Name: _____ **Date:** _____

Answer Key: Muscles, Molecules, and Movement: Midnight Marathon Mystery of 8th Grade

Moving beyond simple heart rates to analyze metabolic thresholds and cellular adaptations during high-intensity interval training and endurance cycles.

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1. An 8th-grade soccer player notices they can sprint faster for longer after a month of hill training. This long-term change in the body's efficiency is known as:

Answer: B) A chronic adaptation

Chronic adaptations are long-term physiological changes, such as increased stroke volume or mitochondrial density, that occur as a result of consistent exercise over time.

2. During a 30-second 'all-out' burst on a stationary bike, the body primarily relies on the _____ pathway to create energy without using immediate oxygen.

Answer: C) Anaerobic glycolysis

Anaerobic glycolysis breaks down glucose for energy during high-intensity activities lasting roughly 30 to 90 seconds when oxygen demand exceeds supply.

3. Hypertrophy refers to the increase in the size of skeletal muscle fibers as a chronic adaptation to resistance training.

Answer: A) True

Hypertrophy is the scientific term for the growth of muscle cells, which occurs when protein synthesis exceeds protein breakdown over a period of training.

4. Which of these is considered an 'acute response' to a single bout of vigorous swimming?

Answer: C) Vasodilation of blood vessels

Vasodilation (widening of blood vessels) is an immediate, or acute, response to exercise that helps deliver more blood and oxygen to working muscles.

5. The _____ volume is the amount of blood the heart pumps out of the left ventricle with every single beat.

Answer: C) Stroke

Name: _____ **Date:** _____

Stroke volume is a key metric in exercise physiology; athletes often have a higher stroke volume, allowing their heart to work more efficiently.

6. Delayed Onset Muscle Soreness (DOMS) is primarily caused by a buildup of lactic acid in the muscles 48 hours after exercise.

Answer: B) False

Lactic acid is cleared from the body shortly after exercise. DOMS is actually caused by microscopic tears in the muscle fibers and resulting inflammation.

7. If an athlete is performing a low-intensity, long-distance hike, which fuel source is their body most likely to prioritize for the aerobic system?

Answer: B) Lipids (Fats)

During low-intensity, steady-state aerobic activity, the body efficiently uses fat (lipids) as the primary fuel source to conserve glycogen stores.

8. The concept of _____ state refers to the point during exercise when oxygen uptake remains constant because it meets the energy demands of the activity.

Answer: A) Steady

Steady state occurs during submaximal exercise when the aerobic system can supply all the necessary ATP, keeping heart rate and breathing stable.

9. Why does a 'cool-down' period help prevent fainting after intense exercise?

Answer: B) It prevents blood from pooling in the lower extremities

A cool-down keeps the 'muscle pump' active, helping return blood from the legs back to the heart and brain, preventing a sudden drop in blood pressure.

10. Mitochondria increase in number and size as a chronic adaptation to regular aerobic endurance training.

Answer: A) True

Increases in mitochondrial density allow the muscles to process more oxygen and produce more ATP, which is a hallmark of cardiovascular fitness.