

MODUL EMaS JPNTrg

MODULE 4 BIOLOGY FORM 4

Chapter 7 : Respiration



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Part A : Objective

1. Which of the following equations represent aerobic respiration ?

- A Carbon dioxide + water + energy \longrightarrow oxygen + glucose
- B Oxygen + glucose \longrightarrow carbon dioxide + water + energy
- C Glucose + carbon dioxide \longrightarrow oxygen + water + energy
- D Energy + oxygen \longrightarrow carbon dioxide + water + glucose

2. What are the end products of anaerobic respiration in human muscle tissues during vigorous exercise?

- A Lactic acid and energy
- B Lactic acid and carbon dioxide
- C Ethanol and carbon dioxide
- D Carbon dioxide and water

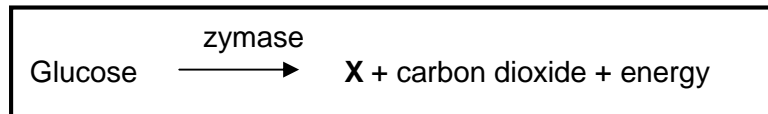
3. What are the end products of anaerobic respiration in yeast?

- A Ethanol and carbon dioxide
- B Lactic acid and carbon dioxide
- C Ethanol and oxygen
- D Lactic acid and oxygen

4. Muscle contraction needs instant energy supply which can be obtained from

- A glycogen which is stored in the muscles
- B fats in the adipose tissue
- C glucose in the muscles
- D adenosine triphosphate in the muscles

5.



Which of the following process uses the product X which is produced in the above chemical equation ?

- A Bread making
- B Cheese making
- C Wine making
- D Ketchup making

6. Exchange of respiratory gases through the skin is characteristic of

- A fish
- B amphibians
- C reptiles
- D mammals

7. Air is inhaled when

- I the external intercostal muscles relax
- II the rib cage moves upwards and outwards
- III the diaphragm muscles relax
- IV the pressure in the thoracic cavity decreases

- A I and II only
- B II and IV only
- C I, II and III only
- D I, III and IV only

8. Figure 1 shows the respiratory system of an insect. The parts labelled X, Y and Z are the

- A spiracle, tracheole, chitin
- B spiracle, trachea, tracheole
- C opening, tracheole, trachea
- D spiracle, trachea, bronchiole

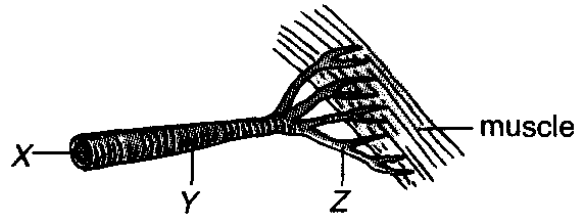


Figure 1

9.

- K** The opercular cavity is enlarged.
- L** The mouth opens.
- M** The floor of the buccal cavity is lowered.
- N** Water containing dissolved oxygen is drawn into the mouth.
- O** The operculum closes.

K, L, M, N and **O** describe the mechanism of inhalation in a fish which **is not** in the correct sequence. Arrange them in the correct sequence ?

- A K,M,L,O,N B M,L,N,K,O C L,O,M,K,N D L,M,K,O,N

10. Figure 2 shows a longitudinal section through an alveolus and the associated blood capillary in a lung.

Which of the following describe the concentrations of oxygen at X and Y ?

	X	Y
A	Low	Low
B	Low	High
C	High	Low
D	High	High

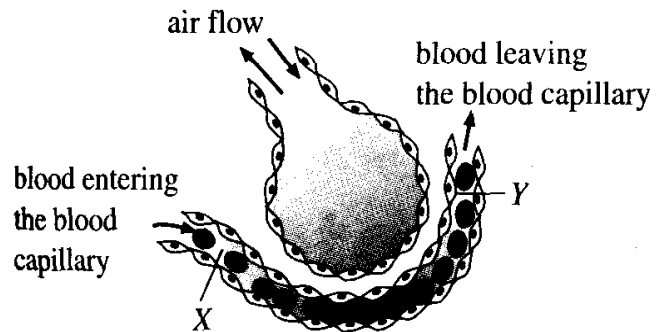


Figure 2

11. What are the common characteristics shown by the respiratory surfaces of animals?

- I They are thin. III They have a large surface area.
- II They are moist. IV They are covered by a network of capillaries.

- A I and II only B III and IV only C I, II and III only D I, II, III and IV

12. To regulate the rhythm of breathing, the respiratory centre of the medulla oblongata needs direct nerve input from the

- I aortic bodies. III central chemoreceptors.
- II carotid bodies. IV intercostal chemoreceptors.

- A I and II only B II and IV only C I, II and III only D II, III and IV only

13. What happen when a person is in great fear?

- I Adrenalin in the blood increases
 - II The rate of breathing increases
 - III The rate of heartbeat increases
 - IV The rate of cell respiration increases
- A I and IV only B II and III only C I, II and IV only D I, II, III and IV

14. Figure 3 shows an experiment to demonstrate the effect of cigarette smoke on lung.

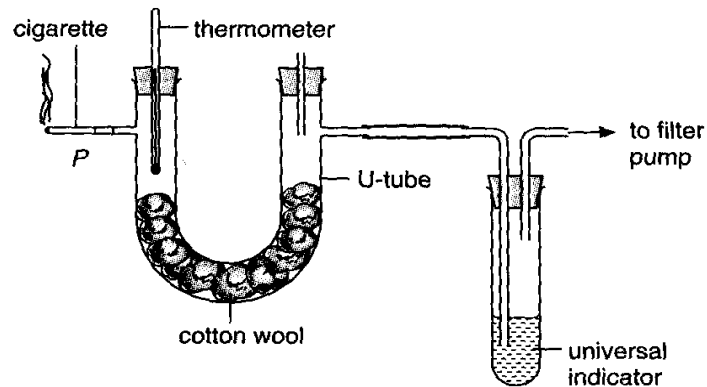


Figure 3

Based on the results of this experiment, what conclusions can be drawn about the effects of cigarette smoke on the human respiratory system?

- I Cigarette smoke is acidic.
- II Cigarette smoke emits a strong smell.
- III Cigarette smoke causes an increase in the temperature of the lungs.
- IV Cigarette smoke causes tar to be deposited in the alveoli.

- A I and II only B I, II and III only C II, III and IV only D I, II, III and IV

15. Why is carbon monoxide in tobacco smoke harmful ?

- A It can cause lung cancer.
- B It causes addiction.
- C It kills the cells lining the trachea.
- D It competes with oxygen to combine with haemoglobin.

16. The following are good respiratory habits to be cultivated, except

- A swimming B a balance diet C deep breathing D breathing through the mouth

17. The process of photosynthesis and respiration can be thought of as a cycle because

- A both processes use energy
- B respiration occurs only in animals while photosynthesis occurs only in plants
- C both give off oxygen which is used by animals
- D the products of one process are used as the raw materials in the other process

18. The measurements from a J-tube experiment to determine the percentage composition of gases in expired air are as follow:

Length of original air bubble = 10.1 cm
 Length of air bubble after treated with KOH solution = 9.7 cm
 Length of the air bubble after treated with pyrogallol solution = 8.1 cm

What is the percentage composition of carbon dioxide in expired air?

- A 1% B 2% C 3% D 4%
19. The graph in figure 4 shows oxygen exchange in a green plant at different light intensities and at two concentrations of carbon dioxide in the surrounding air.

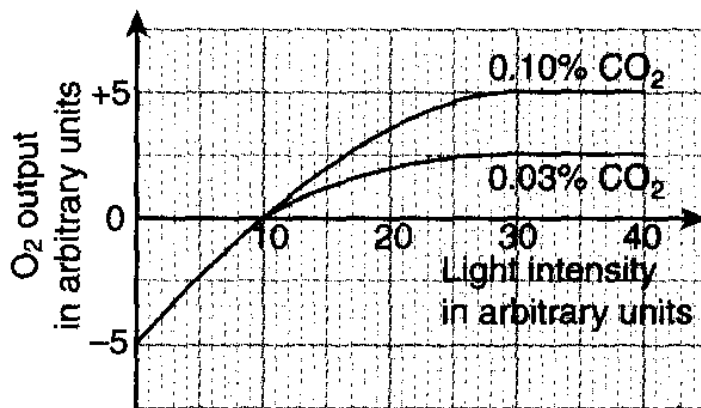


Figure 4

At which light intensity are respiration and photosynthesis occurring at the same rate?

- A 0 B 10 C 20 D 30
20. The attainment of compensation point is directly related to
- A formation of ATP C water uptake
 B production of oxygen D light intensity

Part B : structure item

1.

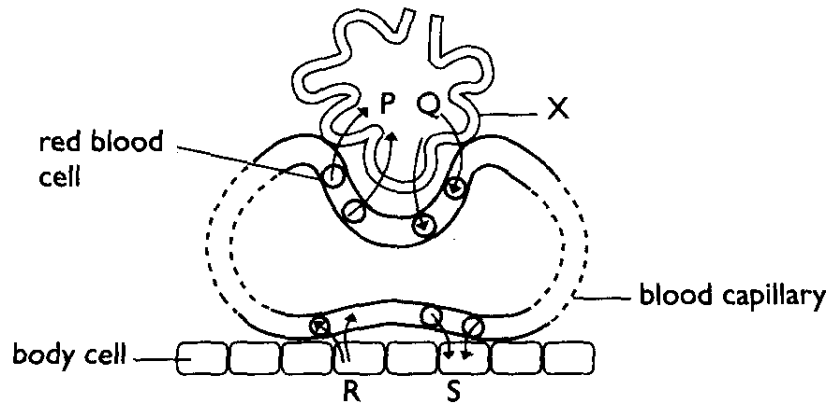


Figure 5

Figure 5 shows the transport and exchange of respiratory gases between the lung and body tissues.

- (a) i. Name the tissue labelled X in the human lung where exchange of respiratory gases occurs.

 ii. State the gases labelled P, Q, R and S.

 [2 marks]
- (b) i. What chemical compound in the red blood cells that help in the transport of oxygen?

 ii. What mineral is contained in the chemical compound mentioned above?

 [2 marks]
- (c) Explain how gas R transported from cells to organ X ?

 [3 marks]
- (d) i. State the function of X structure

 ii. Explain **two** adaptations that help structure E performs its function.

[3 marks]

- (e) Explain how carbon monoxide transported in blood capillaries and state what happens to the body cells

.....
.....
.....

[3 marks]

2. Figure 6(i) shows the respiratory structure of humans and figure 6(ii) shows the respiratory structure of fish.

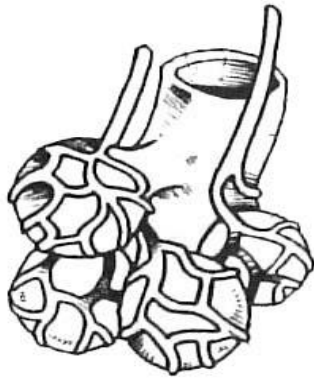


Figure 6(i)

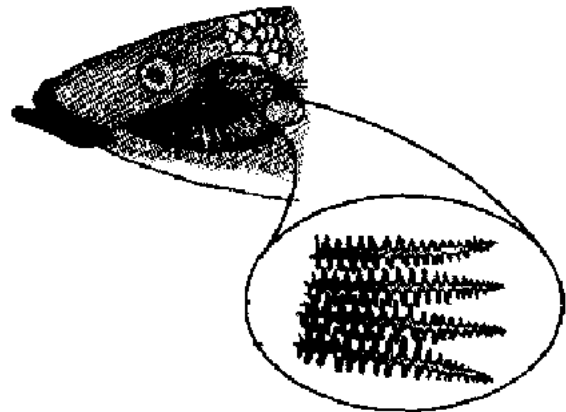


Figure 6(ii)

- (a) Name the structures in figure 7(i) and figure 7(ii) which allow gaseous exchange in human and fish.

.....
.....

[2 marks]

- (b) Describe **two similar** adaptive characteristics of P and Q which enable both the respiratory structures to function efficiently.

.....
.....

[2 marks]

- (c) If both fish and human are of the same size, give **two reasons** why the rate of oxygen supply to body cells in human is faster than the rate of oxygen supply to the body cells in fish.

.....
.....

[2 marks]

(d) Figure 7 shows the model of structure in figure 6(i) in human body.

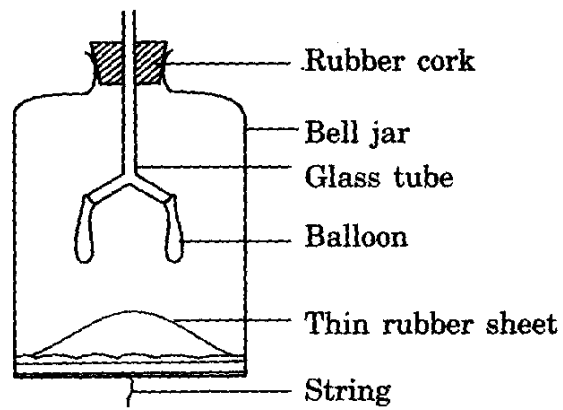


Figure 7

Base on the model,

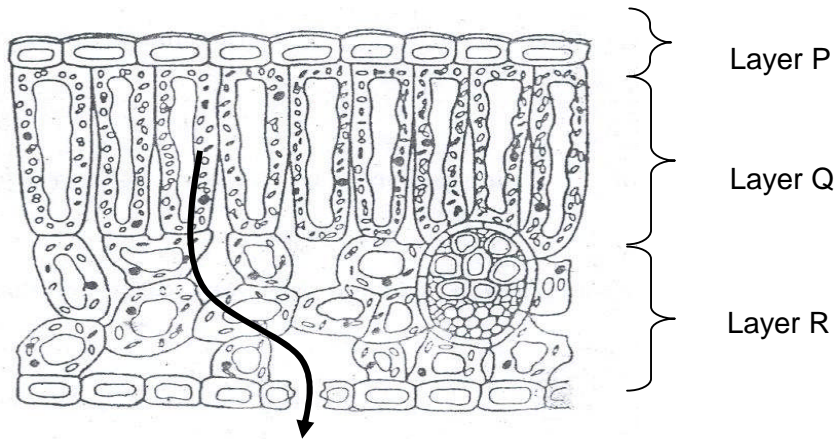
(i) What is the structure is corresponding to the figure 6(i)

.....
[1 mark]

(ii) Describe how the mechanism of breathing can be shown in the model.

.....
.....
.....
.....
.....
[4 marks]

3. Figure 8 shows a cross section of a leaf.



Gas X
Figure 8

(a) What are the structures labelled P, Q and R ?

Layer P : Layer Q : Layer R :
[2 marks]

(b) (i) What is gas X ?

.....
[1 marks]

(ii) Explain how gas X is used to produce energy in human body ?

.....
.....
[3 marks]

(c) The surface of a mesophyll cell is moist with a thin film of water.
What is the purpose of this water film?

.....
[1 mark]

(d) Explain the intake of oxygen from the atmosphere by the leaf.

.....
.....
.....
[3 marks]

(e) Explain why at certain times during the day, exchange of gases between the leaf and the atmosphere does not take place.

.....
.....
[2 marks]

Part C : Essay & Practical Item

Question 1

1.(a) Figure 9 shows energy releasing process in a human muscle cell.

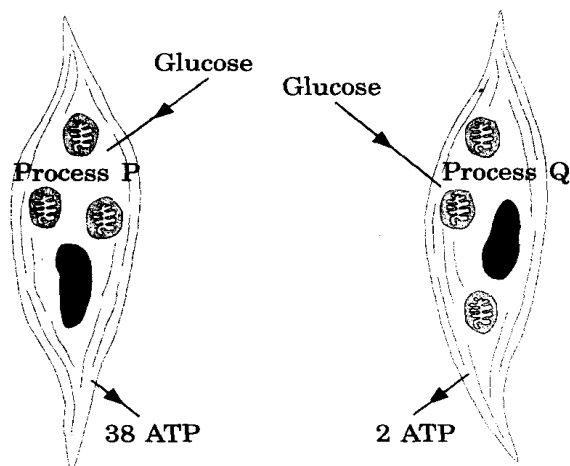


Figure 9

Explain how processes P and Q occur in human muscles.

[4 marks]

(b)

Our rate of respiration varies. For example, we normally take about 20 breaths per minutes when we are at rest. However the rate could double during vigorous physical exercise

Based on the statements above, discuss how the rate of respiration is controlled in human.

[10 marks]

(c) A student analysed a sample of inhale air and exhaled air and obtained the results as shown in table below:

Gas	Percentage Composition	
	Inhaled air	Exhaled air
Oxygen	20.90	16.35
Carbon dioxide	0.04	4.00
Nitrogen	79.00	78.95
Water vapour	Variable	Saturated

Explain the results given in table.

[6 marks]

Question 2 - Practical

A group of student conducted an experiment to measure the process of aerobic respiration by a cockroach over a period of time. Figure 1 shows the set-up of the experiment.

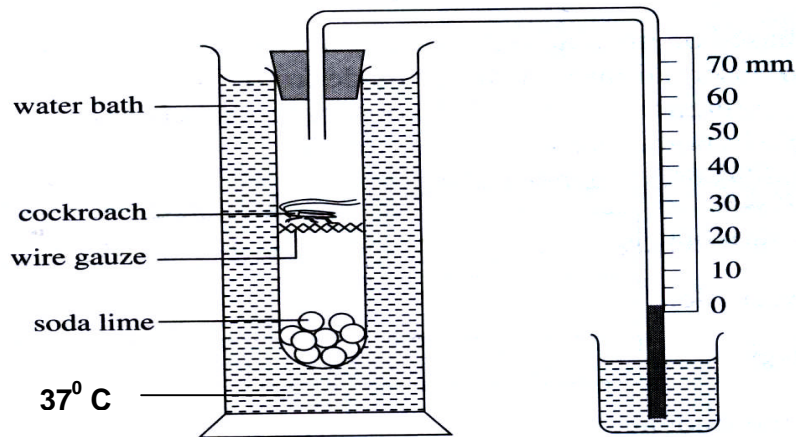
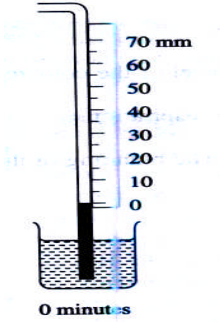
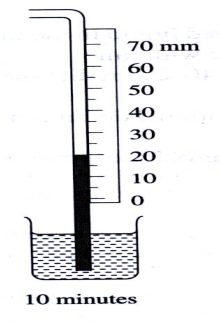
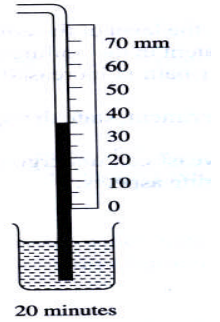
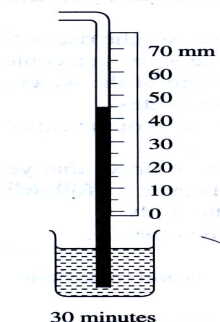


Figure 1

The students carried out the following steps:

- One boiling tube is filled with soda lime and placed with a wire gauze in the middle of the tube.
- A cockroach is placed on the wire gauze in the boiling tube.
- A stopper with a capillary tube is inserted to the boiling tube.
- The end of the capillary tube is immersed in a coloured liquid .
- The initial level of the coloured liquid was marked.
- The boiling tube was placed in a water bath at room temperature.
- The apparatus set-up is left for an hour.
- The heights of the coloured liquid in the capillary tubes are observed and recorded every 10 minutes interval.

Table 1 shows the results obtained from the experiment:

Boiling tube	Time (minutes)	Height of coloured liquid (mm)	Results
P	0	 <p>0 minutes</p>	
Q	10	 <p>10 minutes</p>	
R	20	 <p>20 minutes</p>	
S	30	 <p>30 minutes</p>	

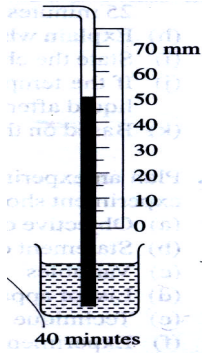
T	40		
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Table 1

*For
Examiner's
Use*

a) Record all the values of your reading in Table 1.

[3 marks]

1 (a)

b) (i) Based on the results in Table 1 , state **three** observations that can be made from this experiment.

Observations	
1	
2	
3	

1 (b) (i)

(ii) State the inference from the observations in (b) (i).

[3 marks]

.....

.....

.....

.....

1 (b) (ii)

[3 marks]

For
Examiner's
Use

c) Construct a table and record all your data collected in the experiment.

[3 marks]

d) Complete table 2 based on the experiment.

Variable	Particulars to be implemented
1. Manipulated variable:	How to alter the manipulated variable.
2. Responding variable:	What to observed in the responding variable.
3. Controlled variable:	How to maintain the controlled variable.

1 (d)

[3 marks]

Table 2

1 (e)

e) Plot a graph based on your reading at Table 1.
 What is the height of coloured liquid at 35th minutes?

.....

[3 marks]

(f) According to your graph at (e) , state the relationship between the use of oxygen gas with time.

.....

[3 marks]

1 (f)

(g) State a suitable hypothesis for this experiment.

.....
.....
.....

1 (g)

[3 marks]

(h) If the temperature of the water bath is increased to 40⁰ C, predict the height of the coloured liquid and the amount of carbon dioxide gas at 40 minutes.

.....
.....
.....

1 (h)

[3 marks]

(i) Based on the results of the experiment , state the operational definition of respiration.

.....
.....
.....

1 (i)

[3 marks]

(j) Another group of students carried out the experiment to determine the aerobic respiration of germinating seeds. They were provided with the following materials:

Potassium hydroxide solution	thermos flask
Thermometer	U-tube with coloured liquid
liquid	

1 (j)

Classify the above list into materials to be tested and apparatus to be use based on their functions in the experiment.

[3 marks]