Class X - Health and Physical Education

Effects of Physical Activities on Human Body

CBSE NOTES

Effects of Physical Activities on Human Body - Mastery Worksheet

Advance your understanding through integrative and tricky questions.

Mastery Questions

1. Explain how physical activities affect the muscular system, including changes in muscle fibres and muscle performance.

Hint: Focus on the structural and functional changes in muscles due to physical activities.

Solution: Physical activities lead to several changes in the muscular system. Firstly, muscle fibres enlarge, causing an overall increase in muscle size by up to 60%. This is evident in athletes like tennis players, whose arm muscles are well-developed. Secondly, regular physical activities maintain good muscle tone by keeping muscles in a partial state of contraction. Thirdly, there's an increase in muscle proteins, which are essential for muscle contraction. Additionally, the number of blood capillaries supplying muscles increases, enhancing oxygen and nutrient delivery. Lastly, regular exercise improves the efficiency of ligaments and tendons, increases muscle strength, delays muscle fatigue, and improves reaction time and muscle movement efficiency.

2. Compare and contrast the effects of physical activities on the respiratory and circulatory systems.

Hint: Highlight the unique and shared benefits for each system.

Solution: Physical activities have distinct yet interconnected effects on the respiratory and circulatory systems. In the respiratory system, regular exercise increases lung size and chest volume, improves lung power through practices like Pranayam, and activates inactive alveoli, enhancing vital capacity. In contrast, the circulatory system benefits from an increase in heart size and thickness, more efficient blood circulation due to activated capillaries, and a decrease in heart rate at rest. Both systems experience improved efficiency in oxygen delivery and waste removal, but the respiratory system focuses more on oxygen intake and carbon dioxide expulsion, while the circulatory system emphasizes blood flow and nutrient transport.

3. Describe the concept of oxygen debt and its relevance to physical activities.

Hint: Think about the balance between oxygen supply and demand during exercise.

Solution: Oxygen debt occurs during intense physical activities when the body's oxygen demand exceeds the supply, leading to anaerobic respiration and lactic acid accumulation in muscles. This creates a temporary oxygen deficit that the body repays during the recovery period by increasing

oxygen intake to break down lactic acid and restore ATP levels. Oxygen debt is crucial for understanding muscle fatigue and the importance of recovery phases in sports and exercise.

4. Analyze the role of the heart in adapting to regular physical activities, including changes in heart rate and stroke volume.

Hint: Consider how the heart becomes more efficient with regular exercise.

Solution: Regular physical activities lead to significant adaptations in the heart. The cardiac muscles develop, increasing the heart's size and the thickness of its walls. This enhances the heart's efficiency, allowing it to pump more blood per beat (increased stroke volume) and reducing the resting heart rate. For instance, an athlete's heart may beat fewer times per minute at rest compared to a non-athlete, as each beat is more effective. These adaptations improve overall cardiovascular health and endurance.

5. Discuss the impact of physical activities on bone health and the prevention of osteoporosis.

Hint: Focus on the mechanical and biological effects of exercise on bones.

Solution: Weight-bearing physical activities, such as walking and running, stimulate bone formation and density, helping to prevent osteoporosis. These exercises stress the bones in a beneficial way, promoting the activity of osteoblasts (bone-forming cells) and increasing calcium deposition. Regular physical activity thus preserves bone mass, reduces the risk of fractures, and maintains skeletal strength, especially important as one ages.

6. Explain how regular physical activities influence the levels of LDL and HDL in the blood and their implications for heart health.

Hint: Link cholesterol levels to their effects on the cardiovascular system.

Solution: Regular physical activities decrease low-density lipoprotein (LDL), known as 'bad cholesterol,' which can clog arteries, and increase high-density lipoprotein (HDL), or 'good cholesterol,' which helps remove cholesterol from the bloodstream. This balance reduces the risk of atherosclerosis and coronary heart disease, promoting better cardiovascular health. Exercise also improves blood vessel elasticity and reduces blood pressure, further protecting the heart.

7. Illustrate the process of double circulation and how physical activities enhance its efficiency.

Hint: Trace the path of blood and the role of exercise in improving circulation.

Solution: Double circulation refers to the blood passing through the heart twice in one complete cycle: once to the lungs (pulmonary circulation) and once to the body (systemic circulation). Physical activities enhance this process by strengthening the heart muscle, increasing stroke volume, and improving capillary density. This ensures more efficient oxygen delivery to tissues and faster removal of carbon dioxide, supporting sustained physical performance.

8. Evaluate the benefits of yoga on the respiratory and circulatory systems, citing specific asanas.

Hint: Identify asanas that target breathing and blood flow.

Solution: Yoga, particularly asanas like Bhujangasana (Cobra Pose) and Dhanurasana (Bow Pose), strengthens the chest and abdominal muscles, enhancing lung capacity and efficiency. Pranayama techniques improve oxygen intake and carbon dioxide expulsion. For the circulatory system, asanas such as Sarvangasana (Shoulder Stand) promote blood flow to the heart and brain, while Suryanamaskar (Sun Salutation) sequences boost overall circulation, reducing the risk of cardiovascular diseases.

9. Describe the changes in vital capacity and residual volume due to regular physical activities and their significance.

Hint: Consider how exercise affects lung volume measurements.

Solution: Regular physical activities increase vital capacity—the maximum air inhaled and exhaled—by enhancing lung and chest muscle strength. This allows for greater oxygen uptake during exercise. Residual volume, the air remaining in lungs after maximal exhalation, may also increase slightly, ensuring that alveoli remain open for gas exchange even at rest. These changes improve respiratory efficiency and endurance, crucial for athletes and active individuals.

10. Construct a detailed explanation of how physical activities integrate the functions of the muscular, respiratory, and circulatory systems to enhance overall health.

Hint: Think about the interconnectedness of these systems during exercise.

Solution: Physical activities integrate the muscular, respiratory, and circulatory systems to enhance health. Muscles demand more oxygen and nutrients during exercise, prompting the respiratory system to increase oxygen intake and the circulatory system to deliver it efficiently. The heart pumps faster, and lungs work harder to meet this demand. Over time, these systems adapt: muscles grow stronger, lungs increase in capacity, and the heart becomes more efficient. This synergy improves endurance, reduces disease risk, and promotes overall well-being, showcasing the body's remarkable ability to adapt to physical challenges.

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