'A' LEVEL REVISION QUESTIONS

1. (a) Discuss the role of genes in protein synthesis.
   (b) What are the causes of variation and its biological importance?
   (C) Account for the causes of variations in asexually reproducing population.

2. (a) What is the fate of a glucose molecule in the cell cytoplasm
   (b) Discuss the energy flow in a named ecosystem.

3. (a) Outline the functioning of the autonomic nervous system (ANS) in the human body.
   (b) Compare the ANS and the endocrine system.

4. (a) How is stomatal opening brought about in leaves?
   (b) Why is transpiration considered a necessary evil to plant life?

5. (a) Compare the open circulatory system and closed circulatory system.
   (b) Describe the functioning of the circulatory system in insects.

6. (a) With specific examples explain how the alternation of generation occur in living organsms.

7. (a) What is meant by the term ecological succession?
   (b) Describe the stage involved in succession on an abandoned farm land.
   (c) How does biomass, specie number and biodiversity very with the serial stages.

8. Write an essay on the phytochrome systems.

9. (a) Explain what the expression safe period means with reference to a woman's menstrual cycle.
   (b) Describe the hormonal and other changes that occur from fertilization to birth in humans.

10. (a) What is the biological significance of homeostasis?
    (b) Outline the homeostatic processes and their functioning in animals.

11. (a) What is the biological significance of homeostasis?
    (b) Trace the evolutionary trend of water conservation mechanisms of organisms.
    (c) Explain using a diagram the structure and functioning of he kidney nephron.

12. (a) Relate the structure of the following to their functions:
    (i) Carbohydrates
    (ii) Proteins.

13. (a) With evidence discuss the sliding filament hypothesis in musclar movement.
    (b) Outline the adaptations of birds for flight.

14. (a) Outline the evidence4 of evolution.
    (b) Discuss the evolutionary evidence from the organic evolutionary point.

15. (a) Briefly outline the advancements of phylum anthropods over phylum annelida.
    (b) Discuss with reasons he biodiversity and success of anthropods.

16. Discuss man's influence and impact on the environment.

17. (a) Outline the effect of large mammals in a national park.
    (b) Using a suitable method describe how the population size may be determined.
    (c) Explain the management of such mammals for a stable ecosystem.

18. (a) Discuss the response of stomata to environmental factors.
    (b) Explain why the stomata of a leaf tend to open during day and close at night. What advantage is there in this?

19. (a) What is the role of transpiration in plants? Describe the mechanism of transpiration
    (b) What factors affect rate of transpiration?
    (c) What theories have been advanced to explain translocation in plants?

20. (a) What is meant by translocation?
    (b) What theories have been advanced to explain translocation in plants?

21. (a) What is an essential element in plants?
    (b) Name all the micro-nutrients and macro-nutrients of plants. What are the respective functions in plant growth?

22. (a) Compare oxidation phosphoryalation and photosynthetic phosphorylation.
    (b) Discuss the "light" and "dark" stages of photosynthesis.
    (c) Name and give functions of the photosynthetic pigments present in plant cells.

23. (a) Describe the structure of muscles.
    (b) Describe the sequence of Event involved in the stimulation and contraction of the skeletal muscle fibre.
    (c) What are the functions of muscles?

24. (a) Outline the chemical changes which the proteins and the fats undergo when they are used as energy source. Illustrate where the products of the change link up with carbohydrate respiration.
    (b) Discuss the role of A.T.P. in a living cell.

25. (a) Describe with specific examples how different animals conceal themselves from their enemies.

    (b) What factors would enable a predator to successfully act as a biological control.

26. (a) Describe the sequence of events in which a molecule of CO_2 expired by Herbivore might become incorporated into a molecule of Glycogen in another animal of the same species.
    (b) Describe with examples how and where plants store food. What is the importance of the stored food to the plant?

27. Compare the changes which take place in the reproductive organs leading to the formation of Gametes in man.

28. (a) Explain how the mammalian kidney eliminates metabolic waste products from the body.
    (b) Discuss how different terrestrial mammals conserve water.

29. (a) A mutation is a source of genetic variation in a population. How do such variations arise? How are they maintained within a population and what are their importances?
    (b) Sexual reproduction reduces the level of genetic variation in a population. Outline the4 mechanism by which a sexual reproduction is achieved and under what circumstances might lack of genetic variation be advantageous?

30. (a) Give an account of the production of gametes by the mammalian ovary.
    (b) Explain the role of hormones in sexual cycle of a female mammal.
    (c) How does the role of hormones change?
        (i) The early stages of pregnancy?
        (ii) The final stages of pregnancy?

31. (a) Show how amoeba and spyrogyra can be classed together as living organisms but distinguished as an animal and a plant cell.
    (b) Describe the mechanism of locomotion of amoeba.

32. (a) Describe and account for the circulatory and respiratory changes which occur in the skeletal muscle during assertion of strenuous exercise on them.
    (b) Describe the mechanism concerned with the transport of CO_2 in the blood and its release at the alveoli surface.

33. (a) Describe the structure of a protein molecule.
    (b) Discuss the roles of proteins in the Human.

34. (a) Describe the structure of DNA molecule.
    (b) Describe the mechanism of protein synthesis in a cell.
    (c) Briefly state how an animal deals with excess proteins.

35. (a) What is an ecosystem?
    (b) Describe the flow of energy and recycling of carbon and nitrogen in any named ecosystem.

36. (a) Giving examples explain how some animals are able to utilize cellulose available in their food.
    (b) What problems does a man with a ruptured pancreas face in utilizing ingested food?

37. (a) Define evolution.
    (b) Variation is said to provide the raw materials for evolution. This can be due to environmental or genetic factors. Describe how both sources of variation could contribute to specialization and evolution.
    (c) How has man used this knowledge of variation and evolution to his benefit?

38. (a) What is a parasite?
    (b) Describe the adaptations of the named parasite in (b) above to its mode of nutrition.

39. (a) Protection storage transport conduction ad support are some of the functions performed by plant tissues for each of the functions, name one different tissue and show how the structure of the tissue is related to its function.
    (b) Outline the different methods by which insects transmit plant and animal disease giving examples.

40. (a) Discuss the response of stomata to environmental factors.
    (b) Explain why the stomata of a leaf tend to open during day and close at night. What advantage is there in this?

41. (a) Insects have been regarded as a very successful group in life. State factors that have contributed to the success of the insects' class.
    (b) Outline the different methods by which insects transmit plant and animal disease giving examples.

42. (a) What is the role of transpiration in plants? Describe the mechanism of transpiration.
    (b) What factors affect rate of transpiration?
    (c) What process is responsible for the phenomenon of guttation?
    (d) Explain how transpiration bring about rise of water up a tall plant.

43. (a) What is meant by translocation?
    (b) What theories have been advanced to explain translocation in plants?

44. (a) What is an essential element in plants?
    (b) Name all the micro-nutrients and macro-nutrients of plants. What are their respective functions in plant growth?

45. (a) Compare oxidative phosphorylation and photophosphorylation.
    (b) Discuss the "light" and "dark" stages of photosynthesis.
    (c) Name and give functions of the photosynthetic pigments present in plant cells.

46. (a) Compare photosynthetic phosphorylation and oxidation phosphorlation. What are the role of ferredoxin and phostoquinone?
    (b) Describe the light reactions of photosynthesis. What are the products of these reactions?
    (c) Compare the process of cyclic and non-cyclic photosysphorylation.
    (d) Discuss the sequence of events that constitute the dark reaction of photosynthesis. What are the products of these reactions?

47. Write a concise description of the structure and life history of the common mushroom and account for their relatively widespread distribution of this fungus.

48. Compare and contrast from the functional point of view the circulatory systems of a mammal and an earthworm.

49. With reference to named examples, state adaptations developed by various animals for locomotion:

(a) on dry land
(b) in air.

Compare the flight mechanism in birds and insects.

50. Compare the method of ventilation in a bony fish, such as tilapia with that of man.

51. (a) Name the different respiratory surfaces utilized by the different animals explaining briefly their structures.
(b) Outline the general characteristics of these surfaces that enable them carry out their functions.
(c) How is the haemoglobin molecule adapted to its functions of gaseous transport?

52. An area of land was chosen for the establishment of a new settlement. Describe a biological feasibility study you would carry out to determine its suitability for an agricultural settlement.

53. (a) Describe the process of digestion in the small intestine of a mammal
(b) How is the secretion of enzyme in humans controlled?

54. (a) Give an account of the process of photosynthesis.
(b) How does photosynthesis benefit?
(i) A paramecium and a green alga living within its body?
(ii) A bird feeding on ticks off the body of a buffalo?

55. (a) Compare and contrast mitosis and meiosis.
(b) Describe spermatogenesis in a mammal.
(c) What is the importance of meiosis in sexual reproduction?

56. (a) How does temperature regulation in mammals differ from that in reptiles?
(b) What are the advantages of endoethermy in mammals?

57. Give an account of the perennating organs in plants and roles they play in the survival of plant species.

58. Explain what the expression "safe period" means with reference to a woman's cycle when implantation does occur.
- comment on the efficiency of the 'safe period' as a contraceptive technique.

59. Compare ventilation in bony-fish and cartilaginous fish.

60. Distinguish between mitosis and meiosis.
- Describe the changes you would observe in a cell during gametogenesis in male organisms. Comment on the importance of meiosis in sexually reproducing organism.

61. (a). What are the organs, which form the female reproductive system in man?

(b). Outline the major changes in the development of a fertilized egg until just after birth in a woman.

62. What are the values of National Parks to Uganda? What problems are often encountered in the management of National Parks?

63. State FIVE ways by which cartilage differs from bone. Outline the functions of the mammalian skeleton. What could lead to malformation of bones in human being?

64. Describe how you would conduct experiments to determine changes in population of the following organisms:
    (i) A species of plant in a grassland area.
    (ii) A small mammal such as a rodent also in a grassland area.
    (iii) Protozoa in a water pond.

65. (a) Describe the structure and composition of the DNA molecule.
    (b) Explain how mutations may arise.
    (c) What may be the consequences of such mutations in natural populations?

66. (a) How and in what form do plants and animals obtain the nitrogen they require?
    (b) In what ways do the plants

67. (a) Explain the ways by which heat is lost from the body of an animal.
    (b) Describe how a small mammal e.g. a cat and a reptile e.g. lizard can overcome fluctuating environmental temperatures.

68. Write a short account of site of production, transport and functions of three named mammalian hormones.

69. Describe the transport of materials in the phloem citing experimental evidence for the process. What hypotheses have been suggested to explain transport in phloem cells?

70. With reference to named animals distinguish between eternal and internal fertilization.
    - Briefly outline the mode of nutrition, nitrogenous excretion and gaseous exchange in subsequent stages of development of a frog, a bird and a mammal.

71. (i) State any two theories, which have been put forward to explain stomatal movements.
    (ii) Describe the mechanism of stomatal movements based on one of these theories.
    (iii) What are the limitations of the theory you have described?

72. State and describe the phases of sexual (menstrual) cycle. Describe how it is initiated and maintained in animals by endocrine secretions.

73. Explain what is meant by: endoskeleton, exoskeleton and hydrostatic skeleton? With the relevant examples, explain briefly how each of the mentioned structures are used in locomotion.

74. Describe the structure of xylem elements in flowering plants. Explain how the vessels are able to maintain a continous flow of water up a fall tree.

75. (a) What is transpiration? Outline how it is affected by environmental factors.
    (b) What are the advantages and disadvantages of transpiration in terrestrial plants?

76. Discuss the process of nitrogen fixation what are the usual forms in which nitrogen is absorbed by plant?

77. Write brief accounts of three of the following:
    Apical dominance, metamorphosis, gametogenesis, photoperiodism, commensalisms.

78. The taking in oxygen and control of water balance are two of the important metabatic processes, choose an example in a plant, name the organs involved and discuss how the process take place.

79. Describe the mechanism of protein synthesis in a cell. Briefly state how an animals cell deals with excess proteins.

80. What features of viruses are of significance in adapting them to a jourasitic way of life? In your answer refer to one plant and one animal virus. Why is it difficult to place viruses in any of the accepted group of living organism?

81. List the function of the mammalian skin. Explain how each of the functions you have listed is carried out by the skin.
    What Biological problems do you think are associated with skin grafting?
82. Why is it necessary for higher plants to be differentiated into tissues? Describe the development and the structure of three important tissues with different functions and how their structures are related to their functions.

83. why is it more difficult to study the inheritance of quantitative characters such as size, weight and intelligence than qualitative ones such as ABO and Rh blood antigens?

84. In man <u>normal</u> in short fin fingers is genetically controlled. If indivuals are grouped as <u>normal</u> or short short-fingered,f the character appears to be controlled by one of alleles. Short –fingered individuals, however, show a range in length of the index-finger from extremely short to slightly short. What might explain this variation in the expression of short finguredness?
    EITHER

85. If you are given plants of a species unknown to you, describe what you would do, using only ordinary school equipment, to study the process and changes leading from unopened flower bud to the formation of fruits and seeds.
    OR
    Choose two animal species you have studied in their habitat, describe how these species animals are related to conditions in which they are living. How has man's activities affected the distribution of animals?

86. Where and how do plants store food? What is the importance of food stored in
    (a) seeds
    (b) organs of paremation?

87. What are the main differences b/a flowers which are wind-pollinated and those which are insect pollinated? Describe the sequence of events from the time and fallen grain is deposited as to the stigma until a mature endosperm seed is produced. In your answer pay particular to the importance of cell division.

88. What are the main features of the photosynthetic process? Show how this process is important in the life of the following organisms:
    (a) A parastic fungus living on a parasitic fruit
    (b) A bacterium living on organic matter in the soil
    (c) A fea feeding on the blood of a lion.

89. What is meant by?
    (a) Analogous structures
    (b) Homologous structures
    (c) Vestigal structures.

    Give examples of each. How can these structures be used as evidence for the process of organic evolution?

90. (a) Explain the difference between direct development and development which includes larval forms by outline the life histories of two animals.

    (b) Explain two important parts played in the life histories of animals by larval stages (refer to the named example).
    (c) In what ways can larval forms of named animal be considered of economic importance in East Africa?

91. With the aid of a diagram, describe the structure of herbaceous monotyledenous stem, and indicate how it differs from that of a woody dicotyledori. What are the functions of any three important tissues you have described?

92. (a) Explain how breathing movements are carried out by a mammal. How is the cycle maintained?
    (b) How does vigorous exercise affect?
        (i) Breathing frequency
        (ii) Pulse rate?

        Explain how these effects are bought out.

93. What are the main metabolic waste products of a mammal? Explain how the kidney is involved in the elimination of some of these products from the body of a mammal.

94. Sutelopes are common in E. Africa grasslands. Outline the interrelationship which may exist b/in the antelopes and :

(a) Other mammals
(b) Insects
(c) Green plants.

95. Compare the composition and function of blood and tissue fluid (including lymph) in a mammal. State briefly how tissue fluid reenters the blood system.

96. What do you understand by the terms heteotroph? Give labeled drawings to show the appearance of the alimentary canals of an earthworms and adult –frog. For each animal, state how large surface area of absorptive surface, relative to the internal volume of the animal, has been achieved?
Describe the methods used by each animal to obtain food.

97. Explain as fully as the part played by each of the following in the process of respiration in plants and animals:
Enzymes, hydrogen acceptors, inorganic phosphates, oxygen. 'The efficiency of aerobic respiration is claimed to be 45%. Comment briefly on this statement.

98. Give an account of the part played by each of the following in the process of respiration in plants and animals:
Enzymes, hydrogen acceptors inorganic phosphate, oxygen.
'The efficiency of aerobic respiration is claimed to be 45%. Comment briefly on this statement.

99. What are the physical principles involved in the transfer of heat between the animal and its environment?
Describe briefly morphological physiological and behavioural adaptation. Which enable the animals to withstand high environmental temps.

100. Viruses are very small, multiply only in the host cell and contain relatively few chemical constituents write an account of viruses explaining these facts. Do you consider viruses to be living organisms? Give reasons for your answer.

101. Explain what is meant by sexual reproduction and how it differs from a sexual reproduction. You know a farmer who wishes to grow a crop that ripens evenly and of uniform quality. What do you need to know about the breeding system of the crop before you could advise against growing the crop from seed, what would you recommend and why?

102. A fully heterozygine maize plant was red normal seed. It was crossed with a green plant with tassel seed. The following results were obtained.
(a) Represent by means of a suitable symbols genotypes of the parental and of F, generation.
(b) Do the results, indicate linkage? Give reasons for your answer.
(c) Describe briefly the physical basis of linkage.

103. Explain the following terms:
(a) Long day plant
(b) Day neutral plant

(c) Critical day length.

A long day plant grown in short days is transferred to long days. Describe want happens?

It is sometimes said that flowering is brought about by a hormone – like substance formed in the plant in the appropriate day-length. Describe ten experiments, which suggest the existence of this substance.

104. Give an account of the process of sexual reproduction in a named coelenterate and a named fern and show that the process is essentially similar in each organism. Indicate by simple drawings, eh position of the sex organs in both organisms

105. Explain the following terms:

(a) Long day plant
(b) Day neutral plant
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106. Give an explanation for each of the following statements. (Biochemical formulae and diagrams of reactions are not required)

(a) Anaerrobic respiration is less efficient than aerobic respiration.
(b) A human liver cell may contain one thousand or more mitochondria in its cyloplasm, the human red blood cell has none.
(c) Under certain conditions the muscle may require and oxygen debt.

107. The following questions require short answers only:

(a) State two important differences which can be seen under a light microscope between plant and animal cells.
(b) Name the membrane bounded channels which form a network and at most fill the cytoplasm of most cells and are seen only in an electron micrograph.
(c) Give the name of the ‘small granules’ which often cover the membrane – founded channels referred to in (b). What is their function?
(d) Give one way by which you would require the colloidal – stage’ of protoplasm.
(e) Which constituents of cytoplasm are responsible for the colloidal state/
(f) Viewed under the electron microscope the cell membrane has 3-layered – structure. What is thought to be the chemical nature of each of these layers?
(g) List the cellular components of a gastric gland and give the function of <u>each</u>.
(h) Give two reasons why viruses are not usually accepted as ‘cells’

108. Outline the life-cycle of the honey bee (or other named social insect). In what respect is the worker caste specialized in relation to social behaviour? Explain briefly how a colony of social insects controls the size of its population.

109. Explain what is meant by any <u>three</u> of the following in relation to organic revolution:

- homologous organs, vestigial organs

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- endemic species, fossil bones.

110. What is the importance of parasites to natural community?
With reference to a <u>named</u> parasite, give an account of the advantages and disadvantages of its way of life.

111. (a) From what substance is oxygen evolved during photosynthesis evolved? What evidence can you give to support your answer?
(b) Name the substance formed as a direct result of the '<u>light reaction</u>' in photosynthesis.
(c) State briefly how atmospheric carbon dioxide reaches the chloroplast of the leaf cells.
(d) Outline the process by which sugar is formed in the dark – reaction in photosynthesis.
(e) In many plants the sugar made in photosynthesis is immediately converted into starch. Suggest an explanation for this immediate transformation.

112. Red blood cells are very sensitive to change in salt concentration of the solution and if transferred from plasma to a less concentration solution they swell and may even burst (haemolysis). In an experiment to find the percentage of human cells haemolysed at different concentration of the solution the following result would be obtained:

Percentage Conc.(gm/100ml)	0.33	0.36	0.38	0.39	0.42	0.44	0.48
Percentage y^2 R.	100	90	80	68	30	16	0

Plot the results on the graph paper provided and draw the curve. Use the horizontal axis for the varying percentage of salt concentration. Answer the following questions.

(a) Give a short explanation to account for haemolysis.
(b) At what percentage salt concentration does haemolysis begin?
(c) At what percentage salt concentration are all the cells haemolysed.
(d) At what percentage salt concentration are the proportions if haemolysed and non-haemolysed cells equal?
(e) What do you think would happen to the cells if the percentage salt concentrated of the external solution were increased to about 0.6? Explain your answer.
(f) What part of the human body is responsible for detecting changes in the salt concentration in the blood?
(g) Name the principal organ in man concerned with maintaining with uniform salt concentration of the blood.
(h) What do you regard as a safe percentage salt concentration for human blood?

113. Describe how the skeleton of a named arthropod is used in the animals' locomotion. How is it possible for an earthworm to move without the aid of a skeleton?

114. What is the part played in the life-cycle of each of the following

a) The sporangium of mucor (or Rhizopus)

b) The sporangium of a fern.
c) The stamen of a flowering plant?

The labeled drawings to show the appearance of (a) and (b), as seen under the microscope.

115. Write a brief account of the chemical nature of starch and protein. In what forms are these two substances transported within flowering plants, and by what mechanism is the movement brought about?

116. Give a brief account of the factors and process involved in temperature control in mammals. Where is the temperature regulating centre in name?
How is he centre stimulated?

117. (a) Show, by reference to a named higher insect, e.g. calliphora or Musca, that you understand the terms ecdysis and metamorphosis.
(b) Discuss part played by any two named insects as carriers of disease.

118. (a) What is a " sense organs" State briefly why sense organs are found in animals but not in plants.
(b) What senses are served by the mammalian ear and how does the ear function?

119. What are primary and secondary meristems in flowering plants? Illustrate your answer with fully labeled drawings. What is the importance of these meristems in the growth of the plant?

120. Give a labeled drawing to show the microscopic structure of paramecium. How do you think paramecium regulates the amount of water within its body? Describe an experiment which you could carry out to test this hypothesis.

121. Give a labeled drawing to stage of mitosis. It will be sufficient if you draw two non-homologous chromosomes. Describe the changes which be seen to occur during the later stages of mitosis.
Describe how chromosomes replication is believed to take place.

122. Throughout the life of man urine is constantly produced by the kidney. Explain why this is necessary. Give a labeled drawing of one kidney tubule and describe how it functions?

123. Give diagrams of how relative positions of xylem and phloem tissues in a primary stem, primary root and leaf of a named plant. Give details of the components of xylem and phloem tissues and compare their functions.

124. Locomotion is characteristic of animals rather than plants. What do you regard as the basic reason for this difference?
Either (a) Show by means of a labeled drawing the structure of a bird's wing and explain how wings are used in flight.
Or (b) Write an account of locomotion in fish, referring particularly to shape, endoskeleton, myotomes and spinal cord.

125. Give a summary of Darwin's reasoning which led him to suggest hypothesis of evolution by means of natural selection. Marsupial mammals are abundant in and around

126. Australia, common in South America and are represented by only one species, the opossium, in the U.S.A and are found nowhere else. How do you explain this curious distribution of marsupials?
What kind of evidence best explains cases of discontinous distribution of animals?

127. Describe the structure of vegetative mycelium of either MUCOR OR RHIZOPUS. Write an account of the changes that occur in the mycelium during reproduction. What is the importance of these changes to the plant?

128. Describe an experiment, which you have carried out to measure the growth of a small animal and in which you were required to relate growth to food intake.

129. Explain how the structure of the head and thorax of a locust (or cockroach) is related to function.

130. Take as an example of a named habitat with which you are familiar, and describe how you would investigate the climates factors and soil factors of the area. Describe, how two plants and two animals of the area selected are adapted to their environment.

131. Describe the structure of the inflorescence and the flower of a named cereal or grass. This group of plants depends on the wind for the transfer of pollen. Comment upon those features of the morphology, distribution and life cycle of the grasses or cereal, which adapt them to this mode of pollination.

132. Describe the growth in size of a small animal (e.g from birth on wards). What are the factors that describe an experiment you could perform to relate food supply to growth.

133. Flower colour (Red or White) and hairness (hairy or smooth) are two characters in a sweet pea that are inherited as single factors. Describe experiments you would carry out to show:

(a) The dorminant recessive relations of these characters.
(b) Whether the characters are carried on the same or on different chromosomes. In each describe the results you might obtain.

134. As animals evolved and colonized dry land, they were faced with danger of dessication, both at the adult stage and during development. Taking as examples a fish, a frog, a bird and a mammal, describe the processes leading to fertilization and the way the embryo is protected and nourished, to illustrate how the danger, where it arises, has been overcome at this stage of the life cycle. (Details of the development of embigo are not required)

135. Outline the stages which glucose is broken down to carbon dioxide and water in the process of respiration in cells. Explain the part played by Adenosine Triphospahte (ATP) in this process. Why is it thought that respiration is carried out in the

136. list the constituents of a balanced diet, and state briefly the role of each in the metabolism of the animals. How would show you experimentally that vitamin C was essential for the health of rats? What precautions would you have to take, and how you would decide whether rats were healthy?

137. What are the characteristics of a virus? How do viruses differ from bacteria? What are their ways in which disease causing viruses are spread from organism to organism? Give examples.

138. With reference to named examples, state adaptations developed by various animals for locomotion:
   (a) on dry land
   (b) in the air.

139. Discuss the importance of leaves to the plant. What are the main differences between submerged, floating and aerial leaves?

140. (a) How do human beings and birds regulate their body temperatures?
   (b) What are the advantages of endothermy?

141. (a) How are the gas exchange surfaces adapted for their function in terrestrial mammals?
   (b) Give an account of gas exchange mechanism in a bony fish such as Tilapia. How do these mechanism differ from those of terrestial mammals?

142. Outline the ecological effects of fire in the abiotic and biotic comparents of an ecosystem.

143. Where and how do plants store food? Give examples. What is the importance of the stores of food to plants?

144. Compare and contrast parasitism with symbiosis giving examples where possible of what significance is symbiosis to man?

145. Draw and label a summary of the mammalian blood circulatory system. Compare and contrast circulatory system of a mammal with that of an insect.

146. With the help of large labeled diagrams compare gaseous exchange in a named terrestrial insect and a named bony fish.

147. What is the secondary growth? With the help of diagrams;
   (a) Show how a vascular cambium forms secondary xylem and phloem.
   (b) Describe the activities of a cork cambium in a stem.

148. Describe how a molecule of glucose is broken down in the glycolytic pathway.

149. Give an account of the cohesion – tension theory for the transport of water to the leafy shoot of a tree. Give a brief account of modifications of plant structures that influence the rate of water loss.

150. Name the mechanism involved in transfer of heat between animals and their environment. Describe briefly, morphological, philological and behavioural adaptations which enable animals to withstand high temperatures.

151. (a) Describe the significance of wild life conservations in Kenya / Uganda.
(b) Why do farmers sometimes find it difficult to accept wild – life conservation?

152. A new area has been proposed for settlement by group of farmers. Discuss the feasibility study you would undertake to ascertain its suitability for agriculture.

153. Explain how the mammalia kidney eliminates metabolic waste products from the body. In which ways do excretory products of birds differ from mammals?

154. Describe the main causes of seed dormancy. How can dormancy be broken?

155. (a) Distinguish between sympathetic and para-sympathetic various system in mammal.
(b) What differences are there between normal and nervous communication?

156. Discuss how the human regulates its temperature and blood – glucose concentrations.

157. With the aid of labeled diagrams, describe in detail the structural features of mitrehondria and chloroplasts, which are related to their ability to carry out their biological functions.

158. Using information from your own field studies write short notes on four of the following:
(a) Biomass pyramid
(b) Adaptive behaviour of arthropods
(c) Epithytes and climbers
(d) Colonization
(e) Sampling technique
(f) One soil organism.

159. What an object suddenly approaches the eye, the eyelids involuntarily blink. What is the physiological process, which causes this response? Devise an experiment with could show the response of any named invertebrate to the stimulus of light. Describe the apparatus you would require, the results you would expect and how you would record them. What conclusion would you draw?

160. Describe the mechanism of heating of the mammalian heart. Suggest two factors that would normally change the rate of its best. By means of a simple plan only, show the circulation of blood in a mammal.

161. Outline the life history of a named form either by means of a diagram or by a description. Draw a drawing to show the external appearance of a small portion of a leaf, bearing reproductive organs label the parts you draw.

162. How does the kidney regulate the water content of the body? Give the principal substances excreted in mammalian urine? Give briefly the functions of the ureter, urethra and he urinary bladder.

163. Describe the structure and function of the ……. of a flowering plant. What changes take place in the nucleus during the formation of pollen grain?

164. Describe the different methods by which insects transmit diseases. Give examples.

165. What is the chemical nature of foods commonly stored in
(a) mammals and
(b) flowering plants?

166. If there were no fossils, what evidence would there be for theory of evolution? Briefly indicate, the reasons, which type of evidence you consider most convincing.

167. (i) State two theories, which have been put forward to explain stomatal movements.
(ii) Describe the mechanism of stomatal movements based on one of these theories.
(iii) What are the limitations of the theory you have described?

168. State and describe the phases of sexual (menstrual) cycle. Describe how it is initiated and maintained in mammals by endocrine secretion.

169. What is meant by endoskeleton and hydrostatic skeleton? With relevant principles, explain briefly how each of the mentioned structures are used in locomotion.

170. Describe the structure of xylem elements in flowering plants. Explain how the vessels are able to maintain a continuous flow of water up a tall tree.

171. (a) What is transpiration? Outline how it is affected by the environmental factors.
(b) What are the advantages and disadvantages of transpiration in terrestrial plants?

172. (a) Describe changes undergone by chromosomes from interphase to telophase of mitosis.
(b) Name two processes which ensure that each of the two daughter cells from mitosis reuxain diploid as the mother cell.
(c) Give any four differences between mitosis and merosis.

173. (a) How is each of the following organisms adapted to its mode of nutrition?
(i) Roundworm (Ascaris Lunricoides).
(ii) Tick
(iii) Potato blight (phytopthora infestans)
(b) What are the main effects of the organisms in (a) on their hosts?
(c) How do nitrogen fixing bacteria differ from roundworm in their relationship with their hosts?
(d) What is the economic importance of nitrogen fixing bacteria?

174. (a) Illustrate and label the principal facts of a spermatozoan indicationg the functions of each part.

(b) Compare the changes, which take place in the reproductive organs leading to the formation of gametes in man.

175. (a) Give an account of how a man inside a house perceives a song of bird in the compound.

(i) Photosphorylation.

(ii) chemosynthesis

(b) Explain how light energy is transformed into chemical energy for dark assimilation.

(c) Outline the formation of starch form carbon dioxide by green plants (Details of Biochemical reaction not required).

176. (a) Give an account of how a man inside a house perceives a song of a bird in the compound.

(b) How is the hearing ability of a man different from that of bats?

177. Using information from your own field studies, write short notes on four of the following:-

(a) Biomass pyramid
(b) Adaptive behaviour of arthropods
(c) Epiphytes and climbers
(d) Colonization
(e) Sampling techniques
(f) One soil organism.

178. Describe the structure and life history of a named saprophyteic fungus. What are the difference in the mode of nutrition of the fungus you have chosen and a named parasitic fungus?

179. A mouse weighing 100-150g consumes an amount of food equal to or greater than its body mass each day. An African weighing 6 tonnes (6×10^3 kg) consumes between 300 – 450 kg of food each day. How do you account for the difference in the amount of food consumed per body mass between the two animals?

180. What external and internal characteristic would help you to recognize a stem? What adaptations or stems do you associate with vegetative reproduction? Under what environmental conditions is a vegetative reproduction advantageous over sexual reproduction?

181. Transpiration has been described as a ‘necessary evil’ comment on this statement and give examples of how plants minimize water.

182. Compare the methods of action of the endocrine system and spinal nerves. In what why does the automatic nervous system have a similar function to the endocrine system?

183. With reference to the animals you have studied explain the terms:

(a) Hydrostatic skeleton.
(b) Exoskeleton.
(c) Endoskeleton.

184. It is known that certain plant species can have flower colours, for the example red and yellow. Briefly outline the type of experiments and precautions you would take to find out whether the variation was due to genetic or environmental factors.

With the aid of diagrams describe the following types of cells and briefly show how they are modified for their functions.
(a) Xylem vessels
(b) Palisode parenchyma
(c) Guard cells
How is turgidity important in supporting a young herbaceous plant?

185. Describe for a chosen habitat, the ways in which organisms are dependent upon one another for food. In most habitats that have been studied only a small proportion of the sun's energy is trapped in photosynthesis. What becomes of this trapped energy?

186. All dicotyledonous plants have a similar basic structure, and yet there is a great variety of forms (herbs, shrubs, trees, etc). Indicate briefly how growth substances may be involved in bringing about these difference in form.
For one named example of a herbaceous dicotyledon, describe the growth pattern of buds, stem and leaves throughout one complete. Growth cycle.

187. Describe briefly the changes that occur in a named plant from immediately after fertilization until the seedling is living free of reserve food supplies. In what ways does the environment affect the development of the plant during this period?

188. What is a gene? Describe the chemical nature and function of genes (wherever possible you should refer to any experiments you know which led to the discovery and knowledge of genes).
How do you know that genes are situated on chromosomes?

189. Make a large, labeled drawings of paramecium to show its detailed structure. Indicate the anterior end. As paramecium moves through water its body traces out a spiral bath and at the same time rotates about its own axis. Explain how this type of motion is produced. What is the usual response of paramecium to an unfavourable stimulus?

190. From the nutritional view point a chemical analysis of fish meat revealed the following average composition per 100g:

Water	78g
Protein	16g
Fat	3g
Glycogen	2g

Vitamin A and D and several vitamins of the B complex.
A good supply of magnesium and phosphorous small quantities of iron, iodine and

calcium.

(a) Explain why fish meat alone would not be a suitable diet for man.

(b) Describe the digestion and absorption of fat in a mammal.

191. (a) The following chemical changes usually accompany a continuing series of contractions of skeleton muscle in vertebrate animals:

(i) Increased uptake of oxygen.
(ii) Increased giving off of carbon dioxide
(iii) Formation of llactic acid.
(iv) Fall in amount of carbohydrate.
(v) Chemical changes in phosphoric acid compounds.

Give a brief explanation to account for each change.

(b) What part do skeletal muscles play in fish locomotion?

192. (a) (i) What are the main kinds of information that mammals obtain through their receptor cells?

(ii) State, as accurately as possible, the position of the different kinds of receptor cells in a mammal.

193. (a) With reference to your field studies show, by examples, that you understand the following terms:

(i) Habitat
(ii) Community
(iii) Ecological niche.

(b) Areas of fare soil are often left by landslides. Describe what you consider to be the likely succession of plants in the early colonization of such bare surfaces. For the plants you mention comment on those features that are particularly important in early colonizers.

194. 'One gene, one enzyme' is an expression, which summarises that way in which we think hereditary factors control the metabolism of an organism. Explain this more fully indicating how DNA, RNA, and an enzyme are related to one another.
What is the relationship between the DNA molecule, the gene, and the Mendelian factor?

195. Describe the structure of a named filamentous alga' most algae are aquatic. By comparing the structure of the algae you have described with that of an angiosperm, briefly explain why you think big evolutionally changes were necessary before plants become adapted to dry conditions.

196. Describe the structure of the mammalian ear. How does the ear function to make the animal aware of its environment?
Men who have traveled in space have frequently been affected by nausea and other unpleasant symptoms. From what you know of the function of ear, suggest a possible explanation.

197. Select one animal from a habitat with which you are familiar and describe those features, which may adapt it to that habitat. Why does the animal occur in other, different habitats? What is the relationship of the animal to other organisms in the habitat?

198. Give an account of the structure and growth of shoot primary meristem (shoot apex) of a named angiosperm. What environmental or other factors may cause change

199. over from the formation of leaves to the formation of flowers at the shoot-apex). Illustrate your answer with examples wherever possible.

200. Draw a labeled diagram of a mammalian kidney tubule.
Compare the composition of the blood entering the glomerulus with:
(a) The blood leaving the glomerulus
(b) The filtrate as it enters proximal convoluted tubule.
(c) The urine.

201. (a) Discuss the responses of stomata to environ metal factors.
(b) Discuss the mechanism of stomatal opening and closure.

202. When carbon dioxide combines with water, carbonic acid is produced. Discuss why carbon dioxide carried in blood does not make it acidic.

203. Describe the mechanism of gaseous exchange in the lungs.
How are breathing movements controlled?

204. (a) What is meant by;-
(i) Amoebid movements?
(ii) Ciliary movements?

(b) With help of a diagram describe the process of movement in Amoeba.
(c) What is the importance of Amoeboid, ciliary and flagella type of movement in man?

205. (a) Describe the chromosomal changes from interphase to the telophase in mitosis.
(b) Name two processes which ensure that each of the two daughter cells from mitosis remain diploidias the mother cell.
(c) Give any four differences between mitosis and meiosis.

206. (a) How does water rise from the soil to the leaves of a tall tree
(b) What external factors may affect the rate at which water rises up the tree?
(c) Why is transpiration important to plant?

207. (a) What is photosynthesis?
(b) Describe the adaptations of leaf of a C_3 plant for efficient photosynthesis
(d) In what way do C_3 plants differ in their leaf structure from plants?

208. Describe how plants survive periods of water stress.

209. Write an essay on Transport of respiratory gases in plants including environment effects.

210. (a) Describe the structure of
(i) Mammalian skeletal muscle

(ii) Heart muscle

(b) Describe the mechanism of muscle contraction and control.

211. (a) What do you understand by the term "Aerobic respiration"? and out line the principle stages of this phenomenon.

(b) Discuss the role of Adenosine triphosphate (ATP) in cells.

212. What is phototropism? Give a detailed explanation of this phenomenon in plants with reference to the various types of phototropism.

213. Explain what is meant by each of the following the concept of evolution.
(a) Natural selection
(b) Homologous organs
(c) Convergent evolution
(d) Spontaneous generation
(e) Reproduction isolation
(f) Pentadactyl limb

214. What is Homeostasis? For each of the following explain its Homeostatic importance.
(a) Pancrease
(b) Skin
(c) Heart and blood vessels
(d) Kidney

215. (a) What are the causes of seed dormancy when conditions necessary for germination are present?
(b) What are the advantages of dormancy?
(c) How many dormancy of artificially broken?

216. (i) What is an ecosystem?
(ii) In a named ecosystem describe he flow of energy and recycling of carbon and nitrogen.
(iii) Briefly show how deforestation leads to changes in nutrient levels of the soil.

217. Give the factors that control the size of population. Comment on these factors in relation to human population.

218. (a) Discuss energy flow through an ecosystem.
(b) Outline the steps in the role of pyruvic acid and acetylco a during glucose metabolism.

219. (a) Describe the mechanism and significance of seed dormancy.
(b) What is the significance of seed size in plants?

220. (a) What is the general role of the Automatic nervous system in the body?
(b) Give a brief account on the functioning of the Autonomic nervous system.
(d) What are the similarities between the Autonomic nervous system and ecodorine system?

221. Comment on the statement, "multi cellularity is biological efficiency".

222. Give the modifications the following tissue have for their functions.
(a) Collenchyma (b) Phloem fibres
(c) Xylem fibres (d) Solerenchyma.

223. (a) Give an account of how a mother in a kitchen perceives a call for help from her dying child.
(b) How does hearing ability in man differ from the in bats?

224. (a) With help of a diagram describe the functional unit of the mammalian kidney?
(b) Write a brief essay entitled "The inteplay between aldosterine and Antidurietic hormone in water conservation"

225. (i) With a diagram of a well labeled myelinated nerve cell, describe impulse transm transmission in nerves.

(ii) List three similarities between neuromuscular junction and interneuronal synpase.
(iii) List three chemical transmitters of nervous information.

226. (i) What particular biological difficulties arise with increasing size and complexity of organisms? How have these been over come?
(ii) "The fundamental advantage of multicellularity is biological efficiency" discuss.

227. (a) With reference to a named animal examples, distinguish between external and internal fertilization.
(b) Briefly outline the role of nutrition examples, nutrition, nitrogenous excretion and gaseous exchange in subsequent stages of development of a frog, a bird and mammal.

228. Describe the phases of the menstrual cycle, indicating how it is initiated and maintained in humans by endocrine secretions.

229. Give 6 differences between cartilage and bone. Indicate the possible cause of bone malformations in human beings.

230. Write an essay entitled "The importance of National parks in Uganda" briefly indicating the possible problems encountered in the management of National parks.

231. (a) What are the environmental factors that affect transpiration?
(b) What are the advantages and disadvantages of Transpiration?
(e) What is transpiration after all?

232. (a) What are the female reproductive organs in a flowering plant?
(b) Describe the changes that occur from the time of pollen is deposited on the stigma up to just after fertilization.

233. (a) With a labeled structure of spermatozoa indicate the functions of each part.
(b) Describe the process of spermatogenesis in man.

234. (a) Draw the structure of the female reproductive system in man.
(b) Briefly describe he major changes in the development of a fertilized egg until just after birth in man.

235. (a) Describe the structure of
(i) Xylem elements
(ii) Phloem elements.
(b) Explain how the phloem is adopted to the function of translocation.
Compaire the structure of the sieve tube and companion cells
Compare the structure of the phloem and xylem (functional and sructual)

236. Make a large detailed well-labeled diagram of an Animal cell and give the functions of nucleus and the organelles.
(b) in a tabular form, compare and constrast a mitochondria and a chloroplast.

237. (a) With an example in each case distinguish between a sex limited and sex-linked characters.
(b) In cattle the genes for white and black colour pattern WB and the gene for the long horns (H) are dorminant and located on the X-chromosome.
State the sex and phenotype in case a bull with white and black colour pattern and long horns is mated with brown female with short horns.

238. (a) Describe the mechanism of stamatal opening and closure.
(b) out line the formation of starch from carbondioxide by green plants.
(Biochemical details not required)
(c) What factors adopt a leaf for the process of photosynthesis?

239. Describe the changes undergone by a protainaceous diet from the time it is ingested to when it becomes a product ready to be assimilated.

240. (a) Describe the following types of skeleton.
(i) Endoskeleton
(ii) Exoskeleton
(iii) Hydrostatic skeleton.
(b) Explain how each of the skeletons in a named example achieves its functions of locomotion.

241. (a) Outline the main mechanisms of fruit and seed dispersal, with an example where ever possible.

(b) What is the importance of this process?

242. Name one important Auxin and describe how it brings about irritability in plants to the various environmental stimuli.

243. Discuss in details the factors, which affect enzyme activity.

244. (a) Describe oxygen and carbondioxide transportion tion in the body.

(b) Outline the steps which lead to formation of a blood clot in order of accurance.

245. (a) Explain what is meant by a feed by mechanism and give various types of feed back mechanisms.

(b) Describe 3 physiological feed back mechanisms in mammals.
and 2 non-physiological feed back mechanisms.

246. Discuss the following phenomenon with an example in each case:

(i) Parasitism
(ii) Saprophytis
(iii) Holozoic nutrition
(iv) Holophytic nutrition.

247. Discuss the effects of light in the life of plants.

248. What are properties of water? How are they an adaptation?

249. What are the properties of water? How are they an adaptation for the various function of water?

250. (a) Briefly explain the following processes.

(i) Phagocytosis
(ii) Pinocytosis
(iii) Miropinocytosis

(b) Describe what happens to a Red blood cell
(i) When placed in a hypotonic solution
(ii) When placed in a hypartonic solution

251. (a) State mendels first and seconds laws.

(b) maize seeds were sown and 180 white seedlings and 560 green seedlings were seen after germination. How do you explain this? What progeny would you expect in the next generation.

252. (a) Compare and contrast Deoxrybonucleric acid (DNA) and Ribonucleic acid (RNA)

(b) Briefly discuss protein synthesis indicating the important steps involved.

253. Write an essay on the interdependence between plants and animals (Hint: Nitrogen and carbon cycle should be included among other points in your essay).

254. (a) Explain with examples, the terms
(i) Habitat
(ii) Ecological niche
(iii) Environment
(iv) Climax community.
(b) Discuss the factors that permit prolific growth of plants in a jungle.

255. What is a parasite? Explain how a named parasite is adapted for a parasitic existence?

256. (a) What do you understand by the following
(i) Convergent evolution?
(ii) Divergent evolution?
(b) The first mammals which were isolated in North America and East Africa belonged to the same genus, however today the mammals found in North America and East Africa belong to different genera. Using your knowledge of evolution, explain this observation.

257. If a maize plant heterozygous for the alleles short plant and wrinkled leaf (both recessive to normal size normal leaf) is back crossed with the homozygous recessive parent, 160 of the seeds where subsequently collected and germinated;

(a) (i) How many would you expect to how wrinkled leaves?
(ii) How many would you expect to show normal size and normal leaves?

(b) If the heterozygous maize was selfed what proportion of the off spring show.
(i) Normal size
(ii) Normal leaves and short plant.

(c) In the fruit fly, rod eye (R) is sex linked and dominant to white eye (W) specify the distribution of eye colours among the following cross. Heterozygons red eyed female crossed with red eyed male. Show your working.

258. The graph below shows the number of receptors cells (cones and rods) in the human retina along a holizontal line from the Nasal side of the outside distances are expressed in arbitrary units.

Nasal side

(a) What is the name of the retina at positions 5 and 6
(b) What information can you deduce from the graph about the number of rods and cones at
(c) Explain your answer to part b
(d) Outline two similarities and three differences between

(i) Rods and cones

(ii) Simple eye compound eye.

259. Mammalian blood is mainly a tissue of transport and difference being made up of various cells and plasma.

(a) Outline five materials transported in the blood ad for each indicate the form in which it is transported.
(b) Name two different tissues in adult mammals where blood cells are made.
(c) Name two proteins found in mammalian blood and give their functions.
(d) From your theory of oxygen dissociation curve, draw and briefly explain such a curve. What would you expect a curve of an animal like lung fish which borrows into oxygen deficient mud to be? Explain your answer.

260. One of the methods by which terristial animals endeavour to overcome he problem of excessive water loss is by passing out Nitrogenous wastes with subsequent reabsorption of water. With the help of diagrams (functional units) described how this is accomplished in

(i) man
(ii) insects

261. (a) (i) Draw the structure of well labeled myelinted nerve cell and indicate the direction of impulse flow.

(ii) Outline 3 possible functions of the myelin sheath.
(b) State two theories that have been suggested to explain nervous transmission.
(c) Describe one of these theories with help of diagrams.

262. (a) What is a reflex arc?
(b) The reflex arc is said to contain nerve synapses among other things. Describe how a nerve impulse is transmitted across these synapses.
(c) Briefly indicate 2 structural differences and similarities between the sympathetic and parasympathetic system
(d) Give 4 comparisons and contrasts between the activities of parasympathetic and sympathetic systems.

263. Deoxyribonucleic acid (DNA) has now been isolated as the material of inheritance inheritance, and the basis of protein synthesis. Using this information:-

(a) (i) Explain the structure of DNA
(ii) Give 4 differences and similarities between DNA and RNA.

(b) The processes leading to the synthesis of proteins are believed to occur in following sequence

(1) DNA Replication
(2) Transcription
(3) Translation

Define and describe each of these processes.

264. (a) Draw the structures of well labeled:
(i) Human spermatozoan
(iii) Human egg cell

(b) Briefly describe the process of fertilization in mammals
(c) Compare and contrast internal and external forms of fertilization in named mammals.

265. (a) What is meant by
(i) a vitamin?
(ii) amino acid?
Make three clear physiological and nutritional differences between them.
(b) Fill the table below

Vitamin and or mineral	**Function in man**	**Deficiency**	**Main sources**
1. Phosphorus			
2.Potassium			
3. Calcium			
4. Cobalt			
5. Copper			
6. Iron			
7. Magnesium			
8. Selenium			
9. Vit. A			
10. Vit. C			
11. Vit. D			
12. Vit B_1			
13. Vit B_2			
14.Niactin			
15. Vit K			
16. Vit E			

266. Discuss the role of the pituitary gland in the control of mammalian reproduction.

267. Compare and contrast the functioning of the gills and lungs

268. (a) Explain the terms photosynthesis and respiration.
(b) compare and contrast these two processes in a tubular form
(c) Name the important organelle for each process
(d) Draw labeled structure of these important organelles.

(e) Give four differences and five similarities between these organelles (these could be functional, structural or both)

269. Discuss the interplay between Insulin and Glucogen in the control of blood glucose level.

270. (a) Explain the nature of an oxygen dissociation curve and
(b) show the effects of the partial pressure of CO_2 and pH on the curve.

271. (a) Illustrate and label the principal parts of a spermatozoan indicating the

indicating the functions of each part.
(b) Discuss the hormonal interplay from the time of fertilization in a mammal up to time of parturition.

272. The black butter flies are parasites of the Anual bean plants and certain perennial plants. The table shows the relationship between environmental temperature (resistance) and the number of black butter flies in flight.

Temperature	**Average percentage of flies in flight**
12	0
14	0
16	5
18	10
20	45
22	82
24	94
26	98
28	100

(i) plot these results on a graph.
(ii) Comment on the shape of the graph and suggest physiological explanation for the changes in the number of black butterflies in flight.
(iii) What are the roles played by the Annual and prenial hosts on the cycle of the fly.
(iv) Suggest three biological advantages that flight provides to the flies.

273. Peach tree have fuzzy fruits. Nectarine trees have smooth fruits (No fizz). Most commercial varieties of peaches and nectarines have yellow fresh fruits but some have white flesh. Suppose that you have some peach and some nectarine trees and make the following crosses and get the following progenies.

Cross	**Parent**	**Pregnancy**
1.	White peach 1 x Yellow Nectarine	12 yellow peach tree and 10 white trees.
2.	Yellow nectarine 1 X yellow nectarine	15 yellow nectarine trees.
3.	White peach 1 X yellow	

Represent the allele for fuzz fruits by A. The allele for smooth fruits B and the Allelle for yellow flesh by C and the allele for flesh by D

(a) What proportion of phenotypes would you expect in the progeny if you selfed nectarine?
(b) What are the genotypes of white peah 1, of yellow nectarine 1? And of yellow nectarine 2
(c) What proportion of phenotype would you expect in the progeny if you selfed one of the yellow peach in the progency from cross.

(d) What can you conclude from these experiments about the genetic difference between peaches and nectarines?

274. Two experiments were conducted to measure the metabolism of a rat (3.5g live Weight). One experiment was conducted at 250C and the other at 380C. one litre of oxygen consumed by the rat corresponds to 4.8 kilo calories of energy produced by the animal.
The data obtained is in the table below.

Volume of Oxygen consumed at ;

25.^{0}C	0.2	0.4	0.6	0.85	1.1
38.^{0}C	0.4	1.2	1.8	2.6	3.3
Time taken in minutes	3	6	9	12	15

(a) Using time on the x-axis and volume of oxygen consumed on the Y-axis, indicate the above information on the same graph.
(b) Calculate the rates of oxygen consumption at 25^0 C and 38^0C.
(c) Calculate the energy equivalent in k cals/kg/Hr for oxygen consumed at 25^0C and 37^0C.
(d) Draw and label a detailed diagram of the cell organelle within which oxygen utilization takes place in Animal tissues.
(e) Name one other important metabolic process taking place in animal cells.

275. An experiment was conducted to investigate the interaction between two species of bacteria. A and B. under the same environment calculated every two days in and the data obtained is below:-

Population density of A in millions	**Population density of B in millions**	**Time in days.**
0	0	0
10	10	2
30	35	4
15	30	6

20	35	8
10	50	10
5	55	12
15	60	14
5	65	16
0	65	18

(a) Construct a graph of population density against Time in days.

(scales: on y-axis 2cm: 25 millions and draw the two population curves on same graph)

(b) Describe the population changes of the two species of bacteria during the period of the investigation.
(c) Outline the factors underlying the changes in the populations of the two species.
(d) In another experiment, bacteria species A was replaced by another species C. It was found that species C occupies the bottom of the culture medium while species B occupied the upper part.
  (i) What possible conclusions would you make from the two experiments outlined above with respect to the interaction between the three species of Bacteria.
  (ii) State a way in which results from this experiments would be of value to researchers in a laboratory.

276. An area of land a size of a football play ground located near your school is dug up and cleared of all vegetation. Then observed for a period of 30 years, records being made on monthly basis. Assuming that no large herbivores and unusual drought affected the Area in the period.
Answer the following questions.
(a) From your knowledge of local flora and fauna describe the successional appearance of plants and animals from the first month to the last month.
(b) With examples, discuss the trophic relationships you would expect to find on this area by the end of the investigation period.
(c) Discuss a sampling method in each case for plants and for animals you would use to determine the population density of any one type of plant and surface dwelling inverterbrate on the observation area.
(d) Give the differences that you would observe between a typical crop-field and the observation area at the end of the observation period.

277. (a) What do you understand by the term wild life?
(b) clearly distinguish between cropping and poaching of animals.
(c) what role do small mammals rodents play in a National park.
(d) give the possible effects, large mammals have on equatic biota.
(e) Describe one method you would use to count large mammals in a National park.

278. The figures below show theoretical age structures in Africa and Europe in a certain investigation year.

279. (a) Compare and contrast the size of the human population groups of the two continents in
(i) Pre productive group
(ii) Reproductive group

(b) Suggest one other continent likely to have a more or less similar age structure as that for Africa.
(c) Construct one diagram to show the proportions in human populations in your family and suggest possible advantages and or disadvantages of such a distribution.

280. A mammalian red blood cell is sensitive to changes in salt concentrations of the external solution. When it is placed in a hypertonic solution, it is plamolysed and when it is placed in a hypotonic solution it swells and eventually bursts. This is called haemolysis. An experiment was conducted to find the percentage of Red blood cells haemolysed at different concentrations of salt solution and the following results were obtained.

Percentage salt concentration ($g/100cm^3$)	0.48	0.45	0	0.40	0.38	0.35	0.32
Percentage red blood cell haemolysed	0	15	30	65	80	90	100

(a) What do the following terms mean?

(i) hypertonic solution?
(ii) Hypotonic solution?

(b) Plot a graph of the percentage red cells haemolysed against the percentage salt concentration.
(c) Describe the processes of (i) Haemolysis and
(ii) Plasmolysis

(d) At what percentage salt solution is the proportion of the non haemolysed red blood cells equal to that of the haemolysed red blood cells/
(e) What is the significance of these observations as far body physiology is concerned?

281. Enzymes are organic catalysts found in living tissues. Every enzyme has an optimum temperature range within which acts best. An experiment was carried out to investigate the effect of temperature on the rate of an enzyme- controlled reaction (enzyme and substrate concentration were constants) and the results were as follows:

Temperature ^{0}C	0	10	20	30	40	50	60
Rate of reaction in mg of products per unit time.	0.23	0.5	1.4	2.8	4.2	2.4	0

(a) Plot the results on graph paper (Rate against temperature)
(b) With your theory of enzymes properties give a detailed explanation and interpretation of the graph.
(c) Suggest a possible optimum temperature range for the enzyme under investigation.
(d) Outline other properties of enzymes which could limit their functions.

282. The starfish inhabiting the deep waters of the tropics feeds on coral polyps. And Certain coral areas, these starfish gather to form large aggregate of individuals, when the food in one area is used up the starfish move to another coral area.
(a) Give two possible reasons for the congregation of starfish.
(b) What are the possible merits and demerits of the starfish behaviour.
(c) Starfish have caused severe damage to coral reefs of economic importance. Suggest methods by which man can control the destructive activities of the starfish.

283.

The graph above shows population explosion in Kiahab deer following removal of predators in an isolated area in America.

(1) Suggest an explanation with reasons for the rapid increase in the dear population from 1905 and 1924.
(2) What explanation can you give the sudden down ward curve of the population between 1924 and 1930?
(3) What would you expect to have happened to the deer population and the predators after 1935?

284.

The graph above shows the trend of population growth of laboratory Mice which bred over a period of time.

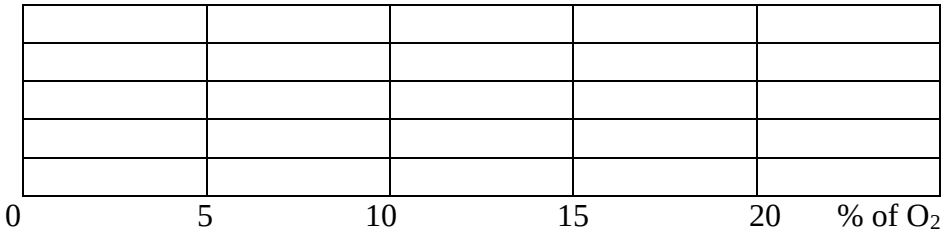
(a) Explain the shape of the curve between (i) A – B (ii) B – C (iii) C – D (iv) D – E

(b) Outline five factors likely to contribute to the shape of the curve at D – E

(c) If the graph represented human population in a Country, suggest any four factors which would contribute to shape at C – D

(d) Explain the concept of Animal population Natural control, in national parks.

285. Oxygen is carried by the red blood cell in form of oxyhaemolobin, when the Oxygaemoglobin in each blood sample is plotted against the percentage of oxygen in the Air around, a graph called oxhaemoglobin dissociation curve is obtained and such a graph is represented below.



GUIDING QUESTIONS TO COORDINATION RESPONSE AND CONTROL APPOACHED IN THREE CATEGORIES.

A. Reception and stimuli

B. Nervous and endocrine systems

C. Response and behaviour

A. RECEPTION ND STIMULI

Define the following terms

(i) Stimuli
(ii) Receptor
(iii) Response
(iv) Effecter.

1. Explain the meaning of the following receptors with examples.

i) Primary receptor cells
ii) Secondary receptor cells
iii) Sense organs.

According to position in body:

i) Exteroreceptors.
ii) Enteroreceptors
iii) Chemonreceptors
iv) Electroreceptor

According to distance at which they are able to defect stimuli

i) Distance receptors
ii) Contract receptors

3. (a) Explain how a receptor cell works
(b) State the characteristics common to all

i.e – Adaptation
- Transudation
- Sensity
- Precision
- Inhibition

4. (a) Draw and label a L.S of a human eye
   (b) State the function of each part labeled
   (c) Explain how the human eye controls the amount of light entering it i.e compare bright and dim light
   (d) Describe accommodation of the human eye i.e compare distant and near objects.

5. (a) Compare cones and rods.
   (b) Explain light reception in cones and rods.
   (c) How is the human eye able to distinguish objects close to each other?
      (i) Explain colour vision
      (ii) Compare a compound eye and a Mahan eye

6. (a) Draw and label a human ear. State the function of each part
   (b) Describe how human ear performs the following
      (i) Hearing
      (ii) Balance
      (iii) Body orientation.

RECEPTION AND RESPONSE IN PLANTS

7. (a) Explain the following responses with diagrams where necessary
      (i) Phototropism
      (ii) Geotropism
      (iii) Hydrotropism
      (iv) Chemotropism
      (v) Thigmotropism
      (vi) Aerotropism

   (b) With examples explain the following tactic responses
      (i) phototaxis
      (ii) thermotaxis
      (iii) chemotaxis

8. (a) State an example, site of productions and major effects of each of the following grown substances
      (i) Auxins
      (ii) Gibberellins
      (iii) Cytokinins
      (iv) Abscissic acid
      (v) Ethene

   (b) Draw a graph to show a relationship between growth and auxin concentration in roots and shoots and interpret the graph

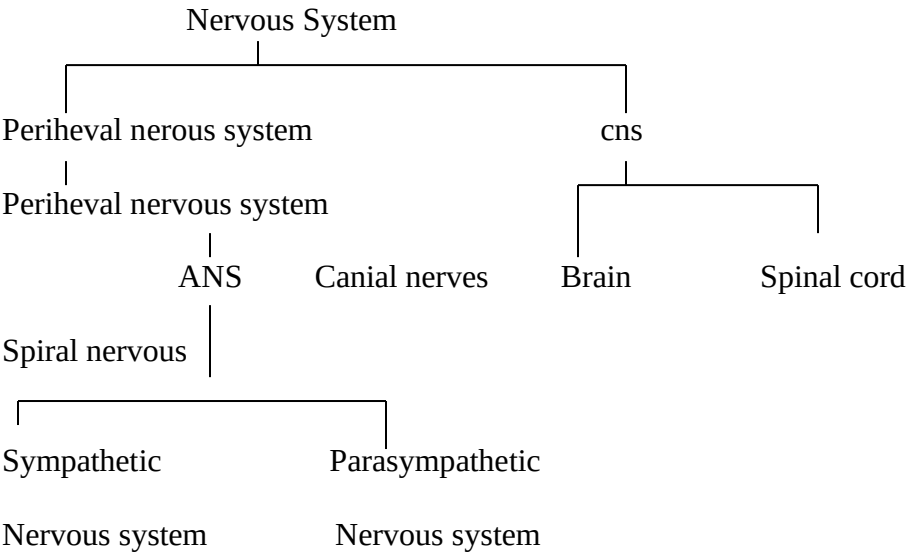
9. (a) (i) What are nastic responses?
   (ii) Explain the following;-
      - Photonasty
      - Thermonasty
      - Thimonasty

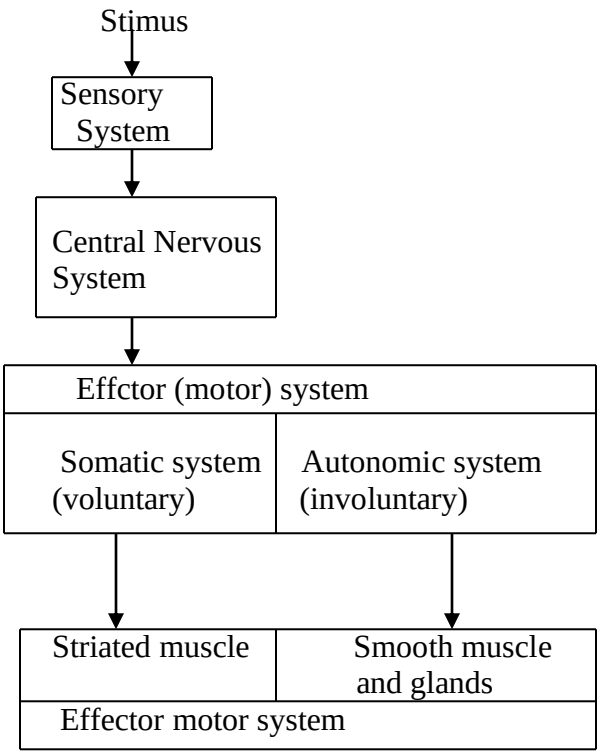
- Nycinasty

(b) Compare tropisms and nastic reponses

10. (a) Explain how the mechanism of the following is controlled
    (i) What is photopeidism?
    (ii) Explain the following
        - short day plants
        - long day plants
        - day neutral plants.

NERVOUS AND ENDOCRINE SYSTEMS





11. (a) Define the following:
    (i) Neuron
    (ii) Motor neuron.

    a. Sensory neuron
    b. (i) Draw a structure of a neuron and label all the parts.
       (ii) State the function of each part.

12. (a) Define the function of each part
    (i) Resting potential
    (ii) Action potential
    (iii) Refractory period

(b) (i) Describe the formation and transmission of a nerve impulse
(ii) State and explain the factors affecting transmission speed along a neuron.
(iii) What is all or nothing law?

13. (a) Distinguish between
    (i) absolute refractory period
    (ii) relative refractory period

(b) (i) Draw a graph to show changes in the excitability of an axon following threshold stimulus.
(ii) State the importance of the refractory period

14. (a) (i) Draw a structure of a nerve synapse and label all the parts.
(ii) State the function of parts labeled

(b) (i) Describe how a synapse function
(ii) State neurotransmittersubsistence

(c) Explain the function of synapses

15. (a) Draw a vertical structure of the human brain, and state the function of each part e.g
    (i) Cerebrum
    (ii) Corpus callosum
    (iii) Thalamus
    (iv) Hypothalum
    (v) Corpora quadrigemina
    (vi) Medulla obiongate
    (vii) Cerebellum
    (viii) Pons.

16. State the similarities & differences the sympathetic and parasympathetic. Nervous system.

ENDOCRINE SYSTEM

17. (a) Define the following;
    (i) Hormone
    (ii) Endocrine gland

(iii) Exocrine gland

(b) State the differences between
(i) Exocrine gland and endocrine glands
(ii) Hormone and enzyme

(c) State the properties of hormones

(d) Describe the nature and action of hormones

17. (a) Draw a human body and locate the following endocrine glands
(i) Hypothalamus – pituitary
(ii) Thyroid
(iii) Parathyroid
(iv) Adrenal
(v) Pancreas
(vi) Ovaries
(vii) Testis
(viii) Pineal
(ix) Thymus

(b) (i) State the hormones produced by above glands and the functions of each hormone.

(ii) State deficiencies of each hormone

(c) (i) State the similarities and differences between endrocrine and nervous system.

C: RESPONSE AND BEHAVIOUR

- The study of behaviour is called ethology
- Behaviour is divided into two categories ie.

(i) Instinct (innate) behaviour
(ii) Learned behvaviour

1. (a) (i) What is instinctive
(ii) State characteristics of instincts

(b) Define the following behaviour and state the importance of each behaviour to the organisms
(i) Reflex actions
(ii) Kinesis
(iii) Taxis
(iv) Territorial
(v) Reproductive

2. (a) (i) What is learning?
(ii) State characteristics of learning.
(iii) State the differences between instinctive and learned behaviour.

(b) Explain the following types of learning, state the characteristics of each giving the importance of each of the of the organism's survival

(i) Habituation
(ii) Associative learning
(iii) Conditional reflex
(iv) Trial and error
(v) Imprinting
(vi) Exploratory learning
(vii) Insight learning.

REVISION QUESTIONS AND LOCOMOTION

1. (a) What is locomotion
   (b) Describe the following types of locomotion:
   (i) Amoeboid locomotion
   (ii) Ciliary
   (iii) Flagellaly locomotion
   (c) State the importance of each type in (b) above.

2. (a) Explain the following with examples.
   (i) Hydrostatic skeleton
   (ii) Exoskeleton
   (iii) Endoskeleton

   (b) Describe locomotion in an earthworm

3. (a) Describe flight in insects
   (b) Describe flight in birds.
   (c) State the adaptations of flight in birds.

4. (a) (i) Describe locomotion in fish.
   (ii) Explain how the following are controlled in fish.

- Yawing
- Pitching
- Rolling

5. (a) Describe walking in tetrapods
   (b) Describe the mechanism of muscle contraction.