NAME. …… INDEX NO. …….

P530/1
BIOLOGY
(Theory)
July/Aug.2023
Paper 1
$2^1/_2$ hours

KAYUNGA SECONDARY SCHOOLS HEAD TEACHERS AND PRINCIPAL ASSOCIATION (KASSHPA)

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)
Paper 1

2 hours: 30 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper consists of sections; **A** and **B***

*Attempt **all** questions in both sections*

*Write the answers to section **A** in the boxes provided and answers to section **B** in the spaces provided.*
No additional sheets of paper should be inserted in this booklet

For Examiners' Use Only			
Section		Marks	Examiners signature & No.
A	1-40		
B	41		
	42		
	43		
	44		
	45		
	46		
Total			

SECTION A (40 MARKS)

1. The behaviour in which an animal ceases to respond to repeated stimuli is

A. exploratory learning.
B. associative learning.
C. imprinting
D. habituation.

2. How are enzymes and inorganic catalysts similar? They are both

A. highly specific in the reactions they catalyse
B. affected by changes in pH
C. affected by changes in temperature.
D. unchanged at the end of a reaction.

3. Which one of the following processes is not affected by changes in oxygen concentrated?

A. Exocytosis
B. Phagocytosis
C. Facilitated diffusion
D. Pinocytosis

4. How do marine bony fish overcome the problem of becoming dehydrated?

A. Have a large volume of glomerular filtrate.
B. Absorb salts via chloride secretory cells
C. Posses few and small glomeruli
D. Excreting ammonia as nitrogenous waste

5. During non-cycling electron pathway of photosynthesis, electrons are lastly accepted by

A. NADP
B. ferrodoxin
C. cytochrome
D. water

6. When an allele exerts multiple effects on the phenotype of an individual, it is said to be

A. epistatic
B. polygenic
C. pleitropic
D. polyploidy

7. The ability of water to move along the apoplast pathway in plants is attributed to its

A. high latent heat of fussion
B. polar nature
C. high adhesion-cohesion forces
D. high density

8. Which one of the following is true about a damaged tissue?

A. Temperature of the tissue reduces
B. Has a large number of phagocytes
C. Permeability of capillaries that drain the tissue decrease
D. Has a large number of memory cells

9. A partially closed ductus arterious in an individual causes

A. high blood pressure
B. shortage of oxygen to tissue
C. heart attack
D. anaemia

10. Which one of the following chromosomal mutations occurs during anaphase I of meiosis?

A. Non-disjunction
B. Deletion
C. Inversion
D. Duplication

11. Which one of the following factors does not increase the chances of fertilization in mammals?

A. Seasonal breeding cycles.
B. Female receptiveness to the male only during ovulation
C. Internal fertilization
D. Development of secondary sex characteristics.

12. Figure **1** shows the distribution of two types of moth in an area before and after it was darkened by soot

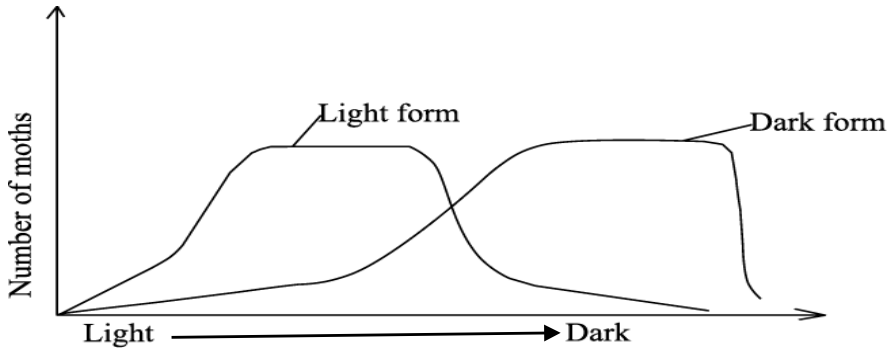

Fig. 2

The process illustrated in figure 1 is

A. genetic drift
B. natural selection
C. mutation
D. gene flow

13. Which one of the following statements explains systolic pressure?

A. Maximum blood pressure in the arteries
B. Blood pressure in the left ventricle following concentrated
C. Maximum blood pressure in the right ventricle
D. Blood pressure in the arteries following relaxation of ventricles

14. Which one of the following processes is not associated with production of water?

A. Synthesis of glycogen
B. Mass flow in plants
C. Aerobic respiration
D. Synthesis of a lipid

15. Which of the following ions are essential in the transmission of the nerve impulses?

A. Sodium ions
B. Potassium ions
C. Chloride ions
D. Carbonate ions

16. The type of growth pattern that occurs in monocotyledons leaves is

A. limited
B. unlimited
C. allometric
D. intermittent.

17. Which one of the following is the last step that occurs before a myofibril contracts.

A. Binding of calcium ions on to troponin
B. Hydrolysis of ATP attached on to myosin heads
C. Release of calcium ions from sarcoplasmic reticulum
D. Shortening of the sarcomere.

18. Which one of the following processes does not avail nitrogen to plants?

A. Ammonification
B. Nitrification
C. Denitrification
D. Nitrogen fixation.

19. The inheritance of skin colour in humans is a suitable example of

A. codominance
B. epistasis
C. pleiotropic
D. polygenic inheritance.

20. Which one of the following ecological pyramid may be used to determine productivity in an ecosystem?

A. Pyramid of energy
B. Pyramid of biomass
C. Pyramid of numbers
D. Pyramid of productivity

21. In plants, cell enlargement is caused by an interaction of

A. ethene and abscisic acid
B. cytokinins and ethane
C. gibberellin and auxins
D. cytokinins and abscisic acid.

22. Which one of the following organelles is abundant in a phagocytotic cell?

A. Golgi apparatus
B. Lysosomes
C. Microbodies
D. Centrosomes

23. Figure 2 shows the rate of photosynthesis at different light

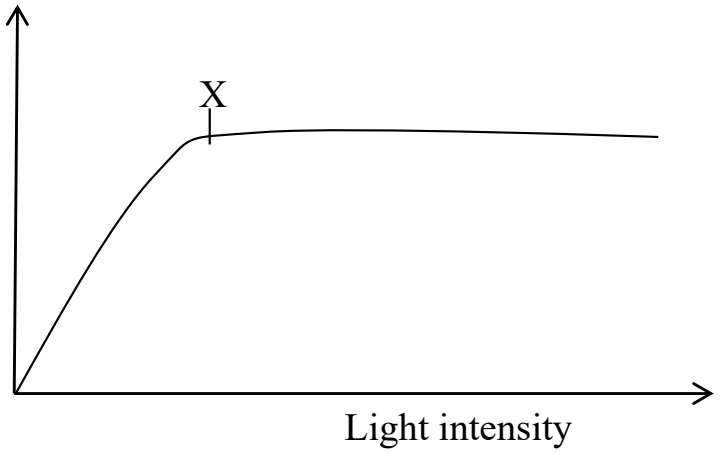

Fig 2

The factor limiting carbohydrate synthesis below point X is

A. light intensity
B. temperature
C. carbon dioxide concentration
D. chlorophyll concentration

24. Which one of the following meristems is responsible for primary growth in plants?

A. Lateral meristem
B. Apical meristems
C. Intercalary meristems
D. Primary meristems

25. In plants, the strength of the walls of the xylem vessels is mainly attributed to the presence of;

A. pectins
B. cellulose
C. liginin
D. murein

26. Insects and birds are adapted for flight by possessing wings. This is an example of

A. convergent evolution
B. adaptation radiation
C. divergent evolution
D. natural selection

27. Some bacteria when infected with microphages may make a particular amino acid they could not make before. This is due to;

A. transformation
B. mutation
C. transduction
D. duplication

28. In organism with a large number of undifferentiated cells, reproduction would occur suitably by

A. fission
B. conjugation
C. fragmentation
D. sporulation

29. Which one of the following can act as indicator species for levels of pollution in an environment?

A. Lichens
B. Mosses
C. Ferns
D. Algae

30. Which one of the following conditions would lead to increased dissociation of oxyhaemoglobin in a mammal?

A. Decrease in the metabolic rate
B. Decrease in the pH of blood
C. Increase in partial in partial pressure of oxygen in the environment
D. Increase in environmental temperature

31. Which one of the following trophic levels has the greatest concentration of pesticides residues in an ecosystem?

A. Tertiary consumers
B. Primary consumers
C. Secondary consumers
D. Primary producers

32. Gaseous exchanged in earth worms occurs at the body surface because the body is

A. cylindrical
B. segmented
C. moist
D. elongated

33. How many water molecules are produced when 20 molecules of glycerol are used to synthesise triglycerides
A. 15
B. 30
C. 60
D. 90

34. A cell was treated with a chemical substance that disrupts microtubule assembly. Which one of the following processes would be most affected?
A. Respiration
B. Replication of DNA
C. Active movement of ions
D. Movement of chromosomes to the poles during mitosis

35. Which one of the following would not be caused by seasonal changes in migratory birds?
A. Plumage colouration
B. Feeding behavior
C. Reproductive behavior
D. Hormonal changes.

36. Which of the following processes would be most affected by low rates of respiration?
A. Transcription
B. Translation
C. Transduction
D. Transformation

37. Which one of the following structures supplies oxygenated blood to the foetus?
A. Umbilical cord
B. Umbilical vein
C. Placenta villi
D. Umbilical artery

38. Which one of the following conversions occurs under conditions of starvation?

A. Fatty acids ⟶ carbohydrates
B. Glucose ⟶ Lipids
C. Proteins ⟶ carbohydrates
D. Lipids ⟶ lipoproteins

39. Which one of the following is correct about enzymes in the acrosomes of a sperm? They are

A. lipase and carbohydrases
B. lipases and proteases
C. proteases and carbohydrases
D. proteases only

40. Which one of the following is not a characteristic of members of phylum nematoda?

A. Possession of separate sexes
B. Bilateral symmetry
C. Metameric segmentation
D. Triploblastic.

SECTION B (60 MARKS)

Write answers in the spaces provided

41. Figure 3 shows the effect of food content on the population growth of flour beetles of the same species

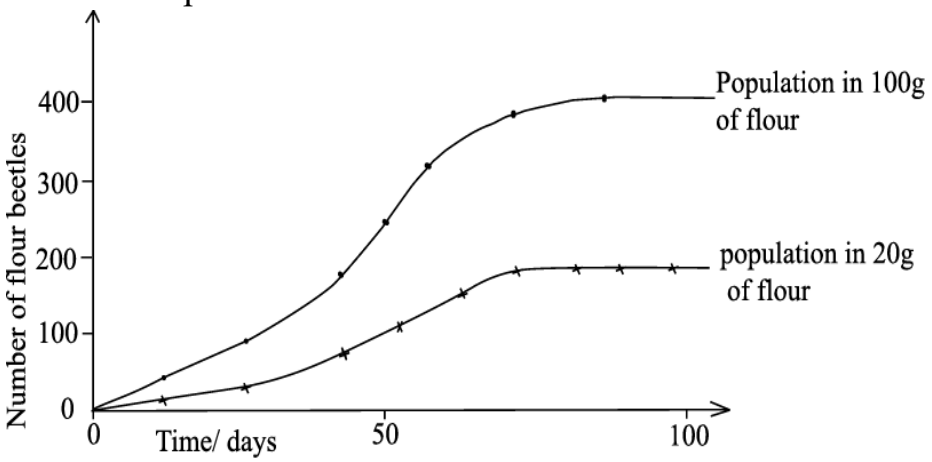

Fig. 3

(a) Compare the effect of food content on the population growth of flour beetles with time. (*04 marks*)

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(b) Explain the effect of food shortage on the population growth of flour beetles. (*05 marks*)

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(c) State **one** density independent factor that would influence the results of this experiment. (*01 mark*)

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42. (a) State **two** roles of membranes within cells. (*02 marks*)

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(b) Give **four** reason why most biological molecules do not diffuse freely across cell membranes. (*04 marks*)

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(c) Explain why the structural arrangement of the cell membrane is described as fluid mosaic. (*04 marks*)

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43. (a) How can the phenotypic stability of a population be maintained over generations? (*04 marks*)

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(b) Give **four** reasons why geographically isolated populations may become divergent with time (*04 marks*)

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(c) How can fluctuating environmental condition lead to polymorphism within a species? (*02 marks*)

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44. Table **1** shows the effect of temperature on the rates of apparent photosynthesis and respiration in a plant that grows under a forest canopy.

Table 1

Temperature/^{0}C	**Rate of the process ($mgCO_2g^{-1}hr^{-1}$)**	
	Apparent photosynthesis	**Respiration**
6	1.3	0.3
10	2.3	0.6
14	2.8	0.7
18	3.1	1.2
23	2.8	1.8
28	2.5	2.1

(a) Compare the effect of temperature on the rates of apparent photosynthesis and respiration. (*03 marks*)

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(b) Explain the effect of temperature on the rate of apparent photosynthesis. (*04 marks*)

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(c) How does a plant growing under a forest canopy benefit from having a lower rate of respiration? (*03 marks*)

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45. (a) Distinguish between a **nerve impulse** and an **action potential**. (*02 marks*)

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(b) Explain why nerve impulses are transmitted in a single direction

(i) across the synapse. (*04 marks*)

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(ii) along an axon membrane of a nerve. (*03 marks*)

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(c) Give a reason why endotherms have a faster impulse transmission than ectotherms of the same axon diameter. (*01 mark*)

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46. (a) What is meant by the term **genetic code**? (*02 marks*)

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(b) Explain the advantage of the genetic code being a 3 base code rather than a 2 base code. (*03 marks*)

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(c) Transcription of the genetic code begins with unwinding of the DNA double helix.

(i) How does unwinding of the DNA double helix occur? (*02 marks*)

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(ii) Explain the importance of unwinding of the DNA double helix during transcription. (*03 marks*)

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