niche allow similar species to coexist.
c. Two species can coevolve and share the same niche.
d. Species diversity is maintained by switching between prey species.
e. A climax community is reached when no new niches are available.

____ 73. 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

____ 74. 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

____ 75. Which of the following interactions can correctly be labeled coevolution?
a. the tendency of coyotes to respond to human habitat encroachment by including pet dogs and cats in their diets
b. a genetic change in a virus that allows it to exploit a new host, which responds to virus-imposed selection by changing its genetically controlled habitat preferences
c. a genetic change in foxes that allows them to tolerate human presence (and food)
d. the adaptation of cockroaches to human habitation
e. the ability of rats to survive in a variety of novel environments

____ 76. Which of the following types of species interaction is *incorrectly* paired to its effects on the density of the two interacting populations?
a. predation-one increases, one decreases
b. parasitism-one increases, one decreases
c. commensalism-both increase
d. mutualism-both increase
e. competition-both decrease

____ 77. Which of the following statements about communities is *not* correct?
a. Many plant species in communities seem to be independently distributed.
b. Some animal species distributions within a community are linked to other species.
c. The distribution of almost all organisms is probably affected, to some extent, by both abiotic gradients and interactions with other species.
d. Ecologists refer to species richness as the number of species within a community.
e. The trophic structure of a community describes abiotic factors such as rainfall and temperature affecting members of the community.

____ 78. 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

____ 79. 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

____ 80. 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.

____ 81. 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

____ 82. Which of the following statements concerning the control of community structure is *false*?
a. A bottom-up community is controlled by nutrients.
b. A top-down community is controlled by predators.
c. Increasing the biomass of vegetation in a bottom-up community will increase herbivores.
d. Increasing the biomass of vegetation in a bottom-up community will increase predators.
e. Increasing the number of predators in a top-down community will decrease the biomass of vegetation.

____ 83. If you wanted to alter the structure of a bottom-up community, your best bet would be to
a. remove the top predators.
b. remove the trees and shrubs.
c. add plenty of fertilizer.
d. add more predators.
e. reduce the number of primary producers.

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

____ 84. the relationship between ants and acacia trees
a. A
b. B
c. C
d. D
e. E

____ 85. the relationship between legumes and nitrogen-fixing bacteria
a. A
b. B
c. C
d. D
e. E

____ 86. successional event in which one organism makes the environment more suitable for another organism
a. A
b. B
c. C
d. D
e. E

____ 87. the relationship between the larvae of small wasps and caterpillars
a. A
b. B
c. C
d. D
e. E

____ 88. 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.

____ 89. There are more species in tropical areas than in places farther from the equator. This is probably a result of
a. fewer predators.
b. a longer growing season.
c. fewer major disturbances.
d. B and C only
e. all of the above

____ 90. A community's actual evapotranspiration is a reflection of
a. solar radiation, temperature, and water availability.
b. the number of plants and how much moisture they lose.
c. the depth of the water table.
d. energy availability.
e. plant biomass and plant water content.

____ 91. Human-induced modifications of the nitrogen cycle can result in
a. eutrophication of freshwater ecosystems.
b. increased availability of fixed nitrogen to primary producers.
c. accumulation of toxic levels of nitrates in groundwater.
d. A and C only
e. A, B, and C

____ 92. When levels of CO_2 are experimentally increased, C_3 plants generally respond with a greater increase in productivity than C_4 plants. This is because
a. C_3 plants are more efficient in their use of CO_2.
b. C_3 plants are able to obtain the same amount of CO_2 by keeping their stomata open for shorter periods of time.
c. C_4 plants don't use CO_2 as their source of carbon.
d. C_3 plants are more limited than C_3 plants by CO_2 availability.
e. B and D only.

The following questions refer to the terms below. Each term may be used once, more than once, or not at all.

A. green world hypothesis
B. turnover
C. biological magnification
D. greenhouse effect
E. cultural eutrophication

____ 93. CO_2 and water vapor re-reflect infrared radiation back toward Earth
a. A
b. B
c. C
d. D
e. E

____ 94. caused by excessive nutrient input into lakes
a. A
b. B
c. C
d. D
e. E

____ 95. caused excessively high levels of DDT in fish-eating birds
a. A
b. B
c. C
d. D
e. E

____ 96. occurs at a high rate for nutrients in tropical rain forests
a. A
b. B
c. C
d. D
e. E

____ 97. 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

____ 98. 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

____ 99. What is the estimated number of extant species on Earth?
a. 1,000 to 50,000
b. 50,000 to 150,000
c. 500,000 to 1,000,000
d. 10,000,000 to 200,000,000
e. 5 billion-10 billion

____ 100. 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

____ 101. Extinction is a natural phenomenon. It is estimated that 99% of all species that ever lived are now extinct. Why then do we say that we are now in a biodiversity crisis?
a. Humans are ethically responsible for protecting endangered species.
b. Scientists have finally identified most of the species on Earth and are thus able to quantify the number of species becoming extinct.
c. The current rate of extinction is as much as 1,000 times higher than at any other time in the last 100,000 years.
d. Humans have greater medical needs than at any other time in history, and many potential medicinal compounds are being lost as plant species become extinct.
e. Most biodiversity hot spots have been destroyed by recent ecological disasters.

____ 102. 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

____ 103. Carbon dioxide and other gases prevent some heat from escaping Earth's atmosphere. This is known as the _____ effect.
a. warming
b. summer
c. carbon
d. carbon dioxide
e. greenhouse

____ 104. What is the term for a top predator that contributes to the maintenance of species diversity among its animal prey?
a. keystone species
b. keystone mutualist
c. landscape species
d. primary consumer
e. tertiary consumer

____ 105. According to most conservation biologists, the single greatest threat to global biodiversity is
a. chemical pollution of water and air.
b. stratospheric ozone depletion.
c. insufficient recycling programs for nonrenewable resources.
d. alteration or destruction of the physical habitat.
e. global climate change resulting from a variety of human activities.

____ 106. Which of the following is *not* an example of an introduced species?
a. brown tree snakes in Guam
b. timber wolves in Minnesota
c. zebra mussels in the Great Lakes
d. kudzu plants in the southern United States
e. starlings in New York

____ 107. Introduced species can have deleterious effects on biological communities by
a. preying on native species.
b. competing with native species for resources.
c. displacing native species.
d. A and B only
e. A, B, and C

____ 108. Introduced species
a. are a problem because they can prey on or outcompete native species.
b. are sometimes present as a result of attempts at biological control.
c. are sometimes accidentally transported to new environments.
d. A and B only
e. A, B, and C

____ 109. 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

____ 110. Which of the following conditions is the *most* likely indicator of a population in an extinction vortex?
a. The population is divided into smaller populations.
b. The species is rare.
c. The effective population size of the species falls below 500.
d. Genetic measurements indicate a continuing loss of genetic variation.
e. The population is no longer connected by corridors.

____ 111. Which of the following statements related to genetic variation is *true*?
a. Genetic variation does not contribute to biodiversity.
b. Population size is always positively correlated with genetic variation.
c. Populations with low N_e are relatively susceptible to effects of bottlenecking and genetic drift.
d. Recent increases in population size of the northern sea elephant are probably related to high levels of genetic variation.
e. Cord grass populations that live in salt marshes require great genetic variation to thrive.

____ 112. If we say a species is *endemic* to a certain area, we mean that
a. it is found only in one particular area of the world
b. it has been introduced to that area.
c. it is endangered in that area.
d. A and C only
e. A, B, and C

4.B-C Formatives
Answer Section

MULTIPLE CHOICE

1.	ANS: A	TOP: Concept 5.2
2.	ANS: D	TOP: Concept 5.2
3.	ANS: E	TOP: Concept 5.3
4.	ANS: C	TOP: Concept 5.3
5.	ANS: E	TOP: Concept 5.3
6.	ANS: C	TOP: Concept 5.4
7.	ANS: C	TOP: Concept 5.4
8.	ANS: B	TOP: Concept 5.4
9.	ANS: E	TOP: Concept 5.4
10.	ANS: E	TOP: Concept 5.4
11.	ANS: B	TOP: Concept 5.5
12.	ANS: C	TOP: Concept 8.4
13.	ANS: C	TOP: Concept 8.4
14.	ANS: D	TOP: Concept 8.4
15.	ANS: C	TOP: Concept 8.4
16.	ANS: E	TOP: Concept 8.4
17.	ANS: D	TOP: Concept 8.4
18.	ANS: C	TOP: Concept 8.4
19.	ANS: D	TOP: Concept 8.5
20.	ANS: C	TOP: Concept 6.4
21.	ANS: A	TOP: Concept 6.4
22.	ANS: E	TOP: Concept 6.4
23.	ANS: E	TOP: Concept 6.4
24.	ANS: D	TOP: Concept 6.4
25.	ANS: A	TOP: Concept 6.4
26.	ANS: A	TOP: Concept 6.4
27.	ANS: C	TOP: Concept 6.5
28.	ANS: C	TOP: Concept 6.5
29.	ANS: B	TOP: Concept 6.4
30.	ANS: E	TOP: Concept 6.4
31.	ANS: D	TOP: Concept 6.5
32.	ANS: A	TOP: Concept 6.6
33.	ANS: A	TOP: Concept 6.6
34.	ANS: A	TOP: Concept 14.3
35.	ANS: A	TOP: Concept 18.4
36.	ANS: E	TOP: Concept 18.4
37.	ANS: E	TOP: Concept 18.4
38.	ANS: E	TOP: Concept 18.4
39.	ANS: A	TOP: Concept 40.1

40. ANS: B TOP: Concept 40.1
41. ANS: E TOP: Concept 19.5
42. ANS: A TOP: Concept 19.5
43. ANS: B TOP: Concept 23.1
44. ANS: C TOP: Concept 23.1
45. ANS: C TOP: Concept 23.1
46. ANS: A TOP: Concept 23.1
47. ANS: E TOP: Concept 23.1
48. ANS: E TOP: Concept 23.1
49. ANS: C TOP: Concept 23.1
50. ANS: E TOP: Concept 23.1
51. ANS: E TOP: Concept 23.1
52. ANS: D TOP: Concept 23.1
53. ANS: E TOP: Concept 23.1
54. ANS: A TOP: Concept 23.1
55. ANS: C TOP: Concept 23.1
56. ANS: D TOP: Concept 23.1
57. ANS: A TOP: Concept 23.1, Concept 23.3
58. ANS: B TOP: Concept 23.2
59. ANS: E TOP: Concept 23.2
60. ANS: D TOP: Concept 23.2
61. ANS: D TOP: Concept 23.2, Concept 23.3
62. ANS: E TOP: Concept 23.3
63. ANS: A TOP: Concept 23.2
64. ANS: A TOP: Concept 23.2
65. ANS: C TOP: Concept 23.3
66. ANS: D TOP: Concept 23.4
67. ANS: E TOP: Concept 23.4
68. ANS: B TOP: Concept 26.1
69. ANS: B TOP: Concept 26.3
70. ANS: C TOP: Concept 26.4
71. ANS: C TOP: Concept 26.5
72. ANS: B TOP: Concept 53.1
73. ANS: A TOP: Concept 53.1
74. ANS: B TOP: Concept 53.1
75. ANS: B TOP: Concept 53.1
76. ANS: C TOP: Concept 53.1
77. ANS: E TOP: Concept 53.2
78. ANS: C TOP: Concept 53.2
79. ANS: B TOP: Concept 53.2
80. ANS: B TOP: Concept 53.2
81. ANS: C TOP: Concept 53.2
82. ANS: E TOP: Concept 53.2
83. ANS: C TOP: Concept 53.2

84. ANS: B TOP: Concept 53.1
85. ANS: B TOP: Concept 53.1
86. ANS: D TOP: Concept 53.3
87. ANS: A TOP: Concept 53.1
88. ANS: B TOP: Concept 53.4
89. ANS: D TOP: Concept 53.4
90. ANS: A TOP: Concept 53.4
91. ANS: E TOP: Concept 54.5
92. ANS: D TOP: Concept 54.5
93. ANS: D TOP: Concept 54.5
94. ANS: E TOP: Concept 54.5
95. ANS: C TOP: Concept 54.5
96. ANS: B TOP: Concept 54.4
97. ANS: E TOP: Concept 54.5
98. ANS: E TOP: Concept 54.5
99. ANS: D TOP: Overview
100. ANS: C TOP: Overview
101. ANS: C TOP: Overview
102. ANS: C TOP: Concept 55.1
103. ANS: E TOP: Concept 55.1
104. ANS: A TOP: Concept 55.1, Concept 55.2
105. ANS: D TOP: Concept 55.1
106. ANS: B TOP: Concept 55.1
107. ANS: E TOP: Concept 55.1
108. ANS: E TOP: Concept 55.1
109. ANS: D TOP: Concept 55.1
110. ANS: D TOP: Concept 55.2
111. ANS: C TOP: Concept 55.2
112. ANS: A TOP: Concept 55.2