

Sports Science Fundamentals

Sports Science · Answer Key · 15 Questions

1. What is the primary metabolic pathway for generating ATP during high-intensity, short-duration anaerobic exercise, lasting approximately 10-30 seconds?

- A) Oxidative phosphorylation
- B) Glycolysis (anaerobic)**
- C) The Krebs Cycle
- D) Beta-oxidation

2. Which of the following physiological adaptations is MOST consistently observed in response to endurance training, leading to an improved ability to deliver oxygen to working muscles?

- A) Increased muscle fiber type IIa percentage
- B) Decreased mitochondrial density
- C) Increased stroke volume**
- D) Reduced capillary density

3. In biomechanics, the concept of 'ground reaction force' is crucial. What is it?

- A) The force exerted by the ground on an object
- B) The force exerted by an object on the ground**
- C) The friction between surfaces
- D) The acceleration due to gravity

4. What is the primary function of creatine in sports performance?

- A) To increase muscle protein synthesis
- B) To buffer lactic acid accumulation
- C) To rapidly replenish ATP stores via the phosphocreatine system**
- D) To improve oxygen transport

5. Which type of muscle contraction occurs when the muscle generates force but its length does not change?

- A) Concentric contraction
- B) Eccentric contraction
- C) Isometric contraction**
- D) Isokinetic contraction

6. What is the main limiting factor for performance in prolonged aerobic exercise (e.g., marathon running)?

- A) Glycogen depletion**
- B) Lactate accumulation
- C) Oxygen transport capacity
- D) Electrolyte imbalance

7. The principle of 'specificity' in training suggests that the adaptations to exercise are specific to:

- A) The rest periods taken between sets
- B) The type of exercise performed**
- C) The nutritional intake during training
- D) The weather conditions during exercise

8. What is the physiological response to dehydration during exercise that MOST directly impairs performance?

- A) Increased heart rate and reduced stroke volume**
- B) Decreased blood viscosity
- C) Reduced core body temperature
- D) Increased muscle glycogen synthesis

9. Which energy system is primarily responsible for supplying ATP during very high-intensity activities lasting less than 10 seconds (e.g., a 100-meter sprint)?

- A) Aerobic glycolysis
- B) Oxidative system
- C) ATP-PCr system**
- D) Anaerobic lactic system

10. The term 'VO₂ max' refers to:

- A) The maximum rate of oxygen consumption during submaximal exercise
- B) The minimum oxygen uptake required for resting metabolism
- C) The maximum rate of oxygen consumption during maximal exercise**
- D) The rate of oxygen debt repayment post-exercise

11. What is the primary role of proprioceptors in sports performance?

- A) To detect changes in blood glucose levels
- B) To provide sensory information about body position and movement**
- C) To regulate heart rate during exercise
- D) To break down muscle tissue for energy

12. Which macronutrient is considered the MOST important source of fuel for moderate-to-high intensity exercise?

- A) Protein
- B) Fat
- C) Carbohydrates**
- D) Vitamins

13. The 'sliding filament theory' explains muscle contraction by proposing that:

- A) Myosin filaments pull actin filaments closer together
- B) Actin filaments slide past myosin filaments, shortening the sarcomere**
- C) Calcium ions cause sarcomeres to lengthen
- D) ATP is directly converted into mechanical energy

14. What is the main physiological mechanism responsible for the increase in muscle hypertrophy in response to resistance training?

- A) Increased rate of protein degradation
- B) Increased rate of protein synthesis**
- C) Decreased number of muscle fibers
- D) Reduced blood flow to the muscles

15. In the context of sports nutrition, what is the primary role of carbohydrates during prolonged strenuous exercise?

- A) To facilitate fat metabolism
- B) To provide readily available energy for muscle contraction**
- C) To support muscle protein repair
- D) To act as a signaling molecule for muscle growth