NAME: …… Signature

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P530/1

BIOLOGY

PAPER 1/ 2023

RENA COLLEGE MAYUGE

TOPICAL TESTS EXAMINATIONS

TOPICS: Respiration, transport and gaseous exchange.

UGANDA ADVANCED CERTIFICATE OF EDUCATION

BIOLOGY (THEORY) 2023

S.6 Paper 1

2 HOURS 30 MINUTES

INSTRUCTIONS

- ✓ *This paper consists of sections A and B*
- ✓ *Answer all questions in both sections*
- ✓ *All answers MUST be written in the spaces provided*

FOR EXAMINERS' USE ONLY		
Section	marks	comments
A		
B		
Totals		

ANSWERS FOR SECTION A

1		11		21	31
2		12		22	32
3		13		23	33
4		14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

SECTION A

Answer all question in this section by putting the correct objective in the table provided above.

1. The component of the water potential which is due to the presence of solute molecules is called

A. Turgor potential.
B. Osmotic pressure.
C. Osmotic potential.
D. Turgor pressure.

2. Which one of the following statements is not true of the electron transport chain? The electron transport chain.

A. Is located on the cristae.
B. Produces more NADH than any metabolic pathway.
C. Contains cytochrome molecules.
D. Ends when oxygen accepts electrons.

3. Which one of the following pairs of enzymes are involved in the final steps in respiration?

A. Transferases and phosphokinases.
B. Isomerases and transaminases.
C. Decarboxylases and dehydrases.
D. Dehydrogenases and oxidases.

4. Which one of the following is NOT a product of hydrolysis of ATP in presence of ATPase?

A. Adenosine diphosphate.
B. Energy.
C. Phosphoric acid.
D. Water.

5. Which one of the following organisms use external gills for gaseous exchange?

A. Lung worm.
B. Flat worm.
C. Toad.
D. Fish.

6. The volume of air breathed in and out normally at rest during a respiratory cycle is called
A. Vital.
B. Tidal volume.
C. Residual volume.
D. Lung capacity.

7. Which one of the following is NOT true during hormonal control of breathing?
A. Impulses from chemoreceptors in the aorta and central arteries stimulate the respiratory centres to increase rate of respiration.
B. Stretch receptors in the bronchioles monitor the amount of lung ventilation.
C. Cerebral cortex allows voluntary control of breathing.
D. Vagus nerve carries impulses from the respiratory centre to stretch receptors to stimulate inspiration.

8. Oxide of nitrogen are looked at as greenhouse gases because they
A. Trap long wave radiation emitted by the earth's surface
B. Prevent short wave radiation from reaching the earth's surface
C. Dissolve in rain water to produce acid rain
D. ArenotnaturallyproducedlikeCO2andmethane

9. Antibiotics are effective against bacteria and not viruses because
A. Viruses can hide inside host cells
B. Bacteria are recognized as pathogens but viruses are not
C. Enzymes of bacteria can be inhibited by antibiotics
D. Viruses are resistant to antibiotics

10. Colchinedisruptsmicrotubuleassembly.Whatactivitywouldbemostaffectedby colchine?
A. Photosynthesis B. Replication
C. Movement of chromosomes to the poles during mitosis D. Active transport by membrane proteins

11. Which one of the following is considered to be a passive process in the body?
A. water loss from stomata B. DNA transcription
C. uptake of mineral salts D. Muscular contraction

12. Provision of the baby with colostrum is one way of providing it with immunity known as
A. Natural passive B. Acquired passive
C. Natural active D. Acquired active

13. Which one of the following cells is known for causing allergic reactions in the body of an organism?

A. Basophils B: Monocytes C: Eosinophils D: lymphocytes

14. Which one of the following agranulocytes make the largest number in the body?

A. Neutrophils B: Monocytes C: Lymphocytes D: Basophils.

15. A surfactant is meant to do the following except:

A: killing microbes

B: increasing the rate of oxygen diffusion

C: reduction of energy used to inflate the lungs

D: prevention of friction of the lungs

16. Which of the following pairs of leucocyte phagocytes are the most active?

A: Neutrophils and Eosinophils B: Neutrophils and macrophages

C: Lymphocytes and Macrophages D: Lymphocytes and Neutrophils

17. The heart sounds are due to;

A: blood flowing B: the closure of valves

C: the heart muscle contracting D: the opening of the valves.

18. If oxygen is unavailable the electron transport system cannot work mainly because

A: there will be no ATP for electron transport

B: Reduced NAD and FAD cannot be oxidized

C: Hydrogen cannot be split to release electrons

D: Oxidized NAD and FAD cannot be reduced.

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

A) Increase in the ventilation rate
B) Variation of ventilation rate
C) Reduction in ventilation rate
D) Ceasation of ventilation

20. Which one of the following can be used to indicate the level of air pollution in an environment?

A) Temperature B) oxygen levels
C) Lichen diversity D) humidity levels

21. Which one of the following is the role of capillary network around the alveoli in mammals?

A) Makes the alveoli more permeable
B) Increases the surface area of the alveoli
C) Maintain a steep diffusion gradient
D) Makes the alveoli cell thinner

22. Which one of the following conditions would lead to the Bohr Effect in a mammal?
A) Decrease in the pH of blood
B) Increase in the partial pressure of oxygen in the environment
C) Decrease in the metabolic rate
D) Increase in environmental temperature

23. Which one of the following is the major form in which carbon dioxide travels to the lungs from tissues?
A) Carbonic acid B) sodium bicarbonate
C) Carboxyhaemoglobin D) bicarbonate ions

24. Which one of the following processes does not affect the biochemical oxygen demand in an environment?
A) Nitrification B) ammonification
C) nitrogen fixation D) denitrification

25. Which one of the following structures influence the route by which water enters the vascular bundles from the root cortex?
A) Cortex cells B) casparian strip
C) Root epidermis D) root cap

26. Which one of the following is not formed during anaerobic break down of glucose by yeast?

A. ATP B. Water

C. Carbon dioxide D. Ethanol

27. In teleost's Blood, gaseous exchange is very efficient because
A. meets water with a higher concentration of oxygen
B. Blood and water flow in the same direction
C. Blood and water move at the same speed
D. Blood and water move at different speed

28. Which one of the following processes in plants would be most affected if it takes up a metabolic poison?
A. Movement of water through the xylem
B. Evaporation of water from the leaf
C. Movement of water with in the leaf
D. Movement of food from leaves to roots

29. The chemical reaction that converts carbon dioxide to bicarbonate ions takes place in the:
A. Blood plasma
B. Red blood cells
C. Alveolus
D. Haemoglobin molecule

30. Stomatal closure occurs in plant leaves when ……
A. Turgor in guard cells rises
B. PH in guard cells rises
C. Water potential in guard cells is more than surrounding cells
D. Starch in guard cells is converted to sugar

31. Which one of the following conditions is most likely to increase the risk of the fetus being harmed by the mother's immune system?

	Pregnancy	Blood type of mother	Blood type of fetus
A.	First	Rhesus negative	Rhesus positive
B.	Second	Rhesus positive	Rhesus negative
C.	First	Rhesus positive	Rhesus negative
D.	Second	Rhesus negative	Rhesus positive

32. The oxygen dissociation curve of the fetus lies to left of that of its mother because:
A. The fetus is less active
B. The fetus uses less oxygen
C. Fetal hemoglobin has higher affinity for oxygen
D. Mothers hemoglobin has higher affinity for oxygen

33. Which one of the following is not true during hormonal control of breathing?
A. Cerebral cortex allows voluntary control over breathing
B. Impulses move from the respiratory centre to stretch receptors via Vegas nerve
C. Stretch receptors in bronchioles and bronchi monitor the amount of inflation.
D. Impulses from aortic and carotid bodies stimulate increased inspiration rate

34. A non-competitive inhibitor affects the rate of enzyme action by
A. Binding to the active site
B. Altering the active site
C. Altering the substrate
D. Acting as enzymes

For diffusion to occur,
The diffusion particles should all be of uniform size.
B the diffusion medium should be of uniform density.
C there must be uniform distribution of the diffusing particles.
D A free energy gradient must exist

36. Which organ in the body contains cardiac muscle?
A. Gizzard B. diaphragm C. oesophagus D. heart

37. Which one of the following is the last stage during the electron (hydrogen) carrier system of aerobic respiration?
A. Formation of ATP
B. Reduction of oxygen
C. Reduction of cytochrome
D. production of carbon dioxide

38. During expiration in animals

A. The external intercostal muscle relax and the intercostal contrast
B. The external intercostal muscles contrast and the internal intercostal relax
C. The diaphragm muscles contrast and the diaphragm flattens
D. The rib cage is pulled upwards and outwards

39. The equation for the respiration of the lipid tripalmitin is

$2\ C_{51}\ H_{98}\ O_6 + 145O_2 \longrightarrow 102CO_2 + 98H_2O$ + energy

What is the respiratory quotient for pripalmitin?

A. 0.50 B. 0.70 C. 1.40 D. 1.00

40. An organism living in an oxygen deficient environment has

A. Its oxygen dissociation curve to the right
B. Haemoglobin that easily picks up oxygen
C. Haemoglobin that readily releases its oxygen
D. Myoglobin in its blood stream

SECTION B (60 MARKS)

Answer all questions from the spaces provided.

41.(a) Explain the function of antigens and antibodies in the immune system.

i) Antigens (1mark)

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ii) Antibodies (1mark)

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b) State two ways in which passive immunity may be acquired naturally by a young child. (2marks)

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c) During vaccination against tuberculosis (T.B), children are injected with a weakened strain of T.B bacteria. Explain how this procedure can result in long term defence against T.B. (6marks)

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42. (a) Figure 5 below shows anaerobiosis in a muscle.

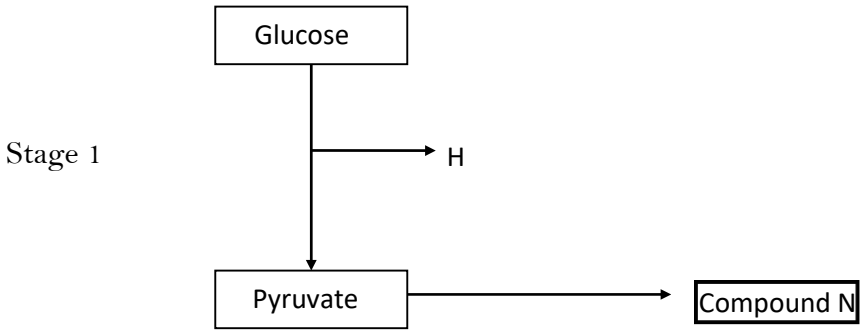

Fig . 5

(i) What happens to the hydrogen atoms removed at stage 1? (01 marks)

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(ii) Identify compound N. (01 marks)

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(iii) Explain why it is important to convert pyruvate to compound N. (01 marks)

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(b) Describe how pyruvate is converted into compound N. (03 marks)

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(c) What is the benefit of prolonged glucose breakdown during cellular respiration? (01 mark)

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(d) State three ways in which the body utilizes ATP. (03 marks)

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43. (a) Define the term Bohr effect (01mk)

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(b) Briefly explain the following observations;

(i) The plasma membrane of erythrocytes is impermeable to positively charged ions. (03mks)

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(ii) Sickle-shaped erythrocytes are less efficient in carrying oxygen to the tissues than the normal shaped cells. (03mks)

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(c) The alveolar capillary lumen is smaller than the size of erythrocytes which pass through it (02mks)

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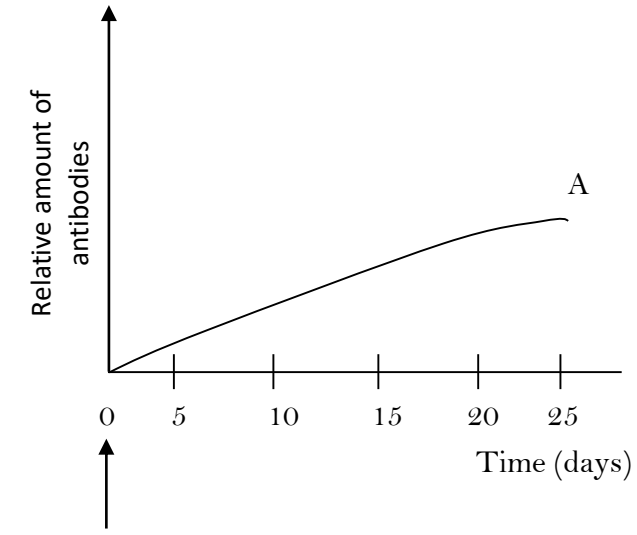
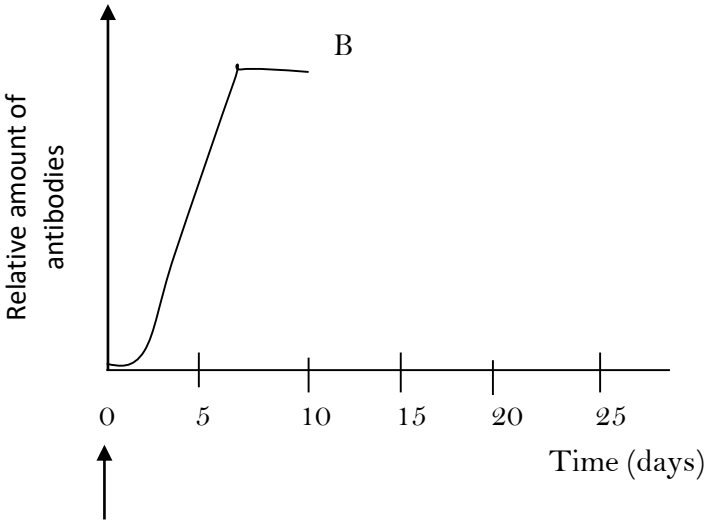
(d) Mention any two blood pigments which contain iron apart from haemoglobin and myoglobin (01mk)

(i) ……

(ii) ……

44. Figure 6 shows the relative amount of antibody formed in the blood stream of a person after a first injection of an antigen (A) and a later injection of the same antigen (B)





a. From the graphs state the type of immunity acquired by the person, giving a reason [2mks]

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b. Explain the shapes of the two curves. [6mks]

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B.……
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c. Apart from production of antibodies, outline two other ways by which the body combats pathogens. [2mks]

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45. Table 2 below shows the relative contributions of aerobic and anaerobic respiration to the total energy output in athletes who are running races of various distances.

Duration of exercise (minutes)	Relative contribution (%) from:	
	Aerobic respiration	Anaerobic respiration
0.5	83	17
2.0	40	60
10.0	9	91
60.0	1	99

Table 2

a. Compare the relative contributions of aerobic and anaerobic respiration to the total energy output. [2mks]

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b. Account for the changes in the contributions of aerobic and anaerobic respiration with duration of exercise. [6mks]

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c. Explain the significance of <u>bradycardia</u> to a diving mammal. [2mks]

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END