

# Respiratory System

## Part A – Multiple Choice

- At which of the following locations is reduced hemoglobin converted to oxyhemoglobin?
  - Liver cells.
  - Heart ventricles.
  - Lung capillaries.
  - Tissue capillaries.
- The medulla controls the breathing rate by monitoring the concentration of
  - oxygen.
  - carbon dioxide.
  - oxyhemoglobin.
  - carbaminohemoglobin.
- The transport process by which gases enter and leave the blood during internal and external respiration is
  - osmosis.
  - diffusion.
  - active transport.
  - facilitated transport.
- One reason that the pH of blood remains relatively constant during internal respiration is because
  - hydrogen ions form water.
  - hemoglobin transports hydrogen ions.
  - carbonic anhydrase forms hydrogen gas.
  - white blood cells absorb extra hydrogen.
- The release of oxygen from hemoglobin is **MOST** closely associated with which of the following conditions?
  - Increased pH.
  - Decreased body temperature.
  - High amounts of oxygen in tissues.
  - Increased carbon dioxide concentration.
- The process of inspiration is accomplished by
  - relaxation of the diaphragm.
  - reduced pressure in the chest cavity.
  - relaxation of the intercostal muscles.
  - increased pressure in the chest cavity.
- The region of the respiratory and digestive tracts where both food and air passes is the
  - larynx.
  - trachea.
  - pharynx.
  - nasal sinus.
- The breathing center is located in the
  - thalamus.
  - cerebrum.
  - hypothalamus.
  - medulla oblongata.
- In which of the following locations does blood have the highest concentration of reduced hemoglobin?
  - Systemic veins.
  - Pulmonary veins.
  - Systemic arteries.
  - Pulmonary capillaries.

10. The exchange of carbon dioxide and oxygen between the air and the blood is called
- breathing.
  - external respiration.
  - internal respiration.
  - cellular respiration.
11. Which of the following sequences correctly describes the passage of air out of the body?
- Pharynx, larynx, trachea, bronchioles, alveoli, bronchi.
  - Pharynx, larynx, trachea, bronchi, bronchioles, alveoli.
  - Pharynx, trachea, bronchi, larynx, bronchioles, alveoli.
  - Alveoli, bronchioles, bronchi, trachea, larynx, pharynx.
12. A decrease in  $\text{CO}_2$  in blood is **MOST** closely associated with
- an decrease in blood pH.
  - contraction of the diaphragm.
  - an increase in plasma temperature.
  - increased bonding capacity of Hb for  $\text{O}_2$ .
13. The pH of blood remains relatively constant during internal respiration because
- $\text{CO}_2$  forms  $\text{HCO}_3^{1-}$ .
  - of the activity of  $\text{HCO}_3^{1-}$ .
  - $\text{HCO}_3^{1-}$  breaks down into  $\text{H}_2\text{O}$  and  $\text{CO}_2$ .
  - carbonic anhydrase forms hydrogen gas.
14. Which of the following initiates a nerve impulse from the lungs to the breathing center?
- Lowering of the diaphragm.
  - Relaxation of the diaphragm.
  - Contraction of the rib muscles.
  - Increased volume of the alveoli.
15. Before reaching the lungs, the air that enters the respiratory tract during inspiration will normally be
- cooled and dried out.
  - cooled and moistened.
  - warmed and dried out.
  - warmed and moistened.
16. As the plasma temperature decreases, the amount of  $\text{CO}_2$  carried by hemoglobin will
- decrease.
  - remain the same.
  - increase slightly.
  - become 99 to 100%.
17. Cells use oxygen during the process called
- breathing.
  - external respiration.
  - internal respiration.
  - cellular respiration.
18. Receptors in the respiratory center of the brain are stimulated by
- low oxygen levels.
  - high oxygen levels.
  - low carbon dioxide levels.
  - high carbon dioxide levels.
19. When compared to the blood in the regions where hemoglobin releases oxygen, the blood where oxygen bonds to hemoglobin to become oxyhemoglobin is *relatively*
- acidic and cool.
  - acidic and warm.
  - basic (alkaline) and cool.
  - basic (alkaline) and warm.

20. The greatest production of bicarbonate ions occurs in the
- aorta.
  - lung alveoli.
  - pulmonary vein.
  - systemic tissue capillaries.
21. A puncture or tear in the lining of the chest cavity would likely result in
- collapse of both lungs.
  - decreased breathing rate and fainting.
  - collapse of the lung nearest the puncture/tear.
  - the leaking of gases (like oxygen) out of the chest cavity.
22. Oxygen passes into the blood capillaries through the walls of the
- alveoli.
  - bronchioles.
  - pleural membranes.
  - pulmonary venules.
23. Which of the following correctly describes the muscle activity during exhalation?
- Diaphragm relaxes; intercostal muscles relax.
  - Diaphragm contracts; intercostal muscles relax.
  - Diaphragm relaxes; intercostal muscles contract.
  - Diaphragm contracts; intercostal muscles contract.
24. In which form is most of the carbon dioxide transported in blood?
- Dissolved gas.
  - Bicarbonate ions.
  - Reduced hemoglobin.
  - Carbaminohemoglobin.
25. The alveolar walls are moist so that
- bacteria can be trapped.
  - water vapor can be inhaled.
  - water vapor can be exhaled.
  - gases can move freely through the membranes.

## Part B – Written Answers

- List **THREE** things hemoglobin can transport, and name a major blood vessel where each can be found in abundance.
  - Besides being able to transport specific molecules and ions, hemoglobin is highly specialized because it is sensitive to conditions. Describe **TWO** differences in conditions that hemoglobin encounters in blood and the effect of these conditions on hemoglobin's transport abilities.
- Describe the interaction of the medulla oblongata, diaphragm, muscles of the rib cage, pleural membranes and lungs during inhalation and exhalation.
- Describe the conditions, reactants, and products of the carbonic anhydrase reaction:
  - in systemic capillaries
  - in pulmonary capillaries
- How is the pH of blood buffered and regulated by the respiratory system?