

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) Which choice best describes a reasonable evolutionary mechanism for animal structures becoming better suited to specific functions? 1) \_\_\_\_\_
- A) Animals with mutations that give rise to effective structures will become more abundant.
  - B) Animals with inventions that curtail reproduction will become more abundant.
  - C) Animals that eat the most food become the most abundant.
  - D) Animals with parents that continually improve their offspring's structures will become more abundant.
  - E) Animals that restrict their food intake will become less abundant.
- 2) Similar fusiform body shapes are seen in sharks, penguins, and aquatic mammals because 2) \_\_\_\_\_
- A) respiration through gills is enhanced by having a fusiform shape.
  - B) the fusiform shape is coded by the same gene in all three types of animals.
  - C) all three types evolved from ancestral forms that fly in the air.
  - D) the laws of physics constrain the shapes that are possible for aquatic animals that swim very fast.
  - E) natural selection has no limits when different organisms face the same challenge.
- 3) To increase the effectiveness of exchange surfaces in the lungs and in the intestines, evolutionary pressures have 3) \_\_\_\_\_
- A) increased the number of cell layers.
  - B) increased the volume of the cells in these linings.
  - C) increased the thickness of these linings.
  - D) increased the surface area available for exchange.
  - E) decreased the metabolic rate of the cells in these linings.
- 4) A specialized function shared by the many cells lining the lungs and the lumen of the gut is 4) \_\_\_\_\_
- A) greater protection due to increased cellular mass.
  - B) lowered basal metabolic rate due to cooperation between cells.
  - C) decreased oxygen demand due to the lack of oxygen in foods.
  - D) greater numbers of cell organelles contained within their cytoplasm.
  - E) increased exchange surface provided by their membranes.
- 5) Tissues are composed of cells, and tissues functioning together make up 5) \_\_\_\_\_
- A) organs.
  - B) organisms.
  - C) organelles.
  - D) membranes.
  - E) organ systems.
- 6) An exchange surface is in direct contact with the external environment in the 6) \_\_\_\_\_
- A) lungs.
  - B) skeletal muscles.
  - C) heart.
  - D) brain.
  - E) liver.

- 7) An example of a connective tissue is the \_\_\_\_\_  
A) skin.  
B) smooth muscles.  
C) cuboidal epithelium.  
D) nerves.  
E) blood.
- 8) Blood is best classified as connective tissue because \_\_\_\_\_  
A) it is found within all the organs of the body.  
B) it contains more than one type of cell.  
C) its cells can move from place to place.  
D) its cells can be separated from each other by an extracellular matrix.  
E) it is contained in vessels that "connect" different parts of an organism's body.
- 9) Bones are held together at joints by \_\_\_\_\_  
A) loose connective tissue.  
B) cartilage.  
C) ligaments.  
D) osteons.  
E) tendons.
- 10) The nucleus of a typical nerve cell is found in the \_\_\_\_\_  
A) dendritic region.  
B) cell body.  
C) synapse.  
D) synaptic terminals.  
E) axonal region.
- 11) Cardiac muscle is both \_\_\_\_\_  
A) smooth and voluntary.  
B) smooth and involuntary.  
C) striated and unbranched.  
D) striated and branched.  
E) striated and voluntary.
- 12) The cells lining the air sacs in the lungs make up a \_\_\_\_\_  
A) stratified squamous epithelium.  
B) simple columnar epithelium.  
C) simple squamous epithelium.  
D) pseudostratified ciliated columnar epithelium.  
E) cuboidal epithelium.
- 13) An ectotherm is more likely to survive an extended period of food deprivation than would an equally-sized endotherm because \_\_\_\_\_  
A) the ectotherm expends more energy/kg body weight than the endotherm.  
B) the ectotherm maintains a higher basal metabolic rate.  
C) the ectotherm has greater insulation on its body surface.  
D) the ectotherm metabolizes its stored energy more readily than can the endotherm.  
E) the ectotherm invests little energy in temperature regulation.

14) Endothermy

14) \_\_\_\_\_

- A) is a characteristic of most animals.
- B) is only seen in mammals.
- C) involves production of heat through metabolism.
- D) is only seen in insects.
- E) is a term equivalent to "cold-blooded."

The following question refers to Figure 40.1.

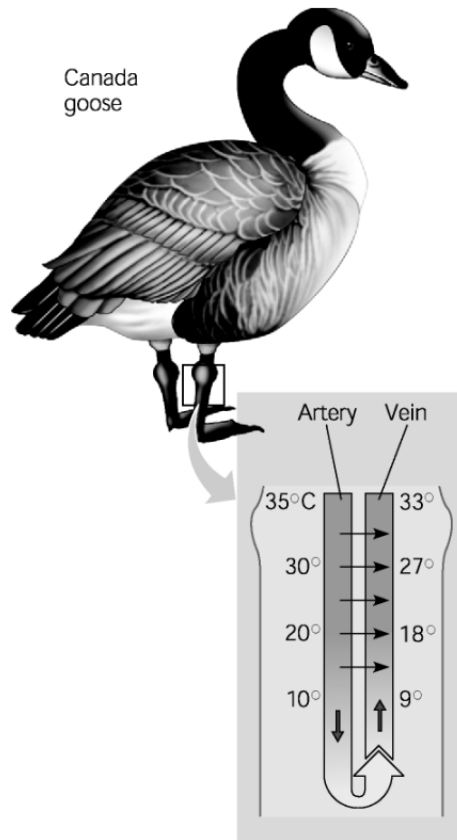


Figure 40.1

15) What does the difference in temperature between arteries and veins in the goose's legs indicate?

15) \_\_\_\_\_

- A) Minimizing the temperature difference between the feet and the abdomen means the goose will lose less heat.
- B) The arterial blood is always cooler in the abdomen, compared to its temperature in the feet of the goose.
- C) The goose's feet function well even when their temperature falls below freezing.
- D) The legs need to be kept cool so that muscles will function well.
- E) The feet need to be kept at the same temperature as the abdomen so that the feet do not freeze in water.

- 16) During the process of digestion, fats are broken down when fatty acids are detached from glycerol. In addition, proteins are digested to yield amino acids. What do these two processes have in common? 16) \_\_\_\_\_
- A) Each requires ATP as an energy source.
  - B) Both occur intracellularly in most organisms.
  - C) They involve the addition of a water molecule to break bonds (hydrolysis).
  - D) Both require the presence of hydrochloric acid to lower the pH.
  - E) They are catalyzed by the same enzyme.
- 17) Foods eaten by animals are most often composed largely of macromolecules. This requires the animals to have methods for which of the following? 17) \_\_\_\_\_
- A) regurgitation
  - B) elimination
  - C) dehydration synthesis
  - D) enzymatic hydrolysis
  - E) demineralization
- 18) To leave the digestive tract, a substance must cross a cell membrane. During which stage of food processing does this take place? 18) \_\_\_\_\_
- A) elimination
  - B) ingestion
  - C) absorption
  - D) hydrolysis
  - E) digestion
- 19) Humans can lose, but cannot gain, heat through the process of 19) \_\_\_\_\_
- A) conduction.
  - B) radiation.
  - C) convection.
  - D) metabolism.
  - E) evaporation.
- 20) Food moves along the digestive tract as the result of contractions by 20) \_\_\_\_\_
- A) cardiac muscles.
  - B) smooth muscles.
  - C) striated muscles.
  - D) skeletal muscles.
  - E) voluntary muscles.
- 21) Which of the following would probably contribute to constipation? A substance that 21) \_\_\_\_\_
- A) stimulates peristalsis.
  - B) contains plenty of fiber.
  - C) speeds up movement of material in the large intestine.
  - D) promotes water reabsorption in the large intestine.
  - E) decreases water reabsorption in the large intestine.

- 22) Which of these speed up heart rate? 22) \_\_\_\_\_  
 A) epinephrine  
 B) low-density lipoproteins  
 C) immunoglobulins  
 D) erythropoietin  
 E) platelets
- 23) In which group of animals would you expect to find a relatively long cecum? 23) \_\_\_\_\_  
 A) omnivores  
 B) heterotrophs  
 C) herbivores  
 D) autotrophs  
 E) carnivores
- 24) In which animal does blood flow from the pulmocutaneous circulation to the heart before circulating through the rest of the body? 24) \_\_\_\_\_  
 A) insect                      B) mollusc                      C) annelid                      D) frog                      E) fish
- 25) An anthropologist discovers fossilized animal remains that give strong evidence that the organism had a large, well-formed, most likely 4-chambered heart, with no connection between the right and left sides. Which of the following could most reasonably be hypothesized from this observation? 25) \_\_\_\_\_  
 A) that the animal and its relatives had evolved from birds  
 B) that the animal had a high energy requirement and was endothermic  
 C) that the species had little to no need to regulate blood pressure  
 D) that the animal was most closely related to reptiles such as alligators and crocodiles  
 E) that the animal was a kind of invertebrate
- 26) Why is the velocity of blood flow the lowest in capillaries? 26) \_\_\_\_\_  
 A) The capillary walls are not thin enough to allow oxygen to exchange with the cells.  
 B) The total surface area of the capillaries is larger than the total surface area of the arterioles.  
 C) The diastolic blood pressure is too low to deliver blood to the capillaries at a high flow rate.  
 D) The systemic capillaries are supplied by the left ventricle, which has a lower cardiac output than the right ventricle.  
 E) Capillaries are far from the heart, and blood flow slows as distance from the heart increases.
- 27) What would be the long-term effect if the lymphatic vessels associated with a capillary bed were to become blocked? 27) \_\_\_\_\_  
 A) More fluid would enter the venous capillaries.  
 B) Nothing would happen.  
 C) Blood pressure in the capillary bed would increase.  
 D) Fluid would accumulate in interstitial areas.  
 E) Fewer proteins would leak into the interstitial fluid from the blood.
- 28) Which of these are involved in the early stages of blood clotting? 28) \_\_\_\_\_  
 A) immunoglobulins  
 B) epinephrine  
 C) erythropoietin  
 D) low-density lipoproteins  
 E) platelets

- 29) The meshwork that forms the fabric of a blood clot consists mostly of which protein? 29) \_\_\_\_\_  
A) thrombin  
B) prothrombin  
C) fibrin  
D) collagen  
E) fibrinogen
- 30) Which of the following is a normal event in the process of blood clotting? 30) \_\_\_\_\_  
A) increase in platelets  
B) production of erythropoietin  
C) activation of prothrombin to thrombin  
D) clotting factor formation  
E) conversion of fibrin to fibrinogen
- 31) Which of the following are the only vertebrates in which blood flows directly from respiratory organs to body tissues without first returning to the heart? 31) \_\_\_\_\_  
A) birds  
B) reptiles  
C) fishes  
D) mammals  
E) amphibians
- 32) Which of the following features do all gas exchange systems have in common? 32) \_\_\_\_\_  
A) They are exposed to air.  
B) They are maintained at a constant temperature.  
C) They are enclosed within ribs.  
D) The exchange surfaces are moist.  
E) They are found only in animals.
- 33) Countercurrent exchange in the fish gill helps to maximize which of the following? 33) \_\_\_\_\_  
A) active transport  
B) blood pressure  
C) osmosis  
D) endocytosis  
E) diffusion
- 34) Why is the respiratory system of a bird more efficient than the human respiratory system? 34) \_\_\_\_\_  
A) A bird lung contains multiple alveoli, which increases the amount of surface area available for gas exchange.  
B) The human respiratory system ends in small parabronchi, which reduce the amount of surface area available for gas exchange.  
C) The bird respiratory system does not mix exhaled air with inhaled air.  
D) Only B and C are correct.  
E) A, B, and C are correct.
- 35) The blood level of which gas is *most* important in controlling human respiration rate? 35) \_\_\_\_\_  
A) carbon monoxide  
B) nitrogen  
C) carbon dioxide  
D) oxygen  
E) nitric acid

- 36) Where do air-breathing insects carry out gas exchange? 36) \_\_\_\_\_  
A) in specialized internal gills  
B) across the thin cuticular exoskeleton  
C) in the alveoli of their lungs  
D) across the membranes of cells  
E) in specialized external gills
- 37) Why is gas exchange more difficult for aquatic animals with gills than for terrestrial animals with lungs? 37) \_\_\_\_\_  
A) Water contains much less O<sub>2</sub> than air per unit volume.  
B) Gills allow water to flow in one direction  
C) Gills allow only unidirectional transport  
D) Water is less dense than air.  
E) Gills have less surface area than lungs.
- 38) Which action below is affected by an antihistamine? 38) \_\_\_\_\_  
A) the secondary immune response  
B) clonal selection by antigens  
C) blood vessel dilation  
D) MHC presentation by macrophages  
E) phagocytosis of antigens
- 39) In some insects, such as *Drosophila*, fungal cell wall elements can activate the protein *Toll*. What is *Toll*'s function? 39) \_\_\_\_\_  
A) functions directly to attack the fungi presented to it  
B) acts as a receptor that, when activated, signals synthesis of antimicrobial peptides  
C) produces antimicrobial peptides by interaction with chitin  
D) causes some hemocytes to phagocytize the pathogens  
E) secretes special recognition signal molecules that identifies specific pathogens
- 40) What are antigens? 40) \_\_\_\_\_  
A) proteins embedded in B cell membranes  
B) proteins that consist of two light and two heavy polypeptide chains  
C) proteins released during an inflammatory response  
D) proteins found in the blood that cause foreign blood cells to clump  
E) foreign molecules that trigger the generation of antibodies
- 41) If a newborn were accidentally given a drug that destroyed the thymus, what would most likely happen? 41) \_\_\_\_\_  
A) His humoral immunity would be missing.  
B) Genetic rearrangement of antigen receptors would not occur.  
C) His T cells would not mature and differentiate appropriately.  
D) His cells would lack class I MHC molecules on their surface.  
E) His B cells would be reduced in number and antibodies would not form.
- 42) Clonal selection implies that 42) \_\_\_\_\_  
A) only certain cells can produce interferon.  
B) the body selects which antigens it will respond to.  
C) a B cell has multiple types of antigen receptors.  
D) antigens increase mitosis in specific lymphocytes.  
E) brothers and sisters have similar immune responses.

Use the graph in Figure 43.1 to answer the following questions.

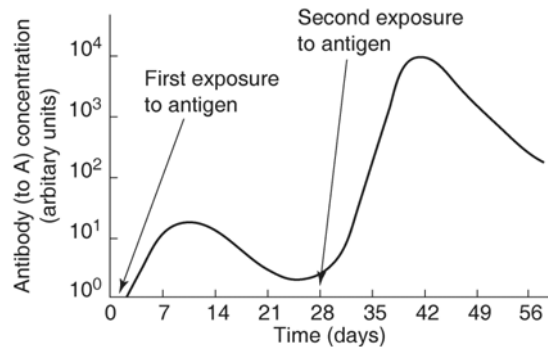


Figure 43.1

- 43) When would memory cells be produced? 43) \_\_\_\_\_
- A) between 0 and 7 days
  - B) between 7 and 14 days
  - C) between 28 and 35 days
  - D) between 35 and 42 days
  - E) both A and C
- 44) When would you find antibodies being produced? 44) \_\_\_\_\_
- A) between 3 and 7 days
  - B) between 14 and 21 days
  - C) between 28 and 35 days
  - D) 14-21 and 42-56 days
  - E) both A and C
- 45) Mammals have *Toll*-like receptors (TLRs) that act in a manner similar to those of insects. While not specific to a particular pathogen, a TLR can recognize a kind of macromolecule that is absent from vertebrates but present in/on certain groups of pathogens. Which of the following is most likely to be recognized by a particular TLR that defends against some viruses? 45) \_\_\_\_\_
- A) double-stranded DNA
  - B) lipopolysaccharides
  - C) double-stranded RNA
  - D) phospholipids
  - E) glycoproteins
- 46) Which of the following cell types are responsible for initiating a secondary immune response? 46) \_\_\_\_\_
- A) macrophages
  - B) stem cells
  - C) T cells
  - D) B cells
  - E) memory cells

- 47) The MHC is important in a T cell's ability to \_\_\_\_\_  
 A) recognize differences among types of cancer.  
 B) distinguish self from nonself.  
 C) identify specific bacterial pathogens.  
 D) identify specific viruses.  
 E) recognize specific parasitic pathogens.
- 48) For one person to produce over a million different antibody molecules could not possibly require over a million different genes. Instead, this variability is accounted for by which processes? \_\_\_\_\_  
 A) crossing-over between the light and heavy chains of each antibody molecule during meiosis I  
 B) DNA rearrangements followed by alternative splicing of the transcripts  
 C) DNA rearrangements in the thymus cells  
 D) increased rate of mutation in the RNA molecules  
 E) alternative splicing of exons after transcription
- 49) The following events occur when a mammalian immune system first encounters a pathogen. Which shows the correct sequence in which they occur? \_\_\_\_\_  
 I. Pathogen is destroyed.  
 II. Lymphocytes secrete antibodies.  
 III. Antigenic determinants from pathogen bind to antigen receptors on lymphocytes.  
 IV. Lymphocytes specific to antigenic determinants from pathogen become numerous.  
 V. Only memory cells remain.  
 A) IV → II → III → I → V  
 B) II → I → IV → III → V  
 C) III → II → I → V → IV  
 D) III → IV → II → I → V  
 E) I → III → II → IV → V
- 50) A transfusion of type A blood given to a person who has type O blood would result in which of the following? \_\_\_\_\_  
 A) no reaction because the O-type individual does not have antibodies  
 B) the recipient's anti-A antibodies clumping the donated red blood cells  
 C) no reaction because type O is a universal donor  
 D) the recipient's B antigens reacting with the donated anti-B antibodies  
 E) the recipient's anti-A and anti-O antibodies reacting with the donated red blood cells if the donor was a heterozygote (*Ai*) for blood type
- 51) Some pathogens can undergo rapid changes resulting in antigenic variation. Which of the following is such a pathogen? \_\_\_\_\_  
 A) the strep bacteria, which can be communicated from patient to patient with high efficiency  
 B) human papilloma virus, that can remain latent for several years  
 C) the causative agent of an autoimmune disease such as rheumatoid arthritis  
 D) the influenza virus, which expresses alternative envelope proteins  
 E) multiple sclerosis, that attacks the myelinated cells of the nervous system

- 52) In certain large animals, this type of neuron can extend beyond one meter in length 52) \_\_\_\_\_  
A) a neuron that controls eye movements.  
B) glial cell in the brain.  
C) an interneuron.  
D) a glial cell at a ganglion.  
E) a sensory neuron.
- 53) Neurotransmitters are released from axon terminals via 53) \_\_\_\_\_  
A) transcytosis.  
B) exocytosis.  
C) active transport.  
D) diffusion.  
E) osmosis.
- 54) The primary neurotransmitter from the parasympathetic system that influences its autonomic targets is 54) \_\_\_\_\_  
A) adenosine.  
B) dopamine.  
C) acetylcholine.  
D) adrenaline.  
E) norepinephrine.
- 55) The major inhibitory neurotransmitter of the human brain is 55) \_\_\_\_\_  
A) GABA.  
B) acetylcholine.  
C) epinephrine.  
D) endorphin.  
E) nitric oxide.
- 56) Neural transmission across a mammalian synaptic gap is accomplished by 56) \_\_\_\_\_  
A) the movement of calcium ions from the presynaptic into the postsynaptic neuron.  
B) impulses traveling as electrical currents across the gap.  
C) impulses ricocheting back and forth across the gap.  
D) impulses causing the release of a chemical signal and its diffusion across the gap.  
E) the movement of sodium and potassium ions from the presynaptic into the postsynaptic neuron.
- 57) A nervous system can alter activities in its target cells in muscles and glands because 57) \_\_\_\_\_  
A) they are electrically coupled by gap junctions.  
B) the target cells have receptor proteins for the signals released by the nervous system.  
C) the nervous system releases signals into the blood to control the target cells.  
D) the target cells each have an internal neural network connected to the nervous system.  
E) the target cells that become disconnected from the nervous system rapidly die.

- 58) In the communication link between a motor neuron and a skeletal muscle, 58) \_\_\_\_\_
- A) the motor neuron is considered the postsynaptic cell and the skeletal muscle is the presynaptic cell.
  - B) action potentials are possible on the motor neuron but not the skeletal muscle.
  - C) action potentials are possible on the skeletal muscle but not the motor neuron.
  - D) the motor neuron fires action potentials but the skeletal muscle is not electrochemically excitable.
  - E) the motor neuron is considered the presynaptic cell and the skeletal muscle is the postsynaptic cell.
- 59) Some viruses can undergo latency, the ability to remain inactive for some period of time. Which of the following is an example? 59) \_\_\_\_\_
- A) influenza, a particular strain of which returns every 10-20 years
  - B) Kaposi's sarcoma, which causes a skin cancer in people with AIDS, but rarely in those not infected by HIV
  - C) herpes simplex viruses (oral or genital) whose reproduction is triggered by physiological or emotional stress in the host
  - D) myasthenia gravis, an autoimmune disease that blocks muscle contraction from time to time
  - E) the virus that causes a form of the common cold, which recurs in patients many times in their lives
- 60) Which of the following is accounted for by immunological memory? 60) \_\_\_\_\_
- A) the human body's ability to distinguish self from nonself
  - B) the ancient observation that someone who had recovered from the plague could safely care for those newly diseased
  - C) the observation that some strains of the pathogen that causes dengue fever cause worse disease than others
  - D) the ability of the immune system to present antigen fragments in association with MHC antigens
  - E) the ability of a helper T cell to signal B cells via cytokines

## Answer Key

Testname: 182PRACTICE

- 1) A
- 2) D
- 3) D
- 4) E
- 5) A
- 6) A
- 7) E
- 8) D
- 9) C
- 10) B
- 11) D
- 12) C
- 13) E
- 14) C
- 15) A
- 16) C
- 17) D
- 18) C
- 19) E
- 20) B
- 21) D
- 22) A
- 23) C
- 24) D
- 25) B
- 26) B
- 27) D
- 28) E
- 29) C
- 30) C
- 31) C
- 32) D
- 33) E
- 34) C
- 35) C
- 36) D
- 37) A
- 38) C
- 39) B
- 40) E
- 41) C
- 42) D
- 43) E
- 44) E
- 45) C
- 46) E
- 47) B
- 48) B
- 49) D
- 50) B

## Answer Key

Testname: 182PRACTICE

- 51) D
- 52) E
- 53) B
- 54) C
- 55) A
- 56) D
- 57) B
- 58) E
- 59) C
- 60) B