*Biology for a Changing World 2e,* Chapter 28 Test Bank

1. A respiratory system is composed of

1. the lungs.
2. trachea.
3. bronchi.
4. alveoli.
5. All of the above.

Answer: E

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

2. What is the primary function of the combined respiratory system structures?

*Answer:* The primary function is to allow organisms to take in oxygen from the air and remove carbon dioxide.

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

3. What structure of the respiratory system allows for air passage from the nose and mouth?

1. pharynx
2. bronchioles
3. trachea
4. larynx
5. bronchi

Answer: A

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

4. Which structure in the respiratory system also contains the vocal chords?

1. alveioli
2. bronchioles
3. lungs
4. larynx
5. bronchi

Answer: D

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

5. How do the structure and function of the bronchioles dictate the eventual distribution of gasses to the alveoli, and why is this feature important?

*Answer:* Bronchioles are highly branched tubes, which carry air to and from alveoli. This structure allows for even distribution of air in the alveoli so that the maximum gas exchange can take place with the cardiovascular system.

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

6. What is the last single airway passage from the outside environment prior to branching between two major bronchi?

1. pharynx
2. bronchi
3. trachea
4. alveoli
5. throat

Answer: C

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

7. The tiny air sacs that act as the primary site of gas exchange are termed \_\_\_\_\_.

1. pharynx
2. lungs
3. trachea
4. alveoli
5. vocal chords

Answer: D

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface

8. The respiratory surface of a lung is dictated by which respiratory system structure?

1. bronchi
2. throat
3. trachea
4. alveoli
5. bronchioles

Answer: D

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface

9. Describe the respiratory system structure that dictates the size of the respiratory surface, and why must that surface area be so large?

*Answer:* Alveoli are tiny, one-cell-thick sacs, which are the site of gas exchange at the end of the bronchioles. Since this is the site of gas exchange for the entire body, the large surface area is required to allow for the exchange of enough oxygen into the body and carbon dioxide out of the body. The gas exchange at the alveoli must match the gas exchange necessary for cellular respiration in the entire body.

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, cellular respiration

10. The major respiratory organ in humans is the \_\_\_\_\_.

1. pharynx
2. lung
3. trachea
4. alveoli
5. voice box

Answer: B

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

11. Asthma is a disease that can affect the bronchioles. Why would new generation inhalers want to keep the size of the medicine-containing particles in the mist small?

*Answer:* Bronchioles are the smallest of the airway tubes leading to the alveoli. The smaller particle size will allow the medication to reach the affected area. Otherwise, the medicine would not have an effect in the right structural component of the respiratory system.

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: respiratory airway structures

12. Which of the following is the correct order of respiratory tubes air would follow during inhalation?

1. mouth→larynx→trachea→pharynx→bronchi→bronchioles→alveoli
2. mouth→larynx→pharynx→trachea→bronchi→bronchioles→alveoli
3. mouth→larynx→pharynx→trachea→bronchioles→bronchi→alveoli
4. mouth→pharynx→larynx→trachea→bronchi→bronchioles→alveoli
5. mouth→pharynx→trachea→larynx→bronchioles→bronchi→alveoli

Answer: D

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

13. Which muscles are primarily responsible for the ventilation of our lungs?

1. rib cage muscles
2. diaphragm
3. lung muscles
4. bronchial muscles
5. cavitation muscles

Answer: B

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, ventilation

14. Inhalation involves which of the following?

1. relaxation of the diaphragm and rig cage muscles
2. a swallowing motion in the upper respiratory tract
3. an increase in outside air pressure
4. contraction of the diaphragm and rib cage muscles
5. upward movement of the diaphragm

Answer: D

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, ventilation

15. Exhalation involves which of the following?

1. increase in lung air pressure
2. upward movement of the diaphragm
3. relaxation of the diaphragm and rib cage muscles
4. A and B only
5. A, B, and C all are involved.

Answer: E

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: respiratory airway structures, ventilation

16. A(n) \_\_\_\_\_\_\_\_\_\_\_ motion of the diaphragm creates a decreasing pressure that results in \_\_\_\_\_\_\_\_\_\_.

1. downward; inhalation
2. upward; exhalation
3. downward; exhalation
4. undulating; inhalation
5. undulating; exhalation

Answer: A

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, ventilation

17. The spiracles of an insect would most closely be associated with which of the following human respiratory structures?

1. mouth
2. bronchioles
3. trachea
4. bronchi
5. alveoli

Answer: A

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, species comparison

18. Trachea and tracheoles of an insect tracheal respiratory system are most closely associated with which part of the human respiratory system?

1. mouth and lungs
2. trachea and larynx
3. bronchi and bronchioles
4. alveoli and bronchioles
5. bronchioles and alveoli

Answer: C

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Hard

Important Words/Concepts: respiratory airway structures, species comparison

19. Which of the following dictate the respiratory surface of a fish?

1. the volume of water over the lungs
2. the size and number of gill filaments
3. the size of the operculum
4. A and B only
5. A, B, and C all dictate respiratory surface.

Answer: B

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, species comparison

20. Diaphragm and rib cage muscle movement in a human is replaced by what air volume control mechanism in insects?

1. The movement of the body surface compresses and expands the tracheal tube system to ventilate air.
2. The spiracles are able to adjust to ventilate air.
3. Carbon dioxide and oxygen are able to diffuse directly into the muscle cells of the insect so there is no need to ventilate air.
4. Tracheoles are able to contract their muscles to ventilate air.
5. Insects are not capable of forced movement of air at any time.

Answer: A

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Hard

Important Words/Concepts: respiratory airway structures, ventilation, species comparison

21. Which of the following fish organs is most closely related to the lungs of a human?

1. operculum
2. gill filaments
3. gills
4. fins for swimming
5. fish mouth

Answer: C

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, species comparison

22. Blood flow in the gill filament of a fish moves in the opposite direction of the water. Why does this flow make sense considering where the gas exchange is occurring?

*Answer:* The most highly oxygenated water is exposed to the oxygen poor blood on the leading edge of the gill filament. Carbon dioxide is released into the water on the lagging edge of the gill filament as the water flows across the gill. Release of carbon dioxide on the leading edge would mean that the waste product would spend more time in contact with the respiratory surface, which is unnecessary. Similarly, oxygen- poor blood will absorb oxygen quickest at the point where it comes in contact with the richest concentration of oxygen in the water (the leading edge of the gill filament).

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, species comparison

23. Humans upper respiratory system provides a way to balance the loss of water and to keep out dust. Which of the following insect respiratory structures function in the same manner?

1. spiracle
2. trachea
3. tracheoles
4. body wall surface
5. antennae

Answer: A

DQ: What structures make up the respiratory system?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, species comparison

24. Why are gasses exchanged in the respiratory systems of insects and fish?

1. Insects and fish require oxygen as a reactant for cellular respiration.
2. Insects use nitrogen gasses as both a reactant and product of cellular respiration, and fish use oxygen as a reactant and carbon dioxide as a product of cellular respiration.
3. Insects and fish create carbon dioxide as a waste product of cellular respiration.
4. Both A and C.
5. All of the above are hurdles.

Answer: D

DQ: What structures make up the respiratory system?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, species comparison, cellular respiration

25. The physical interaction between the respiratory and the cardiovascular system takes place at which respiratory structure in a human?

1. brochioles
2. alveoli
3. bronchi
4. respiratory vessels
5. gill filaments

Answer: B

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems

26. The physical interaction between the respiratory and the cardiovascular system takes place at which respiratory structure in an insect?

1. insect alveoli
2. gill filaments
3. tracheoles
4. bronchi
5. spiracle

Answer: C

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems, species comparison

27. The physical interaction between the respiratory and the cardiovascular system takes place at which respiratory structure in a fish?

1. insect alveoli
2. gill filaments
3. tracheoles
4. bronchi
5. operculum

Answer: B

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems, species comparison

28. The physical interaction between the respiratory and the cardiovascular system takes place at which cardiovascular structure in both humans and fish?

1. capillaries
2. left atrium
3. aorta
4. pulmonary artery
5. filaments

Answer: A

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems, species comparison

29. What structural feature is shared by both capillaries and alveoli that aids in the exchange of gasses by diffusion?

1. Both have thin walls that are just nearly one cell thick.
2. Both have small plasma membranes.
3. Both are full of oxygen-depleted blood for gas exchange.
4. Both are supplied with osmotic pressure from the diaphragm.
5. Both are uniquely thick walled to allow quick diffusion of gasses.

Answer: A

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface

30. Describe the gas exchange diffusion process that occurs at the respiratory surface.

*Answer:* Oxygen enters the blood through diffusion because there is a higher concentration of oxygen in the alveoli than in the blood. Carbon dioxide exits the blood into the alveoli because there is a higher concentration of carbon dioxide in the blood.

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface

31. Provide two unique explanations as to why many experts consider the cardiovascular system and the respiratory system to be one system working together (sometimes termed the cardiorespiratory system).

*Answer:* 1) one of the main purposes of the cardiovascular system is to move gasses exchanged at the alveoli around the body; 2) the alveoli are the site of interaction between the two systems and neither system can function without this contact; 3) the heart and diaphragm are both muscles that require oxygen provided by the respiratory system via the cardiovascular system, yet neither system can work without these muscles.

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: respiratory and cardiovascular systems

32. Cellular respiration keeps the oxygen level in the tissue \_\_\_\_\_\_\_, which \_\_\_\_\_\_\_\_ diffusion rates of oxygen from the blood.

1. low; decreases
2. high; increases
3. low; increases
4. high; decreases
5. Levels of oxygen in the tissue have no effect on oxygen diffusion.

Answer: C

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, diffusion, cellular respiration

33. Blood leaving the right side of heart is headed to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for gas exchange.

1. the body
2. the aorta
3. the lungs
4. the left side of the heart
5. the coronary arteries

Answer: C

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems

34. Blood being pumped by the heart is circulated in two circuits. One circuit carries blood with high levels of \_\_\_\_\_\_\_\_\_\_\_\_\_ to the lungs, and the other circuit carries blood with high levels of \_\_\_\_\_\_\_\_\_\_\_\_\_to the body.

1. oxygen; carbon dioxide
2. oxygen; oxygen
3. carbon dioxide; carbon dioxide
4. carbon dioxide; nitrogen
5. carbon dioxide; oxygen

Answer: E

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface

35. Why is there no need for insects to have a cardiovascular system to allow for gas exchange?

1. Carbon dioxide and oxygen are exchanged directly at the muscle cells.
2. Diffusion of gasses occurs with the air directly.
3. Insect cells do not conduct aerobic respiration.
4. A and B only.
5. B and C only.

Answer: D

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, species comparison, diffusion

36. In fish, \_\_\_\_\_\_\_\_\_\_\_\_\_ in the gills allow for the absorption of oxygen from water and the elimination of carbon dioxide.

1. capillaries
2. air pockets
3. operculum
4. ram ventilation
5. cardiorespiratory surfaces

Answer: A

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, species comparison, diffusion

37. Why will a fish out of water die?

1. The gas exchange system requires water over the gill filaments.
2. Carbon dioxide will build up in the blood of the fish.
3. There will be a lack of oxygen to key organ systems in the fish.
4. B and C only
5. A, B, and C are all reasons

Answer: E

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, species comparison

38. Ram ventilation in some fish requires an open mouth and constant movement to push water over the gills. How does this system of ventilation allow for an increased muscle ATP demand when the fish speeds up and a decrease in muscle ATP demands when the fish slows down?

*Answer:* Increased ATP demands require increased gas exchange (oxygen absorption and carbon dioxide elimination). The increased ATP demands of muscle movement will cause the fish to swim faster. This increase in speed will cause more water to be pushed over the gills and allow for an increase in gas exchange. As the fish slows down, the ATP demands will decrease and so will the need for gas exchange.

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, species comparison, cellular respiration

39. How do we get the correct amount of oxygen absorption and carbon dioxide removal from any particular tissue in the body if the process relies on diffusion?

*Answer:* Highly oxygenated blood will have a high concentration of oxygen compared to the tissues it is passing through in capillaries. As the oxygen is absorbed by the tissue, the level of oxygen in the blood is decreased and diffusion slows. However, if there is a high demand for oxygen, there is also a corresponding increase in the rate of diffusion from the blood because of the increased concentration difference. Increased carbon dioxide levels in the tissue will also increase the rate of diffusion of this gas into the blood. An increasing level of carbon dioxide triggers an increase in heart rate and breathing, which will deliver an increased supply of oxygenated blood for tissue absorption. That same increased blood supply can carry additional carbon dioxide away.

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, species comparison, diffusion

40. Carbon dioxide is carried from the tissue to the lungs by which blood component?

1. plasma
2. red blood cells
3. white blood cells
4. It forms air bubbles and moves through the cardiovascular system.
5. Carbon dioxide does not move into blood directly

Answer: A

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems

41. What stops oxygen from diffusing back into the lungs after it is in the blood?

1. Diffusion slows once there are equal concentrations in the blood and lungs.
2. The oxygen levels in the alveoli and blood move toward equilibrium.
3. The blood is flowing past the alveoli in capillaries and out to the heart.
4. Oxygen does diffuse back into the lungs in small amounts, but the overall movement of oxygen is from the high concentration in the lungs to the low concentration in the blood.
5. All of the above are correct.

Answer: E

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems, diffusion

42. The cardiovascular system carries oxygen and carbon dioxide using which blood components?

*Answer:* carbon dioxide―plasma; oxygen―red blood cells

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems

43. What cardiovascular structure caries blood oxygenated in the lungs throughout the body?

1. arteries
2. veins
3. pulmonary artery
4. Both A and B
5. All of the above.

Answer: A

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems

44. Each alveolus is surrounded by which of the following cardiovascular structures?

1. arteries
2. capillaries
3. aorta
4. bronchioles
5. bronchiole veins

Answer: B

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

45. Aerobic respiration powered by the oxygen supplied through the cardiovascular system produces what product necessary for the cell?

1. carbon dioxide
2. glucose
3. fermentation products
4. diffusion
5. ATP

Answer: E

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: respiratory and cardiovascular systems, cellular respiration

46. Some human populations that live at high altitudes are able to draw more air into their lungs to oxygenate the blood of the cardiovascular system. What genetic term describes this ability?

1. This ability has nothing to do with genetics.
2. traits
3. Mendelian genetics
4. adaptation
5. diffusion

Answer: D

DQ: How do the respiratory and cardiovascular systems cooperate to deliver oxygen to body cells and remove carbon dioxide from tissues?

Type: Use It

Difficulty: Hard

Important Words/Concepts: respiratory and cardiovascular systems, genetics

7. What in the blood allows for the transportation of oxygen from the lungs to the tissues?

1. plasma
2. white blood cells
3. platelets
4. red blood cells
5. erythrocytosis

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures

48. Describe how gas exchange in the lungs and in the tissues differs.

*Answer:* In the lungs, the hemoglobin in red blood cells takes up oxygen from air in the alveoli, and carbon dioxide is released from the plasma into the alveolar lumen. However, in the tissue, oxygen is released by the hemoglobin in red blood cells into the tissue and carbon dioxide moves from the tissue into the plasma.

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory airway structures, gas exchange, respiratory surface

# 

49. An individual who lives on the coast takes a vacation in the mountains at high altitude.

A) What is the relationship between the barometric pressure at this altitude and the ability of this person to deliver oxygen in the blood?

B) What is the body’s response to this change?

*Answer:* A) Barometric pressure drops at high altitude meaning there is less oxygen available to diffuse into and be carried by red blood cells. The higher the altitude, the lower the barometric pressure, the less oxygen is available to diffuse into the blood. B) The body will produce larger numbers of red blood cells to take advantage of the oxygen that is available in the atmosphere.

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training

50. Barometric pressure is typically measured in what units?

1. centimeters of mercury (cmHg)
2. millimeters of mercury (mmHg)
3. centimeters of helium (cmHe)
4. millimeters of helium (mmHe)
5. Barometric pressure is not measured but mathematically calculated.

Answer: B

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training

51. The body maintains oxygen-carrying homeostasis at high altitudes with which response?

1. increasing the heart rate
2. increasing the production of red blood cells
3. moving to lower altitudes
4. breathing harder to increase the barometric pressure
5. allowing blood to move slowly through the lungs

Answer: B

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training

52. When at high altitude, which of the following terms describes the specific pressure exerted by oxygen?

1. homeostasis
2. erythrocytes
3. partial pressure
4. barometric pressure
5. hypoxic pressure

Answer: C

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: partial pressure, altitude/hypoxic training

53. What sickness can develop when the oxygen-carrying homeostasis is abruptly altered due to a quick change in the partial pressure of oxygen?

1. altitude sickness
2. recovery training
3. asthma
4. anemia
5. barometric sickness

Answer: A

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: partial pressure, altitude/hypoxic training

54. Low partial pressure of oxygen in the atmosphere has what effect on the oxygen diffusion into the blood from alveoli?

1. The diffusion rate of oxygen into the blood is always constant and does not change due to a change in the number of available oxygen molecules in the alveolar air.
2. The diffusion rate is increased because there are more oxygen molecules available in the alveolar air.
3. The diffusion rate is decreased because there are more oxygen molecules available in the alveolar air.
4. The diffusion rate is increased because there are fewer oxygen molecules available in the alveolar air.
5. The diffusion rate is decreased because there are fewer oxygen molecules available in the alveolar air.

Answer: E

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training, diffusion

55. Carbon dioxide moves through the cardiovascular system \_\_\_\_\_\_\_\_\_\_\_\_\_.

1. in the form of carbonic acid
2. as gas bubbles
3. as oxygenated carbon
4. attached to hemoglobin
5. as dissolved carbon dioxide

Answer: A

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability

56. What sickness can develop when there is a deficiency in the oxygen-carrying iron available to make hemoglobin?

1. altitude sickness
2. recovery training
3. asthma
4. anemia
5. barometric sickness

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability

57. What provides the oxygen-carrying capability in the blood?

1. hemoglobin protein in the red blood cells
2. four heme groups in each of the hemoglobin proteins
3. Iron in each of the heme groups physically binds to oxygen.
4. A and B only
5. A, B, and C all provide oxygen-carrying capability.

Answer: E

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability

58. During strenuous exercise your tissues, specifically muscles, have high oxygen demands to perform aerobic cellular respiration. The temperature and pH of the blood alter the ability of oxygen to be carried and released by hemoglobin. Describe how pH and temperature would change during the exercise and how that would change the oxygen-carrying capability of the blood?

*Answer:* pH in a working muscle goes down so that it becomes more acidic. The decrease in pH causes hemoglobin to more readily give up oxygen. Temperature in the muscle tissue will go up with increased cellular respiration. This increase in temperature causes hemoglobin to more easily release oxygen. Both temperature and pH changes in the muscle tissue allow for more directed and easy delivery of oxygen to a tissue where there is high demand.

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, cellular respiration, pH, temperature

59. What protein carries oxygen in erythrocytes, and how are its structure and function related?

*Answer:* Hemoglobin is the oxygen-carrying protein in erythrocytes. It contains four iron-containing heme groups, which each have the ability to carry one oxygen molecule. Therefore, one hemoglobin protein can carry four oxygen molecules. Each erythrocyte is full of hemoglobin molecules.

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability

60. Which of the following increases the release of oxygen from hemoglobin in a tissue?

1. decreased partial pressure of oxygen in the tissue due to use in cellular respiration
2. increased pH in the tissue due to repeated contractions
3. increase in temperature in the tissue due to repeated contractions
4. A and C only
5. A, B, and C will each increase the release of oxygen.

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training, pH, temperature

61. Altitude sickness is to low atmospheric oxygen as acidosis is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. low carbon dioxide levels in the blood
2. low carbon dioxide levels in the atmosphere
3. high oxygen levels in the blood
4. high carbon dioxide levels in the blood
5. low oxygen levels in the blood

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training

62. An increased breathing rate is most closely associated with which of the following?

1. the demand for oxygen
2. the demand for carbon dioxide
3. an increase in blood pH
4. an increase in blood carbon dioxide levels
5. a decrease in blood carbon dioxide levels

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, breathing rate, pH

63. What triggers the brain to increase contraction signals to the ventilation muscles?

1. High blood pH is sensed by the brain.
2. Low blood pH is sensed by the brain.
3. High carbon dioxide levels are measured by the brain.
4. Low carbon dioxide levels are measured by the brain.
5. The brain does not have the ability to directly detect changes in the blood.

Answer: B

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, breathing rate, pH

64. The inability to perform carbon dioxide gas exchange in the lungs will lead to a condition called \_\_\_\_\_\_\_\_\_\_\_\_\_.

1. serum sickness
2. erythrocytosis
3. acidosis
4. altitude sickness
5. sea sickness

Answer: C

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, breathing rate, pH

65. Increased carbon dioxide triggers an increased breathing rate, so how does this relate to a potential oxygen demand?

1. Increased carbon dioxide is the product of increased cellular respiration.
2. Increased cellular respiration requires increased oxygen.
3. Increased carbon dioxide is controlled by the pH of the blood.
4. A and B only.
5. All of the above are ways the two are related.

Answer: D

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, cellular respiration, breathing rate, pH

66. How does increasing the breathing rate alter the pH of the blood?

*Answer:* The blood’s buffering system uses the tight control of carbon dioxide, which is turned into carbonic acid in the blood. This acid lowers the pH of the blood. When the breathing rate is increased in response to increased blood carbon dioxide levels and lowered pH, the body is able to discard more carbon dioxide from the blood and return the pH to a more basic and normal level.

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, breathing rate, pH

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67. An increased breathing rate is often associated with which of the following?

1. increased heart rate to deliver oxygen through the cardiovascular system
2. increased carbonic acid levels in the blood
3. decreased pH in the blood
4. increase in cellular respiration in the tissues
5. All of the above are associated with increased breathing rates.

Answer: E

DQ: What factors influence the oxygen-carrying capacity of blood and breathing rate?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, cellular respiration, breathing rate, pH

4. How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

68. The “live high, train low” training regimen is built on what scientific knowledge of the respiratory system?

1. Red blood cell numbers go up at high altitudes.
2. Oxygen delivery is greatly increased with a high partial pressure of oxygen at sea level.
3. Carbon dioxide will not be produced in as high an amount at high altitude.
4. A and B only.
5. A, B, and C are all correct.

Answer: D

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training

69. Why does high altitude not affect sprint athletes as much as it does endurance athletes who have trained only at sea level?

*Answer:* The sprint athletes use primarily fermentation processes instead of aerobic respiration to produce the ATP necessary to compete in their events. However, endurance athletes are just the opposite, and therefore suffer from the high altitude because the low partial pressure of oxygen does not allow for effective delivery of oxygen to the blood.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training, cellular respiration

70. What physiological changes take place that make it better for athletes to live at high altitudes, and why is it better for them to train at sea level?

*Answer:* Living at high altitude causes a physiological response to make more red blood cells. This means that the body can deliver more oxygen to tissues. Training with this increased number of red blood cells at sea level means that athletes can train harder and longer because of the increased partial pressure of oxygen at sea level along with increased oxygen-carrying capacity.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: respiratory and cardiovascular systems, blood, gas-carrying capability, partial pressure, altitude/hypoxic training

71. The type of training regimen that uses altering exposure to different partial pressures of oxygen in order to increase oxygen delivery to the tissue is called \_\_\_\_\_\_\_\_\_\_\_.

1. train high, live low
2. hypoxic conditions
3. partial pressure training
4. altitude training
5. live high, train lowA

Answer: E

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training

72. What is the device that can simulate the “live high, train low” conditions in the comfort of your own home?

1. hypoxic chamber
2. altitude chamber
3. anaerobic chamber
4. high chamber
5. reverse chamber

Answer: A

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: partial pressure, altitude/hypoxic training

73. Which of the following are possible means to increase oxygen delivery to the tissue?

1. Increase the size of your respiratory surface through training.
2. Train and strengthen the muscles controlling the chest to increase lung volume.
3. Increase the number of red blood cells through stressing the respiratory system with hypoxic conditions.
4. B and C only are ways to increase oxygen delivery.
5. A, B, and C are all ways to increase oxygen delivery.

Answer: D

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems

74. Describe two ethical controversies regarding the use of hypoxic chambers by athletes?

*Answer:* 1) Not every athlete can afford the chambers so it is not fair―creates a situation where athletes with sponsors or financial means have an advantage over those from poor backgrounds or without sponsorship. 2) The chamber is artificially recreating an environment that is not obtainable in the natural world unless you were to go from high to low elevation on a daily basis. 3) The hypoxic conditions do alter the performance capabilities of the blood to deliver oxygen in a similar way to other performance enhancing drugs. 4) There is some evidence that suggests that this training does not always have the same effect from athlete to athlete and can be dangerous to an individual’s health if not closely monitored.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: gas exchange, respiratory surface, partial pressure, altitude/hypoxic training

75. There is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between barometric pressure and partial pressure.

1. an inverse relationship
2. a direct relationship
3. a reverse relationship
4. no relationship
5. no difference

Answer: B

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: partial pressure, altitude/hypoxic training

76. Why is the appearance of hypoxic rooms in training facilities for ordinary gym goers unlikely to be beneficial?

*Answer:* To see the benefits of a hypoxic training regimen, you must be exposed to the hypoxic conditions for 12–20 hours a day for at least three weeks. The average gym goer will not have the persistence or the time to invest in this type of training and will likely not see an increase in the oxygen delivery abilities of his blood.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training

77. Data shows that hypoxic training does result in increased oxygen uptake and better performance. However, what makes these studies hard to interpret?

1. a lack of a suitable control group
2. Training of any kind will result in increases in performance.
3. Statistical analysis cannot be performed on these studies.
4. A and B only.
5. A, B, and C all make these studies hard to interpret.

Answer: D

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training, experimental design

78. What organ responds to hypoxic conditions by producing a hormone that increases red blood cell production?

1. brain
2. testes or ovaries
3. lungs
4. cardiac tissues
5. kidneys

Answer: E

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: partial pressure, altitude/hypoxic training, EPO

79. Which hormone naturally stimulates the production of red blood cells?

1. erythropoietin
2. testosterone
3. estrogen
4. oxygone
5. progesterone

Answer: A

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training, EPO

80. What tissue would provide evidence for the increased production of red blood cells following doping with erythropoietin?

1. in the lungs of the individual
2. Increased red blood cells would be found in the kidneys because that is the site of natural erythropoietin.
3. The increase in red blood cells would be most obvious in the arterial blood supply and not the venous supply.
4. In the bone marrow there would be an increase in the number of immature red blood cells being produced.
5. There is no source of red blood cells to look at for a change in production.

Answer: E

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, EPO

81. What common means to artificially alter the oxygen carrying capacity of blood are now banned by the International Olympic Committee?

1. blood transfusions
2. synthetic EPO use
3. hypoxic training
4. A and B only are banned.
5. A, B, and C are banned.

Answer: D

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: EPO, ethics

82. Why would measuring the percentage of red blood cells in the blood be a means to identify EPO doping?

1. Because the source of natural EPO in the kidneys will maintain the percentage of red blood cells at a level below that of EPO doping.
2. Because the EPO will cause the overproduction of red blood cells over all the other blood cells originating from the bone marrow.
3. Because you can identify the source of the EPO with this test.
4. A and B only.
5. A, B, and C are all reasons.

Answer: D

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: EPO, ethics

83. What are the safety concerns regarding doping with EPO?

1. abnormal blood clots
2. strokes
3. overworking the heart
4. Thickened blood can lead to blocked blood vessels.
5. All of the above are concerns.

Answer: E

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: EPO, safety

84. Which of the following is scientific evidence that warming up prior to a workout is beneficial?

1. Warm muscles will cause an increase in red blood cell production.
2. Warm muscles will cause oxygen to be released more efficiently from hemoglobin.
3. Warming up will cause an increase in the partial pressure of oxygen in the alveoli.
4. Warming up will increase the diffusion of carbon dioxide into the lungs.
5. Decrease in breathing rate is a benefit of warming up.

Answer: B

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Easy

Important Words/Concepts: gas exchange, respiratory surface, respiratory and cardiovascular systems

85. Why would the use of hypoxic tents be hard to regulate even though it is known to alter the percentage of red blood cells and give a competitive advantage?

*Answer:* It would be hard to regulate because there is little difference between the effects of hypoxic tents and the “live high, train low” method. Both result in similar changes in the red blood cell percentage.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Easy

Important Words/Concepts: partial pressure, altitude/hypoxic training, ethics

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86. How would an athlete with an iron deficiency respond to hypoxic tent training?

1. This athlete would produce fewer red blood cells in response to the hypoxic conditions.
2. This athlete would produce less erythropoietin.
3. This athlete would be unable to produce red blood cells with the amount of hemoglobin necessary to carry more oxygen.
4. This athlete would observe a decreased breathing rate in response to a decrease in carbon dioxide levels in the blood.
5. The iron deficiency would provide an additive benefit to the hypoxic conditions and lead to a greater increase in red blood cell production.

Answer: C

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, partial pressure, altitude/hypoxic training

87. What effect would ever-increasing partial pressures of carbon dioxide in the atmosphere have on the respiratory system?

*Answer:* Increasing the partial pressure of carbon dioxide would eventually decrease the diffusion rate of carbon dioxide from the plasma into the alveoli. This would cause an increase in carbonic acid in the blood and a decrease in pH. This would increase the breathing rate because the brain would recognize the pH change.

DQ: How can scientific knowledge of the respiratory system be used to design training regimens for elite athletes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: blood, gas-carrying capability, pH, breathing rate, partial pressure, altitude/hypoxic training