

Name..... Centre/Index No.

Name of School Signature.....

P530/1
BIOLOGY
PAPER 1
July/August 2018
2¹/₂ hours



WAKISSHA JOINT MOCK EXAMINATIONS

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.

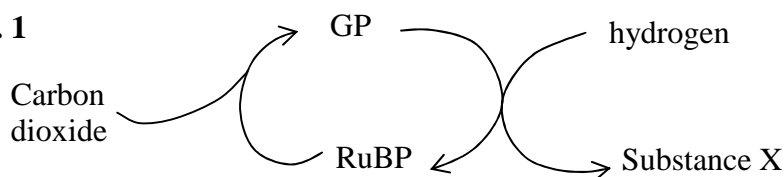
FOR EXAMINERS' USE ONLY			
SECTION		MARKS	Examiners' initials & No.
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

Write the letter corresponding to the most correct answer in the box provided on the right.

- Which of the following structures is present in both eukaryotic and Prokaryotic cells.
A. Mitochondria.
B. Ribosomes.
C. Pili.
D. Centrioles.
- An unbranched polysaccharide is made up of glucose monomers joined together by β (beta 1 – 4) linkages. This polysaccharide could be;
A. amylopectin.
B. cellulose.
C. amylose.
D. glycogen.
- Which of the following statements about the sodium-potassium pump is correct?
A. It results in a higher concentration of sodium ions inside the cell
B. The transport protein has an affinity for sodium ions in the cytoplasm
C. The transport protein has an affinity for sodium ions in the extracellular fluid.
D. It results in a higher concentration of potassium ions outside the cell.
- Which of the following statements is **incorrect** about fungi?
A. they are all eukaryotic.
B. some are photosynthetic.
C. they all have rigid cell walls.
D. most are filamentous.
- Ferns undergo alternation of generations in which a;
A. dominant sporophyte alternates with an independent gametophyte.
B. dominant gametophyte alternates with a dependent sporophyte.
C. sporophyte and a gametophyte have equal life spans.
D. gametophyte produces gamete by meiosis.
- Increase in the dark form of the peppered moth was as a result of the;
A. dark moths migrating to areas which offered the best camouflage.
B. change in selection pressure.
C. change in the prey species taken by birds.
D. increase in the mutation rate.
- Figure 1 below shows an outline of the carbon fixation stage of photosynthesis substance X is;

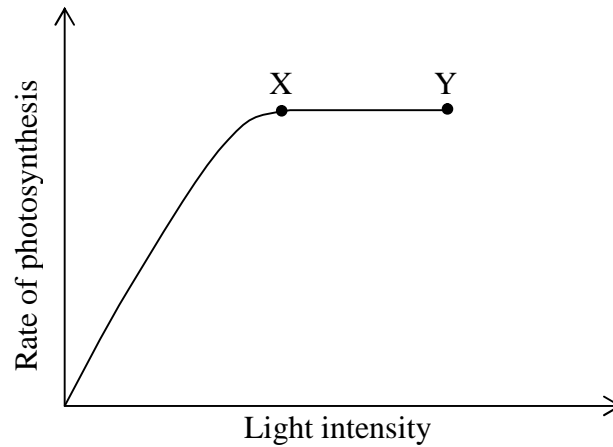
Fig. 1



- A. ATP.
- B. Glucose.
- C. Oxygen.
- D. Water.

8. Figure 2 below shows the effect of increasing light intensity on the rate of photosynthesis in a green plant.

Fig. 2



Which of the following factors limit the rate of photosynthesis between points X and Y?

- A. Light intensity and oxygen concentration.
- B. Temperature and oxygen concentration.
- C. Temperature and carbon dioxide concentration.
- D. Carbon dioxide concentration and light intensity.

9. Which of the following would not be formed during anaerobic breakdown of glucose by yeast?

- A. water.
- B. ATP.
- C. carbondioxide.
- D. ethanol.

10. A plant becomes etiolated when it

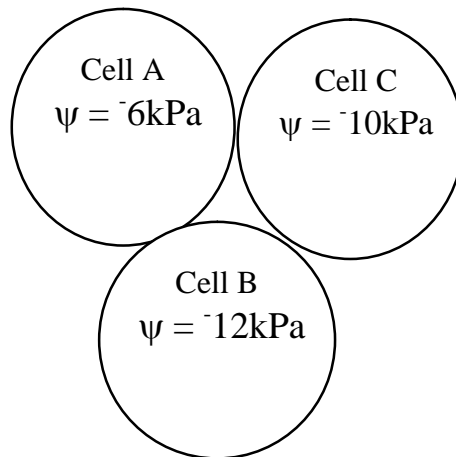
- A. is grown in soil with low nitrogen levels.
- B. is grown in the dark.
- C. is treated with gibberellic acid.
- D. has its apical bud removed.

11. A species that plays a role vital for the survival of other species in an ecosystem is called

- A. a keystone species.
- B. a native species.
- C. an invasive species.
- D. a dominant species.

12. Figure 3 below shows three adjacent cells and their water potentials (ψ).

Fig. 3



Which of the following is the correct sequence of water movement between all the cells?

- A. A \longrightarrow C \longrightarrow B
- B. C \longrightarrow B \longrightarrow A
- C. A \longrightarrow B \longrightarrow C
- D. B \longrightarrow A \longrightarrow C

13. Lack of relaxation between successive stimuli in a muscle is referred to as

- A. tonus.
- B. spasm.
- C. fatigue.
- D. tetanus.

14. Which of the following features is **NOT** present in the phylum arthropoda?

- A. Jointed appendages.
- B. Chitinous exoskeleton.
- C. Parapodia.
- D. Metameric segmentation.

15. Reduction in pH of blood will lead to;

- A. the release of bicarbonate ions by the liver.
- B. reduction in the rate of heart beat.
- C. reduced blood supply to the brain.
- D. a decrease in the affinity of haemoglobin for oxygen.

16. A triglyceride is composed of;

- A. three glycerol and three fatty acid molecules.
- B. three glycerol and one fatty acid molecule.
- C. one glycerol and three fatty acid molecules.
- D. one glycerol and one fatty acid molecule.

17. In mammals, which of the following blood vessels would normally carry the largest amount of urea?

- A. Hepatic portal vein.
- B. Renal vein.
- C. Dorsal aorta.
- D. Hepatic vein.

18. Analogous structures are a result of
A. stabilizing selection.
B. divergent evolution.
C. convergent evolution.
D. shared ancestry.
19. Gause's principle of competitive exclusion states that
A. larger organisms exclude smaller ones through competition.
B. more abundant species will exclude the less abundant species through competition.
C. competition for the same resources excludes species having different food preferences.
D. no two species can occupy the same niche indefinitely for the same limiting resources.
20. The type of gaseous exchange structures in organisms would greatly be influenced by;
A. metabolic rate and respiratory medium.
B. habitat and metabolic rate.
C. body size and metabolic rate.
D. habitat and size of cuticle.
21. Ascent of water in a tall plant as a result of the transpiration stream is due to;
A. root pressure.
B. adhesion.
C. cohesion.
D. capillarity.
22. In which of the following parts of the mammalian testis is the Interstitial Cell Stimulating Hormone (ICSH) produced?
A. leydig cells.
B. primordial germ cells.
C. sertoli cells.
D. seminiferous tubules.
23. Which of the following parts of the mammalian ear are absent in the ear of an amphibian?
A. Ear drum and pinna.
B. Pinna and auditory canal.
C. Eustachian tube and pinna.
D. Auditory canal and Eustachian tube.
24. The secretions of the hypothalamus are transported to the posterior lobe of the pituitary gland through
A. portal blood vessels.
B. pituitary stalk.
C. capillary network.
D. nerve fibres.

25. Table 1 below shows the results obtained from the process of estimating the population size of certain plant species in Ziika whose total land area is $10,000\text{m}^2$ using aquadrat of 1m^2 . From the results the population size of the plant species is;

Table 1

Throws made	1	2	3	4	5	6	7	8	9	10
Number of plants in each throw	53	74	40	63	56	53	70	72	57	53

- A. 600,000 plants.
- B. 60,000 plants.
- C. 6000 plants.
- D. 60 plants.
26. The type of learnt behavior that results due to continuous repetition of a stimulus that is not associated with a punishment or reward is
- A. associative learning.
- B. latent learning.
- C. insight learning.
- D. habituation.
27. Which of the following is **NOT** used to classify organisms in kingdom protocista?
- A. The type of pigment present.
- B. The type of locomotory structure if present.
- C. Mode of nutrition.
- D. Type of cell wall.
28. Ripening of fruits in plants is caused by
- A. Auxins.
- B. Gibberellins.
- C. Ethene.
- D. Cytokinins.
29. During locomotion in an earthworm, when the circular muscles contract the;
- A. longitudinal muscles contract.
- B. longitudinal muscles become stretched.
- C. chaetae are extended.
- D. pressure of coelomic fluid reduces.
30. Which of the following hormones stimulates the liver to synthesize bile rich in hydrogen carbonate?
- A. Gastrin.
- B. Cholecystokinin.
- C. Secretin.
- D. Insulin.
31. The proportion of a recessive allele in a gene pool is 0.1, what is the proportion of the population with the dominant allele?
- A. 0.36
- B. 0.9
- C. 0.18
- D. 0.99

32. When small seeds are sown too deep in the soil, their seedlings may fail to emerge because they.
- A. are suppressed by soil during upward growth.
 - B. do not get enough water.
 - C. exhaust their food reserves before emerging.
 - D. do not get enough air.

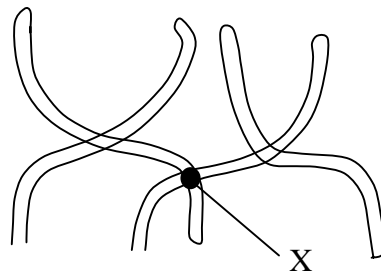
33. Which one of the following is **NOT** a trend in seral succession?
- A. Increase in the proportion of woody parts of plants.
 - B. Increase in the ratio of respiration to photosynthesis.
 - C. Increase in the proportion of leaves to bark and wood.
 - D. Decrease in the proportion of herbaceous plants compared to other plants.

34. Sexual reproduction is important for evolution because
- A. it introduces new genotypes in a population.
 - B. it brings about population explosion.
 - C. more offsprings are produced that survive to adult hood.
 - D. more offsprings are produced to replace the old ones.

35. Digestion of fats is NOT possible in the human stomach because
- A. lipases become active within a narrow range of pH.
 - B. pH of the stomach is too low for lipases to act on fats.
 - C. bile salts that emulsify fats are absent in the stomach.
 - D. fat digestion is only possible in the duodenum.

36. Figure 4 below shows the behavior of chromosomes during melosis

Fig. 4



The region marked X represents

- A. Chiasmata.
- B. Non sister chromatids.
- C. Homologous chromosomes.
- D. Sister chromatids.

37. During the process of photosynthesis in the Z – scheme, the reaction centre of chlorophyll P680 is reduced with electrons that originate from
- A. Water.
 - B. NADPH.
 - C. P700.
 - D. Ferredoxin.

38. Which one of the following situations is likely to have no immediate effect on body temperature?
- A. Increase in environmental temperature.
 - B. acclimatization.
 - C. Release of thyroxine.
 - D. Perspiration.

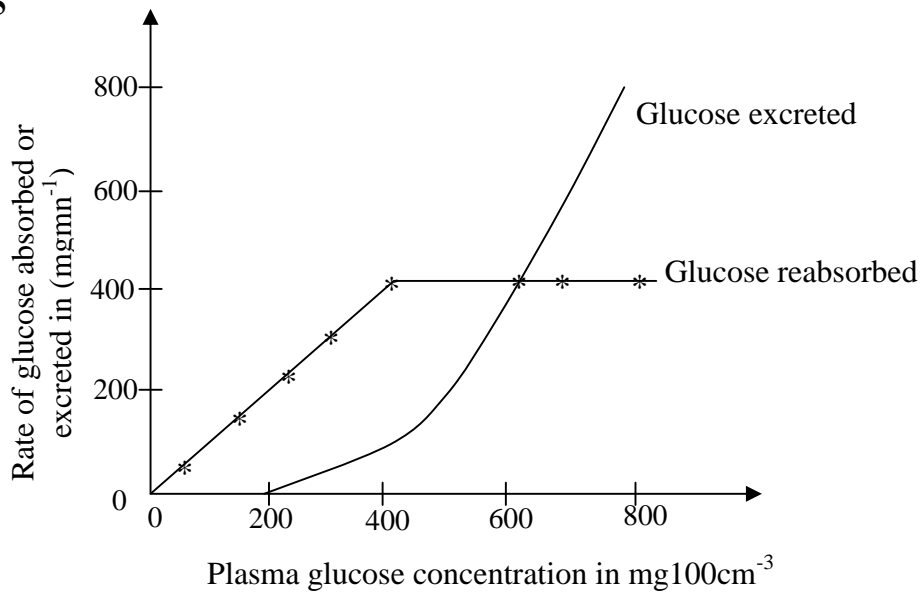
Turn Over

39. If genes C and D are on the same pair of homologous chromosomes and exhibit recombination, the number of phenotypic types from a cross of two individuals heterozygous for both genes will be;
- A. one.
 B. two.
 C. three.
 D. four.
40. Which one of the following will be virtually absent in a highly industrialised area?
- A. Lichens.
 B. Bryophytes.
 C. Algae.
 D. Ferns.

SECTION B (60 MARKS)

41. Figure 5 below shows the rate of glucose reabsorption and excretion from a mammalian kidney in relation to the glucose concentration in the plasma.

Fig. 5



- a) From the graph, compare the rate of glucose reabsorbed with that excreted. (04 marks)

b) Explain the shape of the curve for glucose reabsorption when the plasma glucose concentration is

i) between 0 to $200\text{mg}100\text{cm}^{-3}$ (02 marks)

ii) over $400\text{mg}100\text{cm}^{-3}$ (01 mark)

c) In which part of the nephron is glucose reabsorbed? (01 mark)

d) Explain why glucose may appear in urine of an individual. (02 marks)

42. a) Define the term absorption spectrum. (01 mark)

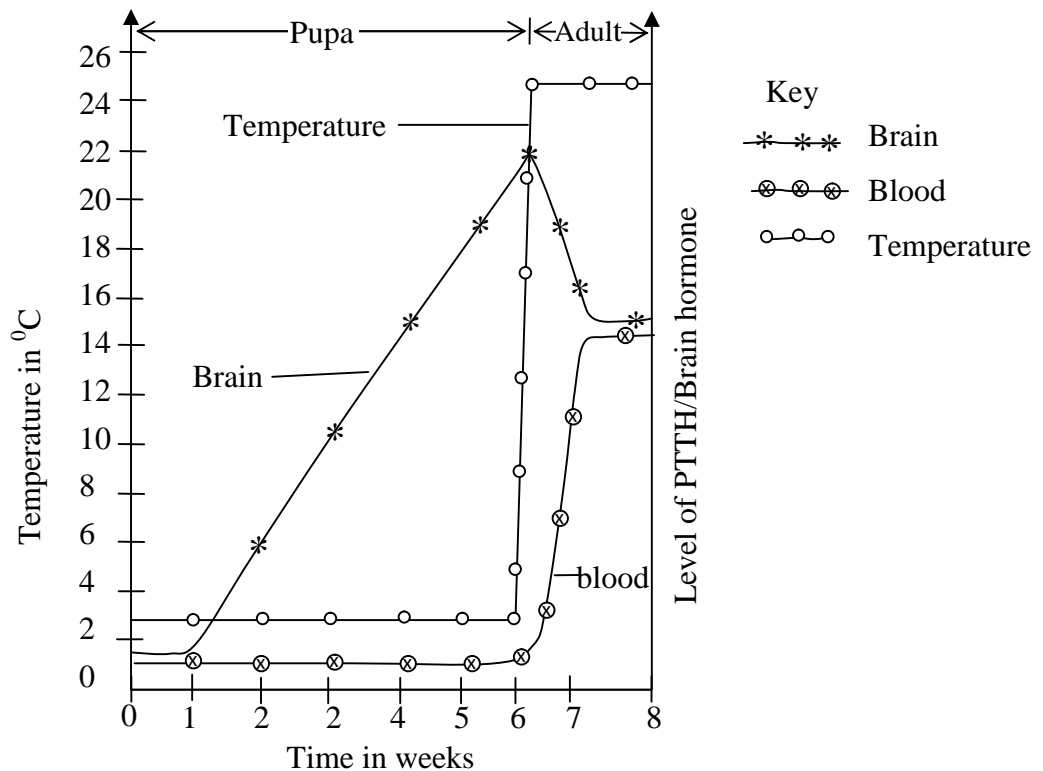
b) State two;

i) evidences that show that photosynthesis is a two stage process.(02 marks)

ii) roles of the light dependent stage during carbon dioxide fixation. (02 marks)

43. Figure 6 below shows the relationship between the levels of prothoracicotrophic hormone (PTTH) or brain hormone in the brain and in the blood of a silkworm first at 3°C and later transferred to a temperature of 25°C with time of its development from pupa to adult. Study the figure carefully and use it to answer the questions that follow.

Fig. 6



a) Compare the levels of PTTH or brain hormone in the brain and blood of silkworm during the study period. (04 marks)

- b) Account for the relationship between the levels of PTH in the brain and blood of the silkworm during its development from pupa to adult. (05 marks)

- c) State any one significance of growth and development in organisms. (01 mark)

44. a) What is meant by the following ecological terms.
i) Biomass (02 marks)

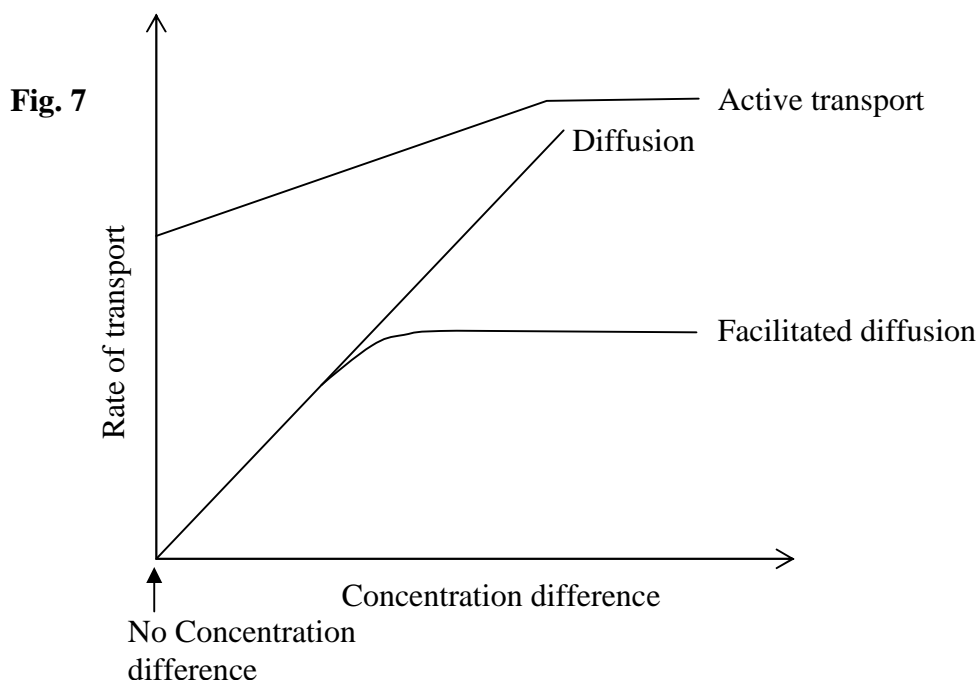
- ii) Productivity (02 marks)

- b) State two advantages of using energy to determine the number of organisms at different trophic levels in an ecosystem. (02 marks)

- c) Explain the advantages a primary consumer has over a higher consumer (02 marks)

- d) In an ecological study to determine the population of fish in a pond, 200 fish were captured, marked and released back into the pond. After three weeks, a second capture of 250 fish was made of which 100 fish were marked. Calculate the population of fish in the pond. (02 marks)

45. Figure 7 below shows the effect of concentration difference on the rate of transport of ions on either side of the cell membrane for three different types of transport. Study the figure carefully and answer the questions that follow;



- a) Explain the rate of transport of ions with changes in concentration difference for facilitated diffusion. (03 marks)

- b) Explain the difference in the rate of transport of ions for active transport, diffusion and facilitated diffusion at no concentration difference. (04 marks)

- c) Suggest what will happen to the rate of transport for active transport if a respiratory poison like potassium cyanide was added? Give a reason for your answer. (02 marks)

- d) State two other factors that would affect the rate of transport of substances across cell membranes other than those mentioned above. (02 marks)

46. a) Distinguish between phenotype and genotype. (02 marks)

b) In guinea pigs, there are two alleles for hair colour, black and white and also two alleles for hair length, short and long. In a breeding experience all the F₁ phenotypes produced from a cross between pure breeding, short black-haired and pure breeding long white-haired parents had short black hair.

i) With a reason, state which alleles are dominant? (02 marks)

Allele/s;

Reason;

ii) Using suitable genetic symbols, determine the expected proportions of F₂ phenotypes. (06 marks)

END