

Biology 1 April 2010 Exam

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scan-tron.

1. Which of the following levels of organization is arranged in the *correct* sequence from most to least inclusive?
 - A. ecosystem, community, population, individual
 - B. population, ecosystem, individual, community
 - C. individual, community, population, ecosystem
 - D. individual, population, community, ecosystem
 - E. community, ecosystem, individual, population
2. Which of the following are important biotic factors that can affect the structure and organization of biological communities?
 - A. temperature, water
 - B. light intensity, seasonality
 - C. nutrient availability, soil pH
 - D. predation, competition
 - E. precipitation, wind
3. Probably the most important factor(s) affecting the distribution of biomes is (are)
 - A. species diversity.
 - B. proximity to large bodies of water
 - C. wind and ocean water current patterns.
 - D. climate.
 - E. day length and rainfall.
4. A community differs from an ecosystem in that the former does NOT include
 - A. unicellular organisms.
 - B. decomposers.
 - C. abiotic (nonliving) factors.
 - D. unicellular organisms and decomposers.
 - E. unicellular organisms and abiotic (nonliving) factors.
5. Which of the following combinations of organisms could be expected to survive in isolation from other forms of life available?
 - A. producers and decomposers
 - B. producers and carnivores
 - C. carnivores and decomposers
 - D. herbivores and carnivores
 - E. herbivores, carnivores, and decomposers
6. Wastes would accumulate and most nutrients would stop cycling if these organisms disappeared from the ecosystem.
 - A. protozoans and protists
 - B. bacteria and fungi
 - C. flatworms, roundworms, and earthworms
 - D. insects
 - E. vertebrates
7. Most of the energy within an ecosystem is lost
 - A. when organisms disperse.
 - B. when organisms die.
 - C. as a result of metabolism.
 - D. by organisms at the top of the food web.
 - E. by herbivores.

8. Of the 20 amino acids, how many are considered to be essential in that the human body cannot synthesize them?
- a. 2
 - b. 5
 - c. 8
 - d. 10
 - e. 12
9. Lipids can serve in all but which of the following capacities?
- a. enzymes
 - b. energy
 - c. membrane structure
 - d. insulation
10. According to the USDA food pyramid, which of the following should be present in the human diet in the highest percentage?
- a. protein
 - b. carbohydrate
 - c. lipid
 - d. vitamins
 - e. minerals
11. The ideal diet consists of all of the following EXCEPT
- a. bulk.
 - b. few complex carbohydrates.
 - c. little salt and sugar.
 - d. little red meat.
 - e. fruits and vegetables.
12. During, or shortly after a meal, most cells use which of the following as a source of energy?
- a. fat
 - b. amino acids
 - c. glucose
 - d. glycogen
 - e. any of these, depending on the concentration of the particular organic compound
13. The organ that stores and detoxifies different organic compounds is the
- a. pancreas.
 - b. small intestine.
 - c. liver.
 - d. spleen.
 - e. gall bladder.
14. The digestion of fats mostly occurs in the
- a. stomach.
 - b. pancreas.
 - c. small intestine.
 - d. lymph vascular system.
 - e. liver.
15. The digestion of which class of foods begins in the mouth?
- a. carbohydrates
 - b. proteins
 - c. lipids
 - d. amino acids
 - e. nucleic acids
16. An animal that migrates great distances would obtain the greatest benefit from storing its energy as
- a. minerals.
 - b. fats.
 - c. amino acids
 - d. proteins
 - e. carbohydrates
17. Some nutrients are considered "essential" in the diets of certain animals because
- a. they are necessary coenzymes.
 - b. they are subunits of important polymers.
 - c. only those animals use those nutrients.
 - e. they cannot be manufactured by the organism.

18. To leave the digestive tract, a substance must cross a cell membrane. During which stage of food processing does this take place?
- absorption
 - hydrolysis
 - digestion
 - ingestion
 - elimination
19. Undifferentiated cells are called
- somatic cells
 - gametes
 - stem cells
 - skin cells
 - neurons
20. Which of the following tools of recombinant DNA technology is *incorrectly* paired with its use?
- DNA ligase—enzyme that cuts DNA, creating the sticky ends of restriction fragments
 - electrophoresis—separation of DNA fragments
 - reverse transcriptase—production of cDNA from mRNA
 - restriction enzyme—production of RFLPs
 - DNA polymerase—used in a polymerase chain reaction to amplify sections of DNA
21. A paleontologist has recovered a bit of tissue from the 400-year-old preserved skin of an extinct dodo (a bird). The researcher would like to compare a specific region of the DNA from the sample with DNA from living birds. Which of the following would be most useful for increasing the amount of dodo DNA available for testing?
- Southern blotting
 - RFLP analysis
 - polymerase chain reaction (PCR)
 - gel electrophoresis
 - therapeutic cloning
22. DNA technology has many medical applications. Which of the following is *not* done routinely at present?
- prenatal identification of genetic disease genes
 - production of viral proteins for vaccines
 - genetic testing for carriers of harmful alleles
 - production of hormones for treating diabetes and dwarfism
 - introduction of genetically engineered genes into human gametes

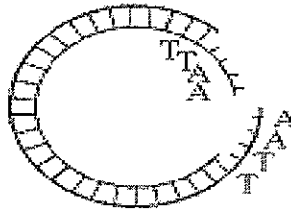


Figure 20.1

23. Which enzyme was used to produce the molecule in Figure 20.1?
- transcriptase
 - DNA polymerase
 - a restriction enzyme
 - RNA polymerase
 - ligase
24. Which of the following separates molecules by movement due to size and electrical charge?
- gene cloning
 - DNA ligase
 - restriction enzymes
 - reverse transcriptase
 - gel electrophoresis

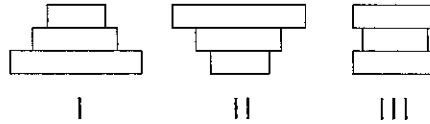
25. The enzyme used in the polymerase chain reaction is
- a. restriction enzyme.
 - b. reverse transcriptase.
 - c. *Taq* polymerase.
 - d. RNA replicase.
 - e. ligase.
26. The use of RFLPs for "genetic fingerprinting" is based on
- a. the type of gel used in electrophoresis.
 - b. identical alleles at loci.
 - c. differences of locations where enzymes make their cuts.
 - d. differences between blood and semen DNA.
 - e. bonding of DNA to RNA.
27. At the end of gastrulation, which of the following are produced?
- a. hollow balls of cells
 - b. embryos with germ layers
 - c. solid balls of cells
 - d. maternal messages
 - e. all of these
28. Which stage or process occurs before the others?
- a. cleavage
 - b. morula
 - c. gastrula
 - d. zygote
 - e. blastula
29. The heart, muscles, bones, and blood develop primarily from
- a. ectoderm.
 - b. mesoderm.
 - c. endoderm.
 - d. the placenta.
 - e. the gray crescent.
30. Which embryonic tissue is incorrectly associated with its derivative?
- a. skin from mesoderm
 - b. nervous system from ectoderm
 - c. stomach lining from endoderm
 - d. circulatory system from mesoderm
 - e. skeletal system from mesoderm
31. Shortly after fertilization, successive cell divisions convert the zygote into a multicellular embryo during a process known as
- a. meiosis.
 - b. parthenogenesis.
 - c. embryonic induction.
 - d. cleavage.
 - e. invagination.
32. In the following list of developmental events, which occurs last?
- a. tissue differentiation
 - b. gamete formation
 - c. gastrulation
 - d. cleavage
 - e. organ formation
33. As an embryo develops, new cells are produced as the result of
- a. preformation.
 - b. differentiation.
 - c. epigenesis.
 - d. morphogenesis.
 - e. cell division.

34. From earliest to latest, the overall sequence of early development proceeds as follows:
- gastrulation → blastulation → neurulation
 - cleavage → gastrulation → organogenesis
 - ovulation → gastrulation → fertilization
 - gastrulation → organogenesis → cleavage
 - preformation → morphogenesis → neurulation
35. Which of the following is an autosomal dominant disease?
- Tay-Sachs disease
 - Cystic Fibrosis
 - Huntington's Disease
 - PKU
 - Hemophilia
36. A couple has a child with Down syndrome when the mother is 39 years old at the time of delivery. Which is the most probable explanation?
- One parent underwent nondisjunction in somatic cell production.
 - One parent underwent nondisjunction in gamete production.
 - The woman inherited the recessive allele for Down's syndrome from her parents.
 - One parent carried a translocation.
 - The father inherited the dominant allele for Down's syndrome from his parents.
37. Which statement is false?
- Behavior is controlled by the environmental stimuli an organism receives.
 - Behavior is partially genetic so that it undergoes natural selection and evolution.
 - Behavior refers only to responses to external stimuli.
 - Behavior sometimes is nonadaptive.
 - Behavior patterns can be learned.
38. Instinctive behavior is
- | | |
|---|--|
| a. stereotyped. | d. triggered by limited sets of clues. |
| b. unlearned. | e. all of these |
| c. induced each and every time the stimulus is presented. | |
39. Which of the following systems is the first of those listed to begin development in the human embryo?
- | | |
|------------------------|---------------------|
| a. nervous system | d. skeletal system |
| b. excretory system | e. endocrine system |
| c. reproductive system | |
40. Newly hatched baby geese follow any large moving objects to which they are exposed shortly after hatching. This is an example of
- | | |
|---------------------|------------------|
| a. homing behavior. | d. migration. |
| b. imprinting. | e. none of these |
| c. piloting. | |
41. All of the following are disadvantages to sociality **except**?
- | | |
|-----------------------|-------------------------|
| a. predator avoidance | d. contagious diseases |
| b. cannibalism | e. parasite infestation |
| c. food depletion | |
42. Altruistic behavior is
- | | |
|--------------------------------|---|
| a. selfish. | d. aggressive behavior. |
| b. sexually directed behavior. | e. nonreactive, such as freezing at the sign of danger. |
| c. self-sacrificing behavior. | |

43. What organ from a common flowering plant would most likely exhibit positive geotropism?
- a. flower
 - b. stem
 - c. root
 - d. pistil
 - e. bud
44. The plant hormone that is gaseous is
- a. auxin.
 - b. gibberellin.
 - c. cytokinin.
 - d. florigen.
 - e. ethylene.
45. The primary root of a seedling grows down
- a. to avoid light.
 - b. in response to gravity.
 - c. because the cells on the top of the root grow faster than those on the bottom of the root.
 - d. in response to different concentrations of auxin.
 - e. for all of these reasons except to avoid light.
46. Short-day plants
- a. flower in spring.
 - b. will not bloom until they have been exposed to a dark period longer than a critical length.
 - c. flower in the fall.
 - d. will not bloom if their dark period is interrupted by two to five minutes of light.
 - e. all of these
47. A population
- a. is the unit of evolution.
 - b. consists of interbreeding members of the same species.
 - c. shares the same gene pool.
 - d. grows at an exponential rate when the birth rate exceeds the death rate at a constant differential, no matter how slight the difference.
 - e. all of these
48. The average number of individuals of the same species per unit of surface area at a given time is the
- a. population density.
 - b. population growth.
 - c. population birth rate.
 - d. population size.
 - e. carrying capacity.
49. To a person studying utilization of classroom space on campus, the most useful data concerning students in a classroom would be expressed by the number of
- a. total individuals.
 - b. individuals per square yard.
 - c. individuals per room.
 - d. rooms per building.
 - e. students of each age.
50. The total number of individuals of the same species that occupy a given area at a given time is the
- a. population distribution.
 - b. population growth.
 - c. population birth rate.
 - d. population size.
 - e. carrying capacity.
51. Populations of most species
- a. are relatively constant over time.
 - b. gradually decrease over time.
 - c. gradually increase over time.
 - d. vary rapidly, depending upon environmental conditions.
 - e. fluctuate wildly.

52. Which of the following is NOT a factor that has led to the dramatic increase in the human population?
- increase of carrying capacity
 - removal of several limiting factors
 - human invasion of new habitats and climatic zones
 - an increase in the levels of pollution in the world
 - the development of public health and the germ theory of disease

For the following question refer to the figure below, which depicts the age structure of three populations.



53. Which population appears to be stable
- II and III
 - II
 - I and II
 - III
 - I

54. A prion is a unique infectious agent because
- one kind can infect both plants and animals
 - it is composed only of protein
 - it can be controlled by only one kind of antibiotic
 - it can infect a virus
 - it is found only in New Guinea

55. This disease is most likely found in persons of African descent because of selection pressure from malaria.

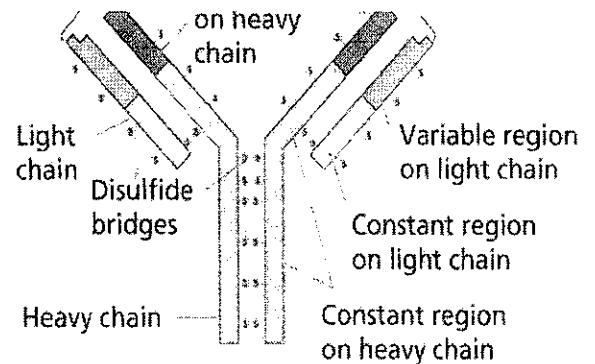
- Hemophilia
- Downs syndrome
- Sickle Cell Anemia
- Achondroplasia
- Neurofibromatosis

56. If a child has an autosomal recessive disease, which of the following is true?

- the child has to have an unaffected parent
- the child might have an affected parent
- all the siblings are also 100% affected
- the child does not show the trait
- both parents are homozygous dominant

57. The diagram at right is most likely

- made of protein
- an antigen
- an antibody
- Both a and b
- Both a and c

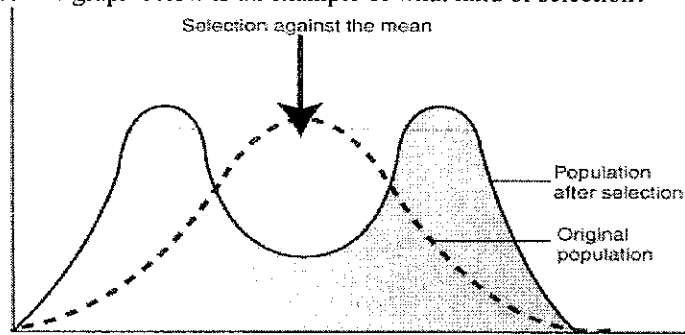


58. Which of the following is not included in connective tissues?

- bone
- skeletal muscle
- cartilage
- collagen
- blood

59. Which of the following is true of the pulmonary circuit?
- Blood is pumped to the digestive system.
 - Oxygen-poor blood is received by the left atrium of the heart.
 - The right ventricle pumps oxygen-poor blood.
 - It bypasses the lungs.
 - It exists only in fishes.
60. Which cell is NOT the same type as the others?
- erythrocytes
 - neutrophils
 - lymphocytes
 - eosinophils
 - monocytes
61. The pulmonary circulation
- involves the hepatic portal vein.
 - moves oxygen-rich blood to the kidneys.
 - includes the coronary arteries.
 - leads to, through, and from the lungs.
 - all of these
62. What is the proper sequence in the flow of air in mammals?
- nasal cavities, larynx, pharynx, bronchi, trachea
 - nasal cavities, pharynx, bronchi, larynx, trachea
 - nasal cavities, pharynx, larynx, trachea, bronchi
 - nasal cavities, larynx, pharynx, trachea, bronchi
 - nasal cavities, bronchi, larynx, trachea, pharynx
63. When you swallow, the epiglottis covers the opening to the
- pharynx.
 - esophagus.
 - larynx.
 - bronchus.
 - alveoli.
64. During inhalation,
- the pressure in the thoracic cavity is greater than the pressure within the lungs.
 - the pressure in the thoracic cavity is less than the pressure within the lungs.
 - the diaphragm moves upward and becomes more curved.
 - the chest cavity volume decreases.
 - all of these
65. Botulism toxin is produced by
- Bacillus*.
 - cyanobacteria.
 - Clostridium*.
 - Chlamydia*.
 - E. coli*.
66. The Old Order Amish of Lancaster, Pennsylvania, a fairly closed community that arose from a relatively small population of German immigrants, display phenotypically a number of genetic disorders that are rare in the average non-Amish human population. Which phenomenon best explains this observation?
- founder effect
 - bottleneck effect
 - natural selection
 - nonrandom mating
 - genetic equilibrium

67. The graph below is an example of what kind of selection?



- a. stabilizing b. selective c. disruptive d. directional

68. Which of the following is a sex-linked disease?

- a. Turner Syndrome d. Maple Syrup Urine disease
 b. Klinefelter's Syndrome e. Marfan Syndrome
 c. Hemophilia

69. The enzyme pepsin starts the digestion of:

- A) starches in the mouth B) starches in the stomach C) proteins in the mouth
 D) proteins in the stomach E) Both C and D

70. Phylogenetic relationships, when determined solely by the study of comparative morphology, may be incorrect due to

- a. morphological divergence. d. extinction.
 b. morphological convergence. e. homology
 c. adaptive radiation.

71. The most conclusive evidence used in establishing the relationship of closely related species is

- a. fossil remains. d. homologous structures.
 b. taxonomy. e. analogous structures.
 c. nucleic acid hybridization.

72. Natural selection changes allele frequencies in populations because some _____ survive and reproduce more successfully than others.

- a. loci d. gene pools
 b. individuals e. alleles
 c. species

73. Sparrows with average-sized wings survive severe storms better than those with longer or shorter wings, illustrating

- a. neutral variation. d. frequency-dependent selection.
 b. the bottleneck effect. e. disruptive selection.
 c. stabilizing selection.

74. Which of these is the smallest unit upon which natural selection directly acts?

- a. an individual's phenotype d. an individual's genotype
 b. a population's gene frequency e. an individual's genome
 c. a species' gene frequency

75. Each of the following has a better chance of influencing gene frequencies in small populations than in large populations, but which one most consistently requires a small population as a precondition for its occurrence?

- a. Non-random mating d. Natural selection
 b. Gene flow e. Mutation
 c. Genetic drift

76. If the frequency of a particular allele that is present in a small, isolated population of Alpine plants decreases due to a landslide that leaves an even smaller remnant of surviving plants bearing this allele, then what has occurred?

- a. genetic drift
- b. microevolution
- c. a bottleneck
- d. A and B only
- e. A, B and C

77. Which of the following has the greatest effect on the rate of chemical cycling in an ecosystem?

- a. the location of the nutrient reservoirs in the ecosystem
- b. the rate of decomposition in the ecosystem
- c. the ecosystem's rate of primary production
- d. the trophic efficiency of the ecosystem
- e. the production efficiency of the ecosystem's consumers

78. Which of the following is a consequence of biological magnification?

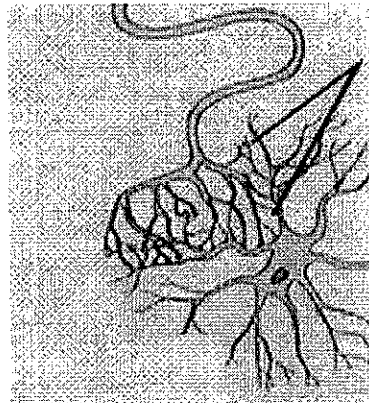
- a. Toxic chemicals in the environment pose greater risk to top-level predators than to primary consumers.
- b. The amount of biomass in the producer level of an ecosystem decreases if the producer turnover time increases.
- c. The biomass of producers in an ecosystem is generally higher than the biomass of primary consumers.
- d. Only a small portion of the energy captured by producers is transferred to consumers.
- e. Populations of top-level predators are generally smaller than populations of primary consumers.

79. How are matter and energy used in ecosystems?

- a. Matter is cycled through ecosystems; energy is not.
- b. Matter is used in ecosystems; energy is not
- c. Energy is cycled through ecosystems; matter is not.
- d. Energy can be converted into matter; matter cannot be converted into energy.
- e. Matter can be converted into energy; energy cannot be converted into matter.

80. The diagram below most likely depicts

- a. a neuromuscular junction
- b. two bone cells
- c. a cartilage cell and a neuron
- d. two neurons meeting at a synapse
- e. a complete reflex arc



Biology 1 April 2010 Exam

Choose the answer that best completes the statements or questions below and fill in the appropriate response on the form. If you change an answer be sure to completely erase your first choice. Please PRINT your name, school, area, and which test you are taking onto the scan-tron.

1. Which of the following levels of organization is arranged in the *correct* sequence from most to least inclusive?
 - A. ecosystem, community, population, individual
 - B. population, ecosystem, individual, community
 - C. individual, community, population, ecosystem
 - D. individual, population, community, ecosystem
 - E. community, ecosystem, individual, population
2. Which of the following are important biotic factors that can affect the structure and organization of biological communities?
 - A. temperature, water
 - B. light intensity, seasonality
 - C. nutrient availability, soil pH
 - D. predation, competition
 - E. precipitation, wind
3. Probably the most important factor(s) affecting the distribution of biomes is (are)
 - A. species diversity.
 - B. proximity to large bodies of water
 - C. wind and ocean water current patterns.
 - D. climate.
 - E. day length and rainfall.
4. A community differs from an ecosystem in that the former does NOT include
 - A. unicellular organisms.
 - B. decomposers.
 - C. abiotic (nonliving) factors.
 - D. unicellular organisms and decomposers.
 - E. unicellular organisms and abiotic (nonliving) factors.
5. Which of the following combinations of organisms could be expected to survive in isolation from other forms of life available?
 - A. producers and decomposers
 - B. producers and carnivores
 - C. carnivores and decomposers
 - D. herbivores and carnivores
 - E. herbivores, carnivores, and decomposers
6. Wastes would accumulate and most nutrients would stop cycling if these organisms disappeared from the ecosystem.
 - A. protozoans and protists
 - B. bacteria and fungi
 - C. flatworms, roundworms, and earthworms
 - D. insects
 - E. vertebrates
7. Most of the energy within an ecosystem is lost
 - A. when organisms disperse.
 - B. when organisms die.
 - C. as a result of metabolism.
 - D. by organisms at the top of the food web.
 - E. by herbivores.

8. Of the 20 amino acids, how many are considered to be essential in that the human body cannot synthesize them?
- a. 2
 - b. 5
 - c. 8
 - d. 10
 - e. 12
9. Lipids can serve in all but which of the following capacities?
- a. enzymes
 - b. energy
 - c. membrane structure
 - d. insulation
10. According to the USDA food pyramid, which of the following should be present in the human diet in the highest percentage?
- a. protein
 - b. carbohydrate
 - c. lipid
 - d. vitamins
 - e. minerals
11. The ideal diet consists of all of the following EXCEPT
- a. bulk.
 - b. few complex carbohydrates.
 - c. little salt and sugar.
 - d. little red meat.
 - e. fruits and vegetables.
12. During, or shortly after a meal, most cells use which of the following as a source of energy?
- a. fat
 - b. amino acids
 - c. glucose
 - d. glycogen
 - e. any of these, depending on the concentration of the particular organic compound
13. The organ that stores and detoxifies different organic compounds is the
- a. pancreas.
 - b. small intestine.
 - c. liver.
 - d. spleen.
 - e. gall bladder.
14. The digestion of fats mostly occurs in the
- a. stomach.
 - b. pancreas.
 - c. small intestine.
 - d. lymph vascular system.
 - e. liver.
15. The digestion of which class of foods begins in the mouth?
- a. carbohydrates
 - b. proteins
 - c. lipids
 - d. amino acids
 - e. nucleic acids
16. An animal that migrates great distances would obtain the greatest benefit from storing its energy as
- a. minerals.
 - b. fats.
 - c. amino acids
 - d. proteins
 - e. carbohydrates
17. Some nutrients are considered "essential" in the diets of certain animals because
- a. they are necessary coenzymes.
 - b. they are subunits of important polymers.
 - c. only those animals use those nutrients.
 - e. they cannot be manufactured by the organism.

18. To leave the digestive tract, a substance must cross a cell membrane. During which stage of food processing does this take place?
- absorption
 - hydrolysis
 - digestion
 - ingestion
 - elimination
19. Undifferentiated cells are called
- somatic cells
 - gametes
 - stem cells
 - skin cells
 - neurons
20. Which of the following tools of recombinant DNA technology is *incorrectly* paired with its use?
- DNA ligase—enzyme that cuts DNA, creating the sticky ends of restriction fragments
 - electrophoresis—separation of DNA fragments
 - reverse transcriptase—production of cDNA from mRNA
 - restriction enzyme—production of RFLPs
 - DNA polymerase—used in a polymerase chain reaction to amplify sections of DNA
21. A paleontologist has recovered a bit of tissue from the 400-year-old preserved skin of an extinct dodo (a bird). The researcher would like to compare a specific region of the DNA from the sample with DNA from living birds. Which of the following would be most useful for increasing the amount of dodo DNA available for testing?
- Southern blotting
 - RFLP analysis
 - polymerase chain reaction (PCR)
 - gel electrophoresis
 - therapeutic cloning
22. DNA technology has many medical applications. Which of the following is *not* done routinely at present?
- prenatal identification of genetic disease genes
 - production of viral proteins for vaccines
 - genetic testing for carriers of harmful alleles
 - production of hormones for treating diabetes and dwarfism
 - introduction of genetically engineered genes into human gametes

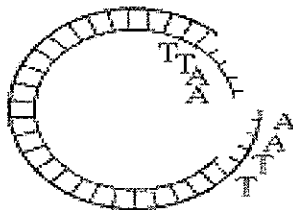


Figure 20.1

23. Which enzyme was used to produce the molecule in Figure 20.1?
- transcriptase
 - DNA polymerase
 - a restriction enzyme
 - RNA polymerase
 - ligase
24. Which of the following separates molecules by movement due to size and electrical charge?
- gene cloning
 - DNA ligase
 - restriction enzymes
 - reverse transcriptase
 - gel electrophoresis

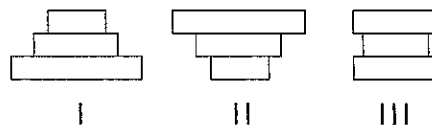
25. The enzyme used in the polymerase chain reaction is
- a. restriction enzyme.
 - b. reverse transcriptase.
 - c. *Taq* polymerase.
 - d. RNA replicase.
 - e. ligase.
26. The use of RFLPs for "genetic fingerprinting" is based on
- a. the type of gel used in electrophoresis.
 - b. identical alleles at loci.
 - c. differences of locations where enzymes make their cuts.
 - d. differences between blood and semen DNA.
 - e. bonding of DNA to RNA.
27. At the end of gastrulation, which of the following are produced?
- a. hollow balls of cells
 - b. embryos with germ layers
 - c. solid balls of cells
 - d. maternal messages
 - e. all of these
28. Which stage or process occurs before the others?
- a. cleavage
 - b. morula
 - c. gastrula
 - d. zygote
 - e. blastula
29. The heart, muscles, bones, and blood develop primarily from
- a. ectoderm.
 - b. mesoderm.
 - c. endoderm.
 - d. the placenta.
 - e. the gray crescent.
30. Which embryonic tissue is incorrectly associated with its derivative?
- a. skin from mesoderm
 - b. nervous system from ectoderm
 - c. stomach lining from endoderm
 - d. circulatory system from mesoderm
 - e. skeletal system from mesoderm
31. Shortly after fertilization, successive cell divisions convert the zygote into a multicellular embryo during a process known as
- a. meiosis.
 - b. parthenogenesis.
 - c. embryonic induction.
 - d. cleavage.
 - e. invagination.
32. In the following list of developmental events, which occurs last?
- a. tissue differentiation
 - b. gamete formation
 - c. gastrulation
 - d. cleavage
 - e. organ formation
33. As an embryo develops, new cells are produced as the result of
- a. preformation.
 - b. differentiation.
 - c. epigenesis.
 - d. morphogenesis.
 - e. cell division.

34. From earliest to latest, the overall sequence of early development proceeds as follows:
- gastrulation → blastulation → neurulation
 - cleavage → gastrulation → organogenesis
 - ovulation → gastrulation → fertilization
 - gastrulation → organogenesis → cleavage
 - preformation → morphogenesis → neurulation
35. Which of the following is an autosomal dominant disease?
- Tay-Sachs disease
 - Cystic Fibrosis
 - Huntington's Disease
 - PKU
 - Hemophilia
36. A couple has a child with Down syndrome when the mother is 39 years old at the time of delivery. Which is the most probable explanation?
- One parent underwent nondisjunction in somatic cell production.
 - One parent underwent nondisjunction in gamete production.
 - The woman inherited the recessive allele for Down's syndrome from her parents.
 - One parent carried a translocation.
 - The father inherited the dominant allele for Down's syndrome from his parents.
37. Which statement is false?
- Behavior is controlled by the environmental stimuli an organism receives.
 - Behavior is partially genetic so that it undergoes natural selection and evolution.
 - Behavior refers only to responses to external stimuli.
 - Behavior sometimes is nonadaptive.
 - Behavior patterns can be learned.
38. Instinctive behavior is
- | | |
|---|--|
| a. stereotyped. | d. triggered by limited sets of clues. |
| b. unlearned. | e. all of these |
| c. induced each and every time the stimulus is presented. | |
39. Which of the following systems is the first of those listed to begin development in the human embryo?
- | | |
|------------------------|---------------------|
| a. nervous system | d. skeletal system |
| b. excretory system | e. endocrine system |
| c. reproductive system | |
40. Newly hatched baby geese follow any large moving objects to which they are exposed shortly after hatching. This is an example of
- | | |
|---------------------|------------------|
| a. homing behavior. | d. migration. |
| b. imprinting. | e. none of these |
| c. piloting. | |
41. All of the following are disadvantages to sociality **except**?
- | | |
|-----------------------|-------------------------|
| a. predator avoidance | d. contagious diseases |
| b. cannibalism | e. parasite infestation |
| c. food depletion | |
42. Altruistic behavior is
- | | |
|--------------------------------|---|
| a. selfish. | d. aggressive behavior. |
| b. sexually directed behavior. | e. nonreactive, such as freezing at the sign of danger. |
| c. self-sacrificing behavior. | |

43. What organ from a common flowering plant would most likely exhibit positive geotropism?
- a. flower
 - b. stem
 - c. root
 - d. pistil
 - e. bud
44. The plant hormone that is gaseous is
- a. auxin.
 - b. gibberellin.
 - c. cytokinin.
 - d. florigen.
 - e. ethylene.
45. The primary root of a seedling grows down
- a. to avoid light.
 - b. in response to gravity.
 - c. because the cells on the top of the root grow faster than those on the bottom of the root.
 - d. in response to different concentrations of auxin.
 - e. for all of these reasons except to avoid light.
46. Short-day plants
- a. flower in spring.
 - b. will not bloom until they have been exposed to a dark period longer than a critical length.
 - c. flower in the fall.
 - d. will not bloom if their dark period is interrupted by two to five minutes of light.
 - e. all of these
47. A population
- a. is the unit of evolution.
 - b. consists of interbreeding members of the same species.
 - c. shares the same gene pool.
 - d. grows at an exponential rate when the birth rate exceeds the death rate at a constant differential, no matter how slight the difference.
 - e. all of these
48. The average number of individuals of the same species per unit of surface area at a given time is the
- a. population density.
 - b. population growth.
 - c. population birth rate.
 - d. population size.
 - e. carrying capacity.
49. To a person studying utilization of classroom space on campus, the most useful data concerning students in a classroom would be expressed by the number of
- a. total individuals.
 - b. individuals per square yard.
 - c. individuals per room.
 - d. rooms per building.
 - e. students of each age.
50. The total number of individuals of the same species that occupy a given area at a given time is the
- a. population distribution.
 - b. population growth.
 - c. population birth rate.
 - d. population size.
 - e. carrying capacity.
51. Populations of most species
- a. are relatively constant over time.
 - b. gradually decrease over time.
 - c. gradually increase over time.
 - d. vary rapidly, depending upon environmental conditions.
 - e. fluctuate wildly.

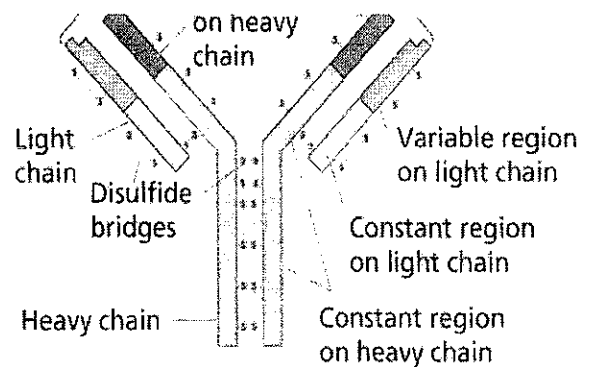
52. Which of the following is NOT a factor that has led to the dramatic increase in the human population?
- increase of carrying capacity
 - removal of several limiting factors
 - human invasion of new habitats and climatic zones
 - an increase in the levels of pollution in the world
 - the development of public health and the germ theory of disease

For the following question refer to the figure below, which depicts the age structure of three populations.



53. Which population appears to be stable
- II and III
 - II
 - I and II
 - III
 - I
54. A prion is a unique infectious agent because
- one kind can infect both plants and animals
 - it is composed only of protein
 - it can be controlled by only one kind of antibiotic
 - it can infect a virus
 - it is found only in New Guinea
55. This disease is most likely found in persons of African descent because of selection pressure from malaria.
- Hemophilia
 - Downs syndrome
 - Sickle Cell Anemia
 - Achondroplasia
 - Neurofibromatosis
56. If a child has an autosomal recessive disease, which of the following is true?
- the child has to have an unaffected parent
 - the child might have an affected parent
 - all the siblings are also 100% affected
 - the child does not show the trait
 - both parents are homozygous dominant

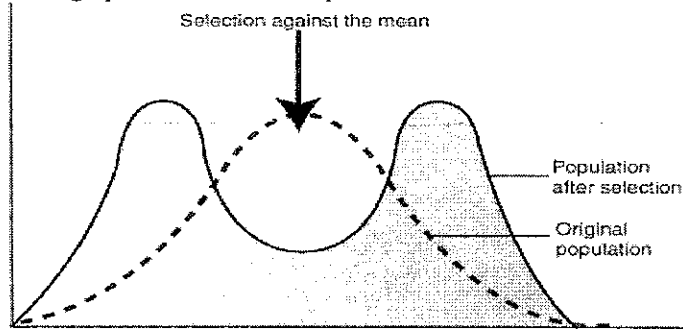
57. The diagram at right is most likely
- made of protein
 - an antigen
 - an antibody
 - Both a and b
 - Both a and c



58. Which of the following is not included in connective tissues?
- bone
 - skeletal muscle
 - cartilage
 - collagen
 - blood

59. Which of the following is true of the pulmonary circuit?
- Blood is pumped to the digestive system.
 - Oxygen-poor blood is received by the left atrium of the heart.
 - The right ventricle pumps oxygen-poor blood.
 - It bypasses the lungs.
 - It exists only in fishes.
60. Which cell is NOT the same type as the others?
- erythrocytes
 - neutrophils
 - lymphocytes
 - eosinophils
 - monocytes
61. The pulmonary circulation
- involves the hepatic portal vein.
 - moves oxygen-rich blood to the kidneys.
 - includes the coronary arteries.
 - leads to, through, and from the lungs.
 - all of these
62. What is the proper sequence in the flow of air in mammals?
- nasal cavities, larynx, pharynx, bronchi, trachea
 - nasal cavities, pharynx, bronchi, larynx, trachea
 - nasal cavities, pharynx, larynx, trachea, bronchi
 - nasal cavities, larynx, pharynx, trachea, bronchi
 - nasal cavities, bronchi, larynx, trachea, pharynx
63. When you swallow, the epiglottis covers the opening to the
- pharynx.
 - esophagus.
 - larynx.
 - bronchus.
 - alveoli.
64. During inhalation,
- the pressure in the thoracic cavity is greater than the pressure within the lungs.
 - the pressure in the thoracic cavity is less than the pressure within the lungs.
 - the diaphragm moves upward and becomes more curved.
 - the chest cavity volume decreases.
 - all of these
65. Botulism toxin is produced by
- Bacillus*.
 - cyanobacteria.
 - Clostridium*.
 - Chlamydia*.
 - E. coli*.
66. The Old Order Amish of Lancaster, Pennsylvania, a fairly closed community that arose from a relatively small population of German immigrants, display phenotypically a number of genetic disorders that are rare in the average non-Amish human population. Which phenomenon best explains this observation?
- founder effect
 - bottleneck effect
 - natural selection
 - nonrandom mating
 - genetic equilibrium

67. The graph below is an example of what kind of selection?



- a. stabilizing b. selective c. disruptive d. directional

68. Which of the following is a sex-linked disease?

- a. Turner Syndrom d. Maple Syrup Urine disease
 b. Klinefelter's Syndrome e. Marfan Syndrome
 c. Hemophilia

69. The enzyme pepsin starts the digestion of:

- A) starches in the mouth B) starches in the stomach C) proteins in the mouth
 D) proteins in the stomach E) Both C and D

70. Phylogenetic relationships, when determined solely by the study of comparative morphology, may be incorrect due to

- a. morphological divergence. d. extinction.
 b. morphological convergence. e. homology
 c. adaptive radiation.

71. The most conclusive evidence used in establishing the relationship of closely related species is

- a. fossil remains. d. homologous structures.
 b. taxonomy. e. analogous structures.
 c. nucleic acid hybridization.

72. Natural selection changes allele frequencies in populations because some _____ survive and reproduce more successfully than others.

- a. loci d. gene pools
 b. individuals e. alleles
 c. species

73. Sparrows with average-sized wings survive severe storms better than those with longer or shorter wings, illustrating

- a. neutral variation. d. frequency-dependent selection.
 b. the bottleneck effect. e. disruptive selection.
 c. stabilizing selection.

74. Which of these is the smallest unit upon which natural selection directly acts?

- a. an individual's phenotype d. an individual's genotype
 b. a population's gene frequency e. an individual's genome
 c. a species' gene frequency

75. Each of the following has a better chance of influencing gene frequencies in small populations than in large populations, but which one most consistently requires a small population as a precondition for its occurrence?

- a. Non-random mating d. Natural selection
 b. Gene flow e. Mutation
 c. Genetic drift

76. If the frequency of a particular allele that is present in a small, isolated population of Alpine plants decreases due to a landslide that leaves an even smaller remnant of surviving plants bearing this allele, then what has occurred?

- a. genetic drift
- b. microevolution
- c. a bottleneck
- d. A and B only
- e. A, B and C

77. Which of the following has the greatest effect on the rate of chemical cycling in an ecosystem?

- a. the location of the nutrient reservoirs in the ecosystem
- b. the rate of decomposition in the ecosystem
- c. the ecosystem's rate of primary production
- d. the trophic efficiency of the ecosystem
- e. the production efficiency of the ecosystem's consumers

78. Which of the following is a consequence of biological magnification?

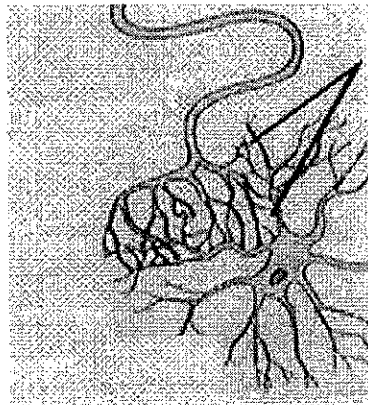
- a. Toxic chemicals in the environment pose greater risk to top-level predators than to primary consumers.
- b. The amount of biomass in the producer level of an ecosystem decreases if the producer turnover time increases.
- c. The biomass of producers in an ecosystem is generally higher than the biomass of primary consumers.
- d. Only a small portion of the energy captured by producers is transferred to consumers.
- e. Populations of top-level predators are generally smaller than populations of primary consumers.

79. How are matter and energy used in ecosystems?

- a. Matter is cycled through ecosystems; energy is not.
- b. Matter is used in ecosystems; energy is not
- c. Energy is cycled through ecosystems; matter is not.
- d. Energy can be converted into matter; matter cannot be converted into energy.
- e. Matter can be converted into energy; energy cannot be converted into matter.

80. The diagram below most likely depicts

- a. a neuromuscular junction
- b. two bone cells
- c. a cartilage cell and a neuron
- d. two neurons meeting at a synapse
- e. a complete reflex arc



**New Jersey Science League
Biology 1 Answer Key
Date: April 2010**

1 A	17 D	33 E	49 B	65 C
2 D	18 A	34 B	50 D	66 A
3 D	19 C	35 C	51 A	67 C
4 C	20 A	36 B	52 D	68 C
5 A	21 C	37 C	53 D	69 D
6 B	22 E	38 E	54 B	70 B
7 C	23 C	39 A	55 C	71 C
8 C	24 E	40 B	56 B	72 B
9 A	25 C	41 A	57 E	73 C
10 B	26 C	42 C	58 B	74 A
11 B	27 B	43 C	59 C	75 C
12 C	28 D	44 E	60 A	76 E
13 C	29 B	45 E	61 D	77 B
14 C	30 A	46 E	62 C	78 A
15 A	31 D	47 E	63 C	79 A
16 B	32 E	48 A	64 B	80 D

BIOLOGY I : No AP or second year students in this category. NOTE: Consistent with a modern approach to biology, principles of evolution will be included in every test as these apply to the topics listed.

JANUARY TEST - the process of science, principles of evolution natural selection, structure of matter (basic chemistry including the chemistry of water and pH), "biomolecules" (carbohydrates, proteins, lipids), microscopy, measurement, cell structure and function, diffusion, osmosis, active transport, cell metabolism, enzymes, ATP, philosophy/history and experiments pertaining to the preceding topics.

FEBRUARY TEST - evolution, mitosis/meiosis, patterns of genetic inheritance, DNA/RNA (structure, transcription, translation), viruses, bacteria, cell structure and function, photosynthesis, cell respiration, enzymes, philosophy/history and experiments pertaining to the preceding topics.

MARCH TEST - evolution, principles of taxonomy, phylogeny and classification, non-human animal structure/function/systems, plant structure/function/systems, life cycles, embryology, organismic reproduction, fungi, algae, ecology (ecological relationships and succession), disease, mitosis/meiosis, philosophy/history and experiments pertaining to the preceding topics.

APRIL TEST - evolution, biotechnology (genetic engineering, PCR, DNA fingerprinting, DNA manipulation, bioinformatics, stem cells), human anatomy & physiology, human nutrition, embryology, populations, animal/plant behavior, ecology (matter and energy in the living world), inherited and acquired disease, philosophy/history and experiments pertaining to the preceding topics.

Testing Dates for 2011

Thursday January 13, 2011, Thursday Feb 11, 2011;

****Thursday March 17, 2011; *Thursday April 14, 2011**

*The April 2011 exam can be changed based upon the Schools spring break.

**Changed due to HSPA testing.

New Jersey Science League
PO Box 65 Stewartsville, NJ 08886-0065
phone # 908-213-8923 fax # 908-213-8924 email njscil@enter.net Web address
www.enter.net/~njscil

