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Index No............................................ Signature: .....................................

P530/1

**BIOLOGY**

**Paper 1**

July/August 2022

2½ hours



WESTERN JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

**BIOLOGY**

**Paper 1**

2 Hours 30 Minutes

**INSTRUCTIONS TO CANDIDATES:**

*This paper consists of Sections* ***A*** *and* ***B****.*

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

***SECTION B****: Write answers to this section in the spaces provided.*

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

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| --- | --- | --- | --- |
| **FOR EXAMINERS’ USE ONLY** | | | |
| **Section** | | **Marks** | **Examiners’ signature & No.** |
| **A** | **1 – 40** |  |  |
| **B** | **41** |  |  |
| **42** |  |  |
| **43** |  |  |
| **44** |  |  |
| **45** |  |  |
| **46** |  |  |

**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. What are the products of the light dependent reactions of photosynthesis?
2. ATP, RUBP and reduced NAD. B. ATP, oxygen and reduced NADP.
3. PGA, oxygen and reduced NAD. D PGA, reduced NADP and RUBP.
4. A man has haemophilia. Which statement **correctly** describes the inheritance of the gene causing this condition?
5. He inherited the recessive allele from his mother.
6. He inherited the dominant allele from his father.
7. He can pass the recessive allele to his son.
8. He can pass the dominant allele to his daughter.
9. A plant tissue which is tubular, open ended with lignified and thickened walls is
10. Tracheid. B. Xylem vessel C. Parenchyma D. Sieve tube
11. Which one of the following types of epithelia lines the walls of the mammalian alveoli?
12. Columnar epithelium C. Stratified epithelium
13. Cuboidal epithelium D. Squamous epithelium
14. What important event occurs in all mammals during oestrus?
15. Implantation B. Menstruation C. Ovulation D. Gestation

1. Which type of immunity is provided by vaccination?
2. Artificial active B. Artificial passive C. Natural active D. Natural passive
3. **Figure 1** represents the action potential of a myocardial cell. Repolarization is represented by
4. 1 and 2 B. 2, 3 and 4 C. 3, 4 and 3 D. 1 and 5

**Fig. 1 3**

**2 4**

**1 5**

1. Respiratory quotient is the volume of carbon dioxide produced divided by the volume of oxygen used in the same time. During which one of the following is respiratory quotient most likely to be higher?
2. Sprinting B. Walking C. Resting C. Drinking
3. In pea plants, tallness (T) is dominant to dwarfness (t). Which one of the following crosses will give 75% of the offspring tall?
4. tt x Tt B. Tt x Tt C. TT x tt D. TT x Tt
5. All the alleles present in the population of a species are called the population’s
6. gene frequency. B. gene pool. C. genome. D. genotype
7. During locomotion in a tetrapod, which of the following is the correct order of movement of limbs after the animal has moved its left hind limb?
8. Left fore, right hind, right fore. B. Left fore, right fore, right hind.
9. Right hind, left fore, right fore. D. Right fore, left fore, right hind.
10. A disadvantage in parallel flow system in fish gills is that;
11. Water flows too slowly over the respiratory surface.
12. Blood does not get saturated enough with oxygen.
13. Blood and water are not close enough.
14. Water flows too rapidly over gills.
15. The resolving power of a microscope is the
16. ability of a microscope to distinguish fine detail.
17. clarity of the image formed by the microscope.
18. number of times the image is magnified by the objective lens.
19. power of the microscope to focus very small objects.
20. Net primary productivity in C4 plants is higher than that in C3 plants **because**
21. C4 plants have a higher turn-over rate.
22. energy accumulates at a higher rate in C4 plants.
23. photophospholyration occurs in C4 plants.
24. there is photorespiration in C3 plants.
25. Which one of the following does **not** affect the biochemical oxygen demand?
26. Ammonification B. Nitrogen fixation C. Nitrification D. Denitrification
27. During locomotion, bones of a tetrapod are subjected to the following forces **except**
28. shearing. B. compression. C. tension. D. expansion.
29. Which one of the following cell organelles is associated with the final stage of most cell secretions?
30. Smooth endoplasmic reticulum C. Ribosome
31. Rough endoplasmic reticulum D. Golgi apparatus
32. Which one of the following is the correct route taken by blood on leaving the heart in a single circulatory system?
33. Gills body heart C. Gills heart body
34. Body gills heart D. Body heart gills
35. Which of the following are formed during anaerobic respiration in yeast cells?
36. Lactic acid and ATP B. Lactic acid and ADP C. Ethanol and ATP D.Ethanol and ADP
37. The circulatory system in insects plays a role in all the following body systems **except**
38. excretory system. B. respiratory system C. digestive system. D. reproductive system.
39. Which one of the following is a chemical mechanism of coping with cold environment in a mammalian body?
40. Vasoconstriction B. Shivering C. Raising of body hair D. Insulation by the subcutaneous fat
41. Which one of the following is the HRNA strand that corresponds to the DNA strand TAGGCT?
42. AUCCGA B. UUCCGU C. CGAAUC D. UAGGCU
43. There is a limited biomass at each trophic level in a food chain **because** at each level, there is progressive
44. reduction in numbers of organisms. B. loss of energy.
45. reduction in size of organisms. D. reduction in amount of food.
46. **Figure 2** below shows an animal cell during meiosis.

**X**

**O O**

**X**

Which one of the following stages is illustrated?

1. Prophase II B. Prophase I
2. Metaphase I D. etaphase II

**Fig 2**

1. Which one of the following would **not** lead to evolution?
2. Better suited phenotypes in a specific environment increasing in number.
3. The environment remaining stable for a long time.
4. Organisms producing more offspring than the environment can support.
5. A large number of offspring dying before reproduction.
6. The end-product of glycolysis is
7. glucose diphosphate. B. lactic acid C. citric acid. D. pyruvic acid.
8. The importance of mutual inhibition in the mammalian eye is to
9. reduce the frequency of impulse transmission.
10. increase contrast between light-dark boundaries.
11. reduce sensitivity of the eye.
12. increase ability to resolve close stimuli separately.
13. Antidiuretic hormone is produced by the
14. Adrenal gland and decreases urine production.
15. Pituitary gland and decreases urine production.
16. Adrenal gland and increases urine production.
17. Pituitary gland and increases urine production.
18. In flowering plants, the number of chromosomes in the structure which gives rise to the embryo sac is
19. n B. 3n C. 2n D. 4n
20. In plants, ripening of fruits and falling of leaves are respectively caused by
21. auxins and gibberellins. C. gibberellins and florigen.
22. cytokinins and auxins. D. ethene and abscisic acid.
23. Gaseous exchange in earth worms occurs at the body surface **because** the body is
24. moist. B. elongated C. segmented. D. flattened
25. In Drosophila, the alleles for width of abdomen and length of wings are linked. When a Drosophila with long wings and broad abdomen was mated with one possessing vestigial wings and narrow abdomen, the following offspring were obtained.

Long wings, broad abdomen = 686

Long wings, narrow abdomen = 211

Vestigial wings, broad abdomen = 206

Vestigial wings, narrow abdomen = 465

*What was the cross over value?*

1. 13.3% B. 26.6% C. 49.4% D. 73.4%
2. Production of a hypertonic urine in animals is mainly achieved by the
3. Bowman’s capsule. C. proximal convoluted tubule.
4. Loop of Henle. D. Distal convoluted tubule.
5. Which one of the following is likely to cause a faster rate of evolution of organisms?
6. Stabilising selection C. Disruptive selection
7. Directional selection D. Slow changing environment
8. **Figure 3** shows hormonal interaction that occurs during menstruation.

**X**

Level of Hormone in the body

**Y**

**Fig. 3** Ovulation

Hormones **X** and **Y** are respectively;

1. Luteinizing hormone and oestrogen. B. Oestrogen and progesterone.
2. Progesterone and oestrogen. D. Luteinizing hormone and follicle stimulating hormone.
3. Which one of the following genetic abnormalities does **not** result from non-disjunction?
4. Klinefelter’s syndrome B. Turner’s syndrome C. Haemopholia D. Down’s syndrome
5. A common aspect between photosynthetic and chemosynthetic bacteria is that they both
6. use water as a source of hydrogen.
7. release oxygen during the synthesis of organic compounds.
8. contain energy absorbing compounds.
9. synthesise organic compounds from inorganic materials.
10. Animals A, B, C and D have their body volumes and surface areas as shown below:

Animal Volume (cm3) Surface area (cm2)

A 32.0 61.1

B 1.2 3.0

C 3.3 8.2

D 7.5 49.0

Which one of them would have the greatest need for a respiratory system?

1. Which one of the following is **not** a requirement for the working of a physiological homeostatic mechanism?
2. Receptors B. Skin capillaries C. Control mechanisms D. Effectors
3. In which one of the following parts of the cell does most production of ATP occur?
4. Matrix of mitochondrion B. Cristae of mitochondrion
5. Cytoplasm of the cell D. Outer membrane of the mitochondrion

**SECTION B (60 MARKS)**

*Answer* ***all*** *questions in this section in the spaces provided.*

1. (a) What is meant by the term **negative feedback**? (*01 mark*)

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(b) A person fasted overnight and then swallowed 75 g of glucose. The graph below shows the resulting changes in the concentrations of glucose and hormone **Z** in the blood.

Concentration of Substance in blood

Glucose

Hormone **̴ƶ**

0 15 45 60 75 90 105 120 135 Time (Min)

75g Glucose taken

1. Explain the relationship between the concentrations of glucose and hormone **Z** in the blood after 75 g of glucose was swallowed. (*05 marks*)

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Name hormone **Z**. (*01 mark*)

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(c) From the graph, briefly explain how production of hormone **Z** is regulated.(*3 marks*)

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1. (a) Briefly explain the meaning of each of the following types of learned

behaviour.

1. Habituation. (*02 marks*)

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1. Insight learning. (*02 marks*)

.......................................................................................................................................................................................................................................................................... Imprinting. (*02 marks*)

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(b) (i) What is the adaptive significance of imprinting in the life of an

animal? (*02 marks*)

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1. What is the evolutionary significance of territorial behavior to organisms? (*02 marks*)

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1. The **figure 4** below shows the results from an experiment in which the effect of different concentrations of substrate on the rate of an enzyme. Catalyzed reaction was investigated. The experiment was then repeated using the same experiment conditions and substrate concentrations but in the presence of mixed amounts of compounds **A** and **B** (0.2 m) (0.2mM)

100

Maximum reaction rate

80

Compound **A** present

Maximum reaction rate with B

Rate of reaction (arbitrary units)

60

Compound **B** present

Compound A and B absent

40

20

**Fig. 4**

0

5 10 15 20 25 30 35

1. Compare the rate of reaction in the presence of compounds **A** and **B**. (*04 marks* .............................................................................................................................................................................................................................................................................................

b) Explain the effect of compound **A** on the reaction rate. (*04 marks*)

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c) Giving a reason in each case, suggest the identity of compounds **A** and **B**. (*2 mks*)

Compound **A**.....................................................................................................................

Reason.............................................................................................................................

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Compound **B**...................................................................................................................

Reason............................................................................................................................

....................................................................................................................................... (a) (i) What is meant by the term **Bohr effect**? (*02 marks*)

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(ii) What is the physiological significance of the Bohr effect? *03 marks*)

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(b) Explain the effect of each of the following on the oxygen dissociation curve of haemoglobin in mammals.

1. Temperature. (*03 marks*)

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Size of the animal. (*02 marks*)

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.................................................................................................................................................(a) (i) What is meant by the term **genetic drift**? (*01 mark*)

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(ii) How does genetic drift contribute to the evolution of new species?

(*03 marks*)

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(b) In humans, albinism is caused by an autosomal recessive allele. On average 1 person in 10,000 is an albino. Using Hardy Weinberg formula , determine the;

1. frequency of the albino allele in the human population. (*02 marks*)

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1. frequency of the heterozygous genotype in the population. (*02 marks*)

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(c) Explain why it is difficult to eliminate recessive alleles from a population. (*02 marks*)

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................................................................................................................................................. (a) State **three** structural differences between xylem and phloem tissue. (*03 marks)*

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(b) How are plant sugars loaded into the sieve tubes according to the pressure flow hypothesis? (*04 marks*) ....

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(c) Suggest **three** evidences to show that translocation of sugars from source to sinks in plants is an active process. (*03 marks*)

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