

AHMES SECONDARY SCHOOL
FORM SIX HOLIDAY PACKAGE DECEMBER 2021

BIOLOGY

1. (a) There are three types of ecological pyramids.
 - i. Identify and name them.
 - ii. Show how they are constructed.(b) What are the advantages and disadvantages of each of the pyramids identified in (a) above?(c) Explain why only a small proportion of energy taken up by each level of a food chain is transferred to the next step.
2. (a) Explain how a quadrant can be used to estimate population size with respect to the three aspects of species distribution namely: species density, species frequency and species cover.
(b) State any four factors which influence population distribution.
3. Explain how the following support the theory of organic evolution.
 - i. Comparative embryology
 - ii. Selective breeding
 - iii. Comparative anatomy
 - iv. Comparative embryology.
 - v. Comparative biochemistry.
 - vi. Classification.
 - vii. Palaeontology.
4. (a) Briefly explain why it is important that active transport is employed in the absorption of the end products of digestions.
(b) Elaborate the role of the liver in the digestion and metabolism of the end products of digestion
5. Discuss the sensory and hormonal control of secretions of the digestive system in man.
6. The human body has an elaborate mechanism to ensure that its water content is kept more or less constant. Discuss the role of the endocrine system in maintaining water balance in the human body.
7. (a) Explain how feedback system works to bring about homeostatic conditions in animals.
(b) Describe the counter current multiplier system in the loop of Henle.

8. Two people X and Y, drank a glucose solution containing 100 grams of the solute. The blood sugar of each person was measured after 3 hours and the results obtained were as shown in the table below.

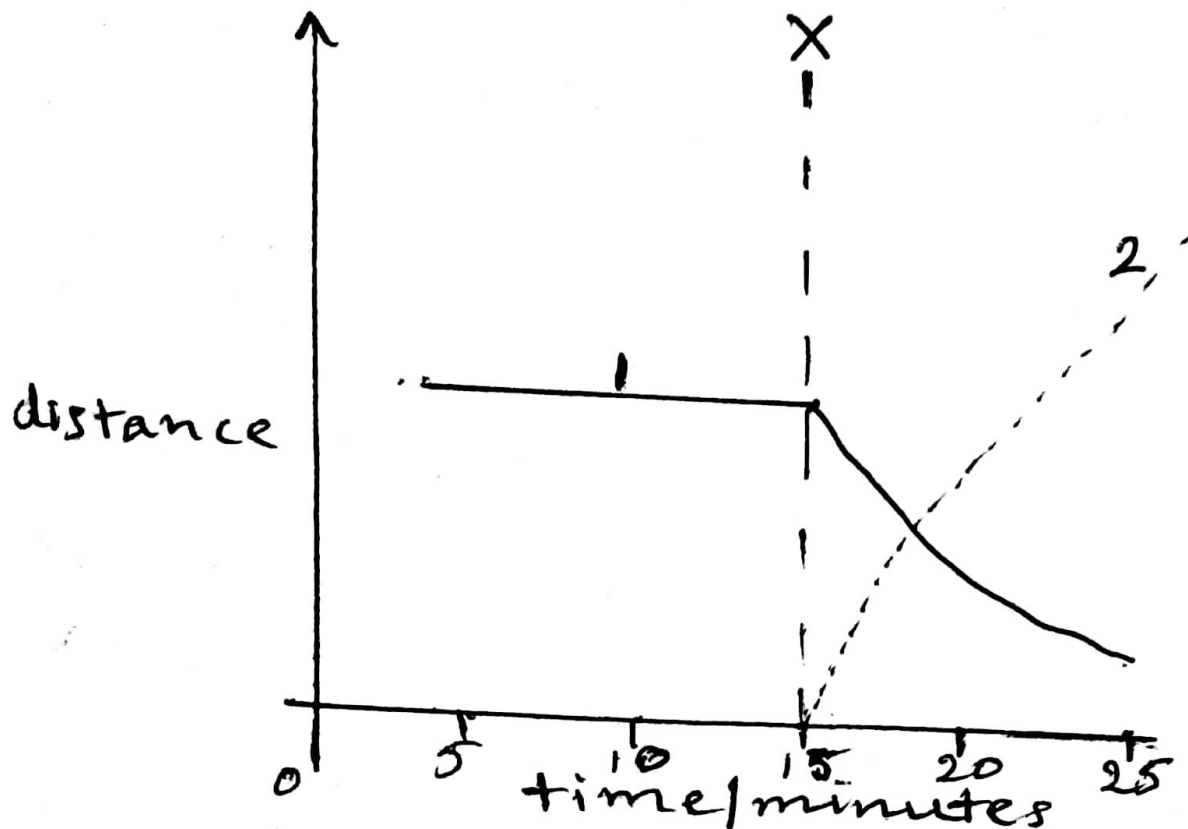
Time (minutes)	Blood sugar level mg/100cm ³ blood	
	X	Y
0 glucose drunk	81	90
20	136	131
40	181	142
60	213	89
90	204	79
120	147	74
150	129	86

- (a) Plot a graph of blood sugar (vertical axis) against time (horizontal) for X and Y.
 (b) Suggest explanations for the changes in blood sugar levels of X and Y.
9. (a) How does the electron transport chain system release ATP molecules?
 (b) Explain why electron transport systems are important in living organisms.
10. (a) Draw a diagram to show the cellular structure of the retina of a mammalian eye.
 (b) How does the eye control the amount of light entering it?
11. (a) (i) Classify receptors into five categories on the basis of the stimuli they respond to.
 (ii) Name the stimuli in each case.
 (b) Tabulate four differences between rods and cones.
12. (a) What is phytohormone?
 (b) In what ways are phytohormones important in plant growth and development?
13. (a) Describe the properties which account for the DNA's suitability as a material for heredity.
 (b) In oats, the grain is enclosed by the dried remains of the outer parts of the flower, called the hull. In a cross between two pure breeding varieties of oats, one with black-hulled grains, the other with white-hulled grains, the offspring (F₁) all had black-hulled grains. Allowing the F₁ plants to self-fertilize gave an F₂ with the phenotypes shown below.

Phenotype	Number
black-hulled grains	418
Grey-hulled grains	106
White-hulled grains	36

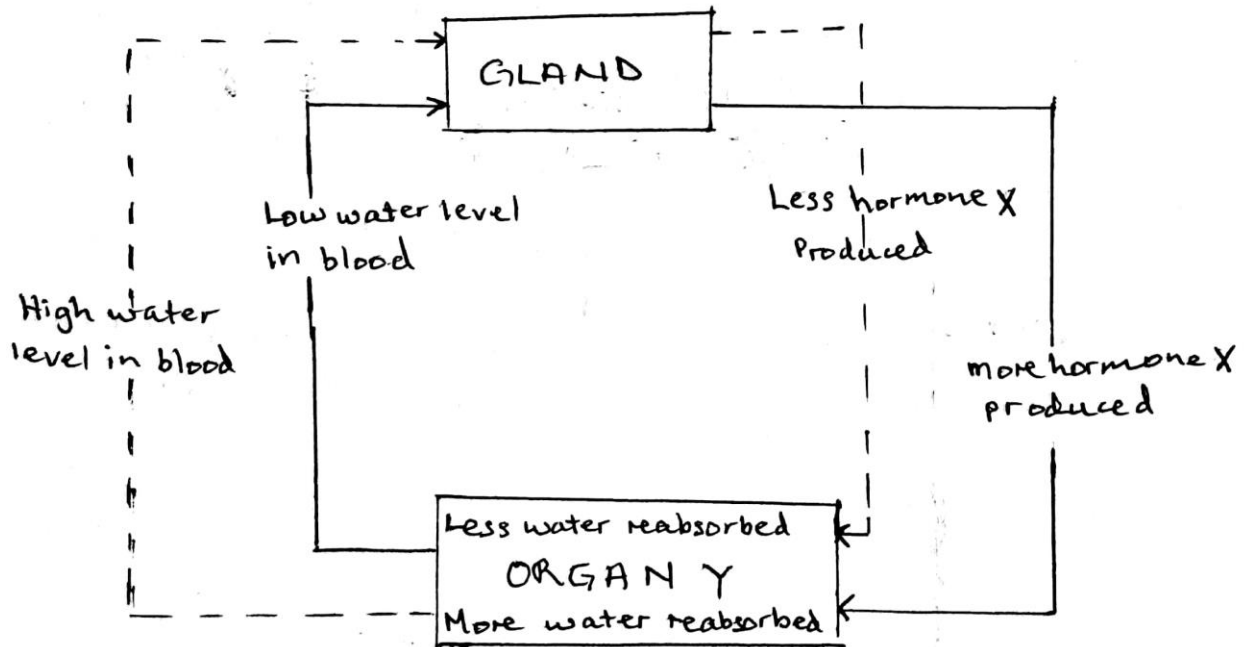
- (b) (i) What genetic ratio is suggested
 (ii) Devise suitable symbols for the alleles involved, and set out the crosses, using a Punnet square, to show the gametes, genotypes and phenotypes in each generation.

14. (a) Using the active potassium transport theory explain the mechanism of opening and closing of stomata. Draw a well labeled diagram structure of cells that support the mechanism of opening and closure of stomata.
- (b) A farmer stored maize for seeds in airtight metallic drum for use after one year. He was preserving the seeds against seed borer insects. After planting the seeds, that was when he released the serious mistake committed. What was the mistake and how did it amount to what damage observed?
15. (a) (i) What is meiosis?
(ii) Discuss briefly the fact that mitosis is an essential process in life.
- (b) Study carefully the graph below, which shows measurements taken during one mitotic cell cycle. These include distance between centromeres of chromosomes and poles of spindles, and distance between centromeres of sister chromatids. Giving two reasons, show which stage of mitosis begins at X.



- (i) Which measurements are shown by each curve 1 and 2?
(ii) Draw and label the chromosomal behavior at time between 2-15 minutes.
16. Alternation of generations in plants is a survival strategy in solving one of terrestrial problems in course of taking off to land during evolution. It involves two generation individuals in lower plants but the necessitated two in one individual in higher plants. Discuss as to why and how.

17. (a) The diagram below represents a control system for fluid level in mammals.

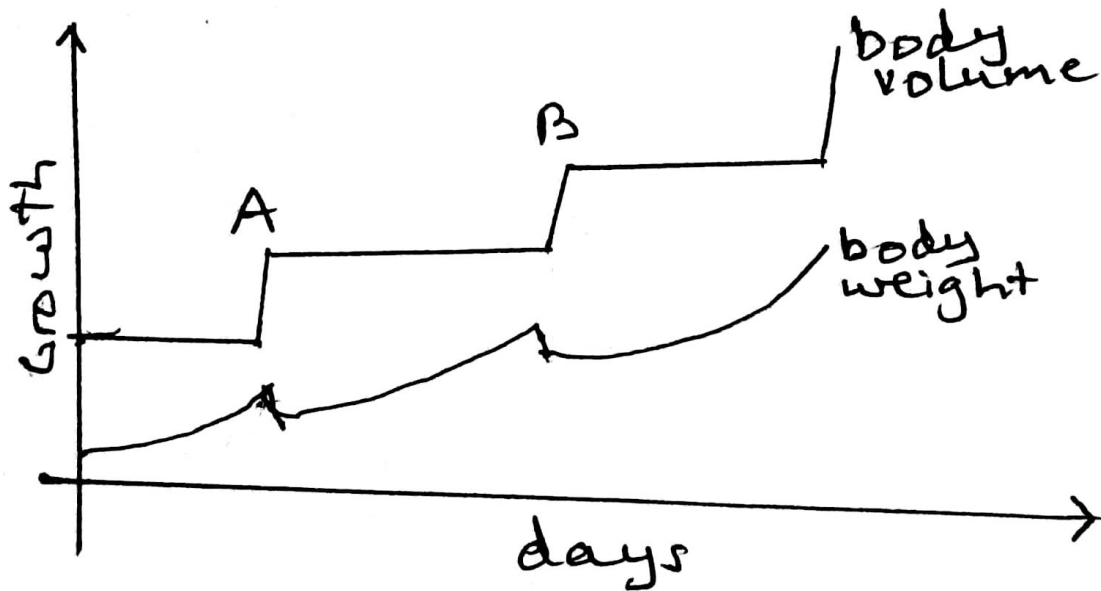


- (i) What is the name given to a mechanism such as represented above?
- (ii) Identify hormone X.
- (iii) Name the gland that secretes the hormone.
- (iv) How does the hormone reach the target organ Y?
- (v) Identify organ Y.

(b) Hormones resemble and yet differ from enzymes. Explain.

18. (a)
- (i) What is meant by the term parasitism?
 - (ii) Explain any four problems that a parasite faces in parasitism.
 - (iii) Show symbiosis in Lichens

(b) (i) Account for the growth curves below, of a certain animal:



(ii) Why is this growth phenomenon important to the type of organisms experiencing it?

(iii) Give an example of a group of organisms which have such a pattern of growth.

(iii) State the hormone responsible for such pattern of growth.

(iv) What is the name of the phenomenon?

19. (a) Why is it not possible to use homozygous dominant organism in a back cross (test cross) experiment to determine the genotype of an organism showing the dominant phenotype? Illustrate your answer fully.

(b) Categorize the following list of human traits into continuous and discontinuous traits: Tongue rolling, intelligence, height, blood groups, sex and skin colour.

20. (a) Give two differences between the X and Y chromosomes of humans.

(b) Why are there more colour-blind individuals than hemophiliacs in the population when the alleles for both defects are inherited in the same fashion, that is, sex linked?