

Ch 15 – The Respiratory System Provincial Review KEY

31. A

32. B

33. C

34. A

35. D

36. D

29. C

30. A

31. C

45. A

33. C

40. B

9. a) The pH of the blood in the lungs is approximately 7.4 and the temperature is slightly cooler than that of the body tissues. These conditions favor the release of carbon dioxide and hydrogen ions from hemoglobin and the binding of Hb to oxygen instead. The pH of the blood in the tissue capillaries is slightly lower, 7.38, while the temperature is slightly warmer than that of the lungs.

b) The lower pH and warmer temperature in the body tissues causes the hemoglobin protein to undergo a conformational change. This change in shape causes the molecule to bind preferentially with carbon dioxide; thus, it releases oxygen gas at the tissues in favor of binding to CO₂

c) Strenuous exercise will cause the blood to become more acidic, as increased amounts of H⁺ are produced. Levels of bicarbonate and carbaminohemoglobin will rise as well. The osmolarity of the blood will likely increase as well as water loss occurs through sweat production.

44. A

45. C

46. C

47. C

4. **Alveoli are thin walled** – this increases the efficiency of the diffusion of carbon dioxide and oxygen

Alveoli are incredibly numerous; over 150 million of them – this increases the surface area over which diffusion of gases can occur

Alveoli have a vast capillary network which supplies a lot of blood and provides a large surface area across which diffusion of gases can occur.

7. a) **Internal Respiration:** Within our body cells, cellular respiration is occurring. Two products of cellular respiration are water and carbon dioxide. Once carbon dioxide is produced it diffuses out of our tissues into our blood stream and then into our red blood cells. Within the red blood cell, carbon dioxide reacts with water to form carbonic acid; this reaction is catalyzed by the enzyme carbonic anhydrase. It is then split to form hydrogen ion and bicarbonate ions. The carbon dioxide is transported mainly as bicarbonate in the blood as it travels to the lungs. Some carbon dioxide binds to hemoglobin within the red blood cell to form carbaminohemoglobin.

41. A

34. C

35. B

36. OMIT

4. The respiratory centre of the brain located within the medulla oblongata is sensitive to changes in the levels of hydrogen ions and bicarbonate ions. If the amount of either substance rises then the medulla will send nerve impulses to the diaphragm and intercostal muscles causing them to contract more frequently – this will increase the rate of contraction of the diaphragm.

45. D

46. D

47. D

48. A – *as carbon dioxide enters the blood it reacts with water to form carbonic acid which is in turn converted into hydrogen ions and bicarbonate... hence water is "used up" and thus decreases!*

32. A

33. D