1.7 Long-Term Effects of Exercise: Training Adaptations: 10-minute Pack

Total Marks

AQA 8582 · Calculators not allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 After several months of regular aerobic training, what typically happens to a performer's resting heart rate?

- ☐ A) It increases
- ☐ B) It decreases
- ☐ C) It stays exactly the same
- ☐ D) It becomes irregular

(Total for Question 1 is 1 mark)

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2 Long-term training also increases the amount of glycogen a muscle can store. Explain how this benefits a performer during prolonged exercise.

(Total for Question 2 is 2 marks)

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3 A rower follows a structured training programme for three years, progressing from club level to national competition.

Evaluate how long-term training adaptations across the cardiovascular, respiratory, muscular and skeletal systems combine to improve the rower's performance over this period.

(Total for Question 3 is 6 marks)

4 Using resting heart rate as an example, state one difference between a short-term effect of exercise and a long-term effect of exercise.

(Total for Question 4 is 2 marks)

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Mark scheme · 1.7 Long-Term Effects of Exercise: Training Adaptations: 10-minute Pack

Question 1

B (it decreases) **B1**

Answer: B (it decreases)

Question 2

glycogen is the muscle's stored form of glucose, used as fuel by both the lactic acid and aerobic systems, oe **B1**

a larger glycogen store means more fuel is available before the muscle runs low, delaying fatigue during prolonged exercise, oe **B1**

Answer: Glycogen is the muscle's stored form of glucose, used as fuel by both the lactic acid and aerobic energy systems; a larger glycogen store means more fuel is available before the muscle runs low, delaying fatigue during prolonged exercise.

Question 3

Level 3 A detailed and coherent evaluation that explains at least four long-term adaptations from different body systems (e.g. cardiac hypertrophy, increased stroke volume, capillarisation, increased vital capacity, muscle hypertrophy, increased mitochondria, increased bone/tendon strength) and clearly links each to improved rowing performance, using accurate terminology throughout. **5-6**

Level 2 At least two or three long-term adaptations are explained with reasonable accuracy, with some link made to improved performance, but development may be limited or restricted to one or two systems. **3-4**

Level 1 One or two relevant points about long-term training adaptations are made, with little explanation or clear link to performance. **1-2**

Level 0 No relevant content. **0**

Indicative content:

- Cardiac hypertrophy and increased stroke volume increase the rower's cardiac output during maximal effort, delivering more oxygen to the working muscles.
- A lower resting heart rate (bradycardia) shows the heart has become more efficient, needing fewer beats to maintain the same resting cardiac output.
- Capillarisation around both the muscles and the alveoli improves the exchange of oxygen and carbon dioxide, supporting a higher rate of aerobic energy production.
- An increased vital capacity, from stronger respiratory muscles, allows the rower to take in more air with each breath during a race.
- Muscle hypertrophy in the legs, back and arms increases the force the rower can generate with each stroke.
- An increased number and size of mitochondria, and increased myoglobin and glycogen stores in the muscles, all increase the muscle's capacity to produce energy aerobically over the several minutes a rowing race lasts.
- Increased bone density and stronger tendons and ligaments help the rower withstand the repeated high forces of training and racing with a reduced risk of injury, allowing more consistent long-term training.
- A balanced evaluation might conclude that no single adaptation explains the improvement alone: the cardiovascular and respiratory adaptations increase how much oxygen can be delivered, the muscular adaptations increase how effectively that oxygen (and stored fuel) can be used to generate force, and the skeletal adaptations allow the rower to sustain the training load needed to develop and maintain all of the above over three years.

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Question 4

a short-term effect is a temporary change that happens during a single exercise session (heart rate rises during exercise) and then returns to normal once exercise stops, oe **B1**

a long-term effect is a lasting change that develops over weeks or months of repeated training (resting heart rate becomes permanently lower) and remains even when the person is not currently exercising, oe **B1**

Answer: A short-term effect (e.g. heart rate rising during a single session) is a temporary change that returns to normal once exercise stops, whereas a long-term effect (e.g. a permanently lower resting heart rate) is a lasting change that develops over weeks or months of repeated training and remains even when the person is not currently exercising.

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