

Respiration

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and respiration
Sub Topic	Respiration
Booklet	Theory
Paper Type	Question Paper 1

Time Allowed : 52 minutes

Score : / 43

Percentage : /100

Grade Boundaries:

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

1 (a) Outline the process of glycolysis in a mammalian cell.

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[6]

- (b) Within a mammalian cell, ATP can be produced in a number of ways, including:
 - substrate level phosphorylation during the Krebs cycle
 - xidative phosphorylation.

Table 7.1 compares both processes.

Complete Table 7.1.

Use a tick (✓) if the statement is correct or a cross (✗) if the statement is incorrect. The first row has been done for you.

Table 7.1

statement	substrate level phosphorylation	oxidative phosphorylation
enzymes are involved	✓	✓
occurs in cytoplasm		
occurs in mitochondria		
channel proteins are involved		

[3]

- (c) An investigation into the RQ values of germinating maize seeds was carried out.
- A sample of maize seeds was soaked in water for one hour.
 - The mean RQ value of some of the seeds was then calculated and the remaining seeds were then planted in soil.
 - After 12 hours, the mean RQ value of some of the planted seeds was calculated.
 - The remaining seeds were allowed to germinate and grow into seedlings.
 - After 21 days, the mean RQ value of some of the seedlings was calculated.

Table 7.2 shows the results of the investigation.

Table 7.2

stage of germination and growth	mean RQ
seeds soaked in water	5.6
seeds after 12 hours in the soil	0.8
seedlings after 21 days	1.0

Suggest an explanation for each of the RQ values shown in Table 7.2.

seeds soaked in water

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seeds after 12 hours in the soil

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seedlings after 21 days

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..... [6]

[Total: 15]

(c) ATP is produced in three stages of aerobic respiration.

Complete the table below to show two products of each stage, **other than ATP**.

stage	products
glycolysis	1. 2.
Krebs cycle	1. 2.
oxidative phosphorylation	1. 2.

[3]

(d) Carbohydrates and lipids are both used as respiratory substrates.

Table 7.1 shows the energy values of carbohydrates and lipids.

Table 7.1

respiratory substrate	energy value/kJg ⁻¹
carbohydrate	15.8
lipid	39.4

Explain why lipids have a higher energy value than carbohydrates.

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[2]

(e) Respiration can be investigated by calculating the respiratory quotient (RQ).

(i) State how the RQ is calculated.

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(ii) Give the typical RQ values obtained from the respiration of carbohydrates and lipids.

carbohydrate
lipid [2]

(iii) Suggest what happens to the RQ value when respiration in yeast becomes anaerobic.

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..... [1]

[Total: 15]

- 3 (a)** A mitochondrion contains DNA and ribosomes and is the organelle in which aerobic respiration takes place.

Suggest the functions of the DNA and ribosomes **in a mitochondrion**.

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- (b)** Oxidative phosphorylation takes place in the mitochondrion.

Different stages of oxidative phosphorylation are listed below.

They are **not** listed in the correct order.

stage	description of stage
Q	protons diffuse through the channel protein into the matrix
R	a proton gradient is set up across the crista
S	hydrogen atoms split into protons and electrons
T	protons combine with electrons and oxygen atoms to form water
U	electrons are passed from carrier to carrier
V	reduced NAD releases hydrogen atoms to cytochrome carriers
W	energy from electron transfer is used to pump protons into the intermembrane space
X	ATP synthase produces ATP

Complete Table 8.1 to show the correct order of the stages.

Two of the stages have been done for you.

Table 8.1

correct order	letter of stage
1	V
2
3
4
5	R
6
7
8

[4]

(c) ATP can be converted to ADP and inorganic phosphate by the enzyme ATPase.

State the **type** of reaction taking place.

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[1]

(d) Some parasitic worms, such as tapeworms, live in a mammalian gut where there is no oxygen.

Suggest how a tapeworm produces ATP in this environment.

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[5]

[Total: 13]