

S 452 June
S.S.C.E. 1993
BIOLOGY 2
2 hours 5 minutes

WEST AFRICAN EXAMINATIONS COUNCIL
NIGERIA

Senior School Certificate Examination

June 1993

BIOLOGY 2

2 hours 5 minutes

Do **not** open this booklet until you are told to do so. While you are waiting, read the following instructions carefully.

This paper consists of two sections. Answer Section A on your Objective Test answer sheet and Section B in your answer book. Section A will last for 50 minutes after which the answer sheets will be collected. Do **not** start Section B until you are told to do so. Section B will last for 1¼ hours.

SECTION A

50 minutes

OBJECTIVE TEST

[60 marks]

- Use HB pencil throughout.
- If you have got a blank answer sheet, complete the top section of it as follows.
 - In the space marked *Name*, write in capital letters your **surname** followed by your **other names**.
 - In the spaces marked *Examination, Year, Subject and Paper*, write 'S.S.C.E.', '1993 June', 'BIOLOGY' and '2', respectively.
 - In the box marked *Index Number*, write down your **index number** vertically in the spaces on the left-hand side. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
 - In the box marked *Subject Code*, write down the digits 451024 in the spaces on the left-hand side. Shade the corresponding numbered spaces in the same way as for your index number.
 - In the box marked *Sex*, shade the space marked *M* if you are male, or *F* if you are female.
- If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in 2 above. In the boxes marked *Index Number, Subject Code* and *Sex*, **reshade** each of the shaded spaces.
- An example is given below. This is for a *male* candidate, whose **name** is Kehinde Adeolu KOLADE, whose **index number** is 41230068 and who is offering *Biology 2*.

WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS

Name: KOLADE KEHINDE ADEOLU Examination: S.S.C.E Year: 1993 June
Surname Other Names

Subject: BIOLOGY Paper: 2

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Indicate your sex by shading the space marked M (for Male) and F (for Female) in this box

M F

For Supervisors only
If candidate is absent shade this space:

- INSTRUCTIONS TO CANDIDATES
- Use grade HB pencil throughout.
 - Answer each question by choosing one letter and shading it like this: A B C D E
 - Erase completely any answers you wish to change.
 - Leave extra spaces blank if the answer spaces provided are more than you need.
 - Do not make any markings across the heavy black marks at the right hand edge of



Answer **all** the questions.

Each question is followed by five options lettered A to E. Find out the correct option for each question and shade **in pencil** on your answer sheet the answer space which bears the same letter as the option you have chosen. Give only **one** answer to each question. An example is given below.

The cells that surround the stoma are called

- A. stomatal cells.
- B. parenchyma cells.
- C. epidermal cells.
- D. substomatal cells.
- E. guard cells.

The correct answer is guard cells, which is lettered E, and therefore answer space E would be shaded.

(A) (B) (C) (D) **+E+**

Think carefully before you shade the answer spaces; erase completely any answers you wish to change.

Do all rough work on this question paper.

Now answer the following questions.

1. The organ which is sensitive to light in *Euglena* is the

- A. gullet.
- B. chloroplast.
- C. eye spot.
- D. contractile vacuole.
- E. flagellum.

2. Which of the following is a similarity between a typical animal cell and a typical plant cell?

Presence of

- A. cellulose cell wall
- B. chlorophyll
- C. centrally-placed nucleus
- D. cell membrane
- E. large vacuole

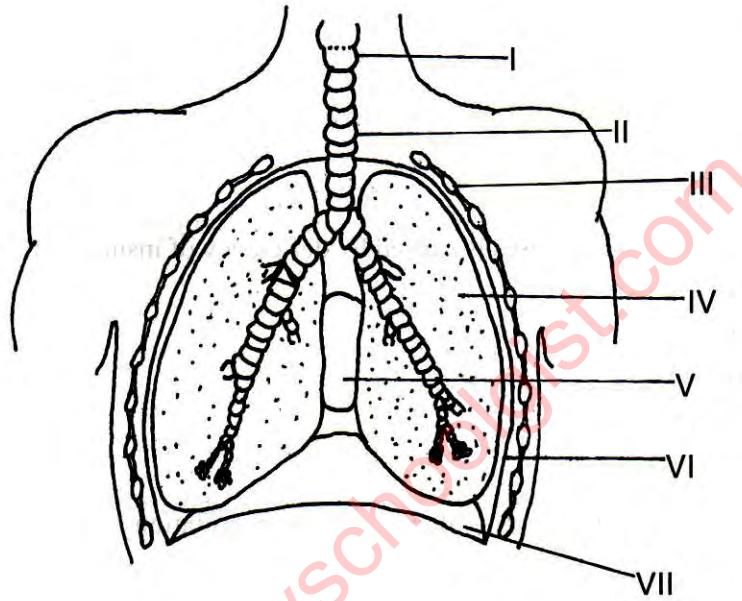
3. The first scientist to describe the cell was

- A. Theodor Schwann.
- B. Felix Dujardin.
- C. Robert Hooke.
- D. Charles Darwin.
- E. Matthias Schleiden.

4. In which of the following parts of a cell is the chromosome found?

- A. Nucleus
- B. Golgi body
- C. Cytoplasm
- D. Cell membrane
- E. Cell wall

Use the diagram below to answer Questions 5 to 8.



5. The part labelled VII is the

- A. pleural cavity.
- B. lung.
- C. rib.
- D. diaphragm.
- E. intercostal muscle.

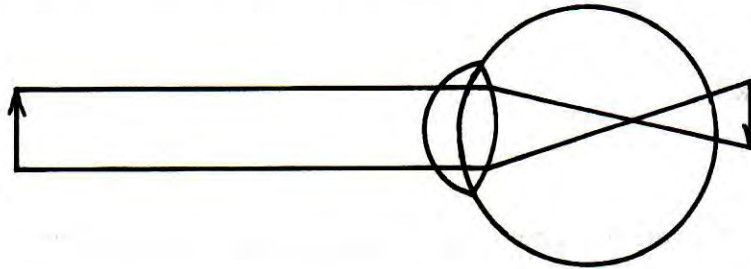
6. The part labelled I is the

- A. epiglottis.
- B. larynx.
- C. oesophagus.
- D. trachea.
- E. bronchus.

7. Exchange of gases takes place in the air sacs contained in the part labelled
- A. I.
 - B. II.
 - C. IV.
 - D. V.
 - E. VI.
8. During the process of breathing, volume and pressure changes occur as a result of the movement of the parts labelled
- A. I and II.
 - B. II and IV.
 - C. III and VII.
 - D. IV and V.
 - E. VI and VII.
9. Which of the following diseases is caused by deficiency of insulin in the body?
- A. Malaria
 - B. Diabetes mellitus
 - C. Hepatitis
 - D. Gonorrhoea
 - E. Cholera
10. Which of the following is the medium of transportation of nutrients within unicellular organisms?
- A. Blood
 - B. Serum
 - C. Protoplasm
 - D. Plasma
 - E. Lymph
11. Which of the following blood vessels carries oxygenated blood into the heart?
- A. Pulmonary vein
 - B. Anterior vena cava
 - C. Pulmonary artery
 - D. Aorta
 - E. Posterior vena cava
12. The conditions that ensure successful exchange of gases in multicellular organisms include the following **except**
- A. concentration gradient across the respiratory surface.
 - B. presence of thin membrane as the respiratory surface.
 - C. fast transportation of absorbed gases.
 - D. presence of large surface area of the respiratory organ.
 - E. presence of small, dry surface area of the respiratory organ.

13. The respiratory organ found in the cockroach is the
- A. air sac.
 - B. trachea.
 - C. lung book.
 - D. lung.
 - E. gill.
14. Which of the following structures functions as an excretory system found in flat worms?
- A. Contractile vacuole
 - B. Nephridium
 - C. Flame cell
 - D. Malpighian tubule
 - E. Kidney
15. Which of the following organs is associated with deamination of proteins?
- A. Lung
 - B. Stomach
 - C. Kidney
 - D. Liver
 - E. Heart
16. Ultrafiltration in the kidney takes place in the
- A. loop of Henle.
 - B. renal vein.
 - C. Bowman's capsule.
 - D. pelvis.
 - E. pyramid.
17. When an axon is at rest, the concentration of ions on either side of the membrane are different. Which of the following is correct about the concentrations of ions on either side of the membrane?
- A. There is an excess of potassium ions inside the axon and an excess of sodium ions outside.
 - B. The inside of the axon becomes positively charged while the outside is negatively charged.
 - C. There is an excess of sodium ions on the inner side of the axon.
 - D. Chloride and potassium ions begin to move across the membrane.
 - E. Calcium ions accumulate on the inner side of the axon.
18. The groups of sensory cells found on the upper surface of the tongue are called
- A. ampullae.
 - B. taste buds.
 - C. nerve cells.
 - D. somatic cells.
 - E. tactile cells.

Use the diagram below to answer Questions 19 and 20.

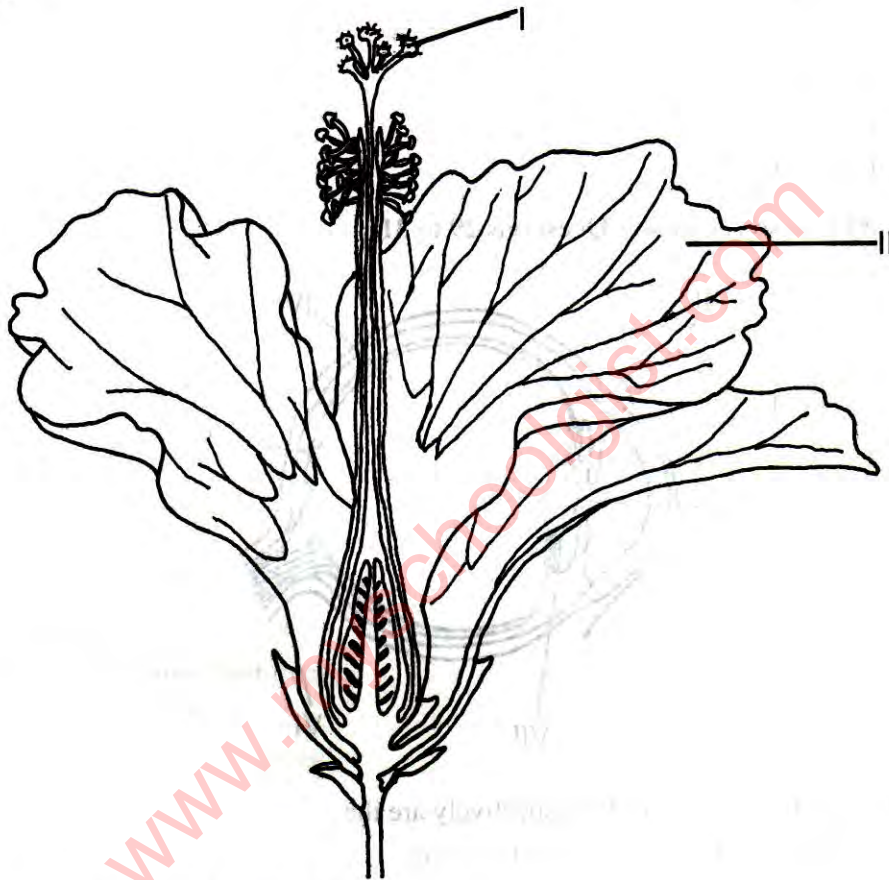


19. What type of eye defect is illustrated in the diagram above?
- Hypermetropia
 - Myopia
 - Cataract
 - Astigmatism
 - Glaucoma
20. This defect can be corrected by the use of
- convex lens.
 - concave lens.
 - cylindrical lens.
 - surgical operation.
 - biconcave lens.
21. Which of the following is **not** a courtship behaviour exhibited by animals?
- Pairing
 - Display
 - Seasonal migration
 - Hibernation
 - Territorialism
22. Which of the following mineral salts is a trace element?
- Zinc
 - Carbon
 - Hydrogen
 - Potassium
 - Calcium
23. Which of the following organisms reduces nitrates in the soil to gaseous nitrogen?
- Euglena*
 - Protozoon
 - Denitrifying bacterium
 - Parasitic mould
 - Nitrifying bacterium

24. The process whereby microorganisms can convert atmospheric nitrogen into nitrogenous compound is known as

- A. nitrogen cycle.
- B. nitrogen fixation.
- C. denitrification.
- D. putrefaction.
- E. decomposition.

Use the diagram below to answer Questions 25 to 27.



25. What is the function of the part labelled II?

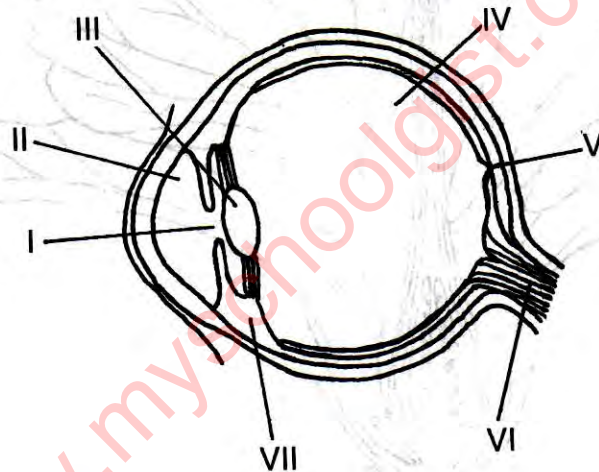
- A. Attraction of insects
- B. Secretion of nectar
- C. Protection of the stigma
- D. Formation of fruit wall
- E. Attachment of flower to the shoot

26. The function of the part labelled I is to

- A. receive pollen grains.
- B. produce nectar.
- C. store the pollen grains.
- D. store the ovules.
- E. produce the male gametes.

27. How would you describe the position of the ovary in relation to the receptacle?
- Superior
 - Inferior
 - Semi-inferior
 - Gamosepalous
 - Polysepalous
28. What type of relationship exists between a tapeworm and an infected mammal?
- Symbiosis
 - Commensalism
 - Predation
 - Parasitism
 - Saprophytism

Use the diagram below to answer Questions 29 to 31.



29. The parts labelled IV, V, and VI respectively are the
- ciliary body, optic nerve and yellow spot.
 - blind spot, optic nerve and suspensory ligament.
 - vitreous humour, yellow spot and optic nerve.
 - blind spot, optic nerve and pupil.
 - yellow spot, retina and choroid layer.
30. The light ray entering the eye goes through the following route
- II → III → I → IV → V.
 - II → I → VII → III → V.
 - II → I → III → IV → V.
 - V → IV → III → I → II.
 - I → VII → III → IV → V.

31. Which of the following structures are adjusted in focussing the image of a distant or near object on the retina?
- A. I and II
 - B. II and III
 - C. III and VII
 - D. IV and V
 - E. V and VII
32. Which of the following best describes a marine habitat? A large body of water
- A. which has no distinctive colour or taste
 - B. with high concentration of salt
 - C. with little suspended materials
 - D. with no water weeds
 - E. which sustains no animal life
33. The following are features of the tropical rain forest **except**
- A. abundant water supply.
 - B. loose and moist soil.
 - C. short trees growing beneath tall trees.
 - D. scanty trees with small leaves.
 - E. presence of many animals.
34. The following are features of Northern Guinea Savanna **except**
- A. presence of tall trees with thick bark.
 - B. bare soil with very few trees.
 - C. presence of fire-resistant trees.
 - D. abundant herbivores.
 - E. predominance of woody trees.
35. Which of the following explains the term *pyramid of numbers*?
- A. The number of organisms in a trophic level
 - B. The relationship between plants in different trophic levels
 - C. The number of saprophytes and parasites in a habitat
 - D. The number of predators in a habitat
 - E. Progressive decrease in the number of individuals from lower to higher trophic level
36. In which of the following processes is carbon dioxide **not** given out?
- A. Respiration in plants
 - B. Decay of organisms
 - C. Burning of organic matter
 - D. Burning of fuels
 - E. During photosynthesis

37. Sea water taken in by a living organism can be recycled into the atmosphere through all the following processes **except**
- A. transpiration.
 - B. digestion.
 - C. excretion.
 - D. respiration.
 - E. decay.
38. Which of the following water pollutants may contain organisms that cause dysentery?
- A. Pesticides
 - B. Sewage
 - C. Industrial wastes
 - D. Fertilizers
 - E. Crude oil
39. Which of the following is **not** an adaptation of plants or animals to desert environment?
- A. Well developed tap root system
 - B. Small leaves with thick epidermis
 - C. Stems with spike-like leaves
 - D. Metabolic waste in the form of uric acid in some animals
 - E. Broad leaves for storage
40. A climax community is characterised by
- A. a stable composition of plant and animal species.
 - B. rapid changes in the composition of species.
 - C. constant changes in appearance of the habitat.
 - D. different species occurring at different times.
 - E. gradual change in animal population.
41. Which of the following is not a characteristic of overcrowding in plant and animal community?
- A. Population outstripping available space
 - B. Population exceeding available food
 - C. Competition within the population
 - D. Increase in primary production
 - E. Population increasing at the same rate as the birth rate
42. The use of predators or parasites to control pests in the farm is known as
- A. predator control.
 - B. chemical control.
 - C. biological control.
 - D. animal control.
 - E. parasitic control.

43. Which of the following substances **cannot** control the growth of harmful microorganisms?
- Antibiotics
 - Hypertonic salt solution
 - Disinfectants
 - Isotonic sugar solution
 - Antiseptics
44. Which of the following is the underlining principle in the adoption of biological control of pests?
- Knowledge of agricultural practices by the farmer
 - Relationship between plants and animals
 - The presence of poisonous chemicals in the farm
 - The relative population of plants and animals in the farm
 - The predator–prey relationship in the ecological community
45. The following agencies are responsible for conservation in Nigeria **except**
- Forestry Departments.
 - Nigerian Conservation Society.
 - Game Reserve Authority.
 - Nigerian Red Cross Society.
 - Ministry of Agriculture and Natural Resources.
46. The largest game reserve in Nigeria is the
- Kainji Game Reserve in Niger State.
 - Zamfara Forest Reserve in Sokoto State.
 - Yankari Game Reserve in Bauchi State.
 - Borgu Game Reserve in Niger State.
 - Oban Hills Game Reserve in Cross River State.
47. The table below indicates the result of an experiment during which grains of different colours in two maize cobs were counted.

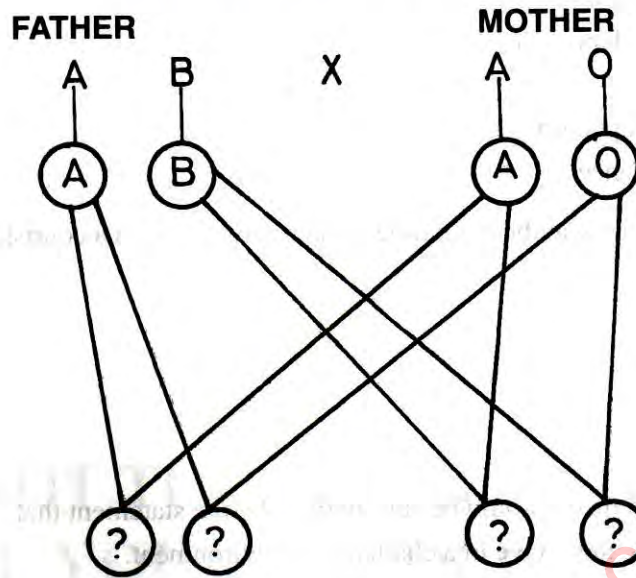
Maize Cob	Colours of Maize Grains		
	White	Pink	Red
I	30	60	30
II	50	99	49

Which of the following ratios agrees with the result?

- 9 : 3 : 3
- 1 : 2 : 1
- 1 : 3 : 1
- 2 : 1 : 1
- 2 : 3 : 2

48. One of the factors that must be considered for safe blood transfusion is
- social class of the donor.
 - age of the recipient.
 - rhesus factors of the donor and the recipient.
 - nationality of the donor.
 - weight of the recipient.
49. One of the major criticisms against Mendelian laws is that they do **not** recognise that
- one trait is often controlled by many pairs of genes.
 - single factor inheritance is never a reality.
 - complete dominance is always possible.
 - incomplete dominance is not possible.
 - hybrids exist in living organisms.
50. Identical twins inherit their genes from
- the same ovum and different sperms.
 - the same sperm and different ova.
 - different sperms and many ova.
 - the same ovum and the same sperm.
 - many ova and many sperms.
51. The offspring produced when pure strains interbreed is described as
- dominance.
 - phenotype.
 - allele.
 - genotype.
 - hybrid.
52. Which of the following diseases or disorders can be prevented by the application of the knowledge of heredity through marriage counselling?
- Sickle cell anaemia
 - Haemophilia
 - Diabetes mellitus
 - Colour blindness
 - River blindness

53. Study the genetic cross below showing the inheritance of blood groups.



From the cross above, which of the following F_1 offspring does **not** belong to the father?

- A. AA
 - B. AO
 - C. OB
 - D. OO
 - E. AB
54. Which of the following is a function of the chromosome?
- A. Transmission of hereditary traits
 - B. Protein synthesis
 - C. Excretion
 - D. Energy production
 - E. Manufacture of enzyme
55. Which of the following does **not** illustrate adaptation to the environment?
- A. Colour changes by chameleon
 - B. Streamline shape of fishes
 - C. Light bones in birds
 - D. Development of big muscles by a weight lifter
 - E. Possession of fins by fishes
56. The changing of colour by a chameleon to that of the environment is an example of
- A. adaptive radiation.
 - B. protective coloration.
 - C. courtship display.
 - D. display of body colour.
 - E. territorial behaviour.

57. The division of labour in social insects is an example of
- A. structural adaptation.
 - B. physiological adaptation.
 - C. commensalism.
 - D. behavioural adaptation.
 - E. hormonal influence.
58. The swarming especially at the beginning of the rainy season is a courtship behaviour shown by
- A. migratory birds.
 - B. pigeons.
 - C. crickets.
 - D. winged termites.
 - E. bees.
59. Lamarck's evolution theory could be summarised by the statement that
- A. only the fittest can survive in a challenging environment.
 - B. species that are unable to adapt become extinct.
 - C. new characteristics do not arise in organisms in time of need.
 - D. the changing environment imposes structural, physiological and behavioural changes in organisms.
 - E. in a changing and unstable environment nature rejects the weak.
60. The property of clay soil that prevents it from supporting thick vegetation is its
- A. possession of chemically weathered granite rocks.
 - B. inability to retain much water.
 - C. tendency of becoming waterlogged.
 - D. porosity and low water retention ability.
 - E. high capillary spaces between the soil particles.

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**YOU WILL BE PENALIZED SEVERELY IF YOU ARE
FOUND LOOKING AT THE NEXT PAGE BEFORE
YOU ARE TOLD TO DO SO.**

16

SECTION B

ESSAY

[60 marks]

1¼ hours

Answer **three** questions **only** from this section.

Write your answers in ink in your answer book.

Large labelled diagrams should be used where they make an answer clearer. The names given for chosen species must be English or Scientific and **not** vernacular.

All questions carry equal marks.

1. (a) (i) List **two** diseases each of plants and animals caused by bacteria.
(ii) State **three** ways in which bacteria are useful.
- (b) State **three** methods by which mosquitoes can be controlled and state the reason for each method.
- (c) Describe an experiment to demonstrate the presence of bacteria under the finger nails.
2. (a) Describe the process of inhalation in man.
- (b) Describe briefly the process of gaseous exchange in the shoot system of flowering plants.
- (c) Describe an experiment to demonstrate the effect of distilled water on mammalian red blood cell.
3. (a) Give a brief description of the characteristics of the Northern Guinea savanna.
- (b) Describe how you can estimate the density of a plant species using a quadrat.
4. (a) List **four** characters which can be transmitted from parent to offspring in man.
- (b) State **two** differences between mitosis and meiosis.
- (c) Explain briefly the importance of meiosis and fertilization in the reproduction of organisms.
- (d) In a monohybrid cross between a pure breeding plant that produces blue flowers and a pure breeding plant that produces white flowers, the F_1 generation produced only blue flowers.
By means of labelled cross diagrams, state the type of flowers you would expect if the F_1 generation is
 - (i) self-pollinated;
 - (ii) cross-pollinated with a pure breeding plant that produces white flowers.Give reasons for your answers in (d)(i) and (ii).