Candidate's Name: .....

Signature: .....

Random No.					Personal No.		

(Do not write your School/Centre Name or Number anywhere on this booklet.)

P530/1
BIOLOGY
Paper 1
(Theory)
Nov./Dec. 2025
2½ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY

Paper 1
(Theory)

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

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

All *the questions in both Sections are* **compulsory**.

Write 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	**Question**	**Marks**	**Examiner's Signature & No.**
A	**1 – 40**		
B	**41**		
	42		
	43		
	44		
	45		
	46		
Total			

Turn Over

SECTION A (40 MARKS)

Write the letter corresponding to the right answer in the box provided. Each question in this section carries **one** *mark.*

1. Which one of the following is a function of the microvilli on epithelium cells lining the small intestine and kidney tubules? They are for

A. reducing the diffusion distance.
B. increasing the surface area.
C. attachment of enzymes.
D. protecting inner tissues.

2. Which one of the following explains why phytoplanktons are found on the surfaces of water bodies?

A. They lack locomotory structures.
B. Water is warmest in the top layers.
C. Light does not penetrate deeper layers of water.
D. The viscosity of water prevents them from sinking.

3. The ability of carbon to form macromolecules of biological importance is attributed to

A. multiple bonds formation.
B. carbon-carbon bond formation.
C. its small size.
D. presence of hydrogen bonding.

4. Conifers are capable of surviving in poor soils because

A. they possess leaves with thick cuticle to minimise water loss.
B. the interval between flowering and corn formation is short.
C. of the presence of mycorrhiza on roots.
D. they possess needle-like leaves to prevent transpiration.

5. All the following are true of the genetic code **except**

A. each amino acid is represented by a triplet code.
B. genetic code is universal.
C. genetic code is degenerate.
D. codon is always read in the 3' – 5' direction.

6. Which of the following reactions is catalysed by lyase enzyme?

A. Ethanol + $NADH_2$ ⟶ Ethanol + NAD
B. Glutamic acid + Pyruvic acid ⟶ Ketoglutaric acid + Alanine
C. Lactose + Water ⟶ Glucose + Galactose.
D. Pyruvic acid ⟶ Ethanol + Carbon dioxide.

7. The bioaccumulation of DDT pesticide in higher trophic levels along the food chain is because

A. it is effective in high doses that can spread to high trophic levels.
B. the pesticide does not break down easily for use in the body.
C. organisms at higher trophic levels are adapted to respond to DDT faster.
D. organisms in the lower trophic levels have tolerant tissues that reduce its effectiveness.

8. Which one of the following processes causes the closure of the atrioventricular valves of the human heart?

A. Atrial diastole.
B. Ventricular diastole.
C. Atrial systole.
D. Ventricular systole.

9. Which of the following structures pinch off and fuse with the cell membrane to release secretions out of the cell?

A. Nucleus.
B. Golgi body.
C. Smooth ER.
D. Rough ER.

10. Which one of the following organisms excrete ammonia as the main nitrogenous waste?

A. Terrestrial birds.
B. Marine bony fish.
C. Fresh water amphibians.
D. Terrestrial insects.

11. Which one of the following is an immediate response of the body to high altitude?

A. Production of more erythrocytes.
B. Increased affinity of haemoglobin for oxygen.
C. Secretion of more alkaline urine.
D. Taking extra deep breaths.

12. The stem and roots of rice growing in swamps contain a big proportion of aerenchyma tissue to

A. facilitate diffusion of respiratory gases.
B. provide hydrostatic support during flooding.
C. ensure maximum anaerobic respiration.
D. provide space for storing water and mineral salts.

13. Which one of the following is the correct order for blood clotting.

A. Thrombin → Prothrombin → Thromboplastin →Fibrinogen → Fibrin.
B. Fibrinogen → Prothrombin →Thrombin → Thromboplastin → Fibrin.
C. Prothrombin → Fibrinogen →Thrombin →Thromboplastin → Fibrin.
D. Thromboplastin → Prothrombin →Thrombin → Fibrinogen→ Fibrin.

14. Figure 1 is a cross section through a myofibril showing arrangement of actin and myosin filaments.

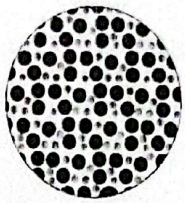

Fig. 1

From which part of the myofibril was the section taken?

A. H – zone.
B. I – band.
C. M – line.
D. A – band.

15. Which one of the following events in a leaf promotes photolysis of water?

A. Coupling of ADP with phosphate groups.
B. Oxidation of photosystem II.
C. Recycling of electron to chlorophyll.
D. Release of electrons by NADP.

16. The continued occurrence of sickle-cell disease in malaria infested parts of Africa is due to

A. continual mutation of the sickle cell trait.
B. gene flow between population.
C. heterozygote advantage of the sickle cell trait.
D. disruptive selection pressure for sickle cell trait.

17. The significance of diploid parthenogenesis in aphid is that it results in

A. many haploid females formed without fertilisation.
B. many diploid females after fertilisation.
C. many haploid wingless aphids after fertilisation.
D. rapid increase in numbers without fertilisation.

18. At birth oxytocin is secreted by the

A. placenta.
B. pituitary gland.
C. uterine wall.
D. hypothalamus.

19. Which one of the following events occur in both prophase of mitosis and prophase I?

A. Splitting of the centromeres.
B. Homologous chromosomes pair up.
C. Each chromosome divides to form two chromatids.
D. Non-sister chromatids exchange genetic portions.

20. Which one of the following is a physiological adaptation of the tape worm for a successful parasitic life?

A. Use of secondary host.
B. Absence of special sense organs.
C. Ability to respire anaerobically.
D. Production of very many eggs.

21. If the nucleus of the pollen grain has 12 chromosomes, how many chromosomes are likely to be in the endosperm nucleus of the same plant?

A. 36.
B. 30.
C. 24.
D. 6.

22. Which one of the following physiological processes is **unlikely** to occur in seeds during germination?

A. Glucose → Starch.
B. Amino acid → Proteins.
C. Glucose → Cellulose.
D. Proteins → Amino acid.

23. Which of the following is a disadvantage of using air as a respiratory medium in earthworms?

A. Air carries less oxygen than water.
B. Oxygen diffuses faster in air than in water.
C. Air increases the risk of desiccation.
D. Air contains nitrogen as well as oxygen.

24. Which one of the following is the effect of red light in plants?

A. Stimulates flowering in long day plants.
B. Stimulates flowering in short day plants.
C. Inhibits flowing in day neutral plants.
D. Stimulates flowing in day neutral plants.

25. Gut bacteria in the large intestines are important in that, they

A. feed on other harmful bacteria.
B. feed on food which should have been egested.
C. produce lactate which makes the intestines acidic.
D. aid in synthesising vitamin K.

26. Gibberellins and cytokinins are similar in action in that, both

A. break dormancy in seeds and buds.
B. induce dormancy in seeds and buds.
C. promote abscission in fruits and flowers.
D. close stomata under condition of water stress.

27. Which one of the following structural features does not facilitate gaseous exchange in plants?

A. Air spaces between cells.
B. Secondary walls of cells.
C. Perforations on the stem.
D. Flattened leaf lamina.

28. Which one of these phyla has the gametophyte as the dominant generation?

A. Angiospermophyta.
B. Bryophyta.
C. Filicinophyta.
D. Corniferophyta.

29. The equation below represents aerobic respiration of a food substance R.

$$R + 26\ O_2 \longrightarrow 18\ CO_2 + 18\ H_2O$$

From the equation, the food substance R likely to have been oxidised is

A. amino acid.
B. amylose.
C. fatty acid.
D. galactose.

30. Which one of the following conditions is less likely to affect the passage of glucose molecules across a membrane?

A. Decreasing pH of the media.
B. Increasing the temperature of the medium.
C. Having many microvilli on a membrane.
D. Presence of numerous carrier proteins.

31. When *Drosophila* with normal wings and grey bodies were crossed with those with vestigial wings and ebony bodies, the offspring were as follows:

Normal wings, grey bodies = 586
Vestigial wings, grey bodies = 106
Normal wings, ebony bodies = 111
Vestigial wings, ebony bodies = 456

The cross over value is

A. 17.2 %.
B. 36.2 %.
C. 46.5 %.
D. 82.8 %.

32. The importance of Casparian strip in the endodermal cells of a root is to

A. slow down apoplast water uptake.
B. create a low water potential in xylem.
C. allow passage of water through the cell walls.
D. provide protection against pathogens.

33. The effect of a drug that prolongs the role of neurotransmitter substances at the synapse is that

A. it causes uncontrollable muscular contraction.
B. sensitivity to the stimulus progressively decreases.
C. there is reduction to the threshold that causes excitation.
D. it inhibits successive impulse transmission at the synapse.

34. The bacteria responsible for conversion of nitrates to free nitrogen in the atmosphere are **less** likely to survive in

A. water logged soil.
B. aquatic sediments.
C. soil in a forest.
D. deeper zones of soil.

35. Which one of the following stages of respiration occurs either in presence or absence of oxygen?

A. Electron transport chain.
B. Conversion of pyruvate to acetyl CoA.
C. Tricarboxylic acid cycle.
D. Formation of pyruvate.

36. Figure **2** represents the change in population of a pest and a biological control agent.

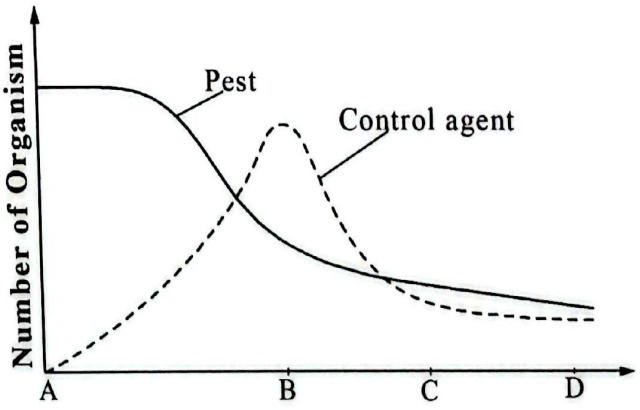

Fig. 2

Which of the points A, B, C and D on figure **2** could an inverted pyramid of numbers be obtained?

37. Florists usually add IAA to cuttings used in vegetative propagation in order to

A. promote flowering.
B. promote sprouting.
C. promote growth of the shoot tip.
D. induce root growth.

38. The kind of behaviour illustrated by birds which were initially driven away by gunshot but eventually ignores the gunshot and continues to destroy crops is

A. trial and error learning.
B. insight learning.
C. imprinting.
D. habituation.

39. Which one of the following processes in bacteria and fungi is **not** a direct beneficial effect to man?

A. Manufacturing of antibiotics.
B. Processing of food.
C. Decomposition of sewage.
D. Forming symbiotic relations with other organisms.

40. Which one of these explains why males are more affected by haemophilia than females?

A. The X chromosome is much larger than the Y chromosome.
B. Males lack another allele on Y chromosome.
C. The genes that cause the condition are mainly carried on male autosomes.
D. The character is strongly increased by male sex hormones.

SECTION B (60 MARKS)

Write the answers in the spaces provided.

41. (a) State **two** distinguishing features of each of the following:

(i) Bryophytes *(02 marks)*

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(ii) Pteridophytes *(02 marks)*

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(b) State **one** similarity and **two** differences in the life cycles of bryophytes and pteridophytes. *(03 marks)*

(i) Similarity

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(i) Differences

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(c) State **three** ways in which reproduction by seeds is advantageous to terrestrial plants. *(03 marks)*

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42. (a) How are the following organisms structurally adapted to provide a large surface area for efficient gaseous exchange?

(i) Mango tree *(02 marks)*

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(ii) Grasshopper *(01 mark)*

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(b) (i) Make a labelled drawing to illustrate counter current flow system over the gill plate of a bony fish. *(02 marks)*

(ii) Explain how the counter current flow system ensures efficient gaseous exchange in the bony fish. (*03 marks*)

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(iii) Explain what would happen if blood and water flowed in the same direction at the same speed over the gill plate. (*02 marks*)

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43. (a) (i) Define chromosome mutation. (*01 mark*)

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(ii) Name **one** chemical substance that causes chromosome mutation. (*01 mark*)

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(b) Briefly explain how the following conditions may arise in naturally breeding organisms:

(i) Polyploidy (*03 marks*)

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(ii) Non-disjunction *(03 marks)*

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(c) State **two** advantages of chromosome mutation. *(02 marks)*

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44. Figure **3** illustrates the biochemical pathways involved in photosynthesis.

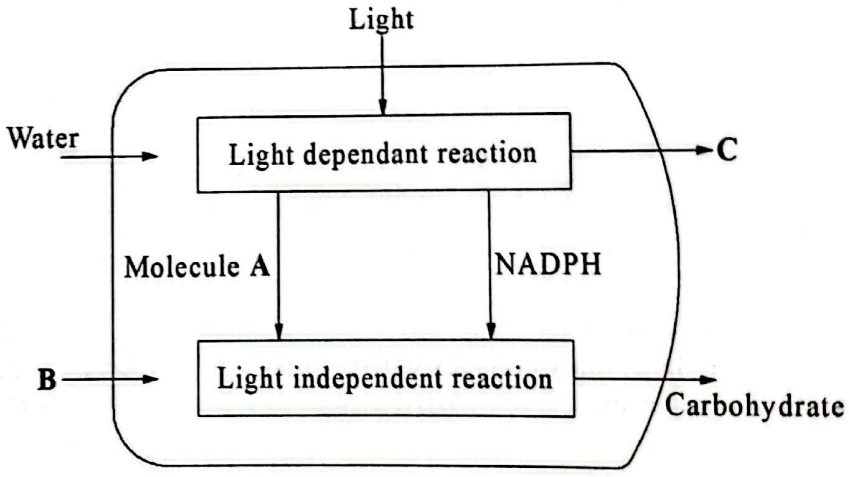

Fig. 3

(a) Name the molecules **A** and **C**. *(01 mark)*

A .....

C .....

(b) (i) How is the NADPH produced in the light dependent reaction? *(02 marks)*

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(ii) What role does NADPH play in the light independent reaction? *(01 mark)*

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(c) With reference to C_4 and C_3 plants, state with reasons the carbon fixation pathway that would be more efficient;

(i) if the oxygen concentration is high and carbon dioxide concentration is low. *(03 marks)*

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(ii) in hot, sunny climates where air spaces are closed to reduce water loss. *(03 marks)*

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45. (a) State **two** differences between counter current multiplier and counter current heat exchange. *(02 marks)*

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(b) Explain how counter current heat exchange mechanism prevents excessive heat loss in animals. *(04 marks)*

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(c) Explain **two** physiological ways by which endothermic animals maintain a constant body temperature in cold environments. (*04 marks*)

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46. Figure 4 shows diurnal variation in the rate of transpiration and water absorption in a plant at different times of the day.

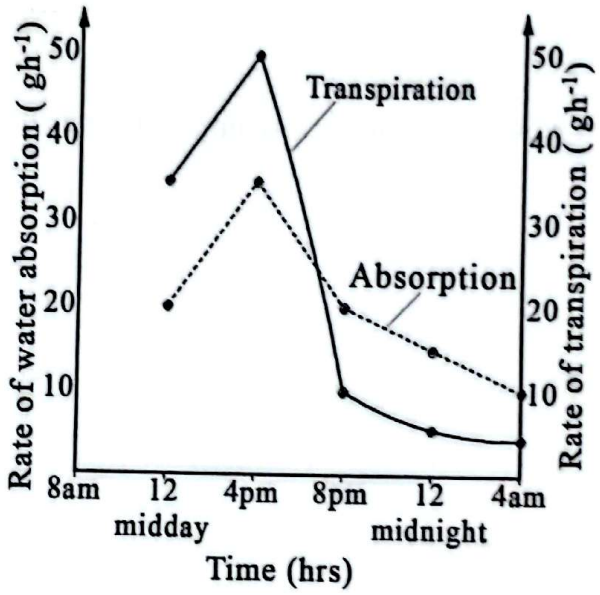

Fig. 4

(a) Explain the relationship between the rate of transpiration and rate of water absorption between 12 midday and 4 pm. (*04 marks*)

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(b) Account for the difference in the rate of absorption and rate of transpiration after 8 pm. *(03 marks)*

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(c) Explain how sunken stomata minimises the rate of water loss from a plant. *(03 marks)*

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END