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**P530/1**

**BIOLOGY**

**(Theory)**

**Paper 1**

**Jul/Aug 2019**

**2 ½ Hours**

**MUKONO EXAMINATION COUNCIL**

**Uganda Advanced Certificate of Education**

**BIOLOGY**

(Theory)

Paper 1

**2 Hours 30 Minutes**

**INSTRUCTIONS TO CANDIDATES**

* *This paper consists of 40 questions in section* ***A*** *and* ***6*** *questions in section* ***B****.*
* *Answer* ***all*** *questions in both sections* ***A*** *and* ***B***
* *Section* ***A:*** *Answers to this section* ***must*** *be written in the boxes provided.*
* *Section* ***B:*** *Answers to this section should be written in the spaces provided and not anywhere else.*
* *No additional sheet(s) of paper should be inserted in this booklet.*

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| --- | --- | --- |
| ***For Examiner’s Use only*** | | |
| ***SECTION*** | ***MARKS*** | ***INITIALS*** |
| *Section A: 1-40* |  |  |
| *Section B: 41* |  |  |
| *42* |  |  |
| *43* |  |  |
| *44* |  |  |
| *45* |  |  |
| ***TOTAL*** |  |  |

**SECTION A (40 MARKS)**

1. Which one of the following is NOT found in cartilage?
2. Chondrin C. Collagen fibres
3. Chondroblast D. Osteablast
4. The component of the water potential which is due to the presence of solute molecules is called
5. Osmotic potential C. Turgor potential
6. Osmotic pressure D. Turgor pressure
7. Figure 1 below shows a type of gland.

**Fig. 1**

The type of gland illustrated in figure 1 above is

1. Simple branched tubular
2. Simple branched saccular
3. Compound tubular
4. Compound saccular
5. Which one of the following is the general formula for a simple sugar?
6. (CH2O)n C. (C6H12O)n
7. (C2H2O)n D. (C6H12O6)n
8. Which one of the following pairs of enzymes are involved in the final steps in respiration?
9. Transferases and Phosphokinases
10. Dehydrogenases and Oxidases
11. Isomerases and transaminases
12. Decarboxylases and dehydrases
13. Which one of the following processes leads to high RQs in mammals?
14. Oxidation of Carbohydrate C. Oxidation of protein
15. Oxidation of fat D. Conversion of carbohydrates to fat
16. In the body of animals, phosphates groups for making ATP from ADP are stored in a compound called
17. Phosphocreatine C. Phosphoglyceraldehyde
18. Phosphoglyceric acid D. Phosphoric acid
19. The most important advantage of internal gills over external gills is that
20. They are in close proximity with water rich in oxygen
21. They are highly vascularised
22. They possess very thin epithelia
23. They are enclosed in cavities within the body hence protected.
24. The volume of air breathed in and out normally at rest during a respiratory cycle is called
25. Tidal volume C. Residual volume
26. Vital capacity D. Inspiratory reserve volume
27. Which one of the following constrictions of the gut mix up food?
28. Localized constriction and peristaltic wave
29. Pendular constrictions and Peristattic wave
30. Pendular and localized constrictions
31. Pendular and circular constrictions.
32. Which one of the following hormones causes secretion of non-enzymatic components of pancreatic juice?
33. Enterogastrone C. Chlolecystokinin
34. Secretin D. Gastrin
35. Which one of the following wave lengths of light is least absorbed by chlorophyll?
36. Blue (450 -500nm) C. Green (500 -550nm)
37. Orange (600 – 650nm) D. Red (650 – 700nm)
38. In non-cyclic photophosphorylation, stability of the Chlorophyll molecule is provided by
39. Hydrogen ion C. Oxygen molecule
40. Hydroxyl ion D. Photosystem II
41. Which one of the following Phytohormones is released by a plant under water stress?
42. Abscisic acid C. Ethene
43. Giberellin D. Cytokinin
44. A special property of cones in the retina which confers the eye the ability to resolve two or more stimuli separated spatially is that
45. Numerous cones make synaptic contact with a single bipolar neurone.
46. Each cone has its own bipolar neurone which connects with a single optic nerve fibre.
47. They are concentrated in a small area called the fovea.
48. They show reciprocal inhibition which increases between immediately adjacent cones.
49. In insects, blood is propelled forward through the heart by
50. Contraction of alary muscles which leads to the expansion of the heart.
51. Opening of the valves that allow blood to enter the heart but not leave it.
52. Waves of contraction which commence at the rear and proceed towards anterior end.
53. Waves of contraction which commence at the anterior end and proceed towards the rear.
54. Which one of the following best explains a decrease in phosphorus levels in germinating seeds?
55. Phosphorus is needed for chlorophyll synthesis
56. Phosphorus is incorporated in embryo structure
57. Phosphorus forms plant hormones
58. Phosphorus is used to supply energy.
59. A heterozygous maize plant has a recessive defect which renders it incapable of producing viable seeds, was self – pollinated and gave size to 1200 seedlings. How many of the seedlings were heterozygous?
60. 600 B. 400 C. 800 D. 300
61. In the garden pea, which one of the following characteristics shows continuous variation?
62. Length of stem C. Position of flowers
63. Weight of pod D. Shape of ripe pod

Before Selection

Degree of variance

Numbers

After Selection

Numbers

**Figure 2** depicts a mode of selection operating on continuous phenotypic variation. Which one of the following situations does it illustrate?

1. Human – birth weight and the percentage mortality at different weights
2. Populations adapting to contrasting habitats
3. Response of peppered moth populations to polluted environments.
4. Predatory – prey relations.
5. Which one of the following chemical compounds is usually deposited in the outer walls of most epidermal cells of a leaf?
6. Suberin B. Cutin C. Lignin D. Mucin
7. Which one of the following cells is a result of the first meiotic division during spermatogenesis?
8. Primary spermatocytes C. Spermatids
9. Spermatogonia D. Secondary spermatocytes
10. The arising of new species due to geographical isolation is caused by the following mechanisms except.
11. When a new adaptation arises in a few members of an inbreeding population.
12. In larger populations if mating between individuals.
13. In small populations.
14. In organisms with very limited mobility.
15. Which one of the following is NOT related to temperature control?
16. Variation in ear size in hares
17. Regulation of metabolic rate
18. Reduction of water loss in desert plants.
19. Exhibiting nocturnal behaviour
20. In aquatic communities all free – swimming organisms are described as
21. Nekton B. Benthos C. Neuston D. Plankton
22. Which one of the following does NOT belong to the same phylum as others?
23. Squid B. Snail

C. Water flea D. Octopus

1. In secondary growth in woody plants, the first step is the formation of
2. Secondary Medullary rays C. Secondary vein
3. Cambium ring D. Secondary Phloem
4. Which one of the following veins is functionally similar to most arteries?
5. Vena cava C. Pulmonary Vein
6. Subclavian Vein D. Renal Vein
7. A type of learning behaviour pattern characterized by a reward after accidental encounters is called
8. Operant conditioning
9. Pavlonian conditioning
10. Imprinting
11. Habituation
12. Osmoreceptores responsible for the detection of solute potential in the body are located in
13. Cerebrum C. Medulla oblongata
14. Cerebellum D. Hypothalamus
15. Which one of the following is NOT a density – dependent factor in natural populations?
16. Predation C. Disease
17. Food shortage D. Floods
18. A species is called endemic when
19. It has no representatives in other localities
20. It has been introduced into a new habitat
21. It is considered rare
22. It is on the verge of extinction.
23. Which one of the following does NOT happen when a sarcomere contracts?
24. H band becomes longer C. I band becomes shorter
25. H band becomes shorter D. A band remains the same length.
26. Which one of the following ecosystems shows the highest gross productivity?
27. An ocean C. A grassland
28. A forest D. An estuary
29. Which of the following parts of fins provides the lifting force in a dog fish?
30. Pectoral and anal fins C. Pectoral and pelvic fins
31. Pelvic and dorsal fins D. Dorsal and anal fins
32. Which one of the following is NOT true about linked genes?
33. They do not show independent assortment
34. They are inherited together
35. They affect the same phenotypic expressions.
36. They affect different phenotypic expressions.
37. The arrangement of bivalents on the equator of the cell during cell division is characteristic of
38. Metaphase I C. Anaphase I
39. Metaphase II D. Anaphase II
40. Which one of the following respiratory pigments contains copper?
41. Haemoglobin C. Haemocyanin
42. Haemerythrin D. Chlorocruorin
43. In which of the following plants will flowering be interrupted if a dark period is introduced into the light period?
44. Short day plants C. Day neutral plants
45. Long day plants D. Plants requiring both short and long days.
46. The infective form of malarial parasite in man is
47. Merozoite B. Sporozoite

C. schizent D. Trophozoite

**SECTION B (60 MARKS)**

1. The graph in figure3 below shows the effect of oxygen concentration on the rates of respiration and bromide ion uptake in carrot root discs placed in a culture solution.

Aerobic respiration

Bromide ion uptake

0

50

100

150

200

250

Oxygen concentration in arbitrary units

Rate

**Fig. 3**

1. From the data above, explain ways in which
2. In the absence of oxygen  ***(02 marks)***

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1. At higher concentrations of Oxygen  ***(03 marks)***

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1. (i) On the same graph, Sketch a curve to show the rate of bromide ion uptake in presence of cyanide.  ***(01 mark)***

ii) Give a reason for answer in b(i) above  ***(02 marks)***

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1. A plant cell, after being immersed in pure water for several hours had a solute potential of 800KPa. With reason, state the water potential of the cell ***(02 marks)***

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1. (a) Outline the roles of the following hormones in digestion of food in mammalian alimentary canal.
2. Cholecystokinin  ***(02 marks)***

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1. Secretin  ***(01 mark)***

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b.(i) Explain the role of bile in fat digestion  ***(03 marks)***

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(ii) Describe how the products of fat digestion are modified in order to reach the blood

stream in mammals. ***(03 marks)*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. a)(i) What is meant by positive feedback?  ***(02 marks)***

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(ii) State 2 characteristics of an inefficient homeostatic system  ***(02 marks)***

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b) Describe the role of the liver in the metabolism of proteins and amino acids.

***(04 marks)***

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c) Explain the ecological advantage of possessing two homeostatic mechanisms to an

animal.  ***(02 marks)***

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1. The graph in figure 4 below shows changes in amylase activity of germinating barley grains for the first 12 days.

0

2

4

6

8

10

12

0

0.1

0.15

0.25

0.30

Time/ days

Amylase activity / arbitrary units

0.20

0.5

0

0

**Fig. 4**

1. (i) Explain the changes in amylase activity from day 0 to day 8  ***(05 marks)***

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(ii) Suggest the cause for the change in amylase activity between day 8 and day 12

***(02 marks)***

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1. Outline the three phases of growth in a flowering plant. ***(03 marks)***

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1. (a) Define the term symbiosis  ***(01 mark)***

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(b) State three physiological adaptations of endoparasites ***(03 marks)***

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(c) Giving an example in each case describes other types of symbiotic associations apart from parasitism.  ***(03 marks)***

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(d) Outline three major effects of loss of Biodiversity in a given area. ***(03 marks)***

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1. The genetic code contains punctuation codons to mark the start and end of synthesis of polypeptide chains on ribosome.
2. State the codes for the:
3. Start codon  ***(01 mark)***

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1. Stop codons ***(02 marks)***

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1. (i) Give the meaning of the term genetic code  ***(01 mark)***

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(ii) Outline any four basic features of a genetic code  ***(04 marks)***

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1. Explain why the genetic code for an amino acid is a 3 base code rather than a 2 base code.  ***(03 marks)***

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***End -***