

What is the Respiratory System?

Worksheet

The respiratory system moves air in and out of the lungs and exchanges oxygen for carbon dioxide across the thin walls of the alveoli, the lungs' tiny air sacs.

Questions

1. Where does gas exchange between air and blood occur?
 - A) Trachea
 - B) Bronchi
 - C) Alveoli
 - D) Larynx
2. What happens to the diaphragm during inhalation?
 - A) It relaxes and rises
 - B) It contracts and flattens
 - C) It stops moving
 - D) It closes the airway
3. A person breathes 20 times/min with a tidal volume of 400 mL. What's their minute ventilation?
 - A) 4 L/min
 - B) 6 L/min
 - C) 8 L/min
 - D) 20 L/min
4. Which gas is removed from the blood during gas exchange?
 - A) Oxygen
 - B) Nitrogen
 - C) Carbon dioxide
 - D) Hydrogen
5. A resting adult breathes 16 times per minute, each breath moving about 500 mL of air. What is their minute ventilation?
6. During exercise, breathing rate rises to 25 breaths/min and tidal volume to 700 mL. Find the new minute ventilation and the increase from rest (8 L/min).
7. Blood entering the lungs has low O₂ (40 mmHg) and high CO₂ (46 mmHg). After passing the alveoli, what happens to these values?
8. Define: What is the main function of the respiratory system?
9. Define: Where does gas exchange actually happen?
10. Define: What muscle drives normal breathing?

Answer Key

1. C) Alveoli - Alveoli are the tiny air sacs with thin, capillary-rich walls where O₂ and CO₂ diffuse.
2. B) It contracts and flattens - Diaphragm contraction flattens it, expanding the chest cavity and pulling air in.
3. C) 8 L/min - $VE = RR TV = 20 \cdot 0.4 L = 8 L/min$.
4. C) Carbon dioxide - CO₂, a waste product of metabolism, diffuses out of the blood into the alveoli to be exhaled.
5. Minute ventilation = breathing rate tidal volume = $16 \cdot 500 mL = 8,000 mL/min = 8 L/min$
6. New ventilation = $25 \cdot 700 mL = 17,500 mL/min = 17.5 L/min$ Increase = $17.5 - 8 = 9.5 L/min$ more air per minute
7. In the alveoli, O₂ (~104 mmHg) diffuses into blood and CO₂ diffuses out Blood leaving the lungs: O₂ rises to ~100 mmHg, CO₂ falls to ~40 mmHg This oxygen-rich, low-CO₂ blood returns to the heart to be pumped to the body
8. To bring oxygen into the body and remove carbon dioxide through breathing and gas exchange.
9. In the alveoli - tiny air sacs in the lungs surrounded by capillaries.
10. The diaphragm, a dome-shaped muscle below the lungs that contracts to pull air in.

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