

Chapter 22, The Respiratory System

“Apply What You Know” Answers

- p. 860—Both the pleurae and pericardium are double-layered serous membranes that enclose one of the thoracic viscera, are lubricated by serous fluid, and allow for expansion and contraction of the enclosed organ with minimal friction.
- p. 864—The autonomic nervous system consists of sympathetic and parasympathetic nerve fibers that innervate smooth muscle, cardiac muscle, and glands. Breathing is produced, however, by skeletal muscles—effectors that are not stimulated by autonomic nerve fibers. The breathing rhythm may be described as automatic, but not autonomic.
- p. 866—We inhale because the chest expands. Contraction of the respiratory muscles enlarges the thoracic cavity, lowering the intrapulmonary pressure and sucking air down its pressure gradient into the lungs.
- p. 872— During expiration, alveolar air mixes with air in the dead space of the trachea and other parts of the conducting division. Since dead-space air has not released oxygen to the blood or picked up carbon dioxide from it, it adds oxygen to the expired air and dilutes the expired CO₂.
- p. 875—Oxygen loading is one example of a beneficial positive feedback loop. Each oxygen molecule that binds to hemoglobin increases the probability that the hemoglobin will bind another one (up to the maximum of four), so oxygen loading has a self-accelerating quality reflected in the rapid rise of the midportion of the oxyhemoglobin dissociation curve.
- p. 882—A person with emphysema tends to develop a barrel-like chest in which the intercostal muscles are very stretched. According to the length–tension relationship, highly stretched skeletal muscles do not contract very forcefully when stimulated. Respiration therefore becomes weak and shallow.