P530/1
Biology
Paper 1
Jan/Feb, 2021
2 ½ hours

UGANDA MUSLIM TEACHERS' ASSOCIATION

UMTA RESOURCE PAPERS – 2021

NAME……..

INDEX NO…….....SIGNATURE……....

UGANDA ADVANCED CERTIFICATE OF EDUCATION
Biology Paper one
2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES

*The paper consists of **two** sections **A** and **B**.*

*Answer **all** questions in both sections*

***SECTION A:** consists of **40** questions. Write answers to this section in the boxes provided.*

***SECTION B:** consists of **6** questions. Write answers to this section in the spaces provided*

No additional sheets of paper should be inserted in this booklet

For Examiner's use only

SECTION A **1-40**	**MARKS**
41	
42	
43	
44	
45	
46	
TOTAL	

SECTION A (40 MARKS)

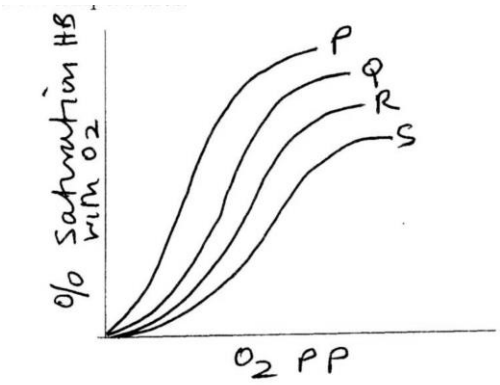
1. Which one of the following organisms illustrates that not all active animals require that the circulatory system transport gases?

A. mammals
B. insects
C. fish
D. birds

2. Which one of the features below is common to both the digestive and respiratory tracts in humans?

A. gullet
B. external nares
C. epiglottis
D. diaphragm

3. Figure 1 shows haemoglobin oxygen dissociation curves of an animal at different temperatures.



Which of the curves represents the oxygen dissociation curve at the least temperature?

A. Q
B. P
C. R
D. S

4. One advantage of excretion of urea over uric acid excretion is that, urea……..

A. requires less energy to form
B. can be concentrated to a greater extent
C. is not a toxic substance.
D. requires less water to excrete

5. Which of the following mechanisms is employed by fresh water Osteichthyes in maintaining water balance? By…….

A. excreting salt across their gills
B. periodically drinking small amounts of water
C. excreting hypotonic urine
D. excreting wastes in the form of uric acid

6. Excretion of a hypotonic urine in humans is mainly associated with the

A. Bowman's capsule
B. the proximal convoluted tubule
C. the loop of Henle
D. the distal convoluted tubule

7. Which of the following will result in air entering into the human lungs?

A. Atmospheric pressure is less than pressure inside the lungs
B. Atmospheric pressure is greater than pressure inside the lungs
C. Although the pressure is the same inside and outside the lungs the partial pressure of oxygen is lower within the lungs
D. The residual air in the lungs causes the partial pressure of oxygen to be less than outside

8. In humans the following apply to the respiratory centre except that, it

A. is stimulated by carbon dioxide
B. is located in the medulla oblongata
C. controls the rate of breathing
D. controls the rate of respiration

9. Carbon dioxide is carried in the plasma in form of

A. carboxy haemoglobin
B. bicarbonate
C. carbamino haemoglobin
D. combined with carbonic anhydrase

10. Which of the animals below breathes by positive pressure mechanism?

A. Fish
B. Humans
C. Birds
D. Frogs

11. Which of these is a true statement as regards to carbon dioxide transport by blood?

A. In lung capillaries carbon dioxide combines with water to give carbonic acid
B. In tissue capillaries carbonic acid breaks down to carbon dioxide and water
C. In lung capillaries carbonic acid breaks down to carbon dioxide and water
D. In tissue capillaries carbonic acid combines with hydrogen ions to form the carbonate ions

12. During blood typing agglutination indicates that the

A. plasma contains certain antibodies
B. red blood cells carry certain antigens
C. plasma contains certain antigens
D. red blood cells contain certain antibodies

13. The cross carried out to find the genotype of an organism is known as

A. Back cross
B. Breeding true
C. Test cross
D. Reciprocal cross

14. The counter current flow in bony fish achieves a high level of gas exchange because it……

A. Increases the concentration gradient.
B. Decreases the distance across which gases diffuse.
C. It increases the speed at which water flows over the gills.
D. Maintains a high concentration gradient.

15. Which of these does **not** pertain to B cells?

A. Have passed through the thymus
B. Specific receptors
C. Antibody mediated immunity
D. Synthesize and liberate antibodies

16. Which of the following correctly defines plasma cells?

A. They are the same as memory cells
B. They are formed from plasma cells
C. Are B cells that actively secrete antibodies
D. Are inactive T cells carried in the plasma

17. Which of the following couples is likely to give birth to a baby suffering from foetal erythroblastosis?

A. Rh^+ mother and Rh^- father
B. Rh^- mother and Rh^- father
C. Rh^+ mother and Rh^+ father
D. Rh^- mother and Rh^+ father

18. Which one of the following comes before the others during the process allopatric speciation?

A. Geographical isolation
B. Pre mating isolating mechanism
C. Post mating isolating mechanism
D. Character displacement

19. During the evolution of the horse, limb length gradually increased. This is an example of

A. disruptive selection
B. stabilizing selection
C. directional selection
D. transient polymorphism

20. What is the role of the hormone cholecystokinin in digestion? It……..

A. Inhibits the secretion of hydrochloric acid in the stomach wall.
B. Stimulates the pancreas to secrete digestive enzymes.
C. Stimulates the liver to release bile juice.
D. Induces the pancreas to release hydrogen carbonates ions

21. If **A** represents assimilation, **R** respiration and **P** net production, then the net production of photosynthesis can be arithmetically expressed as;

A. A = R + P.
B. A + P = R.
C. A + R = P.
D. A – R = P.

22. Which of the plants below is the last type to appear in the ecological succession of a forest?

A. mosses
B. trees
C. grasses
D. shrubs

23. Which of the following is **not** true about parenchyma cells?

A. They are lignified.
B. Are linked to one another by means of plasmodesmata through pits in walls.
C. Some of them are photosynthetic.
D. They act as storage sites.

24. Which of the following processes does not require energy?

A. Absorption of glucose from the gut,
B. Reabsorption of glucose from the glomerular filtrate.
C. Absorption of mineral salts by plant roots.
D. Absorption of water by plant roots.

25. Which of the following is a characteristic of a rapidly growing population?

A. There are equal proportions of all age groups.
B. There is more of the reproductive age group.
C. There is more of the pre-reproductive age group.
D. Birth rate balances mortality rate.

26. Allergy causing antigens cause activated mast cells to release which of the following substances

A. insulin
B. antihistamines
C. antibiotics
D. histamines

27. A type of self-regulation such as the relationship between the pituitary gland, thyroid stimulating hormone, the thyroid gland and thyroxin is known as

A. cyclosis
B. negative feed back
C. synopsis
D. voluntary control

28. Given that 4% of the members of a population of pea plants are short (a recessive character), what is the frequency of both the recessive allele and dominant allele respectively?

A. 0.2 and 0.8
B. 0.8 and 0.2
C. 0.04 and 0.64
D. 0.04 and 0.32

29. Which of the following body structures originates from the mesoderm in the embryo?

A. Liver
B. Muscles
C. Nerves
D. Epidermis

30. During inhalation, the contraction of the diaphragm and intercostal muscles causes the thoracic cavity's volume to

A. decrease and pressure to increase
B. increase and pressure to decrease
C. increase and pressure to increase
D. decrease and pressure to decrease

31. Which of these correctly describes the distribution of ions on either side of an axon when it is not conducting a nerve impulse?

A. Na^+ outside and K^+ inside
B. K^+ outside and Na^+ inside
C. Charged protein outside, Na + and K^+ inside
D. Na^+ and K+ outside and water only inside

32. Hormonelike substances that are secreted by all types of cells and are involved in the sensation of pain are called

A. prostaglandins
B. adrenalins
C. thyroxin
D. insulin

33. Which of the following pairs of structures below represent analogous structures?

A. whale's flippers and bat's wings
B. bird's wings and a butterfly's wings
C. hawk's wings and robin's wing's
D. dog's legs and a horse's leg

34. Sexual reproduction can speed up evolution because it provides more

A. chromosomes
B. genetic variation
C. identical cells
D. organelles

35. Organisms that require a constant supply of oxygen to live are called

A. obligate anaerobes
B. facultative anaerobes
C. chemotropic autotrophs
D. obligate aerobes

36. Which of the following is needed for new species to form?

A. A niche
B. Homologous structures
C. Analogous structures
D. Reproductive isolation

37. Scientists are able to change the gene pool of a population by carrying out

A. adaptive radiation
B. natural selection
C. artificial selection
D. convergent evolution

38. Which of these terms has the same meaning as natural selection?

A. adaptive radiation
B. convergent evolution
C. survival of the fittest
D. divergent evolution

39. In humans the placenta develops from the chorion. This indicates that human development

A. resembles that of the chick
B. is dependent upon extra embryonic membranes
C. cannot be compared to lower animals
D. only begins upon implantation

40. Which of the following best describes the term imprinting?

A. Learning that occurs during a critical period in young animals
B. Learning that requires a sign stimulus to trigger its start
C. Innate behaviour that requires practice to perfect
D. Innate behaviour that does not require practice to perfect

SECTION B (60 MARKS)

41. (a) (i) Define the term attenuated microorganism? (01 mark)

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ii) Vaccines protect against disease by stimulating the production of memory cells. Describe how memory cells are produced and protect the body from disease. (05 marks)

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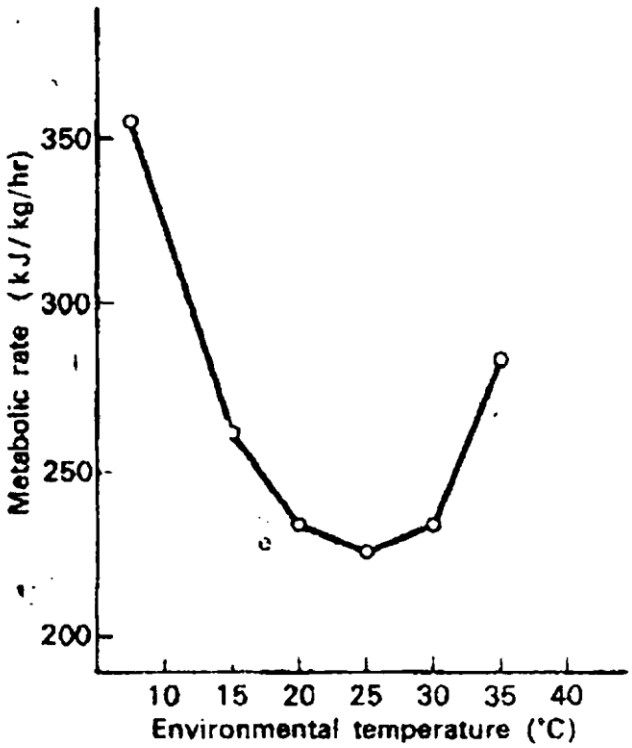
(b) The table shows statements, which may be related to active immunity or passive immunity. Complete the table by placing a tick in the box if the statement is true or a cross in the box if the statement is false. (04 marks)

Statement	**Active immunity**	**Passive immunity**
Antibodies produced if the body is re-infected by the same pathogen.		

Antibodies developed in horse injected into human.		
Antibodies received in breast milk.		
Attenuated microorganisms used in the vaccine.		

42. Figure 2 shows the metabolic rate of a resting dog at different environmental temperatures



(a) Describe the effect of increasing environmental temperature on metabolic rate (04 marks)

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(b) Explain the change in metabolic rate between

(i) 20^0C and 30^0C (02 marks)

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(ii) above 30^0C (02 marks)

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(c) Explain how the Carmel a desert mammal is specialized to meet the problems of overheating and water stress in its habitat (02 marks)

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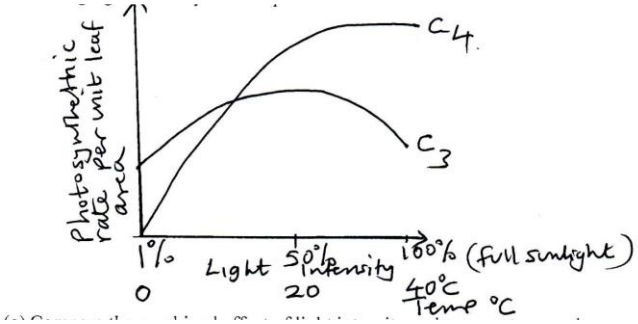
43. Figure 3 shows the comparative photosynthetic response of C_3 and C_4 plants to increasing light intensity and temperature



(a) Compare the combined effect of light intensity and temperature on the photosynthetic rate (03 marks)

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(b) State the advantage of

(i) C_4 photosynthesis over C_3 photosynthesis (03 marks)

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(ii) C_3 photosynthesis over C_4 photosynthesis (02 marks)

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(c) State the likely location of (02 marks)

(i) C_3 plants

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(ii) C_4 plants

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44. (a) Distinguish between sex linked and sex limited characters (02marks)

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(b) Work out a cross between round yellow and wrinkled green peas that gave rise to only round yellow and wrinkled yellow off spring if Round and yellow where dominant phenotypes (08 marks)

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45. (a) Explain what is meant by greenhouse effect (03 marks)

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(b) State the harmful consequences of the following

(i) Ozone layer depletion (03 marks)

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(ii) Discharge of smoke in air from industries (03 marks)

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(a) Suggest **one** way how ozone layer depletion has been minimized (01 mark)

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46.(a) What is meant by **polymorphism** (01 mark)

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(b) *Biston betularia* the peppered moth is light coloured and mottled. In 1848 a dark (melanic) mutant form was captured in Manchester. By 1895 98% of these moths in Manchester were melanic forms. The dark two forms are morphs, the normal form being *Biston betularia typica* and the dark form *Biston betularia carbonifera*

Table 1 observed frequency of the two morphs of *Biston betularia*

Habitat	**Typica**	**Carbonifera**
Rural woodland	94.6%	9.4%
Industrial woodland	10.1%	89.9%

Table 2 observed frequency of predation of *Biston betularia* by woodland birds

Habitat	**Typica**	**carbonifera**
Rural woodland	13.6%	86.3%
Industrial woodland	74.2%	25.8%

(i) Comment on the distribution of the two forms of moth as shown in Table **1** (03 marks)

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(ii) How does the data in Table **2** support the idea of natural selection? (04 marks)

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(iii) Given that the data shown in Table 2 was collected in the 1950s, would you predict similar figures if the investigation was to be repeated this year (02 marks)

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END