**MULTIPLE CHOICE:**

1. Which of the following would **NOT** be considered part of the MALT?
   a. all of the tonsils (tubal, pharyngeal, palatine, lingual)
   b. the appendix
   c. the Peyer’s Patches
   d. the thymus
   e. none of the above are part of the MALT

2. Which of the following is **NOT** a function of the spleen?
   a. storage of platelets
   b. removal of cells (pathogens)/toxins from lymph
   c. storage of breakdown products of hemoglobin
   d. storage of lymphocytes
   e. removal of cells (pathogens) from blood

3. Non-specific cells that attack tumor cells or body cells infected with viruses are
   a. B cells
   b. natural killer cells
   c. helper T cells
   d. cytotoxic T cells
   e. suppressor T cells

4. The cells directly responsible for cell-mediated immunity are the
   a. natural killer cells
   b. B cells
   c. helper T cells
   d. cytotoxic T cells
   e. suppressor T cells

5. Interferon functions to:
   a. kill viruses
   b. kill cancerous cells
   c. prevent virus proliferation in non-infected cells
   d. increase the permeability of capillaries
   e. increase body temperature

6. What causes circulating white blood cells to congregate at the site of injured tissue?
   a. Once a capillary ruptures and white blood cells enter the tissues, they cannot return to the circulatory system.
   b. The increased number of white blood cells is strictly a function of the increased blood flow through an inflamed area.
   c. Chemicals released by damaged cells in the damaged area attract white blood cells.
   d. Circulating white blood cells are initially trapped in blood clots, from which they migrate into the damaged tissues.
   e. The local temperature rise that occurs in injured tissue attracts white blood cells.
7. Class I MHC molecules are found  
a. on all body cells with a nucleus  
b. on red blood cells  
c. on granulocytes  
d. on lymphocytes, macrophages, and certain other cells  
e. on liver cells and macrophages in the spleen  

8. Which of the following is NOT a non-specific, external, chemical defense against invading pathogens?  
a. complement  
b. sweat/sebum secretion  
c. vaginal acids  
d. enzymes of the digestive system  
e. lysozyme  

9. After blood has passed through the capillary beds of the systemic tissues while at rest, it is typically still at least ______ percent oxygenated.  
a. 90  
b. 70  
c. 50  
d. 30  
e. 100  

10. The chemoreceptors involved in regulating breathing rate respond primarily to changes in:  
a. oxygen  
b. carbon dioxide  
c. red blood cells  
d. hemoglobin  
e. nitrogen  

11. In quiet (at rest) breathing  
a. inspiration and expiration involve muscular contractions  
b. inspiration is passive and expiration involves muscular contractions  
c. inspiration involves muscular contractions and expiration is largely passive  
d. inspiration and expiration are both passive processes  
e. none of the above  

12. If a student inhales as deeply as possible and then blows the air out until he cannot exhale any more, the amount of air that remains in the lungs is the  
a. tidal volume  
b. residual volume  
c. dead air space  
d. total lung capacity  
e. vital capacity  

13. Which of the following factors would increase the amount of oxygen discharged by hemoglobin to peripheral tissues?  
a. increased temperature  
b. increased pH  
c. increased tissue PO₂  
d. decreased amounts of CO₂  
e. all of the above
14. The chloride shift in blood at the lungs occurs when
a. hydrogen ions leave the red blood cells
b. hydrogen ions enter the red blood cells
c. bicarbonate ions enter the red blood cells
d. bicarbonate ions leave the red blood cells
e. carbonic dioxide enters the tissues

15. Variable amino acid sequences on the arms of the antibody molecule
a. make the antibody specific for a given antigen
b. are part of the light chains
c. are part of the heavy chains
d. a and b
e. all of the above

16. Tina is singing a song. At a certain point in the song she forces a large volume of air out of the glottis and at the same time increases the tension on her vocal cords. The sound that she produces is
a. low pitched and loud
d. high pitched and soft
b. high pitched and loud
e. medium pitched and soft
c. low pitched and soft

17. Dalton’s law states that
a. gas volume and temperature are directly proportional
b. gas volume and pressure are inversely proportional
c. the volume of gas that will dissolve in a solvent is proportional to the solubility of the gas and the gas partial pressure
d. in a mixture of gases like air, the total pressure is the sum of the individual partial pressures of the gases in the mixture
e. none of the above

18. Artificially acquired active immunity occurs when
a. a person is infected by a pathogen through a cut in the finger
b. an infant receives antibodies through mother’s milk
c. a person is given an injection of antigens
d. a person is given an injection of extra antibodies to supplement his own
e. a person is given an antibiotic of some kind to help fight off the infection

19. Why is the circulatory function of the lymphatic system essential to normal body functioning?
a. returns blood to the circulatory system
b. returns lost fluids to the circulatory system
c. helps return unused oxygen to the circulatory system
d. helps spread cancer cells
e. b. & c.
20. Which of the following is NOT a function of the nasal/sinus cavities?
   a. cleansing the air  
   b. warming the air  
   c. moistening the air  
   d. gas exchange  
   e. resonance of voice

21. The following is a list of some of the structures of the respiratory tree.
   1. lobar bronchi  
   2. small bronchi/large bronchioles  
   3. trachea  
   4. primary bronchi  
   5. respiratory bronchioles  
   6. alveoli  
   7. terminal bronchioles

   The order in which air passes through these structures on the way in is
   a. 3, 4, 1, 2, 7, 5, 6  
   b. 3, 4, 1, 2, 5, 7, 6  
   c. 3, 1, 4, 2, 5, 7, 6  
   d. 3, 1, 4, 2, 7, 5, 6  
   e. 2, 3, 4, 1, 7, 5, 6

22. The almost immediate large respiratory rate increase when beginning mild exercise is due to
   a. the almost immediate large increase in O₂ demand  
   b. the almost immediate large increase in CO₂ production by the body  
   c. CNS (psychic) stimuli, with increase in sympathetic system activity  
   d. increased lactic acid production  
   e. consciously taking deep, chest-filling breaths to impress the babe/guy exercising nearby

23. Air moves out of the lungs when
   a. the gas pressure in the lungs is less than outside pressure  
   b. the volume of the lungs decreases with elastic recoil  
   c. the thorax increases in volume  
   d. contraction of the diaphragm decreases the volume of the pleural cavity  
   e. all of the above

24. Most of the carbon dioxide in the blood is transported as
   a. CO₂ dissolved directly in the plasma  
   b. carbaminohemoglobin  
   c. bicarbonate ion  
   d. CO₂ dissolved in the cytoplasm of red blood cells  
   e. carbonic acid

25. The Hering-Breuer (inflation) reflex
   a. functions to increase ventilation with changes in blood pressure  
   b. alter pulmonary ventilation when the PO₂ changes  
   c. alter pulmonary ventilation when the PCO₂ changes  
   d. protect the lungs from damage due to over-inflation  
   e. are an important aspect of normal, quiet breathing
26. The partial pressure of oxygen in systemic arterial blood is approximately
   a. 40 mm Hg  
   b. 45 mm Hg  
   c. 50 mm Hg  
   d. 70 mm Hg  
   e. 100 mm Hg

27. If one could directly stimulate neurons within the inspiratory center, the frequency of action potentials within which of the following nerves would immediately increase?
   a. intercostal nerves  
   b. phrenic nerves  
   c. vagus nerves  
   d. valsalva nerves  
   e. a and b

28. The normal rate and depth of tidal breathing is established by the
   a. DRG  
   b. pneumotaxic center  
   c. VRG  
   d. expiratory center  
   e. none of the above

29-35. Study the following pairs of statements. If the item on the left is greater, choose A. If the item on the right is greater, choose C. If the items are equal, choose B. If not enough information is given to determine which is greater, choose D.

   A. Left is greater
   B. Items are equal
   C. Right is greater
   D. Not enough information is given

29. Residual Volume  —  Dead space volume

30. \( P_{O2} \) in the air  —  \( P_{O2} \) in the alveoli

31. \( CO_2 \) bound to hemoglobin under high pH  —  \( CO_2 \) bound to hemoglobin under low pH conditions

32. B-cell immune capabilities with only antigen-presentation  —  B-cell immune capabilities with only interleukin release by helper T cells

33. Intrapulmonary pressure  —  Intraleural pressure

34. Blood flow through alveolar capillaries when \( P_{CO2} \) is low in the alveoli  —  Blood flow through alveolar capillaries when \( P_{CO2} \) is high in the alveoli

35. Number of antibodies produced during a primary immune response  —  Number of antibodies produced during a secondary immune response
MATCHING: Answers may be used more than once or not at all.

36. Allergens

37. Costimulators (among other things)

38. Promote inflammation

A. Haptens
B. Grafts
C. Pyrogens
D. Interleukins
E. Prostaglandins

TRUE - FALSE:

39. The most important cells of specific immunity are the agranulocytes.

40. There are five different classes of antibodies, and a specific B cell may manufacture different classes of antibodies at different times.

41. White blood cells are commonly found in lymph, whereas red blood cells are not.

42. Hemoglobin carries NO (besides carrying O₂) and dumps the NO at the tissues when O₂ is dumped; the NO dilates blood vessels and enhances O₂ delivery.

43. Unlike B lymphocytes, activated T lymphocytes do not produce memory cells.

44. A decrease in arterial PO₂ causes the chemoreceptors to become more sensitive to increases in PCO₂.

45. In essence, the lymphatic system has no direct pump or arteries.

46. Slight adjustments in breathing rate during rest is aimed primarily at delivering enough oxygen to the tissues.

FILL-IN-THE-BLANK:

47. The widespread lymphatic tissue found in the mucosal lining of the various mucous membranes is called ________________________.

48. The enzyme ________________________ is used to convert carbon dioxide in the blood to bicarbonate ion.

49. Surfactants are released to reduce _______________ _______________ in the alveoli.

50. The active part of breathing generates a _______________ pressure (in comparison with atmospheric pressure).
SHORT ANSWER: Answer any two (2) of the following.
A. Why is epinephrine administered in the event of anaphylactic shock? (2 pts.)

B. What is the MAC, what does it do, and what typically stimulates its formation? (2 pts.)

C. Describe how the Valsalva maneuver works, and what it is useful for. (2 pts.)

D. What is meant by antigen-presentation? (2 pts.)

E. Define/describe: opsonization, clonal selection. (2 pts.)

F. What precisely do antibodies do? Why is this a useful thing? (2 pts.)

G. Why is it necessary that the partial pressure gradient for oxygen be so much steeper than the partial pressure gradient for carbon dioxide at locations where exchange takes place? (2 pts.)

H. Name one autoimmune condition and its affects on the body. (2 pts.)