

SAMPLE EXAM #4

Multiple Choice Questions

- The walls of the alveoli are composed of two types of cells, type I and type II pneumocytes. The function of type II pneumocytes is:
 - to trap dust and other debris
 - to protect the lungs from bacterial invasion
 - to produce mucus in the alveoli
 - to produce surfactant
- Boyle's Law states that as the volume of a gas increases the pressure exerted by the gas:
 - increases
 - decreases
 - stays the same
- As the diaphragm contracts, the volume of the pleural cavities _____ while the pressure inside the lungs becomes _____ atmospheric pressure.
 - decreases; greater than
 - decreases; less than
 - increases; greater than
 - increases; less than
- Resistance to flow of air within the conducting zone of the respiratory tree is primarily controlled at the level of the:
 - trachea
 - primary bronchi
 - secondary bronchi
 - tertiary bronchi
 - bronchioles
- In order for the lungs to remain inflated the _____ pressure must always be negative.
 - intra-alveolar
 - intraparietal
 - transpulmonary
 - atmospheric
- _____ Law states that in a mixture of gases, the total pressure equals the sum of the partial pressures exerted by each gas. The partial pressure of each gas is directly proportional to its percentage in the total gas mixture.
 - Boyle's
 - Henry's
 - Dalton's
 - Ilitis's
 - Eckel's
- _____ Law states that the amount of a gas that dissolves in a liquid (i.e. in the blood) is proportional to the partial pressure of each gas and the solubility of each gas.
 - Boyle's
 - Henry's
 - Dalton's
 - Ilitis's
 - Eckel's
- The Hemoglobin molecule is used as an oxygen carrier in the blood primarily because:
 - the tissue requirements for oxygen are high compared to other gases
 - the solubility of oxygen in water is very low
 - oxygen is unable to cross the respiratory membrane on its own
 - none of the above
- The P_{O_2} in the tissues is about ____ mmHg while the P_{O_2} in the alveoli of the lungs (at sea level) is about _____ mmHg.
 - 40; 760
 - 104; 50
 - 760; 104
 - 40; 104
 - 104; 760
- The P_{CO_2} in the tissues is about ____ mmHg while the P_{CO_2} in the alveoli of the lungs (at sea level) is about _____ mmHg.
 - >45; 40
 - 104; 40
 - 760; 104
 - >40; 104
 - 104; 760
- If a hemoglobin molecule has two molecules of Oxygen attached to it, it is said to be:
 - fully saturated
 - partially saturated
 - sickled
 - none of the above

12. When a person is exercising, the temperature of the blood _____ and the pH _____.
- increases; increases
 - increases; decreases
 - decreases; decreases
 - decreases; increases
13. The changes due to exercise that are described in question 40 have which of the following effects on hemoglobin?
- its affinity for oxygen decreases
 - its affinity for oxygen increases
 - its affinity for carbon dioxide decreases
 - its affinity for carbon dioxide increases
 - both b and c are correct
14. Most of the carbon dioxide is transported in the blood in what form?
- dissolved in the plasma
 - chemically bound to hemoglobin
 - chemically bound to myoglobin
 - as bicarbonate ion in the plasma
 - chemically bound to albumin
15. The enzyme carbonic anhydrase catalyzes which of the following reactions?
- $\text{HCO}_3^- + \text{H}^+ \leftrightarrow \text{H}_2\text{CO}_3$
 - $\text{H}_2\text{CO}_3 + \text{H}^+ \leftrightarrow \text{HCO}_3^- + \text{CO}_2$
 - $\text{H}_2\text{O} + \text{HCO}_3^- \leftrightarrow \text{CO}_2 + \text{H}_2\text{CO}_3$
 - $\text{CO}_2 + \text{H}_2\text{O} \leftrightarrow \text{H}_2\text{CO}_3$
16. Red blood cells release HCO_3^- ions into the plasma in exchange for _____ ions.
- sodium
 - chloride
 - potassium
 - calcium
 - hydronium
17. Within the red blood cell, hydrogen ions are buffered by _____ while in the blood plasma hydrogen ions are buffered by _____.
- bicarbonate; Hb
 - Hb; bicarbonate
 - carbon dioxide; Hb
 - Hb; carbon dioxide
 - oxygen; carbon dioxide
18. Which of the following reactions occur in the lungs?
- $\text{H}^+ + \text{HCO}_3^- \leftarrow \text{H}_2\text{CO}_3 \leftarrow \text{H}_2\text{O} + \text{CO}_2$
 - $\text{H}^+ + \text{HCO}_3^- \rightarrow \text{H}_2\text{CO}_3 \rightarrow \text{H}_2\text{O} + \text{CO}_2$
 - $\text{HbCO}_3 \rightarrow \text{CO}_2 + \text{Hb}$
 - a and b
 - b and c
19. When a person hyperventilates, the pH of the blood _____; while when a person hypoventilates the pH of the blood _____.
- increases; decreases
 - stays the same; increases
 - decreases; increases
 - stays the same; decreases
 - increases; stays the same
20. The kidneys receive approximately _____ percent of the cardiac output
- 10
 - 15
 - 25
 - 30
 - 50
21. The visceral layer of Bowman's capsule is made up of
- simple cuboidal epithelium
 - podocytes
 - fenestrated epithelial cells
22. The part of the filtration membrane that acts as the most selective barrier is the:
- endothelium
 - parietal cells
 - podocytes
 - basement membrane
 - Bowman's cells

23. Normally, proteins such as albumin do not make it into the glomerular filtrate. Certain bacterial infections may cause these proteins to be found in the filtrate and the urine (albuminuria). This is primarily because:
- the charge on the basement membrane is lost
 - the podocytes lose their end feet connections
 - the endothelial fenestrations become enlarged
 - the pressure in the afferent arteriole is greatly increased
 - none of the above
24. Increases in which of the following factors will DECREASE glomerular filtration rate (GFR)?
- glomerular hydrostatic pressure
 - blood colloid osmotic pressure
 - capsular hydrostatic pressure
 - both a and b
 - both b and c
25. The blood vessels that directly supply the glomeruli with blood are the:
- vasa recta
 - peritubular capillaries
 - afferent arterioles
 - efferent arterioles
 - afferent ductules
26. Which of the following substances are absorbed in the PCT?
- glucose
 - amino acids
 - sodium
 - a, b and c
 - none of the above
27. Glucose is transported into PCT epithelial cells via what type of transport?
- simple diffusion
 - facilitated diffusion
 - primary active transport
 - secondary active transport
 - none of the above
27. Glucose is transported out of PCT epithelial cells (into the interstitial spaces adjacent to the basolateral membrane) via what type of transport?
- simple diffusion
 - facilitated diffusion
 - primary active transport
 - secondary active transport
 - none of the above
28. Glucose is present in the urine with the disease diabetes mellitus. Why is glucose present in the urine?
- the glucose transporters in the PCT become competitively inhibited by sodium
 - the glucose transporters in the PCT become saturated.
 - the concentration of glucose inside the PCT epithelial cells is too high and inhibits further entry of glucose into the cells
 - the concentration of sodium inside the PCT epithelial cells is too high and inhibits further entry of glucose into the cells
 - None of the above