Saladin 7E
Answer Key
Chapter 22, The Respiratory System

Testing Your Comprehension

1. The conducting division is lined with thicker, less permeable epithelial types such as pseudostratified columnar, simple cuboidal, and (in more limited areas) stratified squamous epithelia. Moreover, in most areas these epithelia are ciliated because of their role in transporting mucus. In the respiratory division, the epithelia range from cuboidal to (mostly) simple squamous. The simple squamous epithelium of alveolar ducts, alveolar sacs, and alveoli creates a thin, minimal barrier to gas diffusion.

2. Hyperventilation will raise the blood Po_2 only marginally, since the hemoglobin becomes about 97% saturated even in normal ventilation (eupnea). Hyperventilation does, however, expel CO_2 more rapidly than the body generates it, so it significantly lowers the blood Pco_2. Reduced Pco_2 raises the blood pH; thus, hyperventilation produces alkalosis.

   Emphysema entails a loss of alveolar surface area for gas exchange, so it interferes with oxygen loading and carbon dioxide unloading. Therefore, it lowers the blood Po_2, raises the Pco_2, and because of the latter, lowers the blood pH (producing acidosis).

3. As explained in the previous answer, the logic behind this practice is fallacious because one cannot load a significantly greater than normal amount of oxygen by hyperventilating. The reason a swimmer can hold his or her breath longer is that hyperventilation expels CO_2. Therefore, it takes longer for the blood Pco_2 to build up to the point where it stimulates the chemoreceptors that demand one to resume breathing. By that time, the Po_2 can drop so low that a person can faint and possibly drown.

4. His minute respiratory volume is (650 mL/breath)(11 breaths/min) = 7,150 mL/min (7.15 L/min). With an anatomic dead space of 185 mL, his alveolar ventilation rate is (650 – 185 mL/breath)(11 breaths/min) = 5.12 L/min.

5. In this incident (from *Morbidity and Mortality Weekly Reports*), the nasoenteric tube was misdirected down the woman's trachea and bronchus instead of her esophagus. It pierced the lung surface and admitted air into the pleural cavity. The patient exhibited pneumothorax and atelectasis, and soon died.