

# Aerobic Respiration

## Question Paper 2

<b>Level</b>	International A Level
<b>Subject</b>	Biology
<b>Exam Board</b>	Edexcel
<b>Topic</b>	Respiration, Muscle and Internal Environment
<b>Sub-Topic</b>	Aerobic Respiration
<b>Booklet</b>	Question paper 2

**Time Allowed:** 69 minutes

**Score:** /57

**Percentage:** /100

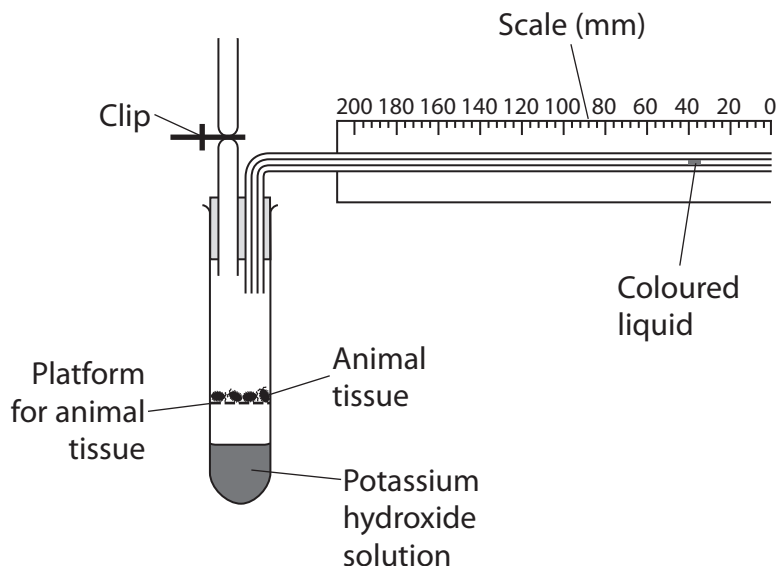
**Grade Boundaries:**

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

- 1 The tissues of some animals can carry out anaerobic and aerobic respiration.
- (a) Three investigations were carried out to study respiration in an animal tissue, using the apparatus shown below.

The tissue used glucose as the respiratory substrate.

All other variables were kept constant.



The table below shows the three investigations that were carried out and the result for investigation 1.

Investigation	Type of respiration	Potassium hydroxide solution absent or present	Coloured liquid moved to the left	Coloured liquid moved to the right	Coloured liquid did not move
1	Anaerobic	Absent	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Aerobic	Absent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Aerobic	Present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (i) Complete the table by placing a cross in one box  for each of investigations 2 and 3 to show the response of the coloured liquid.

(2)



(b) Explain how investigation 3, shown in the table, could be used to compare the rate of respiration of two different tissues.

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**(Total for Question 1 = 11 marks)**

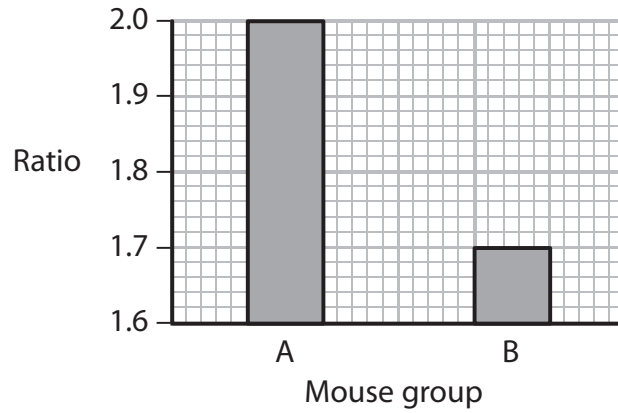


(b) After 15 days, skeletal muscle from the mice in the groups was compared.

- (i) Skeletal muscle cells contain mitochondria. The surface areas of the inner and outer membranes of the mitochondria were compared.

The surface area of the inner membrane was divided by the surface area of the outer membrane to obtain a ratio.

The bar chart below shows the ratios for the two groups of mice.



Use the information in the bar chart to describe the effect of epicatechin on the mitochondria.

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- (ii) The ability of the skeletal muscle to contract was compared. The time taken for the muscle to start to fatigue (fail to contract) was recorded.

The results are shown in the table below.

<b>Group</b>	<b>Mean time taken for skeletal muscle to start to fatigue / seconds</b>
A	164
B	130

Using information from the bar chart and your knowledge of respiration, suggest an explanation for the results shown in the table.

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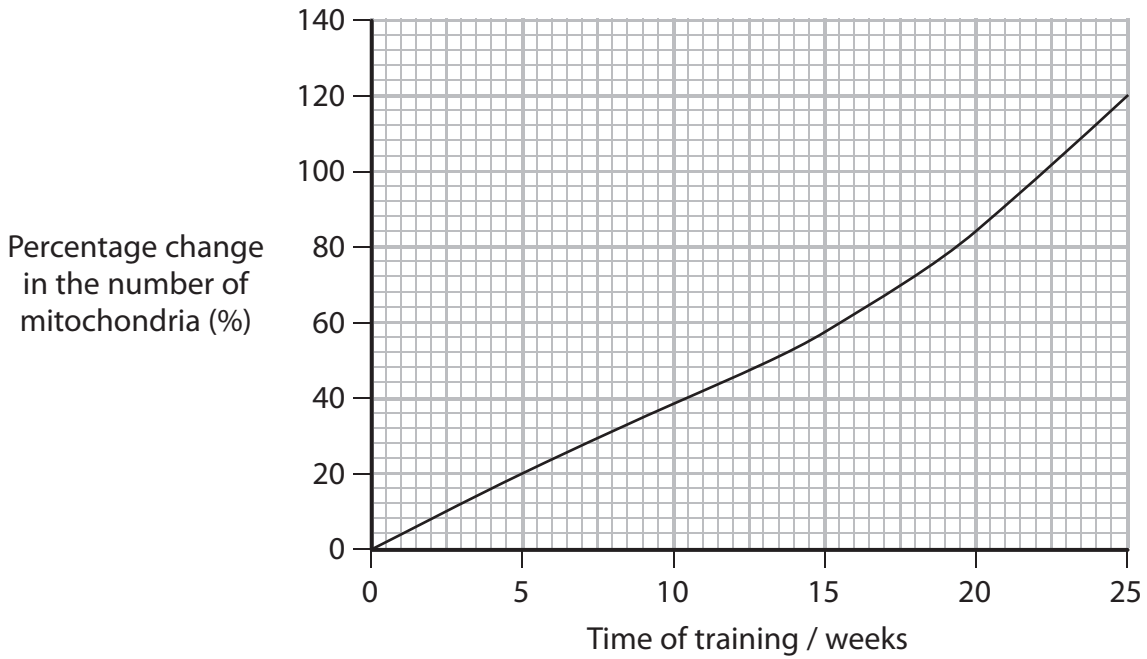
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**(Total for Question 2 = 10 marks)**

3 Endurance training changes the number and size of mitochondria in muscle tissue.

The graph below shows the percentage change in the number of mitochondria found in muscle tissue during 25 weeks of endurance training.



(a) Use the graph to describe the changes in the number of mitochondria in muscle tissue during this 25 week training period.

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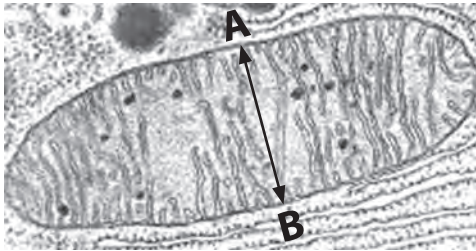
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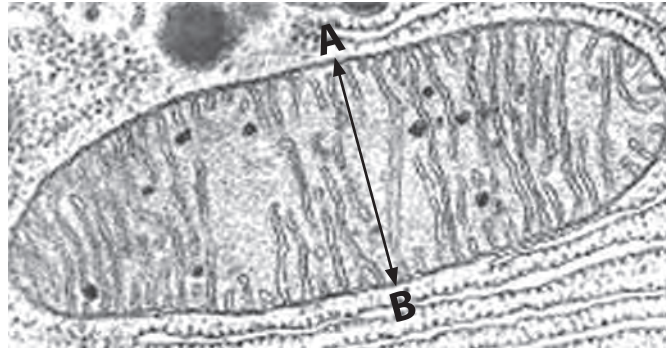


(b) The electron micrographs below show a typical mitochondrion in muscle before and after training.

**Before training**



**After training**



Magnification  $\times 10000$

(i) The width of each mitochondrion is shown by the line A to B.

Calculate the percentage change in the width of the mitochondrion after training. Show your working.

(2)

Answer ..... %

\*(ii) An increase in the width of mitochondria increases the surface area of membranes inside mitochondria.

Explain how an increase in the surface area of these membranes will affect the synthesis of ATP in the muscle tissue of an athlete.

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(ii) A person will suffer a pain called angina if heart muscle cells receive less oxygen.

Suggest how lack of oxygen in heart muscle cells can cause angina.

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**(Total for Question 4 = 13 marks)**

5 Evolution can come about as a result of a change in the structure of DNA.

(a) The questions below refer to the structure of DNA.

(i) Put a cross  in the box next to the term that completes the following statement.

Each DNA strand consists of mononucleotides joined together by bonds between

(1)

**A** one deoxyribose sugar and one phosphate group

**B** one ribose sugar and one phosphate group

**C** two bases

**D** two pentose sugars

(ii) Put a cross  in the box next to the term that completes the following statement.

The mononucleotides in one DNA strand are joined together by

(1)

**A** glycosidic bonds

**B** hydrogen bonds

**C** peptide bonds

**D** phosphodiester bonds

(iii) The table below shows the percentages of bases in a sample of DNA.

Put **one** cross  in the appropriate box, in each row, to show the percentage of bases in a sample of DNA that has 33% thymine.

(3)

Base	0%	17%	33%	34%
Adenine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cytosine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uracil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (b) There are two species of rhinoceros in Africa. The white rhinoceros and the black rhinoceros evolved from a common ancestor.

The photographs below show a white rhinoceros and a black rhinoceros.



©Tony Camacho/Science Photo Library

White rhinoceros



©Tony Camacho/Science Photo Library

Black rhinoceros

The white rhinoceros feeds on grasses. It has a shoulder height of 1.5 m to 1.8 m and has broad flat lips.

The black rhinoceros eats the leaves of shrubs. It has a shoulder height of 1.4 m to 1.7 m and has a pointed mouth.

- (i) Calculate how many times bigger the white rhinoceros is than the black rhinoceros.

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(ii) Suggest how these two species of rhinoceros evolved from their common ancestor.

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(iii) Suggest why both species of rhinoceros can be found in the same region in Africa.

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**(Total for Question 5 = 13 marks)**