

Names:.....Index. No:.....

School Exam Number.....Signature:.....

Candidates should **NOT** write their Centre Name
or Centre Number anywhere on this booklet

P530/1
BIOLOGY
(THEORY)
Paper 1
29 July 2024
2½ hours



ENTEBBE JOINT EXAMINATION BUREAU

Uganda Advanced Certificate of Education

BIOLOGY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper has two Sections: **A** and **B**.*

*Answer all questions in both Sections **A** and **B***

*Write answers to Section **A** by circling the most appropriate alternative answer*

*Write answers to Section **B** in the spaces provided and **not** anywhere else.*

No additional sheet of paper should be inserted in this booklet.

FOR EXAMINER'S USE ONLY		
SECTION	MARKS	EXAMINER'S NO & SIGNATURE
SECTION A: 1 – 40		
SECTION B: 41		
42		
43		
44		
45		
46		
TOTAL		

SECTION A

1. The evolution from single ancestral species to a variety of forms to occupy different habitats is;
A. Continuous distribution
B. Adaptive radiation
C. Discontinuous distribution
D. Adaptive convergence
2. Which one of the following properties of water facilitates its efficient transportation of glucose?
It
A. has high surface tension
B. has a high cohesive force
C. forms hydrogen bonds with other molecules
D. has a high boiling point
3. A companion cell has a large nucleus because;
A. it supports the sieve tube element which lacks a nucleus
B. movement of materials in the sieve tube is an active process
C. of its high metabolic rates
D. it controls a large volume of cytoplasm
4. Which one of the following chemicals is released by adrenergic nerve fibres at synapse?
A. Acetylcholine
B. Acetyl CoA
C. ADH
D. Noradrenaline
5. Haemophilia is caused by a single recessive gene (h) and is sex-linked, occurring commonly in males. If a haemophiliac man has a carrier wife, what would be the probability of having a haemophiliac daughter in the family?
A. 0%
B. 25%
C. 50%
D. 75%
6. Which one of these explains the slow movement of blood through capillaries?
A. Lot of blood volume is converted into lymph tissue.
B. Pressure in venules is high
C. The cross-sectional area of capillaries is larger than that of arterioles.
D. The osmotic pressure in capillaries is very high.
7. In the mammalian menstrual cycle, the decline in the level of progesterone is due to;
A. successful conception
B. formation of corpus luteum
C. degeneration of corpus luteum
D. maturation of graafian follicle
8. Which of the following does **NOT** happen in a non-cyclic electron transport?
A. ATP and NADPH₂ are formed
B. Water donates electrons and protons
C. Oxygen gas is released
D. Oxygen donates electrons

9. Monosomy and trisomy are genetic abnormalities that usually arise due to;
- | | |
|------------------|------------------------|
| A. polyploidy | C. non-disjunction |
| B. crossing over | D. lack of cytokinesis |
10. The advantage of panting to sweating as a method of cooling the body of mammals is;
- | |
|---|
| A. the increased ventilation can lead to excessive loss of CO ₂ from lungs |
| B. the increased ventilation involves muscular work which increases heat loss |
| C. there is minimum loss of salts |
| D. cooling of brain can be made faster |
11. Gaseous exchange continues in the lungs without interruption due to;
- | | |
|-----------------------------|-----------------------------|
| A. presence of residual air | C. presence of erythrocytes |
| B. continuous stimulation | D. large number of alveoli |
12. Which one of the following represents Mendelian dihybrid phenotypic test cross ratio?
- | | |
|------------------|------------------|
| A. 9 : 3 : 3 : 1 | C. 5 : 1 : 1 : 5 |
| B. 1 : 1 : 1 : 1 | D. 9 : 3 : 4 |
13. In commensalism, the relationship of species A and species B is such that;
- | | |
|-----------------------------------|---|
| A. A and B both are benefited | C. A is benefited and B is not affected |
| B. A is benefited and B is harmed | D. A and B are both harmed |
14. Which of the following are the pioneer organisms of secondary succession on land?
- | | |
|------------|-----------|
| A. Mosses | C. shrubs |
| B. Lichens | D. herbs |
15. Birds in a maize field are exposed to a scarecrow. For the first few days, they got scared but later ignored it. This is an example
- | | |
|--------------------|---------------------|
| A. Imprinting | C. Habituation |
| B. Latent learning | D. Insight learning |
16. The extra-embryonic membrane responsible for the embryo's homeostasis is;
- | | |
|-------------|--------------|
| A. yolk sac | C. allantois |
| B. amnion | D. chorion |
17. A hormone which prevents degeneration of the corpus luteum, immediately after fertilization is known as;
- | | |
|-----------------|----------------------------------|
| A. Progesterone | C. Prostaglandins |
| B. Oestrogen | D. Human chorionic gonadotrophin |

18. Which type of mutation is caused by the presence of a nucleotide in a wrong position in a DNA chain?
- A. Inversion
B. Insertion
C. Deletion
D. Substitution
19. Which of the following hormones is likely to increase in the animal during the period of hibernation?
- A. Insulin
B. Glucagon
C. Thyroxine
D. Sex hormone
20. Which one of the following is the main filtration barrier in the nephron?
- A. Endothelium of blood capillary
B. Basement membrane of blood capillary
C. Epithelium of renal capsule
D. The podocytes of renal capsule
21. Which one of the following best explains why branching in woody plants is stimulated by the removal of terminal buds?
- A. Competition for mineral salts is reduced
B. Sources of auxins is removed
C. Sources of gibberellins is removed
D. Growth inhibitors are removed
22. Which of the following causes the closure of aortic valves during cardiac cycle in the mammalian heart?
- A. Filling of the atria with the blood
B. Ventricular pressure rising over aortic pressure
C. Ventricular pressure falling below aortic pressure
D. Contraction of ventricles
23. Which of the following is a test cross?
- A. AABb X AABb
B. AaBb X AaBb
C. AaBb X AABb
D. aabb X AaBb
24. Which of these cells of areolar tissue secrete anti-coagulant?
- A. Macrophage
B. Fibroblast
C. Fat cells
D. Mast cells
25. The restoration of the resting potential of a neurone after an impulse is based on;
- A. Counter- current flow
B. Diameter of the axon
C. Active transport
D. Diffusion
26. Which of the light spectrum are least used in photosynthesis by green plants?
- A. Red and blue
B. Infra-red and yellow
C. Green and yellow
D. Yellow and blue

27. Which of these factors would inhibit ADH release?

- | | |
|----------------------|----------------------------|
| A. High fluid intake | C. High blood sodium level |
| B. Low blood volume | D. Low fluid intake |

28. Some animals appear to spend time and energy helping others of their species. This type of behavior is?

- | | |
|----------------|-------------------|
| A. Competition | C. Territoriality |
| B. Mutualism | D. Altruism |

29. The recessive genes in Zea mays are brown midrib (b) and short internodes (v) and are on the same chromosome. A cross was made between Zea mays heterozygous for brown midrib and short internodes and one which was homozygous for these alleles. The numbers of each offspring were;

1024 All are normal
152 Green midrib and short internodes
136 Brown midrib and long internodes
1088 Brown midrib and short internodes

What is the cross over value?

- | | |
|--------|-------|
| A. 6.7 | C. 12 |
| B. 8 | D. 18 |

30. An impulse crosses a synapse by means of;

- | | |
|-------------------|------------------------------|
| A. Sodium ions | C. Calcium ions |
| B. Potassium ions | D. Neurotransmitter chemical |

31. During the process of photosynthesis in the Z-scheme, the reaction centre of chlorophyll a $P680^+$ is reduced with electrons the originate from;

- | | |
|--------------|---------------|
| A. Water | C. P700 |
| B. $NADPH_2$ | D. Ferredoxin |

32. Which of the following is not true about RNA?

- A. It is manufactured in the nucleus
- B. It may have a single strand
- C. Ratio of A and U:C and G varies
- D. It has only one basic form

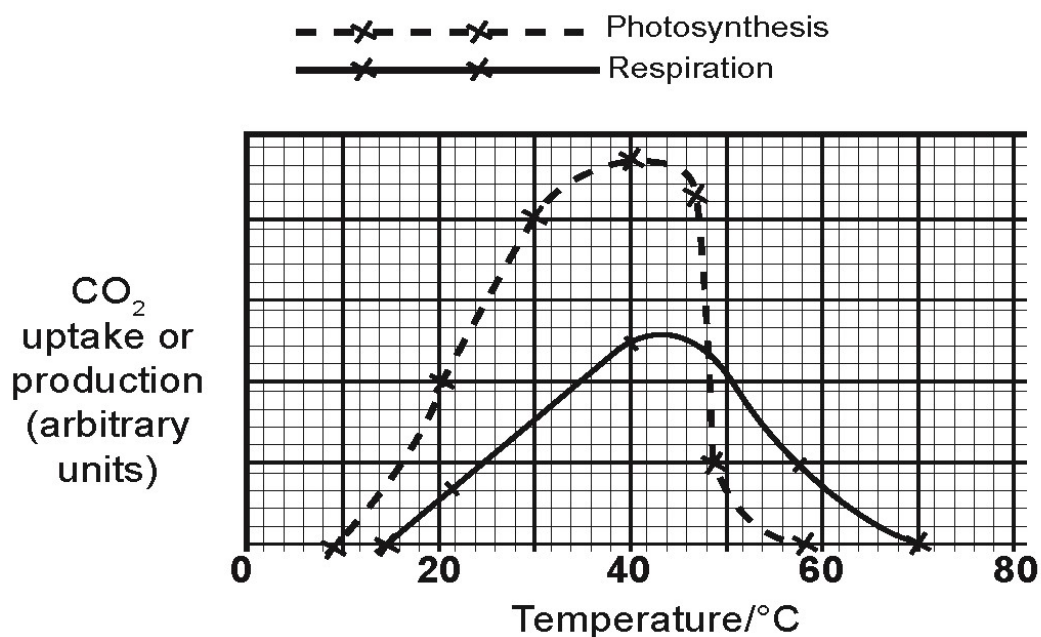
33. Which of the following forms of behaviour may least benefit all the members of the group?

- | | |
|------------------------|--------------------------|
| A. Altruism | C. Territorial behaviour |
| B. Agonistic behaviour | D. Social behaviour |

34. Which of the following is not the fore brain?
- | | |
|-------------|---------------|
| A. Cerebrum | C. Medulla |
| B. Thalamus | D. Cerebellum |
35. Which of the following is a compound plant tissue?
- | | |
|---------------|----------------|
| A. Parenchyma | C. Xylem |
| B. Epidermis | D. Collenchyma |
36. In dicotyledonous plants, lateral roots originate from;
- | | |
|---------------|--------------|
| A. Endodermis | C. Epidermis |
| B. Pericycle | D. Cambium |
37. Which of the following is secreted by the sertoli cells in the testis?
- | |
|------------------------------------|
| A. Testosterone |
| B. Gonadotrophin releasing hormone |
| C. Luteinising hormone |
| D. Inhibin |
38. Which of the following animal groups have body segments and closed circulatory system?
- | |
|--------------------|
| A. Crustaceans |
| B. Platyhelminthes |
| C. Annelida |
| D. Insecta |
39. Which of the following factors reduce inter-specific competition in a community?
- | |
|--|
| A. Resource partitioning |
| B. High intra-specific competition |
| C. Large numbers of species |
| D. Similar prey strategies among the species |
40. Which one of the following equations shows the correct relationship between gross primary productivity (GPP) and net primary productivity (NPP) in plants?
- | |
|---|
| A. $GPP = NPP - \text{photosynthesis}$ |
| B. $NPP = GPP - \text{photosynthesis}$ |
| C. $GPP = NPP - \text{photosynthesis}$ |
| D. $NPP = GPP - \text{plant respiration}$ |

SECTION B

- 41.** The graph below shows the effect of temperature on the rates of photosynthesis and respiration in well illuminated leaves.



- a) Describe the relationship between the rate of photosynthesis and the rate of respiration in the figure above. (04 marks)

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- b) Explain why the rate of respiration is less affected by temperature above 40°C compared to the rate of photosynthesis? *(02 marks)*

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- c) Explain what would happen to the rate of photosynthesis if temperature was increased and light intensity falling on the leaf kept constant? *(04 marks)*

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42. a) State **two** differences between chemical and electrical synapses. (02 marks)

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- b) Calcium ions enter neurons through pre-synaptic membranes when action potentials arrive.

- (i) Explain how these ions enter the neurons. (02 marks)

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- (ii) Briefly explain the events which follow the entry of these ions until the depolarization of the post synaptic membrane. (06 marks)

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c) Explain the importance of acetylcholinesterase at synapses.

(02 marks)

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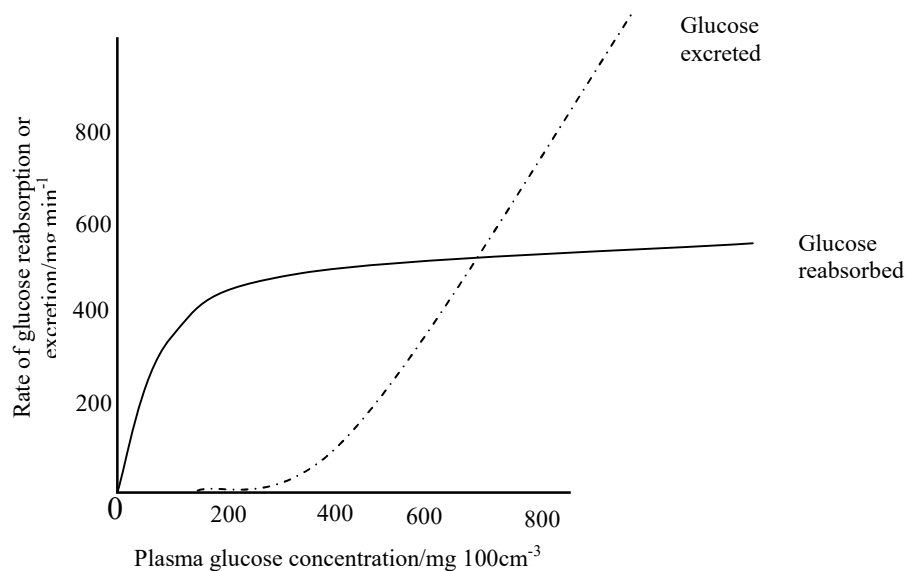
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43. The graph below shows the rate of glucose reabsorption in, and excretion from, a mammalian kidney in relation to the glucose concentration in plasma.



a) Explain the shape of glucose reabsorption curve when plasma glucose concentration is:

i) between 0 and 200 mg 100 cm⁻³

(04 marks)

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ii) over 400 mg 100cm⁻³ (04 marks)

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b) Use the graph to explain why glucose may occur in urine of diabetic people. (02 marks)

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44. a) Outline **four** physiological processes that occur across the epithelia.

(02 marks)

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b) Giving **one** area of location in each case explain how the epithelia are adapted to the physiological process. *(08 marks)*

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45. a) How are hormones and enzymes related?

(04 marks)

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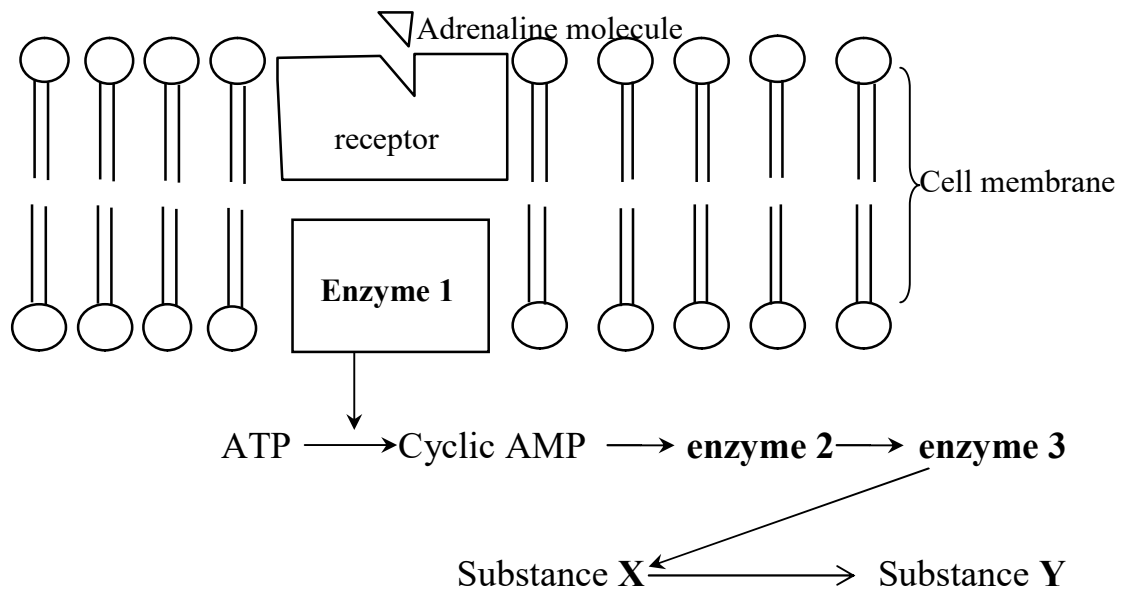
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b) The diagram below summarizes the way in which adrenaline can control a chemical reaction in a liver cell



By naming Enzyme 1, 2, 3 and substances X and Y, use the diagram to explain how a single molecule of adrenaline may cause this cell to produce large amount of substance Y. (04 marks)

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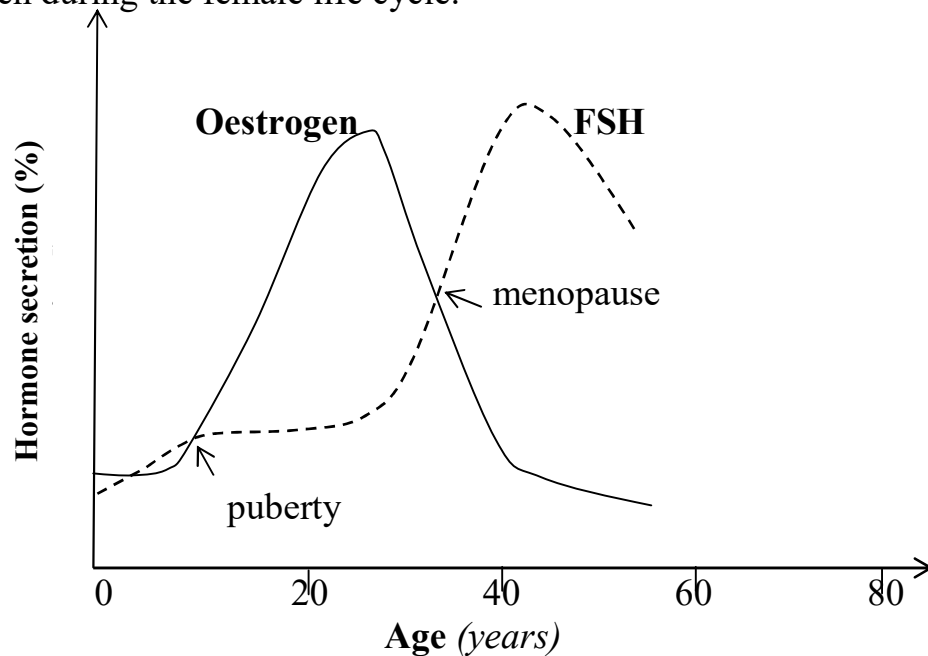
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- c) Describe the role of thyroid stimulating hormone in the conditions of low temperatures. (02 marks)

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46. Figure below shows the secretion of follicle stimulating hormone (FSH) and oestrogen during the female life cycle.



a) Explain what is meant by each of the following.

i) Puberty

(01 mark)

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ii) Menopause

(01 mark)

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b) Explain the changes in both hormones using the graph;

i) after puberty.

(04 marks)

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ii) after menopause (04 marks)

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