Respiration

Question Paper 8

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and respiration
Sub Topic	Respiration
Booklet	Theory
Paper Type	Question Paper 8

Time Allowed : **58 minutes**

Score : **/ 48**

Percentage : **/100**

Grade Boundaries:

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

1 Complete the following passage.

During strenuous exercise, muscles often do not receive sufficient oxygen to support aerobic respiration. As a result, muscles carry out ..... respiration and produce ..... , which diffuses into the blood. Most is then absorbed by the ..... , which respires it to form carbon dioxide and water or uses it to form glucose. The volume of oxygen absorbed by the lungs does not return to normal immediately after strenuous exercise because the body has to repay an oxygen ..... .

Exercise that uses the cardiovascular and gaseous exchange systems is termed ..... exercise. Improvements in fitness of the cardiovascular system can be followed by measuring the decrease in the ..... pulse rate. [6]

[Total : 6]

2 Fig. 2.1 is an electron micrograph of a mitochondrion.

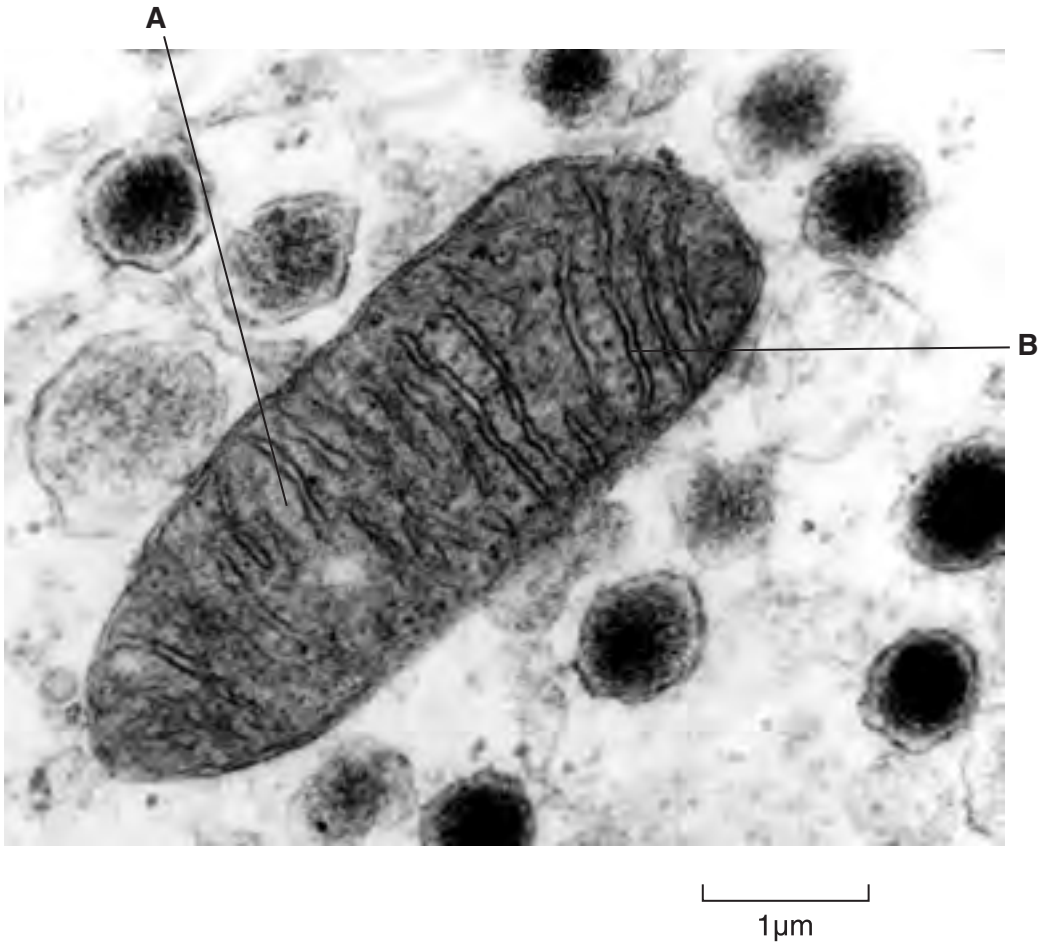

Fig. 2.1

Two stages of respiration occur in mitochondria. These are the Krebs cycle and oxidative phosphorylation.

(a) Complete the table below by naming the structures labelled **A** and **B** and stating which of the stages of respiration occur in each.

	name of structure	stage of respiration
A	....	....
B	....	....

[2]

(b) Describe how the structure of a mitochondrion is adapted to carry out these two processes.

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.....[3]

(c) Describe briefly the role of NAD in respiration.

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.....[3]

(d) Describe how *photophosphorylation* differs from *oxidative phosphorylation*.

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.....[3]

[Total : 11]

3 **(a)** Describe how non-cyclic photophosphorylation produces ATP and reduced NADP. [9]

(b) Outline the steps of the Calvin cycle. [6]

[Total: 15]

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4 **(a)** The initial stages of respiration convert one molecule of glucose into two molecules of a 3C compound.

State

(i) the name given to these initial stages

..... [1]

(ii) where these stages occur in cells

..... [1]

(iii) the **total** number of ATP molecules formed during these stages.

..... [1]

(b) Most of the ATP formed in respiration is produced within the mitochondria by oxidative phosphorylation.

(i) State the location, in the mitochondrion, of oxidative phosphorylation.

..... [1]

(ii) Outline the process of oxidative phosphorylation.

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..... [5]

(c) In an investigation, mammalian liver cells were homogenised (broken up) and the resulting homogenate centrifuged. Samples of the complete homogenate and samples containing only nuclei, only ribosomes, only mitochondria or only the remaining cytosol were incubated with:

1 glucos

2 yruvate

3 glucose and cyanide

4 pyruvate and cyanide

Cyanide inhibits oxidative phosphorylation.

After incubation the presence or absence of carbon dioxide and lactate in each sample was determined.

The results are summarised in Table 7.1.

Table 7.1

	samples of homogenate									
	complete		only nuclei		only ribosomes		only mitochondria		only cytosol	
	carbon dioxide	lactate	carbon dioxide	lactate	carbon dioxide	lactate	carbon dioxide	lactate	carbon dioxide	lactate
1 glucose	✓	✓	✘	✘						✓
2 pyruvate	✓	✓	✘	✘	✘	✘	✓	✘	✘	✓
3 glucose and cyanide	✘	✓	✘	✘						✓
4 pyruvate and cyanide	✘	✓	✘	✘						✓

✘ = absent ✓ = present

(i) With reference to Table 7.1, name the two organelles not involved in respiration.

1. .....

2. ..... [1]

(ii) Explain why carbon dioxide is produced when mitochondria are incubated with pyruvate but **not** when they are incubated with glucose.

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..... [3]

(iii) Explain why, in the presence of cyanide, lactate is produced but carbon dioxide is not.

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..... [3]

[Total: 16]