

## Section 7.1 Review Answers

### Student Textbook page 248

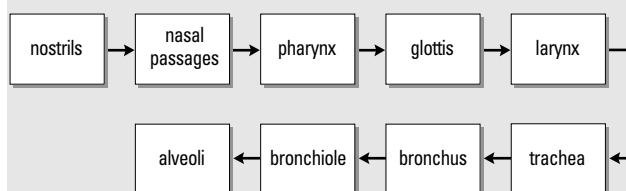
- Respiration is the overall process that provides oxygen to the cells in the body and removes carbon dioxide from the body. The respiratory system must have a large enough surface area for the efficient exchange of gases to meet the body's needs.
- There are a number of requirements for respiration:
  - A large surface area across which oxygen and carbon dioxide diffuse rapidly enough to meet the body's needs is required.
  - Because the porous membrane across which gas exchange occurs consists of living cells, it must be moist. The oxygen and carbon dioxide gases are dissolved in water. (Dead dry membranes like the outer skin are not permeable to these gases.)
  - There must be a large diffusion gradient between the concentrations of the gases on either side of the respiratory surface to maintain diffusion rates high enough to meet the body's needs.
- breathing—involves inspiration during which air moves from the surrounding environment into the spaces inside the lungs. During expiration, air moves from the lung spaces back into the surrounding environment.
  - external respiration—the exchange of oxygen and carbon dioxide between the air and the blood across the membranes in the lungs
  - internal respiration—the exchange of oxygen and carbon dioxide between the blood and the internal tissues across capillary and cell membranes.
  - cellular respiration—the series of energy-releasing chemical reactions that take place inside the cells. It provides ATP for all cellular activities.
- Structures of the upper respiratory tract:

Structures	Functions
nasal passages	<ul style="list-style-type: none"> <li>■ warm and moisten the air</li> <li>■ mucus and ciliated cells trap dust and bacteria, moving them back up into the nose and throat</li> </ul>
turbinate bones	<ul style="list-style-type: none"> <li>■ create turbulence in the air as it passes, increasing its contact with the mucus membranes that moisten and cleanse the air</li> </ul>
blood vessels	<ul style="list-style-type: none"> <li>■ carry blood which loses heat and warms the air in the nasal passages</li> </ul>

- The epiglottis is a flap of cartilage that lies behind the tongue and in front of the larynx. The epiglottis closes over the glottis when a person swallows and prevents food

or drink from entering the trachea. If the epiglottis did not function properly, food or liquids could enter the trachea, causing choking.

- When you have a cold, more mucus is secreted in the cells lining the respiratory system. Coughing is a way to expel the excess mucus from the body. Cough medicine may reduce the amount you cough, which could allow for a build-up of mucus in the respiratory tract. Many cough medications may also make you sleepy.
- Breathing through the mouth allows air to bypass the nasal cavity, so air would not be warmed and moistened as it would be when passing through the nose. The warming and moistening of the air is important for protection of the delicate structures found in the lower respiratory tract.
- The path of air from the nose to the alveoli is:



- The larynx contains the vocal cords. Sound is created as the vocal cords are drawn together and air passing through the narrowed space between them causes them to vibrate. A tube inserted into the trachea would pass through the larynx preventing the vocal cords from coming together. Also, exhaled air would pass through the inserted tube rather than past the vocal cords, so no sound could be made.
- The thin pleural membranes cover the surface of each lung and the inside of the chest wall. Fluid in the space between the membranes causes them to adhere to each other in the same way that a film of tears causes a contact lens to stick to the cornea of the eye. In this way, each lung adheres to the wall of the thoracic cavity and thereby expands and contracts with the movement of the chest.
- The walls of the trachea and bronchi are strengthened by semicircular, cartilaginous arches that prevent them from collapsing during inhalation.
- The structures are:

A – nasal passages	F – trachea
B – nostrils	G – bronchus
C – pharynx	H – lung
D – epiglottis	I – bronchioles
E – larynx	J – diaphragm K – thoracic cavity

- 13.** A – bronchiole    B – alveoli    C – capillary network

Gas exchange takes place between the blood in the capillaries and the air in the alveoli. Oxygen molecules in the air become dissolved in the film of water (moisture) on the alveolar wall and then diffuse into the blood. Carbon dioxide diffuses from the blood in the opposite direction.

- 14.** Several characteristics of alveoli facilitate gas exchange. Their arrangement in clusters (like bunches of hollow grapes) provides a very large surface area across which external respiration occurs. The alveolar walls are covered in a film of water, providing a moist environment for diffusion of gases. Each alveolar wall is only one cell layer thick, creating the minimum distance possible across which diffusion occurs.

Alveoli are significant for gas exchange in that they are specialized tissues for that function. (The outer skin might also function in gas exchange as in amphibians, except that human skin consists of dry, dead cells several layers thick and its total surface area is much less than that of the alveoli.)