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

Unit Three C Level Version A

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

____ 1. Why is the velocity of blood flow the lowest in capillaries?
a. The capillary walls are not thin enough to allow oxygen to exchange with the cells.
b. Capillaries are far from the heart, and blood flow slows as distance from the heart increases.
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. The total surface area of the capillaries is larger than the total surface area of the arterioles.

____ 2. The general functions of the nervous system include which of the following?
I. integration
II. motor output
III. sensory input

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

____ 3. Which of the following is a direct result of depolarizing the presynaptic membrane of an axon terminal?
a. Voltage-gated Ca^{2+} channels in the membrane open.
b. Synaptic vesicles fuse with the membrane.
c. The postsynaptic cell produces an action potential.
d. Ligand-gated channels open allowing neurotransmitters to enter the synaptic cleft.
e. An EPSP or IPSP is generated in the postsynaptic cell.

____ 4. Which of the following respiratory systems is not closely associated with a blood supply?
a. vertebrate lungs
b. fish gills
c. tracheal systems of insects
d. the outer skin of an earthworm
e. the parapodia of a polychaete worm

____ 5. What is the reason that fluid is forced out of systemic capillaries at the arteriole end?
a. The osmotic pressure of the interstitial fluid is greater than that of the blood.
b. The hydrostatic pressure of the blood is less than that of the interstitial fluid.
c. The hydrostatic pressure of the blood is greater than the osmotic pressure of the blood.
d. The osmotic pressure of the interstitial fluid is greater than the hydrostatic pressure of the blood.
e. The osmotic pressure of the blood is greater than the hydrostatic pressure of the interstitial fluid.

____ 6. Tracheal systems for gas exchange are found in which organism?
a. crustacean
b. earthworm
c. insect
d. jellyfish
e. vertebrate

____ 7. What is the term for metabolic pathways that release stored energy by breaking down complex molecules?
a. anabolic pathways
b. catabolic pathways
c. fermentation pathways
d. thermodynamic pathways
e. bioenergetic pathways

____ 8. What is the role of calcium in muscle contractions?
a. break the cross-bridges as a cofactor in the hydrolysis of ATP
b. bind to the troponin complex, which leads to the exposure of the myosin-binding sites
c. transmit the action potential across the neuromuscular junction
d. spread the action potential through the T tubules
e. reestablish the polarization of the plasma membrane following an action potential

____ 9. Which of the following features do all gas exchange systems have in common?
a. The exchange surfaces are moist.
b. They are enclosed within ribs.
c. They are maintained at a constant temperature.
d. They are exposed to air.
e. They are found only in animals.

____ 10. Where are neurotransmitter receptors located?
a. on the nuclear membrane
b. at nodes of Ranvier
c. on the postsynaptic membrane
d. on the membranes of synaptic vesicles
e. in the myelin sheath

____ 11. 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

____ 12. For most ecosystems ____ is (are) the ultimate source of energy, and energy leaves the ecosystem in the form of ____.
a. sunlight; heat
b. heat; light
c. plants; animals
d. plants; heat
e. producers; consumers

Use the data shown below to answer the following questions.

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

	Arterial End of Capillary Bed	Verous End of Capillary Bed
Hydrostatic pressure	8 mm Hg	14 mm Hg
Osmotic pressure	26 mm Hg	26 mm Hg
Po_2	100 mm Hg	42 mm Hg
Pco_2	40 mm Hg	46 mm Hg

____ 13. Which of the following is a characteristic of *both* hemoglobin and hemocyanin?
a. found within blood cells
b. red in color
c. contains the element iron as an oxygen-binding component
d. transports oxygen
e. occurs in mammals

____ 14. In a typical multicellular animal, the circulatory system interacts with various specialized surfaces in order to exchange materials with the exterior environment. Which of the following is *not* an example of such an exchange surface?
a. lung
b. muscle
c. skin
d. intestine
e. kidney

____ 15. If a stimulus is to be perceived by the nervous system, which part of the sensory pathway must occur *first*?
a. integration
b. transmission
c. transduction
d. reception
e. amplification

____ 16. Neurotransmitters are released from presynaptic axon terminals into the synaptic cleft by which mechanism?
a. osmosis
b. active transport
c. diffusion
d. endocytosis
e. exocytosis

____ 17. Two plant species live in the same biome but on different continents. Although the two species are not at all closely related, they may appear quite similar as a result of
a. parallel evolution.
b. convergent evolution.
c. allopatric speciation.
d. introgression.
e. gene flow.

____ 18. Neurotransmitters affect postsynaptic cells by
a. initiating signal transduction pathways in the cells.
b. causing molecular changes in the cells.
c. affecting ion-channel proteins.
d. altering the permeability of the cells.
e. all of the above

____ 19. Why do sharks, penguins, and aquatic mammals have the same fusiform body shape?
a. Natural selection shapes similar adaptations when diverse organisms face the same environmental challenge.
b. Respiration through gills is enhanced by having a fusiform shape.
c. The laws of hydrodynamics constrain the shapes that are possible for aquatic animals that swim very fast.
d. A and C only
e. A, B, and C

____ 20. What do cohesion, surface tension, and adhesion have in common with reference to water?
a. All increase when temperature increases.
b. All are produced by ionic bonding.
c. All are properties related to hydrogen bonding.
d. All have to do with nonpolar covalent bonds.
e. C and D only

____ 21. After an action potential, the resting potential is restored by
a. the opening of sodium activation gates.
b. the opening of voltage-sensitive potassium channels and the closing of sodium activation gates.
c. an increase in the membrane's permeability to potassium and chloride ions.
d. the delay in the action of the sodium-potassium pump.
e. the refractory period in which the membrane is hyperpolarized.

____ 22. A controlled experiment is one in which
a. the experiment is repeated many times to ensure that the results are accurate.
b. the experiment proceeds at a slow pace to guarantee that the scientist can carefully observe all reactions and process all experimental data.
c. there are at least two groups, one of which does not receive the experimental treatment.
d. there are at least two groups, one differing from the other by two or more variables.
e. there is one group for which the scientist controls all variables.

____ 23. Which of the following changes occurs when a skeletal muscle fiber contracts?
a. The A bands shorten.
b. The I bands shrink.
c. The Z lines slide farther apart.
d. The thin filaments contract.
e. The thick filaments contract.

____ 24. Why is glycolysis considered to be one of the first metabolic pathways to have evolved?
a. It produces much less ATP than does oxidative phosphorylation.
b. It is found in the cytosol, does not involve oxygen, and is present in most organisms.
c. It is found in prokaryotic cells but not in eukaryotic cells.
d. It relies on chemiosmosis which is a metabolic mechanism present only in the first cells-prokaryotic cells.
e. It requires the presence of membrane-enclosed cell organelles found only in eukaryotic cells.

____ 25. All of the following respiratory surfaces are associated with capillary beds *except* the
a. gills of fishes.
b. alveoli of lungs.
c. tracheae of insects.
d. skin of earthworms.
e. skin of frogs.

____ 26. Which of the following sensory receptors is *incorrectly* paired with its category?
a. hair cell-mechanoreceptor
b. muscle spindle-mechanoreceptor
c. taste receptor-chemoreceptor
d. rod-electromagnetic receptor
e. olfactory receptor-electromagnetic receptor

____ 27. Where do synaptic vesicles discharge their contents by exocytosis?
a. dendrite
b. axon hillock
c. nodes of Ranvier
d. postsynaptic membrane
e. presynaptic membrane

____ 28. An organism that lacks integration centers
a. cannot receive stimuli.
b. will not have a nervous system.
c. will not be able to interpret stimuli.
d. can be expected to lack myelinated neurons.
e. both A and D

____ 29. Which of the following is true of interstitial fluid?
a. It forms the extracellular matrix of connective tissue.
b. It is the internal environment found in animal cells.
c. It is composed of blood.
d. It provides for the exchange of materials between blood and body cells.
e. It is found inside the small intestine.

____ 30. How does positive feedback differ from negative feedback?
a. Positive feedback benefits the organism, whereas negative feedback is detrimental.
b. In positive feedback, the effector's response is in the same direction as the initiating stimulus rather than opposite to it.
c. In positive feedback, the effector increases some parameter (such as temperature), whereas in negative feedback it decreases.
d. Positive feedback systems have effectors, whereas negative feedback systems utilize receptors.
e. Positive feedback systems have control centers that are lacking in negative feedback systems.

____ 31. Which of following is a true statement about the threshold potential of a membrane?
a. It is equal to about 35 mV.
b. It is equal to about 70 mV.
c. It opens voltage-sensitive gates that result in the rapid outflow of sodium ions.
d. It is the depolarization that is needed to generate an action potential.
e. It is a graded potential that is proportional to the strength of a stimulus.

____ 32. Probably the most important factor(s) affecting the distribution of biomes is (are)
a. wind and water current patterns.
b. species diversity.
c. community succession.
d. climate.
e. day length and rainfall.

____ 33. Regardless of their size, the one thing that is common to all animals is
a. an external body surface that is dry.
b. a basic body plan that resembles a two-layered sac.
c. the use of homeostatic mechanisms to control their internal environment.
d. the use of positive and negative feedback cycles to regulate body water content.
e. having cells surrounded by an aqueous medium.

____ 34. The dynamics of any ecosystem include the following major processes:
a. the flow of energy from sunlight to producers
b. the flow of energy from sunlight to producers and then to consumers
c. the recycling of chemical nutrients
d. the flow of energy to producers and the recycling of nutrients
e. the flow of energy from sunlight to producers and then to consumers, and the recycling of chemical nutrients

____ 35. Air rushes into the lungs of humans during inhalation because
a. the rib muscles and diaphragm contract, increasing the lung volume.
b. pressure in the alveoli increases.
c. gas flows from a region of lower pressure to a region of higher pressure.
d. pulmonary muscles contract and pull on the outer surface of the lungs.
e. a positive respiratory pressure is created when the diaphragm relaxes.

____ 36. What is a hypothesis?
a. the same thing as an unproven theory
b. a tentative explanation that can be tested and is falsifiable
c. a verifiable observation sensed directly, or sensed indirectly with the aid of scientific instrumentation
d. a fact based on qualitative data that is testable
e. a fact based on quantitative data that is falsifiable

____ 37. Why is gas exchange more difficult for aquatic animals with gills than for terrestrial animals with lungs?
a. Water is denser than air.
b. Water contains much less O_2 than air per unit volume.
c. Gills have less surface area than lungs.
d. Only A and B are correct.
e. A, B, and C are correct.

____ 38. Which of the following receptors is incorrectly paired with the type of energy it transduces?
a. mechanoreceptors-sound
b. electromagnetic receptors-magnetism
c. chemoreceptors-solute concentrations
d. thermoreceptors-heat
e. pain receptors-electricity

____ 39. During the contraction of a vertebrate skeletal muscle fiber, calcium ions
a. break cross-bridges by acting as a cofactor in the hydrolysis of ATP.
b. bind with troponin, changing its shape so that the myosin-binding sites on actin are exposed.
c. transmit action potentials from the motor neuron to the muscle fiber.
d. spread action potential through the T tubules.
e. reestablish the polarization of the plasma membrane following an action potential.

____ 40. Which is a correct statement concerning the insect circulatory system?
a. The circulating fluid bathes tissues directly.
b. Blood is always contained in a system of tubes called tracheae.
c. Blood transports oxygen and nutrients to all the tissues.
d. There is no heart, or pump.
e. There is no blood, or circulating fluid.

____ 41. The sodium-potassium pump of neurons pumps
a. Na^+ and K^+ into the cell.
b. Na^+ and K^+ out of the cell.
c. Na^+ into the cell and K^+ out of the cell.
d. Na^+ out of the cell and K^+ into the cell.
e. Na^+ and K^- into the cell and H^+ out of the cell through an antiport.

____ 42. The body's automatic tendency to maintain a constant internal environment is termed
a. negative feedback.
b. physiologic control.
c. homeostasis.
d. static equilibrium.
e. organ system function.

____ 43. In negative pressure breathing, inhalation results from
a. forcing air from the throat down into the lungs.
b. contracting the diaphragm.
c. relaxing the muscles of the rib cage.
d. using muscles of the lungs to expand the alveoli.
e. contracting the abdominal muscles.

____ 44. Which of the following does not form part of the thin filaments of a muscle cell?
a. actin
b. troponin
c. tropomyosin
d. myosin
e. calcium-binding site

____ 45. When you hold your breath, which of the following blood gas changes first leads to the urge to breathe?
a. rising O_2
b. falling O_2
c. rising CO_2
d. falling CO_2
e. rising CO_2 and falling O_2

____ 46. Compared to a smaller cell, a larger cell of the same shape has
a. less surface area.
b. less surface area per unit of volume.
c. the same surface-to-volume ratio.
d. a smaller average distance between its mitochondria and the external source of oxygen.
e. a smaller cytoplasm-to-nucleus ratio.

____ 47. Which part of the vertebrate nervous system is most involved in preparation for the fight-or-flight response?
a. sympathetic
b. somatic
c. central
d. visceral
e. parasympathetic

____ 48. Which of the following is a sensation and not a perception?
a. seeing the colors in a rainbow
b. a nerve impulse induced by sugar stimulating sweet receptors on the tongue
c. the smell of natural gas escaping from an open burner on a gas stove
d. the unique taste of french fries with cheese
e. the sound of a fire-truck siren as it passes by your car

____ 49. What is the term used for the metabolic pathway in which glucose ($C_6H_{12}O_6$) is degraded to carbon dioxide (CO_2) and water?
a. cellular respiration
b. glycolysis
c. fermentation
d. citric acid cycle
e. oxidative phosphorylation

____ 50. Compared to the interstitial fluid that bathes active muscle cells, blood reaching these cells in arteries has a
a. higher P_{O_2}.
b. higher P_{CO_2}.
c. greater bicarbonate concentration.
d. lower pH.
e. lower osmotic pressure.

Unit Three C Level Version A
Answer Section

MULTIPLE CHOICE

1.	ANS: E	PTS: 1	TOP: Concept 42.3
2.	ANS: E	PTS: 1	TOP: Concept 48.1
3.	ANS: A	PTS: 1	
4.	ANS: C	PTS: 1	
5.	ANS: C	PTS: 1	TOP: Concept 42.3
6.	ANS: C	PTS: 1	TOP: Concept 42.5
7.	ANS: B	PTS: 1	TOP: Concept 9.1
8.	ANS: B	PTS: 1	TOP: Concept 49.6
9.	ANS: A	PTS: 1	TOP: Concept 42.1 | Concept 42.5
10.	ANS: C	PTS: 1	
11.	ANS: A	PTS: 1	TOP: Concept 40.1
12.	ANS: A	PTS: 1	TOP: Concept 1.1
13.	ANS: D	PTS: 1	TOP: Concept 42.7
14.	ANS: B	PTS: 1	TOP: Concept 40.2
15.	ANS: D	PTS: 1	TOP: Concept 49.1
16.	ANS: E	PTS: 1	TOP: Concept 48.4
17.	ANS: B	PTS: 1	TOP: Concept 50.4
18.	ANS: E	PTS: 1	TOP: Concept 48.4
19.	ANS: D	PTS: 1	TOP: Concept 40.1
20.	ANS: C	PTS: 1	TOP: Concept 3.2
21.	ANS: B	PTS: 1	TOP: Concept 48.3
22.	ANS: C	PTS: 1	TOP: Concept 1.5
23.	ANS: B	PTS: 1	
24.	ANS: B	PTS: 1	TOP: Concept 9.5
25.	ANS: C	PTS: 1	TOP: Concept 42.1 | Concept 42.5
26.	ANS: E	PTS: 1	
27.	ANS: E	PTS: 1	TOP: Concept 48.4
28.	ANS: C	PTS: 1	TOP: Concept 48.1
29.	ANS: D	PTS: 1	TOP: Concept 40.1
30.	ANS: B	PTS: 1	TOP: Concept 40.4
31.	ANS: D	PTS: 1	TOP: Concept 48.3
32.	ANS: D	PTS: 1	TOP: Concept 50.3 | Concept 50.4
33.	ANS: E	PTS: 1	TOP: Concept 40.1
34.	ANS: E	PTS: 1	TOP: Concept 1.1
35.	ANS: A	PTS: 1	TOP: Concept 42.6
36.	ANS: B	PTS: 1	TOP: Concept 1.5
37.	ANS: D	PTS: 1	TOP: Concept 42.5
38.	ANS: E	PTS: 1	TOP: Concept 49.1
39.	ANS: B	PTS: 1	
40.	ANS: A	PTS: 1	TOP: Concept 42.1

41.	ANS: D	PTS: 1	TOP: Concept 48.2
42.	ANS: C	PTS: 1	TOP: Concept 40.4
43.	ANS: B	PTS: 1	
44.	ANS: D	PTS: 1	TOP: Concept 49.6
45.	ANS: C	PTS: 1	
46.	ANS: B	PTS: 1	
47.	ANS: A	PTS: 1	TOP: Concept 48.5
48.	ANS: B	PTS: 1	TOP: Concept 49.1
49.	ANS: A	PTS: 1	TOP: Concept 9.1
50.	ANS: A	PTS: 1	