Respiration

Question Paper 3

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and respiration
Sub Topic	Respiration
Booklet	Theory
Paper Type	Question Paper 3

Time Allowed : **60 minutes**

Score : **/ 50**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(a)** Explain the role of ATP in active transport of ions **and** in named anabolic reactions. [7]

(b) Outline the process of anaerobic respiration in both mammal and yeast cells. [8]

[Total: 15]

2 In anaerobic soil, bacteria, such as *Pseudomonas stutzeri*, can use nitrate ions (NO_3^-) as a source of oxygen for their respiration. The word equation below summarises the process:

glucose + nitrate $\longrightarrow$ water + carbon dioxide + nitrogen

(a) **(i)** State the name of this process in the nitrogen cycle.

..... [1]

(ii) In agriculture, this reaction can be undesirable. Explain why.

.....

.....

.....

..... [2]

High concentrations of nitrate ions in drinking water obtained from rivers and lakes can be toxic, especially to infants. These nitrate ions enter rivers and lakes dissolved in water which drains from the soil.

(b) **(i)** Name the process, carried out by soil bacteria, which produces nitrate ions.

..... [1]

(ii) Suggest how bacteria, such as *Pseudomonas stutzeri*, can be used in the process of purifying water for drinking.

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..... [2]

(c) In recent years there has been an increase in flooding of agricultural land worldwide.

Explain why crop yields are often significantly reduced even after the flood water has drained away.

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..... [4]

[Total: 10]

3 **(a)** Complete the following passage about ATP by writing in the missing words.

All living organisms use energy. The most common immediate source of energy is adenosine triphosphate (ATP) which is used in every cell for the movement of ions against a concentration gradient, known as ..... .

ATP is known as the universal currency of energy.

ATP is a phosphorylated nucleotide which is known as a 'high energy' molecule. It is made of an organic base, adenine, a 5 carbon sugar named ..... and three phosphate groups. ATP is very soluble in ..... and easily transported within the cell. The removal of the outer phosphate group by the process of ..... releases energy. The energy released as a result of this reaction can be channelled directly into other reactions in the cell.

A certain proportion of this energy is lost as ..... .

ATP is continually broken down and is reformed at a fast rate by the process of respiration.

[5]

(b) During a sporting event an athlete may have to carry out anaerobic respiration in addition to aerobic respiration to produce sufficient ATP.

Fig. 7.1 outlines both processes in a muscle cell and shows how a liver cell is linked to these processes.

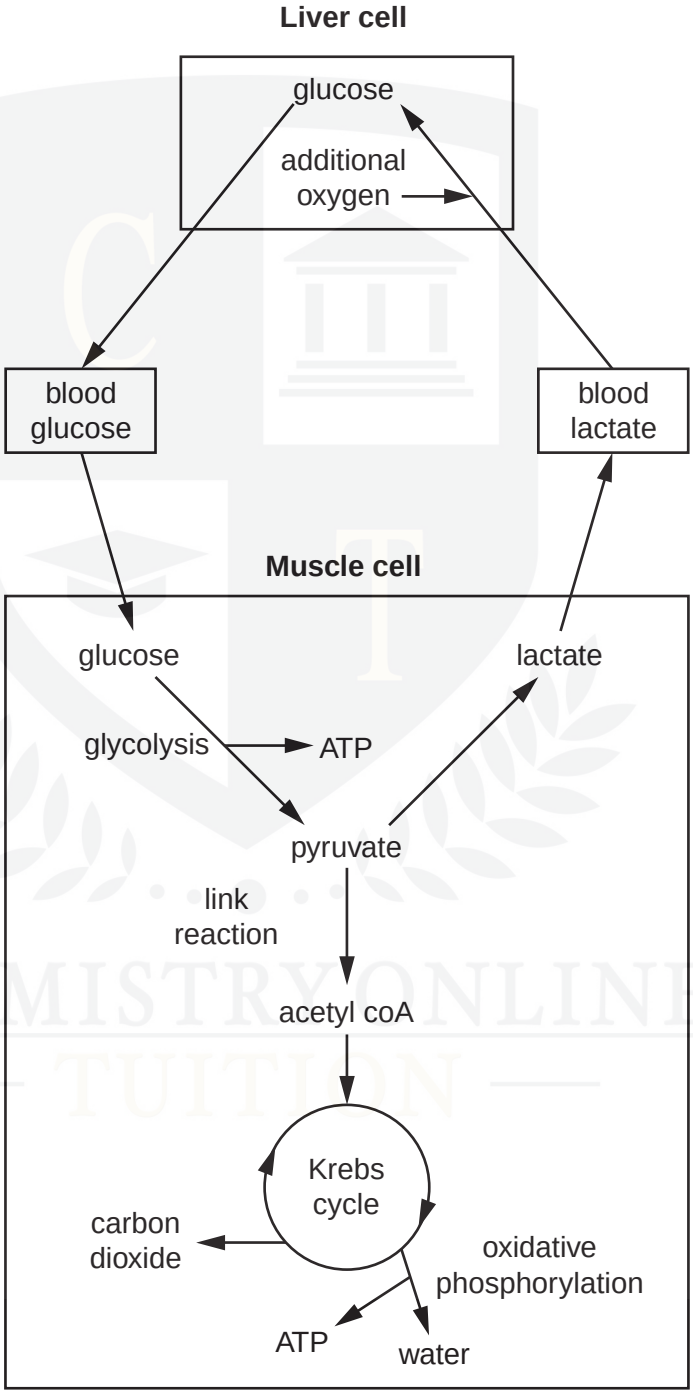

Fig. 7.1

You may refer to Fig. 7.1 in answering questions **(i)** to **(v)** below.

(i) Glucose produced in the liver cell can be released into the blood to maintain blood glucose concentration.

State one use of glucose **within** the liver cell.

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..... [1]

(ii) Suggest why anaerobic respiration is said to be less efficient than aerobic respiration.

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..... [2]

(iii) Complete the table to indicate, within the muscle cell, the precise locations of glycolysis, the link reaction, the Krebs cycle and oxidative phosphorylation.

process	**precise location**
glycolysis	
link reaction	
Krebs cycle	
oxidative phosphorylation	

[4]

(iv) Glucose is phosphorylated at the start of glycolysis in the muscle cell.

Suggest why this phosphorylated glucose does **not** diffuse out of the cell into the surrounding tissue fluid.

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..... [2]

(v) Additional oxygen is required in the metabolic pathways involved in the conversion of lactate to glucose.

State the term given to this additional oxygen.

..... [1]

[Total: 15]

4 The Krebs cycle occurs in the matrix of the mitochondrion.

Fig. 6.1 outlines the steps of the Krebs cycle.

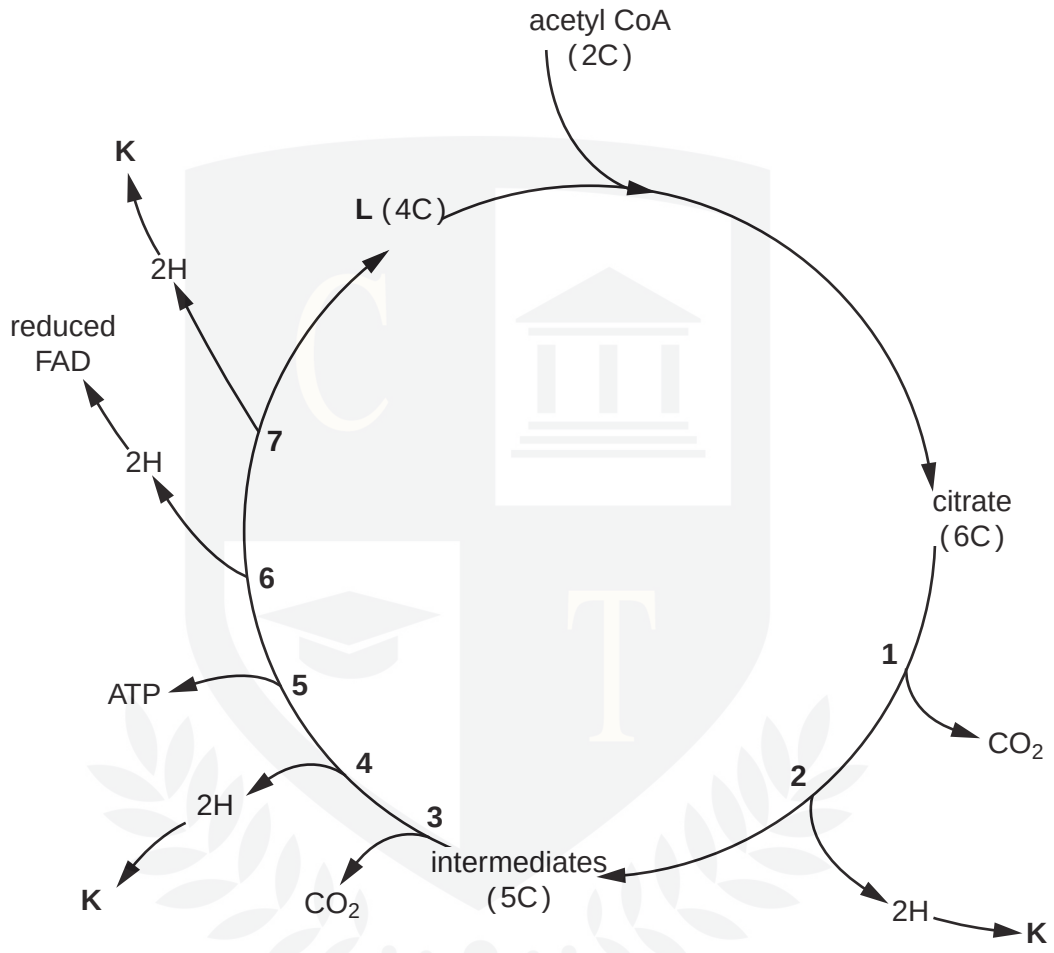

Fig. 6.1

(a) With reference to Fig. 6.1 name the process occurring at:

(i) **1** and **3** ..... [1]

(ii) **2**, **4**, **6** and **7** ..... [1]

(iii) **5** ..... [1]

(b) Name the compounds **K** and **L**.

K .....

L ..... [2]

(c) Most of the hydrogen atoms that are released by the Krebs cycle will take part in oxidative phosphorylation on the cristae of the mitochondria.

Outline the process of oxidative phosphorylation.

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.....[5]

[Total: 10]