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Olympiads
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CREST Science Olympiad (CSO) Worksheet *for* Class 10



Topic

Life Processes: Nutrition and Respiration



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Worksheet on Life Processes: Nutrition and Respiration

- 1. If an individual's blood pH becomes too acidic due to increased carbon dioxide levels, which respiratory response would help restore the pH to a normal level?**
 - a. Increase in respiratory rate and depth
 - b. Decrease in respiratory rate and depth
 - c. No change in respiratory rate and depth
 - d. Stop breathing temporarily
- 2. Under which environmental conditions would a plant be expected to have the highest rate of transpiration?**
 - a. High humidity and low temperature
 - b. Low humidity and high temperature
 - c. High humidity and high temperature
 - d. Low humidity and low temperature
- 3. A patient is diagnosed with a condition where their pancreas doesn't produce sufficient lipase enzymes. What dietary recommendations would you provide to help this patient digest dietary fats?**
 - a. Increase protein intake
 - b. Avoid all fats in the diet
 - c. Limit carbohydrate consumption
 - d. Consume small, frequent meals with reduced fat content
- 4. A group of athletes participated in a high-intensity exercise regimen, while another group maintained a sedentary lifestyle. After a month, their lung capacities were measured. Which of the following results is expected based on their respective activities?**
 - a. Athletes will have decreased lung capacity due to excessive exertion.
 - b. Athletes will have increased lung capacity as a result of improved respiratory efficiency.
 - c. Sedentary individuals will have increased lung capacity due to rest.
 - d. Both groups will have similar lung capacities.
- 5. Imagine you are conducting an experiment to investigate the factors influencing the rate of gas exchange in the respiratory system. You set up a model of the respiratory membrane with varying thickness and surface areas. What do you predict will happen to the rate of gas exchange as the membrane thickness increases, and how would this relate to real-life scenarios?**
 - a. The rate of gas exchange will increase as the membrane thickness increases. This is consistent with conditions in diseased lungs.
 - b. The rate of gas exchange will decrease as the membrane thickness increases.
 - c. The rate of gas exchange remains unaffected by changes in membrane thickness, as real-life factors play a more significant role.
 - d. The rate of gas exchange depends on humidity levels, not membrane thickness.

Answer Key

1. a - When an individual's blood pH becomes too acidic due to increased carbon dioxide (CO_2) levels, the body needs to restore the pH to a normal level (slightly alkaline) by eliminating excess CO_2 , which is an acidic waste product.
Increasing the respiratory rate and depth (breathing more rapidly and deeply) is the body's natural response. This increase in ventilation helps remove excess CO_2 from the bloodstream through exhalation. As CO_2 is eliminated, the blood shifts towards a more alkaline state, raising the blood pH back toward normal levels.
2. b - Low humidity and high temperature" would result in the highest rate of transpiration because it combines the factors of high temperature and low humidity.

High temperature: Higher temperatures increase the kinetic energy of water molecules, causing them to evaporate more quickly from the leaf surface.

Low humidity: When the air surrounding the plant has low humidity, there is a greater concentration gradient. For water vapour to move from the leaf's moist interior to the drier external environment.

3. d - Since the patient's pancreas doesn't produce sufficient lipase enzymes, they may have difficulty digesting dietary fats. Consuming small, frequent meals with reduced fat content can help ease the digestive burden and improve fat absorption. Increasing protein intake, avoiding all fats, or limiting carbohydrate consumption wouldn't directly address the issue of fat digestion in this case.
4. b - High-intensity exercise can lead to increased lung capacity over time because it promotes improved respiratory efficiency. The athletes are likely to experience adaptations in their respiratory system, such as increased lung volume and improved oxygen uptake, to meet the demands of their training. In contrast, sedentary individuals are less likely to experience such improvements in lung capacity.
5. b - Increasing the thickness of the respiratory membrane creates a barrier that hinders the diffusion of gases. In real-life scenarios, this is consistent with conditions in diseased or damaged lungs, where thickening of the respiratory membrane impairs efficient gas exchange, leading to reduced oxygen uptake and carbon dioxide removal.

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