

Candidate's Name :

Signature :

| Random No. | | | | | | Personal No. | | |
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(Do not write your School/ Centre Name or Number anywhere on this booklet.)

553/1
BIOLOGY
(Theory)
Paper 1
Oct./Nov. 2022
2½ hours



UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

BIOLOGY

(THEORY)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of sections; A, B and C.

Answer all questions in sections A and B, plus two questions in section C.

Write the answers to section A in the boxes provided, answers to section B in the spaces provided and answers to section C in the answer booklets provided.

| For Examiners' Use Only | | | |
|-------------------------|----------|-------|------------------------------|
| Section | | Marks | Examiner's Signature and No. |
| A | No. 1-30 | | |
| | | | |
| B | No. 31 | | |
| | No. 32 | | |
| | No. 33 | | |
| C | No. | | |
| | No. | | |
| Total | | | |

SECTION A (30 MARKS)

Answer **all** questions in this section. Write the letter representing the correct answer to each question in the boxes provided.

1. Which one of the following is a property of sandy soil?
A. Low capillarity.
B. High nutrient content.
C. Good water retention.
D. Poor aeration.

☐
2. Which one of the following occurs in the human body as a corrective measure when blood glucose level rises above normal?
A. Absorption of glucose in the ileum reduces.
B. Less insulin is produced.
C. More glucose is converted to glycogen.
D. Oxidation of glucose reduces.

☐
3. Which one of the following hormones controls the secretion of digestive juices from the pancreas?
A. Secretin.
B. Insulin.
C. Adrenaline.
D. Thyroxine.

☐
4. If the parents are carriers of a gene for albinism, what are the chances that they would produce an albino child?
A. 100 % B. 75 %
C. 50 % D. 25 %

☐
5. Which one of the following statements is correct about discontinuous variation? It is
A. exhibited by humans only.
B. controlled by a single gene.
C. present in all plants.
D. controlled by many genes.

☐
6. Plants are usually propagated using stems but **not** roots because
A. stems can store food needed during growth.
B. stems bear leaves which manufacture food for the offspring.
C. roots lack chlorophyll and stomata for gaseous exchange.
D. roots lack buds that can develop into new plants.

☐

7. The most accurate way to measure the growth in plants is by use of
 A. dry weight. B. fresh weight.
 C. height. D. volume. ☐
8. During inhalation in bony fish,
 A. nostrils open.
 B. floor of the buccal cavity is lowered.
 C. operculum is forced open.
 D. mouth is closed. ☐
9. Which one of the following represents the correct sequence of stages in cell division?
 A. Interphase, metaphase, prophase.
 B. Metaphase, prophase, telophase.
 C. Prophase, metaphase, anaphase.
 D. Anaphase, interphase, telophase. ☐
10. Which one of the following sets of natural resources consists of renewable resources only?
 A. Forests, water, oil.
 B. Water, forests, fish.
 C. Minerals, solar energy, water.
 D. Forests, minerals, fish. ☐
11. What is the most correct reason for the ileum being highly coiled? To
 A. ensure it is compact enough to fit in the abdomen.
 B. slow down food movement to allow time for digestion.
 C. transport digested food to the liver.
 D. bring the food into contact with its walls for absorption. ☐
12. Figure 1 shows structures of a vein and an artery. ☐

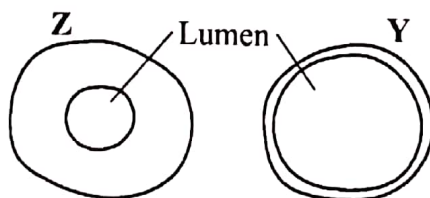


Fig. 1

Which one of the following is true about the vessels?

- A. Z is a vein because it has a thin wall.
 B. Y is an artery because it has a thick wall.
 C. Y is a vein because it has a wide lumen.
 D. Z is an artery because it is fibrous.

13. A healthy adult person has an average of 8,000 leucocytes per mm^3 of blood. What would be the likely concentration of leucocytes per mm^3 of blood in an adult with a bacterial infection?
- A. 4,000.
B. 7,000.
C. 8,000.
D. 12,000.
14. Which one of the following processes contributes to the gaining of heat by the body?
- A. Sweating.
B. Constriction of skin blood capillaries.
C. Shivering.
D. Standing of hair on skin surface.
15. A student made a drawing of a cockroach. The length of the drawing was 5 cm and the actual length of the cockroach was 2.5 cm. What is the magnification of the drawing?
- A. $\times 12.5$
B. $\times 7.5$
C. $\times 2.0$
D. $\times 0.5$
16. Water is moved up the stem of woody plants by
- A. capillarity and transpiration pull.
B. osmosis and diffusion.
C. osmosis and active transport.
D. diffusion and active transport.
17. Which of the following are functions of the cerebrum? It controls
- A. muscular movement and posture.
B. reflex activities such as breathing.
C. heart beat and breathing.
D. learning and memory.
18. Which one of the following does **not** apply to tropisms?
- A. Depends on direction of stimulus.
B. Involve growth.
C. Stimulated by hormones.
D. Whole organism moves.

19. Which of the following diseases can be transmitted by both the house fly and the cockroach?

- A. Cholera and dysentery.
- B. Dengue fever and yellow fever.
- C. Trypanosomiasis.
- D. Cholera and yellow fever.

☐

20. What is the function of the hormone testosterone in humans?

- A. Prepares the body for flight.
- B. Enlarges the skeletal muscles.
- C. Increases heartbeat.
- D. Increase levels of blood sugar.

☐

21. During the pupal stage in the life cycle of an insect, there is

- A. rapid cell division.
- B. much food consumption.
- C. a lot of air intake.
- D. tissue re-organisation.

☐

22. Epigeal germination occurs as a result of the

- A. hypocotyl elongating faster than the epicotyl.
- B. epicotyl elongating faster than the hypocotyl.
- C. radical elongating faster than other parts.
- D. cotyledons elongating faster than other parts.

☐

23. The correct difference between complete and incomplete metamorphosis is

| | Complete metamorphosis | Incomplete metamorphosis |
|----|--|--|
| A. | Young and adult have same feeding habits | Young and adult have different feeding habits. |
| B. | Young and adult are different | Young and adult look alike. |
| C. | Involves 4 stages | Involves 2 stages . |
| D. | Dormant stage is the egg. | Dormant stage is the pupa. |

☐

24. Which of the following blood vessels carry blood with a high concentration of urea?

- A. Hepatic vein and renal artery.
- B. Renal vein and hepatic portal vein.
- C. Hepatic artery and renal vein.
- D. Pulmonary vein and renal vein.

☐

Turn Over

25. Chicken, grass, man and grasshopper are in a food chain. Which one of them has the highest amount of energy?

- A. Chicken.
- B. Man.
- C. Grasshopper.
- D. Grass.

☐

26. Which one of the following cells does not carry out photosynthesis?

- A. Guard cells.
- B. Spongy cells.
- C. Palisade cells.
- D. Epidermal cells.

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27. Which one of the following parts of a flower produces gametes?

- A. Stigma.
- B. Anther.
- C. Filament.
- D. Corolla.

☐

28. Which one of the following is the importance of tactic responses to organisms?
It enables

- A. animals to escape from injurious stimuli.
- B. plant roots to grow towards water.
- C. non-woody plants to obtain mechanical support.
- D. animals to regulate their body temperature.

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29. The interaction of plants, animals and non-living things in their environment forms

- A. a population.
- B. an ecosystem.
- C. a community.
- D. ecology.

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30. Which one of the following is true about the common mould? It

- A. feeds parasitically on animal flesh.
- B. exhibits holozoic nutrition.
- C. ingests food by engulfing.
- D. digests food outside its body.

☐

SECTION B (40 MARKS)

Answer **all** questions in this section.

Answers **must** be written in the spaces provided.

31. Figure 2 shows the changes in the population of zebras that were introduced in an isolated island. Study the figure and answer the questions that follow.

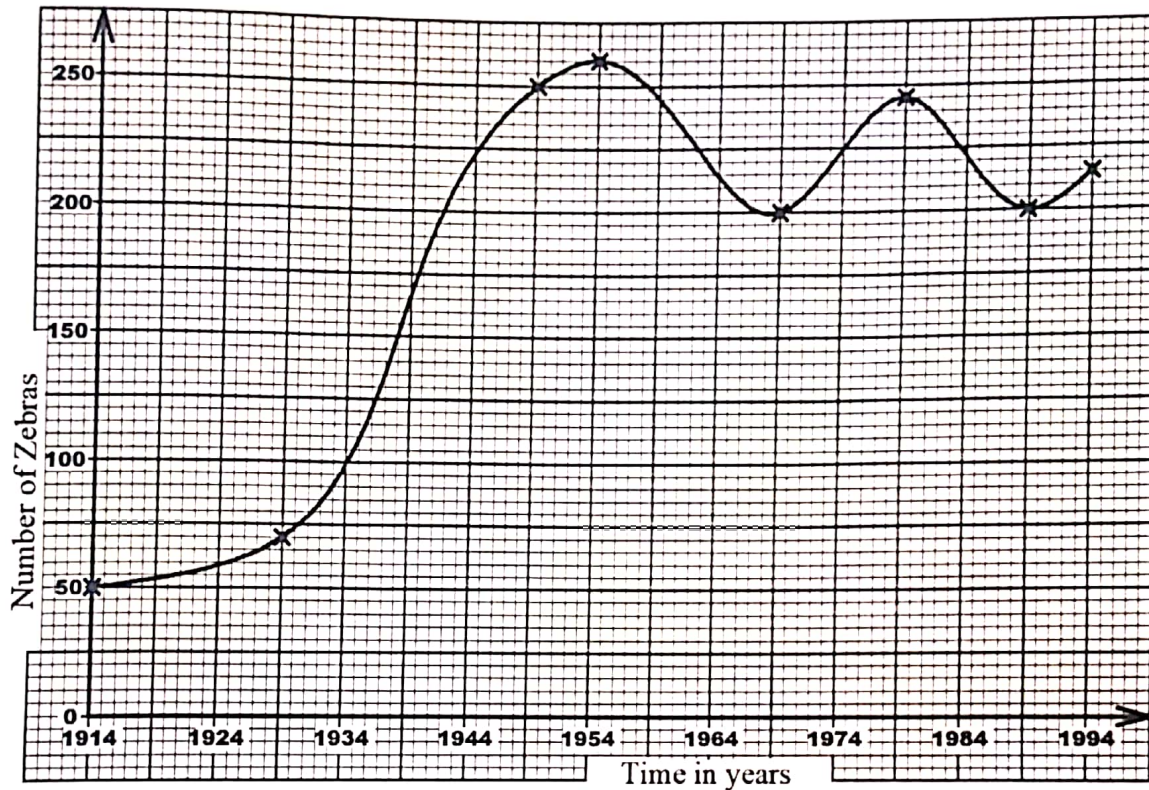


Fig. 2

- (a) Explain the changes in the population of the zebras during the following periods.
- (i) 1914 to 1929. (03 marks)

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(ii)

1929 to 1949.

(03 marks)

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(iii)

1949 to 1954.

(03 marks)

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(b)

(i)

Draw a line on the graph in figure 2 to indicate the zebra carrying capacity of the island. Label it **Z**.

(02 marks)

(ii)

Give reasons for the position of the carrying capacity line you have drawn on the graph.

(01 mark)

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- (c) (i) If in 1919 a pride of 10 lions were introduced to the isolated island, sketch curves on the same axes of figure 2 to show the variation in the population of the zebras and lions. (04 marks)
- (ii) Explain your answer in (c)(i). (04 marks)

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32. (a) Why is it important for the body's internal environment to remain constant? (02 marks)

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- (b) Explain the role of each of the following body organs in maintaining a constant internal environment:

- (i) Lungs. (03 marks)

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(ii) Liver.

(03 marks)

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(c) Name any other **two** homeostatic organs in the human body. (02 marks)

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33. During an investigation, a well-watered potted plant was kept in darkness for 24 hours. After that, three of its leaves were marked X, Y, Z and then treated as shown in figure 3.

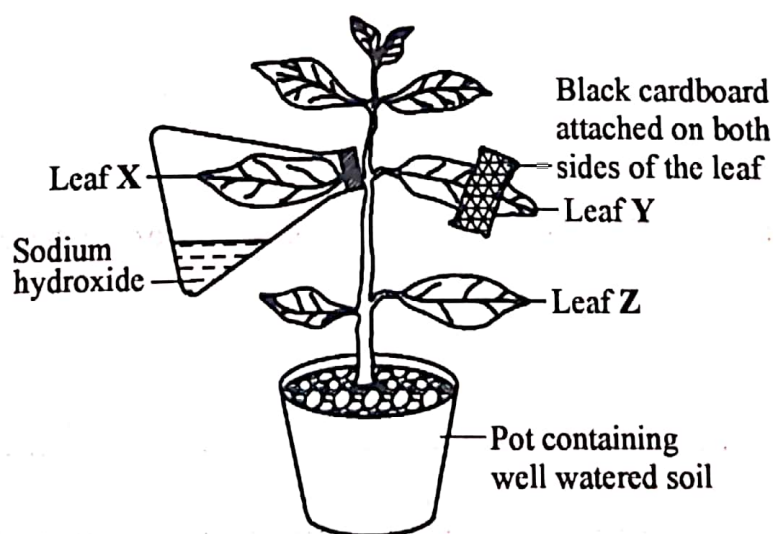


Fig. 3

The whole set up was then exposed to sunlight for about 6 hours and the 3 leaves were tested for starch.

- (a) What was the purpose of keeping the potted plant in darkness for 24 hours? Explain your answer.

Purpose (01 mark)

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Explanation (03 marks)

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- (b) (i) What was being investigated in leaves marked X and Y?

(02 marks)

X

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Y

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- (ii) Why was leaf Z considered as a control in this experiment?

(02 marks)

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- (c) State what was observed when leaf Y was tested for starch. (02 marks)
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SECTION C (30 MARKS)

Answer any two questions from this section.

34. (a) Why is the circulation of blood important in mammals? (06 marks)
- (b) Explain why plants are able to survive without a circulatory system. (09 marks)
35. (a) (i) Explain why the human body temperature increases during physical exercises. (04 marks)
- (ii) How does the body restore the normal body temperature after a physical exercise? (08 marks)
- (b) Why does a human baby feel colder than its mother on a cold day? (03 marks)
36. (a) What is meant by the following:
- (i) simple reflex action,
- (ii) conditioned reflex action? (04 marks)
- (b) Describe the role of the secretions of the pituitary gland in the human body. (11 marks)
37. (a) Explain the different ways of controlling water pollution. (07 marks)
- (b) Giving an example in each case, explain why it is important to conserve insects. (08 marks)