Practice Question Set For A-Level
Subject : Biology
Paper-2 Topic: 6 Organisms Response To Their Environment

Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

Read the following passage.

ATP is essential for muscle contraction. The concentration of ATP in skeletal muscle is approximately 5×10^{-3} mmol g^{-1}. During maximum exercise, ATP in skeletal muscle is used at a rate of approximately 3.7 mmol kg^{-1} s^{-1}. If ATP was not resynthesised, maximum exercise would last a short time.

Some studies have suggested that taking creatine supplements can improve muscle performance during intense short-term exercise. Eating more carbohydrate, known as 'carbohydrate loading', for a few days before exercise can improve muscle performance when exercising for a long time.

During aerobic exercise, calcium ions in muscle cells have several roles. They activate the inclusion of glucose transport proteins, GLUT4, in the cell-surface membrane and the inclusion of fatty acid transport proteins, CD36, in mitochondrial membranes. An increase in muscle activity increases the concentration of carbon dioxide in the blood. This causes an increase in heart rate.

Use the information in the passage and your own knowledge to answer the following questions.

(a) ATP is essential for muscle contraction (line 1).

Describe the roles of ATP in muscle contraction.

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(2)

(b) Calculate how long maximum exercise would last if ATP was not resynthesised (lines 3–4).

Answer _____ s

(1)

(c) Describe and explain how taking creatine supplements (lines 5–6) and 'carbohydrate loading' (lines 6–7) can improve performance of different types of muscle fibres during different types of exercise.

(5)

(d) Suggest and explain how GLUT4 and CD36 transport proteins (lines 10–11) are beneficial during exercise.

(3)

(e) An increase in muscle activity causes an increase in heart rate (lines 12–14).

Describe and explain how.

(4)

(Total 15 marks)

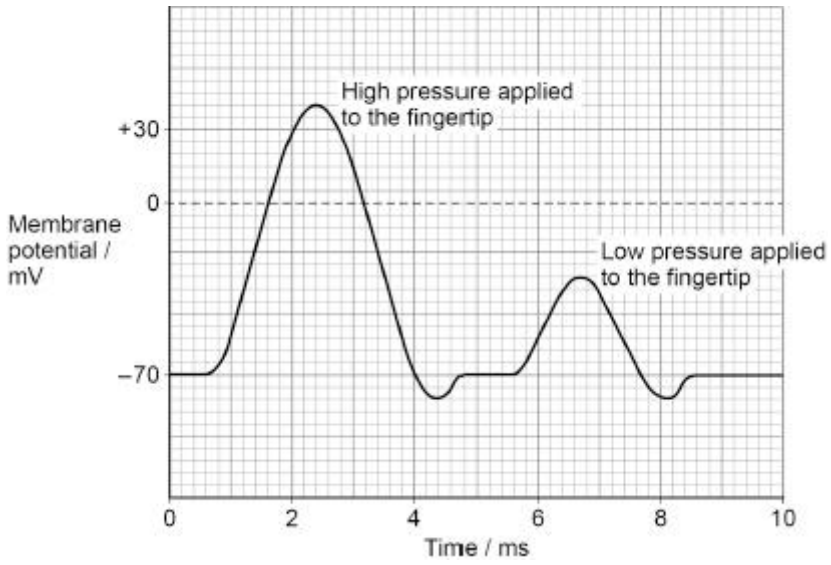
Q2.

(a) Describe how stimulation of a Pacinian corpuscle produces a generator potential.

(3)

Scientists investigated the stimulation of a Pacinian corpuscle in the skin of a fingertip. The scientists applied two different pressures to the fingertip and recorded the changes in membrane potential of the Pacinian corpuscle's sensory neurone.

The graph below shows the scientists' results.



(b) Use the graph to describe what is meant by the all-or-nothing principle.

(2)

(c) On the graph above, from 0.6 ms to 4.0 ms, no new generator potential could be produced. What is this time period called?

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(1)

(Total 6 marks)