

When you are done, you must turn in the entire exam and your answer sheet to Dr. Alexander or one of the proctors, and show them your identification, or your exam will not be graded. Keep your answer sheet and test as shielded as possible at all times. Good luck!

Name (PRINT!) _____ Student # _____

For each question, please fill in the appropriate circle on your answer sheet the answer that you think BEST answers the question. Be sure that you read the entire question first. The questions are worth 2 points each.

1. In each of the following choices below, blood travels directly from the first structure into the second. However, one choice is incorrect. Which choice is incorrect?

- A) left ventricle → aorta. B) vena cava → right atrium. C) left atrium → left ventricle.
D) capillary bed → arteriole. E) right ventricle → pulmonary artery.

2. Carbon dioxide is transported in blood primarily in the form of:

- A) dissolved carbon dioxide gas. B) bicarbonate (HCO_3^-). C) carbonic acid (H_2CO_3).
D) carbon monoxide (CO). E) carbohydrates (CHO).

3. If you are allergic to ragweed, it is because mast cells, in response to subsequent exposure to the ragweed pollen, produce large amounts of _____, which trigger the inflammatory response.

- A) ragweed antigen. B) antibodies. C) interferon. D) complement. E) histamines.

4. What is the body's first line of defense against infections?

- A) antibodies. B) T-cells. C) skin and mucus membranes. D) B-cells. E) G-cells.

5. The body's automatic tendency to maintain a constant internal environment is termed:

- A) reductive feedback. B) physiologic control. C) homeostasis. D) static equilibrium. E) organogenesis.

6. Which method of heat loss or gain is primarily responsible for the following phenomenon: on a windy day, the wind carries off excess heat energy from the coyote via which mechanism?

- A) conduction. B) convection. C) radiation. D) evaporation. E) metabolism.

7. Which of the following by-products of metabolism is the most toxic to animals?

- A) adenine. B) uric acid. C) urea. D) glycine. E) ammonia.

8. Which of the following lists the correct path of carbon dioxide moving out from the alveoli to the outside of the body?

- A) alveoli - bronchioles - bronchi - larynx - pharynx - trachea - oral cavity.
B) alveoli - bronchi - bronchioles - trachea - larynx - pharynx - oral cavity.
C) alveoli - bronchioles - bronchi - trachea - larynx - pharynx - oral cavity.
D) alveoli - bronchi - bronchioles - larynx - trachea - pharynx - oral cavity.
E) alveoli - bronchi - bronchioles - trachea - pharynx - larynx - oral cavity.

9. The large intestine (the colon) primarily absorbs:

- A) proteins. B) glucose. C) fatty acids. D) amino acids. E) water.

10. The meshwork that forms the fabric of a blood clot mostly consists of which of the following proteins?

- A) collagen. B) fibrin. C) thrombin. D) immunoglobulins. E) albumins.

11. B cells form plasma cells, which in turn produce antibodies. A) True. B) False.

12. An animal equipped with metanephridia for collection of nitrogenous wastes:

- A) insect. ~~B) earthworm.~~ ~~C) human.~~ ~~D) flatworm.~~ E) an amoeba.

13. Which of the following is a water-soluble vitamin that acts as an antioxidant?

- ~~A) vitamin A.~~ B) vitamin B. **C) vitamin C.** ~~D) vitamin D.~~ ~~E) vitamin E.~~

14. Which of the following is a correct statement about bile salts? A) they are enzymes. B) they are produced by the pancreas. **C) they increase the efficiency of pepsin action.** D) they are found in gastric juice.

- E) they emulsify fats.**

15. The amniotic egg first evolved in which vertebrate group?

- A) fish. B) egg-laying mammals (monotremes). C) amphibians. **D) reptiles.** E) birds.

16. Lancelets belong to the subphylum:

- A) Urochordata. B) Mammalia. **C) Cephalochordata.** D) Craniata. E) Chordata.

17. A new species of vertebrate was discovered. It has a three-chambered heart, gills that were lost as the juvenile tadpole metamorphosed into an adult, and it could be found in moist terrestrial environments and in the water. It breathes primarily through its skin. A knowledgeable biologist would also predict it also had:

- ~~A) fur.~~ ~~B) cartilaginous endoskeleton.~~ ~~C) amniotic egg.~~ ~~D) a tunic of cellulose.~~ **E) a double circulation** (pulmonary and systemic circulation).

amph.

18. Countercurrent exchange in the fish gill helps to maximize:

- A) blood pressure. B) phagocytosis. **C) diffusion of oxygen.** D) active transport. E) osmosis.

19. Which of the following is **not** one of the main features which characterize all Chordates?

- A) post-anal tail. B) pharyngeal gill slits. C) notochord. **D) ventral nerve cord.**

20. Where would you find alveoli?

- A) in the lung.** B) in the thymus. C) in the stomach. D) in the kidney. E) in the ovary.

21. Which mammals have eggs that hatch inside the female, and the young complete development in a pouch?

- A) monotremes. **B) marsupials.** C) eutherian mammals.

22. The type of muscle that has uninucleated cells, possesses striations, and forms intercalated disks between adjacent cells: ~~A) smooth muscle.~~ ~~B) epitheliomuscular.~~ C) skeletal muscle. **D) cardiac muscle.** E) connective muscle.

23. On a walk, you found a small chordate animal. As adults, the animal loses the notochord (which is present in the larvae) and the adult lives as a benthic marine filter-feeder with an outer coat called the tunic. The pharynx is expanded into a basket-like structure. It is in the subphylum:

- ~~A) Vertebrata.~~ **B) Urochordata.** ~~C) Cephalochordata.~~ ~~D) Hemichordata.~~

24. The neuron consists of all of the following things except:

- A) lacunae.** B) cell body. C) dendrites. D) axons. E) All of the above are parts of the neuron.

25. Skeletal muscles are: A) smooth and involuntary. B) smooth and unbranched. C) smooth and voluntary.

- D) striated and voluntary.** E) striated and branched.

26. Vertebrates with cartilaginous skeletons, fins, and high levels of urea in their blood:

- A) Chondrichthyes.** ~~B) Osteichthyes.~~ ~~C) Amphibia.~~ ~~D) Agnatha.~~ ~~E) Reptilia.~~

27. The class Osteichthyes is characterized by A) a bony endoskeleton, operculum and swim bladder.
 B) a cartilaginous endoskeleton. C) an amniotic egg. D) teeth that are replaced regularly.
E) Two of the above are correct answers.

Muscle
Skeletal
Smooth
Cardiac

28. The outermost extraembryonic membrane involved in gas exchange from the embryo and the outside, through the shell. A) allantois. B) amnion. C) chorion. D) yolk sac.

29. Which of the following is false of both hagfish and lampreys? A) they both have two pairs of semicircular canals. B) they both have a notochord. C) they lack jaws. D) they both have pharyngeal gill slits. E) they both possess a nerve cord.

30. Which of the following is/are example(s) of epithelial tissue? A) red blood cells. B) lining of the lung alveoli.
C) bone. D) answers A and C are both correct. E) answers A, B and C are all correct.

31. A multilayered arrangement of flattened cells would be called: A) complex squamous. B) stacked cuboidal.
 C) pseudostratified columnar. D) simple columnar. E) stratified squamous.

32. Which of the following traits is true concerning the type of muscle cells involved in moving food down the digestive tract? A) cardiac. B) branched. C) striated. D) multinucleated cells. E) involuntary.

33. Salivary glands secrete an enzyme or enzymes that start the digestion of:
 A) carbohydrates. B) proteins. C) lipids. D) nucleic acids. E) all of the above answers are correct.

34. The largest lymphatic organ, found next to the stomach, divided into lobules, and has a red pulp reservoir for red blood cells: A) liver. B) spleen. C) pancreas. D) thymus. E) tonsil.

35. Most of the oxygen is transported through the body in which fashion?
A) dissolved in the blood plasma. B) dissolved in white blood cell cytoplasm. C) bound to neon atoms attached to hemoglobin.
 D) bound to the iron atom in hemoglobin. E) as bicarbonate.

36. Pancreatic juices contain an enzyme or enzymes that digests:
A) carbohydrates. B) proteins. C) lipids. D) nucleic acids. E) all of the above answers are correct.

37. Which of the following is a function of antibody IgE? A) B cell activation. B) lysis of certain microbes.
C) activate complement. D) clump bacterial cells. E) work against parasitic worms.

38. Which of the following groups do birds belong to?
 A) uricotelic animals. B) ureotelic animals. C) ammonotelic animals.

39. The pathway of urine from kidney to the outside is:
A) kidney - ureter - bladder - epididymis - urethra.
B) kidney - ureter - gall bladder - bladder - urethra.
C) kidney - urethra - bladder - ureter.
D) kidney - ureter - liver - gall bladder - bladder - ureter.
 E) kidney - ureter - bladder - urethra.

40. Bowman's capsules are part of which system?
 A) excretory. B) digestive. C) circulatory. D) respiratory. E) nervous.

41. One-way valves are found in which of the following structures?
A) veins. B) arteries. C) capillaries. D) lymphatic vessels. E) two of the above answers are correct.

42. After engulfing a pathogen, a macrophage places _____ on its outer surface, which a helper T cell can recognize and become activated: A) complement. B) MHC proteins and antigens of the pathogen. C) cytokines. D) antibodies. E) antihistamines.
43. Most nutrients are absorbed across the epithelium of the: A) colon. B) esophagus. C) stomach. D) liver. E) small intestine.
44. Smooth muscle propels food through the digestive tract by a process called: A) homeostasis. B) diastasis. D) diffusion. D) peristalsis. E) phagocytosis.
45. The enzyme pepsin is secreted from stomach cells in the _____ form. A) active. B) inactive.
46. Oxygen diffuses to the tissues of terrestrial arthropods (such as the ants and beetles) through: A) blood contained in arteries. B) cells of the cortex. C) lungs. D) ommatidia. E) tracheae.
47. Villi serve to: A) produce antibodies. B) secrete bile. C) increase the filtering area of the kidneys. D) increase the surface area of the intestine for the absorption of nutrients. E) increase the surface area of the lung for gas exchange.
48. Which vertebrate class includes both skunks and bears? A) Aves. B) Reptilia. C) Amphibia. D) Mammalia. E) Osteichthyes.
49. Because arteries carry blood _____ the heart, they operate under _____ pressure than veins. A) toward, higher. B) toward, lower. C) away from, higher. D) away from, lower.
50. All Chordates are vertebrates, but not all vertebrates are chordates. A) True. B) False.