P530/1

BIOLOGY

Paper 1

JUL./AUG.2019

2 ½ hours

TOPICAL EXAMINATIONS

Uganda Advanced Certificate of Education

GASEOUS EXCHANGE

BIOLOGY

(THEORY)

Paper 1

2 Hours 30 minutes.

INSTRUCTION TO CANDIDATES:

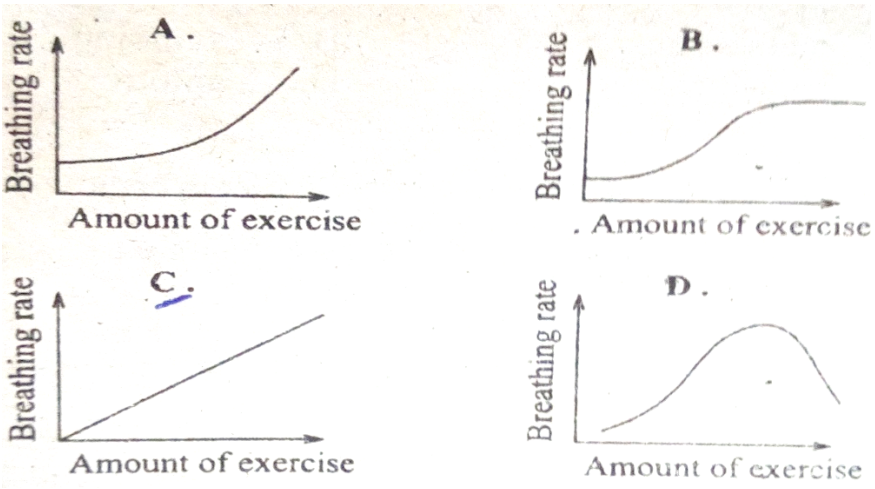
-This paper consists of section **A** *and* **B**

-Answer question **one** *in section* **A** *plus* **three** *others from section* **B.**

-Candidates are advised to read carefully, organise their answers and present them logically, illustrating with well labelled diagrams wherever necessary

SECTION A (40 MARKS)

1. Which of the following curves in the figure below represents the breathing rate of an athlete under increasing sustainable exercise) **UNEB 2012**



2. The following structures are found in the walls of the gas exchange system

    1. Capillaries
    2. cilia
    3. elastic fibres
    4. goblet cells
    5. Smooth muscle cells.

    Which of the following would be found in the lining of the alveolus?

    A. 1 and 3

    B. 1, 2 and 3

    C. 2 and 5

    C. 4 and 5

3. Which substances in tobacco decreases the oxygen carrying capacity of hemoglobin?

A. carbon dioxide

B. carbon monoxide

C. nicotine

D. tar

4. Cartilage is found in which structure?

A. alveolus

B. bronchiole

C. capillary

D. trachea

5. Which of the following is correct about the counter current mechanism in teleost?**UNEB 2012**

A. blood with low oxygen concentration flows in the same direction with water of high oxygen concentration.

B. water of low oxygen concentration flow near blood of high oxygen concentration

C. blood with high oxygen concentration flows in opposite direction to water of high oxygen concentration.

D. water of high oxygen concentration flow in opposite direction to blood of low oxygen concentration

6. The volume and surface area of four animals A, B, C and D. ere shown in the following table;

Animals	**Volume cm^3**	**Surface area cm^2**
A	1	6
B	8	24
C	64	96

D	64	28

Which of the following organisms must need a specialized respiratory system.**UNEB 2011**

7. Which of the following would be the immediate problem to a fish when taken out of water. .

   A. insufficient oxygen supply. **UNEB 2011**

   B. lack of support.

   C. drying up of gills.

   D. Lack of food

8. Cartilaginous fish extracts less oxygen from water than bony fish because the former **UNEB 2010**

   A. Lives in sea water

   B. Are relatively bigger in size

   C. Employ parallel flow system of gaseous exchange

   D. Possess large gills with small surface area volume ratio

9. Which one of the following is correct about parallel flow of water across the gills? **UNEB 2008**

   A. Water has a higher oxygen concentration at each point of contact

   B. Low blood oxygen concentration is attained

   C. Diffusion occurs over the whole region of the gill filament

   D. High blood oxygen concentration is achieved

10. Which one of the following events occur together to increase the oxygen concentration in the alveoli of the lungs

UNEB 2006

A. Contraction pf the diaphragm muscles and internal intercostal muscles

B. Relaxation of diaphragm muscles and external intercostal muscles

C. Contraction of diaphragm muscles and external intercostal muscles

D. Relaxation of diaphragm muscles and internal intercostal muscles

11. Which one of the following a disadvantage is of is a disadvantage of a tracheal system for gaseous exchange in insects?
UNEB 2006

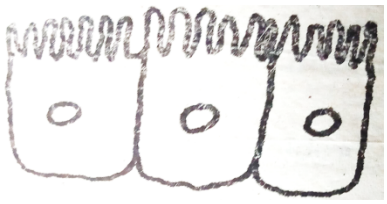
A. Ventilation is limited

B. Tracheoles are impermeable

C. Spiracles are too small

D. The system does not supply all the body parts

12. Which on the following parts of a mammal possess an epithelial tissue as shown below.



UNEB 2006

A. Oviduct

B. Ilueum

C. Respiratory truct

D. Loop of henle

13. Which of the following animals have the most efficient system of gaseous exchange?**UNEB 2006**

A. Insects

B. Bony fish

C. Mammals

D. Amphibians

14. The increase in supply of blood to a heavily respiring tissues is caused by; **UNEB 2005**

A. Ventilation rate

B. Concentration of oxygen in the inhaled air

C. Carbon dioxide concentration in the blood

D. Carbon dioxide concentration in tissues

15. Countercurrent flow in bony fish achieves high level of gaseous exchange because it.**UNEB 2004**

A. Increases the concentration gradient

B. Decreases the distance across which gases diffuse

C. Increases the speed of water flow over the gills

D. Maintains a high concentration gradient

16. Contraction of the intercoastal muscles results into

UNEB 2004

A. Increased pressure in the chest cavity

B. Rib moving inwards and downwards

C. Increased volume of the chest cavity

D. Flattening of the diaphragm

17. Which of the following conditions in human blood would stimulate the highest rates of ventilation and heart beat? **UNEB 2003**

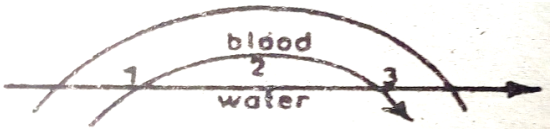
A. Little carbon dioxide

B. Little oxygen

C. Much carbon dioxide

D. Much oxygen

18. The figure below shows a parallel flow across a gill of a fish **UNEB 2002**



At which regions is the highest diffusion gradient for oxygen and most oxygenated blood?

Highest diffusion gradient	Most oxygenated blood
A. 1	2
B. 1	3
C. 2	3
D. 3	1

19. Which one of the following concentrations in the blood would produce the highest frequency of impulses from the carotid artery?
UNEB 2001

A. Low carbon dioxide and high oxygen

B. High carbon dioxide and high oxygen

C. Low carbon dioxide and low oxygen

D. High carbon dioxide and low oxygen

20. Which one is trues of the respiratory system of an organism whose section is shown below?

UNEB 2001

The system requires;

A. A transport mechanism and a ventilation mechanism

B. Ventilation mechanism, and no transport mechanism

C. A transport mechanism and no ventilation mechanism

D. Neithertransport nor a ventilation mechanism

21. Which one of the following is likely to happen to a dog fish which has damaged bronchial valves?

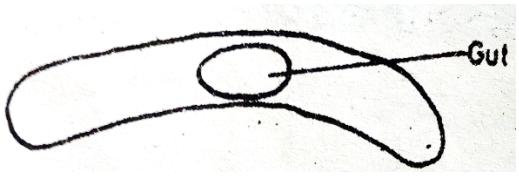
A. Water would not enter the mouth**UNEB 2000**

B. Some water would enter then gill

C. Water would get out of the mouth

D. Water would not enter the mouth

22. The figure below shows cross section of an organism; **UNEB 2000**



Which of the following means of gaseous exchange would be most suitable for the organism?

A. Diffusion of the body

B. Use of trachea

C. Use of lungs

D. Use of gills

23. Which of the following events will immediately result in increase in ventilation rate?

UNEB 1999

A. Increased level of oxygen

B. Increased level of carbon dioxide

C. Accumulation of lactic acid

D. Increased levels of oxygen and carbon dioxide

24. Which of the following blood conditions would cause least ventilation rate in humans?**UNEB 2000**

A. Low carbon dioxide and high oxygen concentrations

B. High carbon dioxide and oxygen concentration

C. Low carbon dioxide and oxygen concentrations

D. High carbon dioxide concentrations

25. The disadvantage of parallel system during gaseous exchange in some fish is the;**UNEB 1998**

A. Slow speed of blood

B. Low blood volume

C. Low oxygen uptake by blood

D. Low water volume over the gills

26. Possession of lungs in amphibians is an adaptation to live.

UNEB 1998

A. Both in water and in land

B. In moist area

C. In water

D. on dry land

27. changes in the level of carbon dioxide in mammalian blood is detected by the; **UNEB 1997**

A. carotid and aortic bodies

B. medulla oblongata

C. cardio-vascular centers

D. hypothalamus

28. Which of the following events will cause inspiration in humans? **UNEB 1997**

A. Internal intercoastal muscles and the diaphragm contract

B. Internal intercostal muscles and diaphragm relax

C. Internal intercoastal muscles contract and diaphragm assumes a dome shape

D. Internal intercoastal muscles relax and diaphragm contracts

29. Which of the following best describes gaseous exchange in the lings?

A. Air moves in and out of the alveolus during breathing

B. Carbon dioxide diffuses from deoxygenated blood in capillaries into alveolar air

C. Oxygen and carbon dioxide diffuse down their concentration gradient between blood and alveolar air

D. Oxygen diffuse from alveolar air into deoxygenated blood

30. Which one of the following is not a role of elastic fibres in the gaseous exchange system?

A. Contract to decrease the volume of the alveoli during expiration

B. Recoil to force air out of the alveoli during expiration

C. Stretch to accommodate more air in the alveoli during deep breathing

D. Stretch to increase the surface area of the alveoli for gaseous exchange

31. Which of the following would be the effect of increasing partial pressure of carbon dioxide in the blood?

UNEB 2018

A. Increase in ventilation rate

B. Variation of ventilation rate

C. Reduction in ventilation rate

D. Ceasation of ventilation

32. Gaseous exchange in earthworm occurs at the body surface because the body is; **UNEB 2018**

A. moist

B. Elongated

C. Segmented

D. Flattened

33. During an exercise, the breathing rate of an individual was 20breaths per minute while the tidal volume was 0.5dm^3.the ventilation rate in dm3min-1 of the individual during exercise was;

A. 40

UNEB 2014

B. 20.5

C. 19.5

D. 10

34. The mountain gorilla lives at a high altitude and its oxygen dissociation curve located at the left of many animals. This suggest that; **UNEB 2014**

A. There is low carbon dioxide tension at high altitudes

B. Its hemoglobin has a higher affinity for oxygen than many animals

C. Temperature are lower at high altitudes

D. It has a high concentration of myoglobin in its muscles

35. Which of the following is the respiratory surface for a mammalian foetus?

A. Alveolus

B. Placenta

C. Chronic villi

D. Amnion

36. The table below shows the rate of breathing and volume of air exchanged with each breath for a person at rest and during exercise

UNEB 2009

State of individual	Breaths per minute	Volume of each breath/ cm^3
At rest	12	500
During exercise	24	1000

The increase in volume of air exchanged per minute when an individual does exercise from rest is;

A. 500cm3

B. 600cm3

C. 1500cm3

D. 1800cm3

37. Which of the following when at high levels in the blood increases the rate of heart beat?

UNEB 2009

A. Carbon dioxide

B. Thyroxine

C. Oxygen

D. Adrenaline

38. A cockroach has a respiratory system while an earthworm doesn'tbecause; **UNEB 2009**

A. Earth worm do not need much oxygen

B. The surface area volume ratio in cockroach is small

C. Earthworms can be parasitic

D. The respiratory system provides shape in ac cockroach

39. Contraction of the intercostal muscles results into

UNEB 2004

A. Increased pressure in the chest cavity

B. Rib moving inwards and downwards

C. Increased volume of the chest cavity

D. Flattening of the diaphragm

40. Which of the following would be the immediate problem to a fish when taken out of water. .

A. insufficient oxygen supply.

UNEB 2011

B. lack of support.

C. drying up of gills.

D. Lack of food

SECTION B (60 MARKS)

41. (a) the table below shows the comparison between the trachea with a respiratory bronchiole. Use a tick(✓) to indicate that the structure is present or absent. And across (X) to indicate that it is absent.
(5marks)

Structure	trachea	Respiratory bronchiole
Smooth muscle cells		
Ciliated epithelial cell		
Mucous glands		
Cartilage		
Elastic fibres		

(b) describe how the alveoli are protected against infections.

(5marks)

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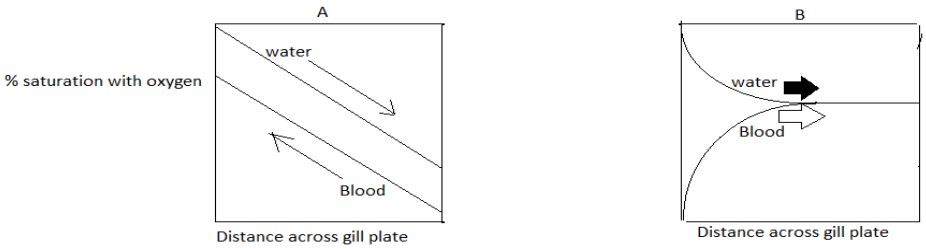
42. (a) the figure below illustrates two different mechanisms of gaseous exchange in fish A and B

UNEB 2012



(i) State two differences between the two systems in terms of oxygen concentration.

(2marks)

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(ii) Explain the physiological advantage of fish A over fish B (4marks)

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(b) describe how a gill is structurally adapted as a respiratory surface.(4marks)

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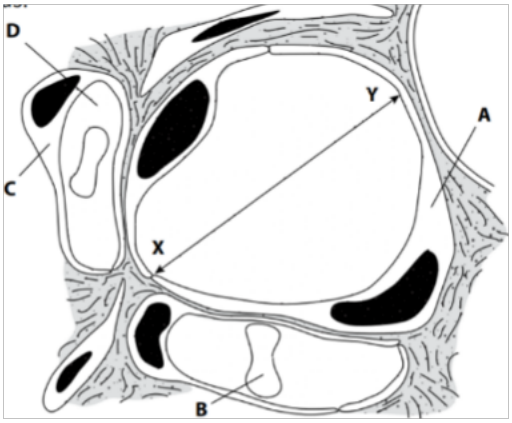
43. The diagram below shows an alveolus;



(a) Name

(i) Cell A, B and C (1 ½ marks)

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(ii) The fluid at D
(1mark)

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(b) Explain how the alveoli is adapted foe the exchange of gases.
(4marks)

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(c) Briefly describe how gaseous exchange occurs across the alveolus (3 ½ marks)

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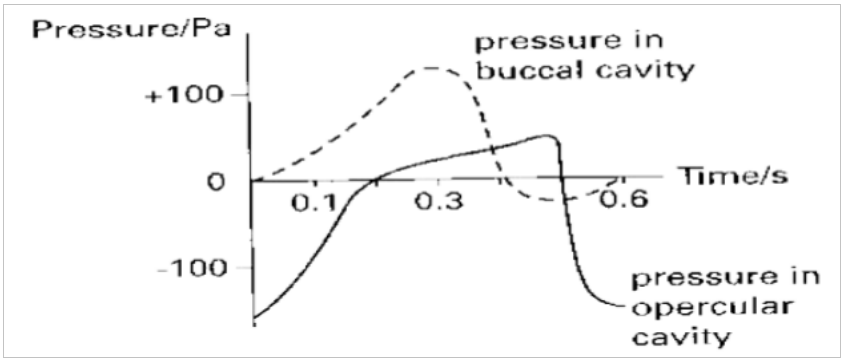
44. The graph below shows the changes in pressure in the buccal cavity and in the opercular cavity, during a ventilation cycle.



(a) Calculate the rate of ventilation in cycle per minute
(3marks)

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(b) With evidence from the graph, explain why water almost flows in one direction over the gills.
(4marks)

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(c) How does fish increase buccal cavity pressure?
(3marks)

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45. Explain the following observations

(a) Why when fish are taken out of water, they suffocate. (3 marks)

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(b) A person who is born and lives at sea level will develop a slightly smaller lung capacity than a person who spends their life time at a high altitude.
(4marks)

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(c) When someone living at or near sea-level travel to locations at high altitude (e.g. the Rwenzori mountain), that person can develop a condition called altitude sickness.
(3marks)

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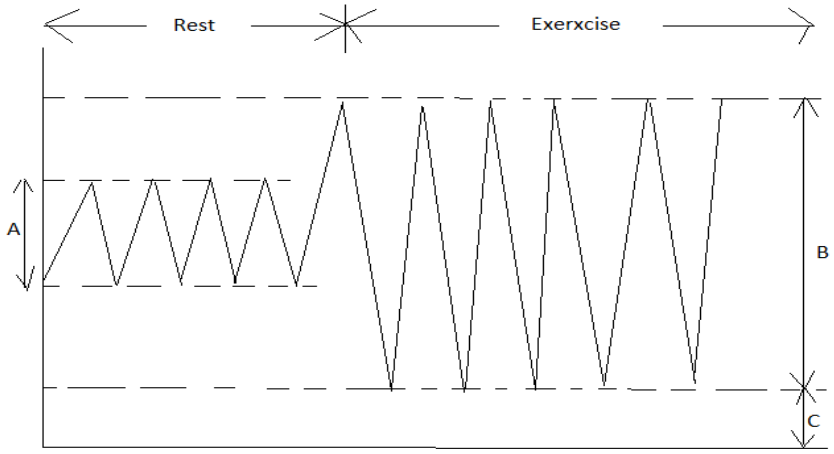
46. The graph below shows the volumes of air breathed in and out by a human at rest and during exercise.



(a) What names are given to the volumes B and C? (2marks)

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(b) N

(i) chemoreceptors in the body core are involved in the regulation of breathing rate. What chemicals are they sensitive to?
(1mark)

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(ii). Name one site of the chemoreceptors in the body. (1mark)

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(iii). Where in the brain are the inspiratory and expiratory centers? (1mark)

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(c) Briefly describe the process of expiration in humans? (5marks)

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