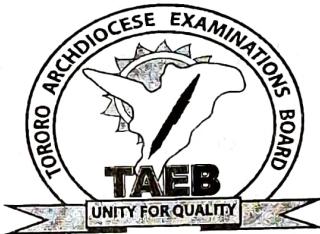


Centre No	Personal No.

Candidates Name.....

Signature.....

P530/1
BIOLOGY
Paper 1
JULY/AUGUST 2024
2 ½ Hours



TORORO ARCHDIOCESE EXAMINATIONS BOARD

Uganda Advanced Certificate of Education MOCK EXAMINATIONS JULY - AUGUST 2024

BIOLOGY

Paper 1

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of section A and B.

Answer all questions in both sections.

SECTION A: Write answers to this section in the boxes provided.

SECTION B: Answers to this section must be written in the spaces provided and not anywhere else.

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

FOR EXAMINER'S USE ONLY	
Section	Marks
A: 1 - 40	
B; No. 41	
42	
43	
44	
45	
46	

Turn Over

SECTION A (40 MARKS)

Write letter corresponding to best choice in the box provided for each question. Each question in this section carries one mark.

1. Compared with a smaller cell, a larger cell of the same shape has
 - A. less surface area.
 - B. less surface area per unit of volume
 - C. the same surface to volume ratio
 - D. a smaller cytoplasm to nucleus ratio.
2. The epithelium best adapted for a body surface subject to abrasion is
 - A. simple squamous.
 - B. simple columnar.
 - C. stratified columnar
 - D. stratified squamous.
3. Which of the following is **not** an adaptation for reducing the rate of heat exchange between an animal and its environment?
 - A. Vasoconstriction.
 - B. shivering
 - C. countercurrent heat exchanger
 - D. blubber or fat layer.
4. Which of the following animals uses the highest percentage of its energy budget for homeostatic regulation?
 - A. a hydra.
 - B. a desert insect
 - C. a desert bird
 - D. a snake in a temperate forest.

5. An animal's inputs of energy and materials would exceed its outputs
- if the animal is an endotherm
 - if it is actively foraging for food
 - if it is hibernating
 - if it is growing and increasing its mass
6. After surgical removal of an infected gall bladder, a person must be especially careful to restrict dietary intake of
- starch
 - protein
 - fat
 - sugar.
7. The main target organs for tropic hormones are
- muscles
 - kidneys
 - blood vessels
 - endocrine glands
8. Which of the following results in long term immunity?
- the passage of maternal antibodies to a developing fetus
 - the injection of serum from people immune to rabies
 - the administration of the chicken pox vaccine
 - the passage of maternal antibodies to a nursing infant
9. Which of the following is **not** a correct statement concerning hormones?
- Hormones are chemical messengers that travel to target cells through the circulatory system
 - Hormones of the same chemical class usually have the same function.
 - Hormones are secreted by specialised cells usually located in endocrine glands.

- D. Hormones are often regulated through feedback loops.
10. The sympathetic division of the autonomic portion of the peripheral nervous system does all of the following *except*
- A. relaxing bronchi in lungs.
 - B. inhibiting bladder emptying
 - C. stimulating glucose release
 - D. stimulating the salivary glands
11. Which of the following is true of innate behaviours?
- A. Genes have very little influence on the expression of innate behaviours.
 - B. Innate behaviours tend to vary considerably among members of a population
 - C. Innate behaviour are limited to invertebrate animals
 - D. Innate behaviours are expressed in most individuals in a population across a wide range of environmental conditions.
12. Which of the following is true with respect to eutrophic lakes
- A. the lakes are less subject to oxygen depletion.
 - B. rates of photosynthesis are lower in eutrophic lakes
 - C. eutrophic lake water contains lower concentrations of nutrients
 - D. eutrophic lakes are richer in nutrients.
13. The observation that members of a population are uniformly distributed suggests that
- A. the size of the area occupied by the population is increasing..
 - B. resources are distributed unevenly
 - C. the members of the population are competing for access to a resource
 - D. the density of the population is low

14. Which of the following is **not** required for a behavioural trait to evolve by natural selection
- A. In each individual, the form of the behaviour is determined entirely by genes.
 - B. the behaviour varies among individuals.
 - C. an individual's reproductive success depends in part on how the behaviour is performed
 - D. some component of the behaviour is genetically inherited.
15. A distinctive feature of the mechanism of action of thyroid hormones and steroid hormones is that
- A. target cells react more rapidly to these hormones than to local regulators
 - B. these hormones bind with specific receptor proteins on the plasma membrane of target cells.
 - C. these hormones bind to receptors inside cells
 - D. these hormones affect metabolism
16. The principle of competitive exclusion states that
- A. two species cannot coexist in the same habitat
 - B. competition between two species always causes extinction or emigration of one species.
 - C. competition in a population promotes survival of the best adapted individuals
 - D. two species that have exactly the same niche cannot coexist in a community.
17. Which structure is incorrectly paired with its tissue system?
- A. palisade mesophyll-ground tissue
 - B. guard cell-dermal tissue
 - C. companion cell-ground tissue
 - D. tracheid-vascular tissue.

18. Heartwood and sapwood consist of
- bark
 - secondary phloem.
 - secondary xylem
 - periderm
19. What would enhance water uptake by a plant cell?
- decreased Ψ of the surrounding solution
 - an increase in pressure exerted by the cell wall
 - the loss of solutes from the cell
 - positive pressure on the surrounding solution.
20. Which of the following would be considered an example of bioremediation?
- adding nitrogen-fixing microorganisms to a degraded ecosystem to increase nitrogen availability.
 - using a bulldozer to re-grade a strip mine.
 - reconfiguring the channel of a river
 - adding seeds of a chromium accumulating plant to soil contaminated by chromium.
21. Photosynthesis ceases when leaves wilt, mainly because
- the chlorophyll of wilting leaves breaks down
 - flaccid mesophyll cells are incapable of photosynthesis
 - stomata close, preventing carbon dioxide from entering the leaf
 - photolysis cannot occur when there is a water deficiency.
22. Competitive enzyme inhibitors
- bind permanently to the active site
 - change the shape of the active site
 - limit formation of enzyme substrate complexes
 - lower the activation energy of the reaction.

23. Food chain are sometimes short because
- only a single species of herbivore feeds on each plant species
 - most of the energy in a trophic level is lost as it passes to the next higher level
 - predator species tend to be less diverse and less abundant than prey species
 - most producers are inedible.
24. Which of the following is the most likely explanation for hypothyroidism in a patient whose iodine level is normal?
- a disproportionate production of T3 and T4
 - under-secretion of TSH
 - over-secretion of TSH
 - a decrease in the thyroid secretion of calcitonin.
25. If a long day plant has a critical night length of 9 hours, which 24-hour cycle would prevent flowering in such a plant?
- 16 hours light/8 hours dark
 - 14 hours light/10 hours dark
 - 15.5 hours light/8.5 hours dark
 - 8 hours light/8 hours dark/light flash/8 hours dark.
26. The table below shows the rate of breathing and volume of air exchanged with each breath for a person at rest and during exercise.

State of individual	Breaths per minute	Volume of each breath (cm ³)
At rest	12	500
During exercise	24	1000

The increase in volume of air exchanged per minute when an individual does exercise from rest is

- A. 500cm^3
- B. 600cm^3
- C. 15000cm^3
- D. 18000cm^3

27. In the fruit fly, *Drosophila melanogaster*, the gene for eye colour is sex-linked. The allele for red eye (R) is dominant to the allele for white eye (r). A cross between two flies produced the offspring shown in the table below.

Sex of offspring	Number with white eyes	Number with red eyes
Female	23	22
Male	21	22

What were the genotypes of the parents in the above cross?

- A. X^rX^r and $X^R Y$
- B. $X^R X^r$ and $X^r Y$
- C. $X^R X^r$ and $X^R Y$
- D. $X^R X^R$ AND $X^r Y$

28. A biochemical analysis of a DNA sample showed that 32% of the bases were adenine. The percentage of guanine bases in the sample is

- A. 32
- B. 36
- C. 18
- D. 16

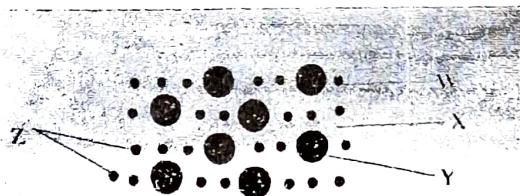
29. Which one of the following cell organelles is associated with final stage of most cell secretions

- A. smooth endoplasmic reticulum
- B. rough endoplasmic reticulum
- C. ribosome
- D. golgi apparatus

30. A property of water that makes it a suitable component of hydrostatic skeleton is its
- A. incompressibility
 - B. high density
 - C. low viscosity
 - D. high surface tension
31. Which of the following is the correct way of classifying a tick?
- A. Kingdom: Animalia; phylum; Arthropoda, class; insecta
 - B. Kingdom: Animalia; phylum; Nematoda; class; Diplopoda
 - C. Kingdom; Animalia; Phylum; Nematoda; class;Arachnida
 - D. Kingdom; Animalia, Phylum Arthropoda, Class Arachnida
32. The signaling molecule for flowering might be released earlier than normal in a long day plant exposed to flashes of
- A. far-red light during the night
 - B. red-light during the night
 - C. red light followed by far-red light during the night
 - D. far-red light during the day
33. A desert mammal's lower lethal temperature is higher than that of a mammal living in a cold region because a desert mammal has
- A. small body extremities
 - B. poor insulation mechanisms
 - C. metabolic water
 - D. a small surface area to volume ratio
34. Which one of the following cells is the most vulnerable to HIV?
- A. T-killer cells
 - B. T-helper cells
 - C. T-suppressor cells
 - D. B-memory cells

35. Following depolarisation, repolarisation of the membrane begins by
- A. diffusion of potassium ions out of the cell
 - B. diffusion of sodium ions out of the cell
 - C. entry of potassium ions into the cell
 - D. entry of sodium ions into the cell
36. In the alternation of generations in the life cycles of plants,
- A. the sporophyte is always dominant
 - B. gametophyte is always short lived
 - C. gametes are produced by meiosis
 - D. spores are always haploid
37. Which one of the following phyla has acoelomate organisms?
- A. Platyhelminthes
 - B. Nematoda
 - C. Annelida
 - D. Mollusca
38. Which of the following sets of parts constitutes the Organ of Corti?
- A. tectorial membrane, basilar membrane, auditory nerve
 - B. tectorial membrane, endolymph, Resissner's membrane
 - C. tectorial membrane, basilar membrane, sensory hair cells
 - D. tectorial membrane, median canal, basilar membrane.
39. The gene that causes albinism in humans is also associated with loss of melanin pigment in the skin. This gene is therefore said to be
- A. polygenic
 - B. epistatic
 - C. codominant
 - D. pleiotropic

40. The figure below shows part of a cross-section of a fibril of a skeletal muscle



Which of the parts labelled contains myosin?

- A. W
- B. X
- C. Y
- D. Z

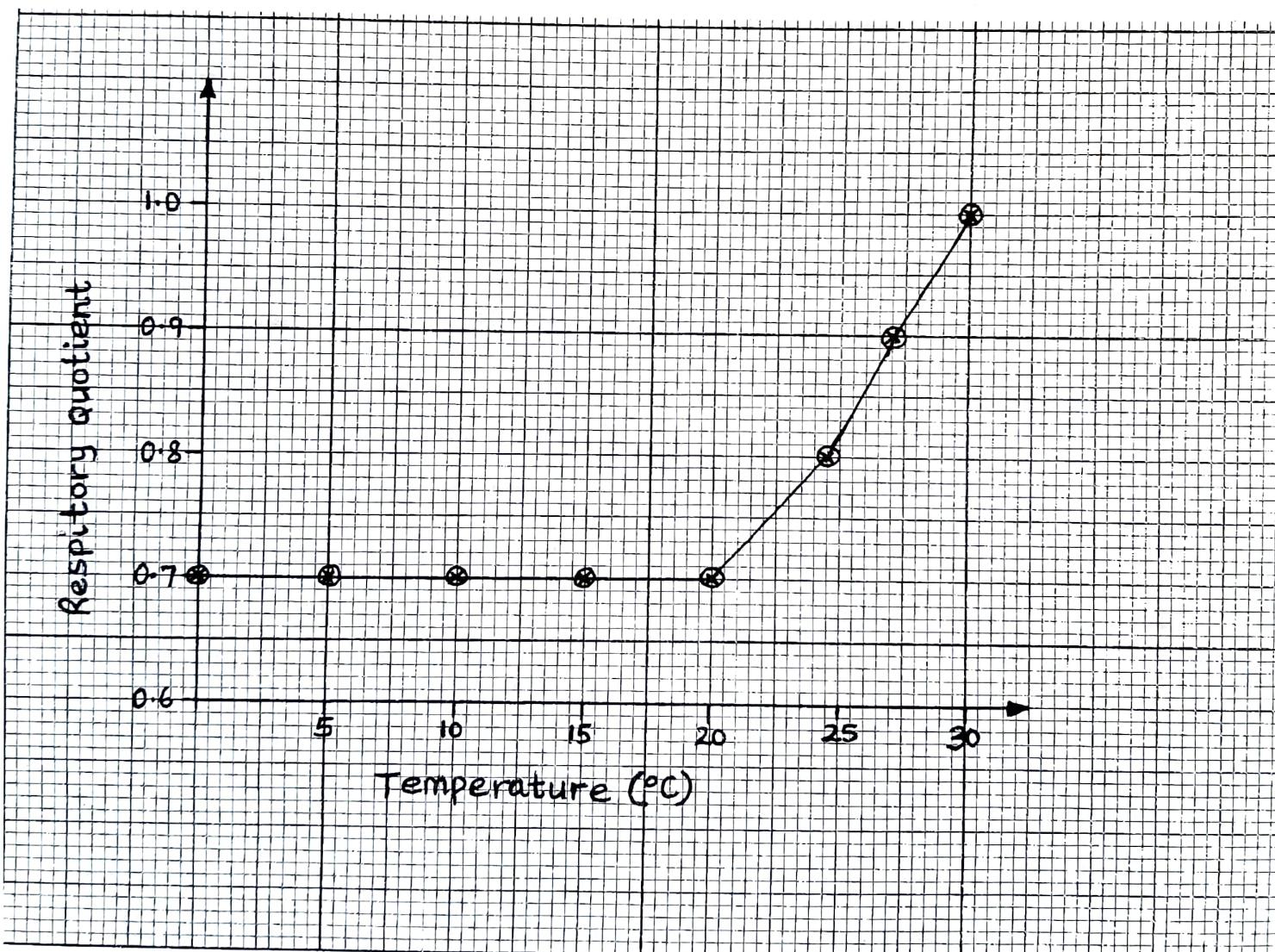
SECTION II (40 MARKS)

Write answers in the spaces provided

41. (a) What is meant by the term respiratory quotient. (02marks)

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- (b) The graph below shows the respiratory quotient values for a mouse at different temperatures.



- (i) Using the information in the graph, explain the relationship between respiratory quotient and temperature. (04marks)

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- (ii) State the circumstance under which respiratory quotient would be over 1.0. (01mark)

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- (c) (i) Apart from being a respiratory substrate mention the physiological roles of carbohydrates in living organisms.

(02marks)

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- (ii) State any **one** functional difference between carbohydrates and lipids. (01mark)

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42. (a) What is meant by the following terms. (06marks)

(i) Indicator species

(ii) Keystone species

(iii) Bioaccumulation

(iv) Biomagnification

(b) What challenges are associated with biological pest control.

(04marks)

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43. (a) What is photorespiration. (01mark)

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(b) Briefly explain how the following group of plants reduce the effects of photorespiration.

(i) C₄ plants (03marks)

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(ii) CAM plants (03marks)

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- (c) Explain how any **two** environment factors limit productivity of plants in Uganda. (03marks)

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44. (a) Mention the body organs involved in maintaining a constant pH of the blogy fluids. (01mark)

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- (b) Briefly explain the role of the following substances in maintaining a constant pH of the body fluids .

- (i) Phosphate buffer systems. (03marks)

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- (ii) Proteins. (03marks)

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- (c) Suggest what would happen if the body's pH regulatory mechanisms fail. (03marks)

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45. (a) (i) What is meant by the term genetic code. (01mark)

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(b) Explain the following features of the genetic code. (04 ½ mark)

(i) Triplet code

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(ii) Degenerate code

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(iii) Non overlapping code

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(b) (i) Briefly explain how DNA determines characteristics in organisms. (02 ½ mark)

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(ii) Mention **two** evidences that support DNA as the genetic material. (02marks)

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46. (a) State **three** differences between a generator potential and action potential (03marks)

	Generator potential	Action potential
I		
II		
III		

(b) Explain how the following factors affect the speed of impulse transmission across cholinergic synapses. (03marks)

(i) Diameter of the axon.

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(ii) Myelin sheath

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(c) How does phytochrome enable plants to detect diurnal variation in light intensity. (04marks)

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END