

401 S. H. S. C. E.  
May 2010  
BIOLOGY 1 & 2  
Objective and Essay Tests  
2½ hours

Name .....

Identification Number .....

THE WEST AFRICAN EXAMINATIONS COUNCIL

Senior High School Certificate Examination

BIOLOGY

May 2010

2½ hours

Do **not** open this booklet until you are told to do so. While you are waiting, read and observe the following instructions carefully. Write your **name** and **identification number** in the spaces provided above.

This paper consists of **two** parts: Paper 1 and 2. Answer Paper 1 on your Objective Test answer sheet and Paper 2 in your Answer booklet. Paper 1 will last **1 hour** after which the answer sheet will be collected. Do **not** start Paper 2 until you are told to do so. Paper 2 will last **1½ hours**.

PAPER 1

OBJECTIVE TEST

[40 marks]

1 hour

1. Use **2HB** pencil throughout
2. On the objective answer sheet supplied, provide the following details **correctly**.
  - (a) Supply the information required in the spaces marked *CENTER NAME*, *CENTER No.*, *SCHOOL NAME* and *SCHOOL No.*
  - (b) In the space marked *STUDENT'S NAME*, write your **surname** followed by your **other names**. Write your *IDENTIFICATION NUMBER* in the space marked *STUDENT No.*
  - (c) In the spaces marked *SUBJECT* and *GRADE*, write *BIOLOGY* and *12TH* in that order.
  - (d) In the box marked *IDENTIFICATION NUMBER*, provide your **identification number** vertically in the spaces on the left-hand side, and shade each numbered space in line with each digit. This identification number must be the same as the one indicated on your Admission Slip. Repeat the process with the correct information for the box marked *YEAR OF FIRST ENTRY*.
  - (e) In the box marked *Subject Code*, write the digits 401 vertically in the spaces on the left-hand side. **Shade** the corresponding numbered spaces as you did for your identification number.
3. An example is given below. This is for a male candidate whose *name* is Joseph Kerkula TOKPAH. His *identification number* is 101011379, his first entry is in 2010 and he is offering *Biology*.

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ST.BROWNE HIGH SCHOOL	891001
CENTER NAME	CENTER No.
SWEN S. TOE ACADEMY	101011
SCHOOL NAME	SCHOOL No.
TOKPAH JOSEPH KERKULA	003
STUDENT NAME	STUDENT No.
BIOLOGY	12TH
SUBJECT	GRADE

IDENTIFICATION NUMBER		YEAR OF FIRST ENTRY	
0	→	0	→
0	→	0	→
0	→	0	→
0	→	0	→
7	→		→
9	→		→

SUBJECT CODE	
4	→
1	→

For Supervisors only If a candidate is absent shade this space.	Shade the space marked M (for Male) or F (for Female) in this box
<input type="checkbox"/>	<input checked="" type="checkbox"/> M <input type="checkbox"/> F

Answer **all** the questions.

**1 hour**

In this test, there are **sixty** objective questions. Each question is followed by **four** options lettered **A to D**. Choose the correct option for each question and shade in **pencil** on your answer sheet the space which bears the same letter as the option you have chosen. Give only **one** answer to each question.

An example is given below.

Which of the following life processes is **not** common to both plants and animals?

- A. Growth
- B. Photosynthesis
- C. Respiration
- D. Reproduction

The correct answer is **photosynthesis** which is lettered **B** and therefore answer space **B** should be shaded like this.

[A]

**[B]**

[C]

[D]

Think carefully before you shade the answer spaces on the answer sheet. Erase **completely** any answers you wish to change. Do all rough work on this question paper.

Now answer **all** the following questions.

1. Which of the following is the basic unit of classification?

- A. Kingdom
- B. Phylum
- C. Family
- D. Species

2. Every multicellular living organism begins life as a/an

- A. prokaryote.
- B. embryo.
- C. single cell.
- D. trophoblast.

3. Which of the following statements is **true** about the origin of life on earth?

- A. It has been duplicated in the laboratory.
- B. It required gaseous oxygen.
- C. It arose from living systems brought to earth from another planet.
- D. It can be explained by using our knowledge of chemistry and physics.

4. The study of how diseases spread is called

- A. epidemiology.
- B. biochemistry.
- C. pathology.
- D. physiology.

5. In which of the following do the organisms have the **closest** taxonomic relationship?

- A. Man and frog
- B. Ameba and paramecium
- C. Whale and kangaroo
- D. Crayfish and spider

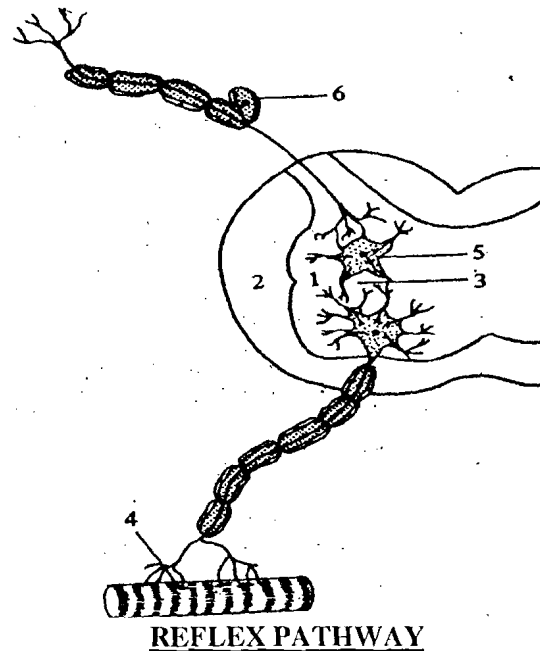
6. A biologist discovered a new living cell in a culture with a distinct cell wall but no definite nucleus. The cell is likely to be that of a/an

- A. animal cell.
- B. plant cell.
- C. protozoan.
- D. bacterium.

7. The conceptual meaning of the term *biogenesis* is that
- cells arise spontaneously from nonliving matter.
  - cells are formed by mitosis of parent cells.
  - nonliving organic material is useful to living cells.
  - living organisms are derived from other living organisms.
8. A piece of potato weighing 1.2gm was put into salt solution. After three hours, it was removed and weighed. The recorded weight was 1.6gms. This experiment demonstrates that the
- salt solution is more concentrated than the cell sap of the potato.
  - cell sap of the potato is more concentrated than the salt solution.
  - salt solution has the same concentration as the cell sap of the potato.
  - the potato lost some water molecules to the salt solution.
9. Gaseous exchange in *spirogyra* is carried out by means of
- spiracles.
  - simple diffusion.
  - cytoplasmic strand.
  - breathing trumpet.
10. One characteristic that all algae have in common is that they
- contain chlorophyll.
  - are unicellular.
  - have heterogamous sexual reproduction.
  - lack alternation of generations.
11. In the absence of a contractile vacuole, an amoeba or paramecium would **not**
- excrete carbon dioxide.
  - move from one place to another.
  - carry out gaseous exchange.
  - regulate its water content.
12. The observation of mitotic events in living cells is made possible by the use of the
- dissecting binocular microscope.
  - electron microscope.
  - light microscope with oil immersion objective.
  - phase-contrast microscope.
13. Which of the following processes can be found in **both** bacteria and protists?
- Mitosis
  - Meiosis
  - Binary fission
  - Fusion of gametes
14. Which of the following is **not** associated with nuclear and cell division in animals?
- Separation of chromosomes
  - Duplication of chromosomes
  - Formation of cell plate
  - Constriction of the dividing cells
15. Which statement **best** describes an important event in the process of oxidative phosphorylation?
- ATP is changed creating phosphate.
  - Phosphorus is added to glucose molecules.
  - Lactic acid is produced.
  - ADP is converted to ATP.

16. An animal with two body layers, a single opening, and a single cavity (gastrovascular cavity) is likely to be a/an
- annelid.
  - arthropod.
  - coelenterate.
  - mollusk.
17. Which characteristic is found in roundworms but **not** in other simple invertebrates?
- A head end
  - Three tissue layer
  - Circulatory system
  - Tissues organized into organs
18. *Rhizopus* is a saprophyte because it
- grows on damp surfaces.
  - feeds on other organisms.
  - secretes enzyme to digest starch externally.
  - consists of branched hyphae.
19. The Unit structure of DNA is the
- pentose sugar.
  - polymer.
  - nucleotide.
  - nucleus.
20. All of the following organisms have a true coelom **except**
- human being.
  - earthworm.
  - starfish.
  - planarian.
21. In the process of cleavage, the **mesoderm** appears during
- the gastrula stage.
  - the blastula stage.
  - the zygote stage
  - organ formation.

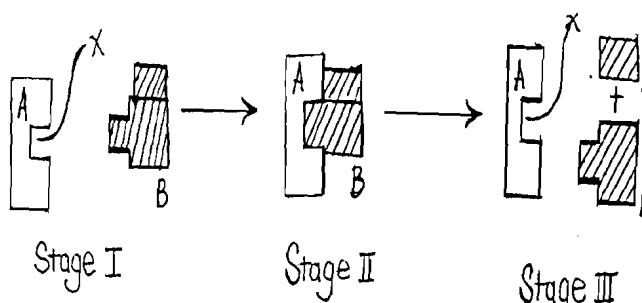
Use the diagram below to answer questions 22 to 25.



22. Which number refers to a synapse?
- 1
  - 3
  - 5
  - 6
23. Which number represents the cell body of a sensory neuron?
- 1
  - 3
  - 4
  - 6
24. The neurohumor most likely to be secreted by the structure numbered 4 is
- acetylcholine.
  - adrenalin.
  - epinephrine.
  - serotonin.

25. A myoneural junction may be located around structure  
 A. 1  
 B. 3  
 C. 4  
 D. 5
26. In guinea pigs, black is dominant. One half of a particular litter is white. If it is assumed that the laws of chance operate, the parent cross was  
 A.  $BB \times Bb$   
 B.  $Bb \times Bb$   
 C.  $Bb \times bb$   
 D.  $BB \times bb$
27. To determine whether an unknown black guinea pig is pure or hybrid black, it should be crossed with a  
 A. white.  
 B. hybrid black.  
 C. habrid white.  
 D. pure black.
28. In the gene pool of a given population of rabbits, 80% of the gametes carry the dominant allele for gray coat. What is the percentage of the population that is heterozygous gray?  
 A. 64%  
 B. 32%  
 C. 20%  
 D. 16%
29. Which set of parents could **not** be the parents of a child with type O blood?  
 A. Father type A, mother type O  
 B. Father type A, mother type B  
 C. Father type B, mother type O  
 D. Father type AB, mother type O
30. Which of the following conditions is represented by co-dominance?  
 A. Polyploidy  
 B. AB blood group  
 C. Sickle cell anemia  
 D. Dwarfism

The diagram below illustrates a biochemical reaction. Use it to answer Questions 31 to 33.



31. Stage II in the diagram represents  
 A. an inorganic catalyst.  
 B. a denatured enzyme.  
 C. a vitamin.  
 D. an enzyme-substrate complex.
32. Which substance is needed for the biochemical reaction above to occur?  
 A. Benedict solution  
 B. Water  
 C. Table salt  
 D. Iodine
33. The area labeled X is known as  
 A. a temperature regulator.  
 B. a pH indicator.  
 C. an active site.  
 D. an atomic nucleus.
34. Pancreatic juice acts in the presence of  
 A. KOH  
 B.  $Na_2CO_3$   
 C. NaCl  
 D.  $H_2CO_3$
35. Which of the following item is **not** properly grouped with the others?  
 A. Calcium ions  
 B. Vitamin B<sub>2</sub>  
 C. Thromboplastin  
 D. Vitamin K

36. Which of the following structures is **not** present in the vascular bundles of a dicot stem?
- Parenchyma, xylem and collenchyma
  - Epidermis, sclerenchyma and xylem
  - Parenchyma, collenchyma and sclerenchyma
  - Sclerenchyma, xylem and collenchyma
37. Mosses belong to the group of plants called
- pteridophytes.
  - bryophytes.
  - schizophytes.
  - gymnosperm.
38. The elephant grass is propagated vegetatively by means of
- corms.
  - suckers.
  - stolons.
  - runners.
39. All of the following are characteristics of flowering plants **except**
- autotrophic gametophytes.
  - seed dispersal.
  - double fertilization.
  - the formation of pollen tubes.
40. The organs constantly in touch with the liver are the
- pancreas, colon and caecum.
  - duodenum and stomach.
  - ileum, stomach and colon.
  - stomach and gall bladder.
41. The following functions are associated with the liver **except**
- regulation of blood sugar.
  - production of heat.
  - production of fibrinogen.
  - production of vitamin D.
42. Using iodine solution, Bluret test, Benedict reagents and ethanol, respectively in testing for reducing sugars, which of the following trends of color changes would be observed?
- Blue → black → blue → brown → clear
  - Brown → blue → brick red → clear
  - Brown → violet → blue → clear
  - Brown → blue → violet → milky
43. To which of the following kingdoms do arthropods belong?
- Prokaryotae
  - Plantae
  - Animalia
  - Protoctista
44. Which of the following diseases could be a hazard to the fish farmer?
- Typhoid
  - Bilharzias
  - Trypanosomiasis
  - Athlete's foot
- Use the information below to answer questions 45 to 48.*
- Each student in a biology laboratory received two solutions. One solution was distilled water. The other was a salt solution with a concentration of salts slightly greater than that of a living cell. The solutions were labeled X and Y, respectively. The students were instructed to place some fresh-water protozoan in each of the solutions and to identify the solutions on the basis of observations. The protozoan in solution X swelled and burst. Those in solution Y shriveled up.*
45. The results indicate that
- solution X is salt water.
  - solution Y is distilled water.
  - solution Y is salt water.
  - solution X had other additions.

46. The organisms in solution X swelled up and burst because
- an antagonistic substance was placed in the solution.
  - the organisms could not adjust to the new environment.
  - osmotic pressure failed to operate.
  - a disproportionate amount of water diffused into the animals.
47. In order to keep the organisms alive in the available solutions X and Y, the laboratory instructor should
- dilute solution Y with solution X and place the organisms in the new solution.
  - boil solution Y and cool, then place the animals in it.
  - acidify solution X, and then add the organisms.
  - evaporate and condense solution X, then add the organisms.
48. What would happen to the protozoan if they were placed in pond water?
- They would shrink and disintegrate.
  - They would swell and burst.
  - They would remain unchanged.
  - They would reproduce at an unusual rate.
49. The concave shape of a bird's wing during flight ensures that the greater air pressure under the wing will
- counteract the effect of gravity.
  - lift the bird so that it can remain airborne.
  - enable the pectoral muscles to contract easily.
  - change the direction of the flying bird.
50. Which of the following will ease the friction between the ends of bones in a movable joint?
- Serum
  - Tissue
  - Blood plasma
  - Synovial fluid
51. The Eustachian tube connects the middle ear with the
- semicircular canals.
  - larynx.
  - pharynx.
  - cochlea.
52. All of the following pairs represent homologous structures **except**
- flipper of a whale; arm of a human being.
  - wing of a bat; wing of a bird.
  - flipper of a whale; lateral fin of a fish.
  - arm of a human being; forelimb of a horse.
53. All of the following generalizations are consistent with the physical and chemical factors found in a food chain **except** that
- the secondary consumers are usually larger in size than the primary consumers.
  - the biomass of a food chain is greatest at the producer end.
  - an increase in the number of organisms occurs in successive links of the food chain.
  - the amount of available energy decreases in successive links of the food chain.

54. After being in a small, poorly ventilated room for an hour with eleven other persons, a student noticed that his rate of breathing had increased. The **most** probable reason for this is that the
- excess water in the body had to be eliminated.
  - carbon dioxide concentration in his blood had increased.
  - oxygen concentration in his blood had increased.
  - air in the room had become hot.
55. All of the following statements about white blood cells are true **except** that
- they are formed in lymph glands.
  - they are formed in bone marrow.
  - they move like a paramecium.
  - they are phagocytic.
56. Which of the following represents the **correct** sequence in blood clotting?
- Platelets, fibrinogen, pro-thrombin, fibrin, thrombin
  - Platelets, pro-thrombin, thrombin, fibrinogen, fibrin
  - Platelets, thrombin, fibrin, pro-thrombin, fibrin
  - Platelets, fibrin, fibrinogen, thrombin, pro-thrombin
57. Which of the following carries urine during excretion and semen during ejaculation?
- Urethra
  - Fallopian tube
  - Vas deferens
  - Seminiferous tubule
58. *Genetic drift*, which can lead to the loss of certain genes by chance, is particularly significant in
- determining the fitness of a species.
  - the evolution of small populations.
  - determining the survival of mutations.
  - accounting for the total gene pool of a species.
59. Which of the below statements are **true** for both aerobic respiration and photosynthesis?
- Synthesizes ATP
  - Makes use of molecules of oxygen
  - Makes use of electron transport system
  - Is controlled by enzymes
- 1, 2, 3, and 4
  - 1, 2, and 3
  - 1, 3, and 4
  - 2, 3, and 4
60. Organic compound containing carbon, hydrogen and oxygen atoms in which the ratio of the hydrogen to oxygen is 2:1 is called
- fats.
  - proteins
  - carbohydrates.
  - glycerol.

**DO NOT TURN OVER THIS PAGE  
UNTIL YOU ARE TOLD TO DO SO.**

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

**PAPER 2**  
**Essay**  
**[60 marks]**

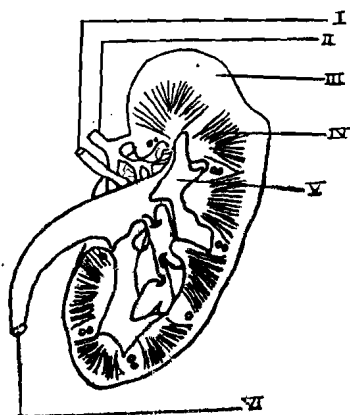
1½ hours

Answer **all** the questions in this paper. Use **black or blue pen** only. Illustrate your answers with large, clear and carefully labeled diagrams wherever possible.

Credit will be given for clarity of expression, orderly presentation of material and accuracy of details.

1. With the aid of well labeled diagrams, show the following eye defects and describe how each can be corrected.
  - (a) Myopia; and
  - (b) Hypermetropia.

Study the diagram below and use it to answer Question 2.



2. (a) Identify the structure in the diagram.
  - i. Name the parts labeled I to VI.
  - ii. State the functions of the parts labeled I, II, III and V
- (b) With what organ system of the mammalian body is this structure associated?
3. (a) List and briefly discuss the **five** major nutritive processes involved in the digestive system.
- (b) State the functions of the following enzymes during digestion:
  - (i) protease;
  - (ii) amylase; and
  - (iii) lipase.

4.
  - (a) List **six** characteristic features of insects.
  - (b) Give **two** reasons why some insects are described as social insects.
  - (c) Name and state the functions of **three** different types of individuals found in a named social insect group.
5. In the course of plant evolution, natural selection has favored the dominance of the sporophyte generation.
  - (a) Cite evidence to substantiate the above.
  - (b) Explain why the gametophyte generation continues to exist in the life cycle of plants.
6. The immune responses of organisms involve antigens, antibodies, and other factors. Describe the *immune response* and discuss its role in the following:
  - (a) Blood transfusion;
  - (b) Rh incompatibility; and
  - (c) Disease resistance.

**END OF PAPER**