

401 S. H. S. C. E.
MAY 2011
BIOLOGY
Objective and Essay Tests
2½ hours

1&2

Name:.....

Identification Number:

THE WEST AFRICAN EXAMINATIONS COUNCIL

Senior High School Certificate Examination

May 2011

BIOLOGY

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 space provided above.

This paper consists of two parts: Papers 1 and 2. Answer Paper 1 on your Objective Test Answer Sheet and Paper 2 in your Answer Booklet. Paper 1 will last for 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 for 1½ hours.

PAPER 1

OBJECTIVE TEST

[40 marks]

1 hour

- Use 2B pencil throughout.
- On the objective answer sheet supplied, provide the following details **correctly**:
 - Supply the information required in the spaces marked **CENTER NAME**, **CENTER No**, **SCHOOL NAME** and **SCHOOL No.**
 - 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**.
 - In the spaces marked **SUBJECT** and **GRADE**, write BIOLOGY and 12TH in that order.
 - 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**.
 - 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.
- An example is given below. This is for a female candidate whose *name* is Wynna A. FANIA. Her *identification number* is 001011210, her first entry is in 2011 and she is offering *BIOLOGY*.

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PRINT IN BLOCK LETTERS			
DWEH SAGBEH ACADEMY CENTER NAME		981001 CENTER No.	
BONDUE TELEEE HIGH SCHOOL SCHOOL NAME		001011 SCHOOL No.	
FANIA, WYNNA A. STUDENT NAME		210 STUDENT No.	
BIOLOGY SUBJECT		12TH GRADE	

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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 type="checkbox"/> M	<input checked="" type="checkbox"/> F

PAPER 1
OBJECTIVE
[40 marks]

Answer all questions.

1 hour

There are **sixty** questions in this paper. 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 answer space which bears the same letter as the option you have chosen. Give only **one** answer for each question. An example is given below.

Most of the energy in the cell is produced in the

- A. nucleus.
- B. golgi apparatus.
- C. mitochondrion.
- D. cytoplasm.
- E.

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

[A]

[B]

☒ [C]

[D]

Think carefully before you shade the answer space on the answer sheet .Erase **completely** any answer you wish to change.

- | | |
|--|---|
| <p>1. The structure which differentiates an animal cell from a plant cell is the</p> <ul style="list-style-type: none"> A. ribosome. B. lysosome. C. cell membrane. D. chloroplast. | <p>5. A characteristic feature of the Mastigophora is the presence of</p> <ul style="list-style-type: none"> A. tentacles. B. flagella. C. swimmerets. D. pseudopods. |
| <p>2. The first person to suggest chemotherapy as a means of treating disease was</p> <ul style="list-style-type: none"> A. Robert Koch. B. Louis Pasteur. C. Paul Ehrlich. D. Marie Curie. | <p>6. Corals belong to the phylum</p> <ul style="list-style-type: none"> A. Embryophyta. B. Porifera. C. Coelenterata. D. Mollusca. |
| <p>3. Fungi differ essentially from green plants in that fungi</p> <ul style="list-style-type: none"> A. are unicellular plants. B. cannot synthesize proteins. C. cannot absorb water. D. are unable to make glucose from CO_2 and H_2O. | <p>7. Which of the following is the most important role of both bacteria and molds in a community of living things?</p> <ul style="list-style-type: none"> A. Fixation of nitrogen B. Spread of disease C. Decomposition of organic material D. Alcohol fermentation |
| <p>4. One major characteristics of the thallophytes is the lack of</p> <ul style="list-style-type: none"> A. cell walls. B. vascular tissue. C. chloroplasts. D. chromosomes. | <p>8. Organisms generally referred to as animals are not</p> <ul style="list-style-type: none"> A. heterotrophic. B. holotrophic. C. holophytic. D. autotrophic. |

Turn Over

9. The short segment of the small intestine closest to the stomach in invertebrates is the

A duodenum.
B esophagus.
C jejunum.
D rumen.

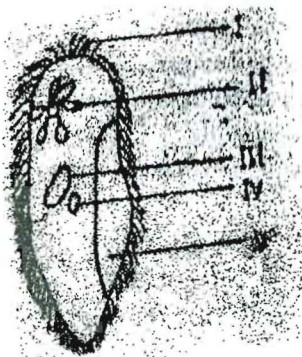
10. Which of the following names an anticoagulant produced by the liver which prevents blood from clotting inside the blood vessels?

A Porphyrin
B Heme
C Fibrinogen
D Glycogen

11. Which of the following structures is adapted for the diffusion of gases in mammals?

A Trachea
B Alveolus
C Oesophagus
D Diaphragm

Use the diagram below to answer questions 12 to 14.



12. What is the level of organization of organism in the diagram?

A Binary fission
B Unicellular
C Multicellular
D Hermaphrodite

13. The structure labeled I is called

A cilia.
B epidermis.
C cell membrane.
D flagellum.

14. The structure labeled II is called the

A contractile vacuole.
B food vacuole.
C micronucleus.
D oral groove.

15. Organs that release hormones into the bloodstream are

A. exocrine glands.
B. excretory glands.
C. secretory glands.
D. endocrine glands.

16. Nerve impulses sent from sensory receptors enter the brain and are routed to the appropriate area of the cerebral cortex by the

A. cerebrum.
B. thalamus.
C. brain stem.
D. hypothalamus.

17. Which of the following items is **not** grouped properly with the others?

A. Centriole.
B. Spindle fiber.
C. Muscle fiber.
D. Chromosome.

18. Which of the following statements concerning chloroplasts is **not** true?

A. They can function outside the cell.
B. They have their own ribosomes.
C. They are divided into grana.
D. They manufacture insufficient amounts of ATP for complete cellular metabolism.

19. All of the following statements are true of mitosis **except** that

A. the process may not be followed by cytokinesis.
B. the cells arising from the process are monoploid.
C. the cells arising from the process are genetically alike.
D. spindle fibers are involved in the movement of chromosomes.

20. Which of the following structures does **not** develop from the ectoderm layer of embryonic cells?
- Skin
 - Brain
 - Hair
 - Stomach
21. The process that ensures equal and identical distribution of genetic material to each cell is known as
- meiosis.
 - mitosis.
 - parthenogenesis.
 - epigenesis.
22. A clean toothpick was dipped into a sample of human blood. The blood was then mixed with a drop of anti-A serum. No agglutination was observed. The blood type was
- A or B.
 - A or O.
 - B or O.
 - AB or B.
23. Using blood from the same sample, the procedure described above was repeated using anti-B serum. Agglutination was produced. The blood type was
- A.
 - B.
 - A or O.
 - B or O.
24. Which of the following vertebrae of the mammalian vertebral column supports the skull?
- Thoracic vertebrae
 - Axis vertebrae
 - Atlas vertebrae
 - Sacral vertebrae
25. Which of the following is part of the appendicular skeleton?
- Atlas
 - Axis
 - Lumbar
 - Scapula
26. During the light reaction of photosynthesis, water molecules are split in a process called
- phosphorylation.
 - glycolysis.
 - photolysis.
 - electrolysis.
27. Of the following, the **smallest** in size is the
- spirillum.
 - coccus.
 - bacillus.
 - virus.
28. Which of the following structures in the fish aids in absorption of digested food?
- Liver
 - Gonads
 - Stomach
 - Pyloric caeca
29. The item that is **not** properly grouped with the others below is
- calcium ions.
 - vitamin B₂.
 - thromboplastin.
 - vitamin K.
30. Since barbiturates cause paralysis of voluntary muscles, it can be assumed that they block impulses travelling
- from the central nervous system to skeletal muscles.
 - from the muscle to the autonomic nervous system.
 - from smooth muscle to voluntary muscle.
 - from striated muscle to the central nervous system.

Use the information below to answer questions 31 to 33.

During the meiosis of a sperm mother cell, chromosomal replication occurs during the first division, resulting in two identical chromatids which are attached to a centromere. In the first division, one homologous chromosome pair (known as a tetrad) separates. In the second division the chromatids separate, resulting in the formation of four haploid sperm cells. By a similar meiotic division, the mother egg cell forms a functional ovum and three polar bodies.

Turn Over

31. In an organism that has a diploid number of 46 chromosomes, the daughter cells formed as a result of the first division have how many chromosomes?

A 22
B 23
C 44
D 46

32. According to modern theory, during the second division the centromeres (kinetochores)

A replicate.
B disintegrate.
C redistribute.
D separate.

33. After replication, how many chromatids do each homologous pair of chromosomes consist of?

A 2
B 4
C 6
D 8

34. The deficiency of vitamin D and calcium ions in the diet of a human causes

A anemia.
B night-blindness.
C rickets.
D kwashiokor.

35. Which of the following organisms causes syphilis?

A *Bordetella pertusis*
B *Clostridium tetani*
C *Treponema pallidum*
D *Mycobacterium tuberculosis*

36. Which of the following infections is **unlikely** to respond to antibiotic treatment?

A Ring worm
B Tetanus
C Measles
D Typhoid fever

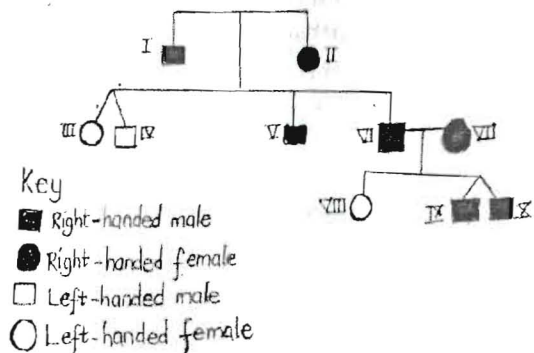
37. In the marine food web, the source of energy to the producer comes from the

A sun
B air.
C sea water.
D sea waves.

38. Algal bloom depletes oxygen content of bodies of water polluted by

A crude oil spillage.
B industrial effluents.
C thermal plant discharge.
D raw sewage disposal.

Use the following pedigree chart, which shows a family history of handedness to answer questions 39 to 43. Right handedness is dominant over left handedness.



39. The genotype of individual I is

A RR.
B rr.
C Rr.
D R.

40. If individual IV marries a woman who is left-handed and they have four children, the number of children that will be right-handed will be

A zero.
B one.
C two.
D three.

41. For handedness, individuals VI and VII are best described as

A recessive and hybrid.
B dominant and homozygous.
C recessive and homozygous.
D dominant and heterozygous.

42. Which individuals in the pedigree could possibly be identical twins?

A VI and VII
B IX and X
C III and IV
D V and VI

43. If the trait for handedness were sex-linked, it would have appeared in
- A all of the offsprings.
 - B most often in the males.
 - C most often in the females.
 - D most often in the males and females.

44. The products of photosynthesis that begin cellular respiration are
- A ATP and water.
 - B NADP^+ and hydrogen.
 - C carbon dioxide and water.
 - D organic compounds and oxygen.

45. In which of the following forms is energy stored in cellular respiration?
- A Adenosine monophosphate(AMP)
 - B Adenosine diphosphate(ADP)
 - C Adenosine triphosphate(ATP)
 - D Heat energy

46. The part of the ear which equalizes air pressure on either side of the eardrum is the
- A auditory meatus.
 - B malleus.
 - C eustachian tube.
 - D oval window.

47. Through which of the following is oxygenated blood from the lungs transported to the left auricle of the heart?
- A Pulmonary vein
 - B Pulmonary artery
 - C Hepatic portal vein
 - D Superior vena cava

48. Most of the carbon dioxide in the blood is carried
- A inside red blood cells.
 - B in the plasma, as bicarbonate ion.
 - C in the plasma, as carbon dioxide.
 - D inside white blood cells.

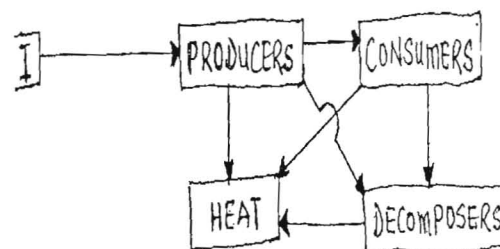
49. Which of the following pairs consists of gametes?

- A Ova and spermatozoa
- B Testes and ovaries
- C Gametophyte and saprophyte
- D Spores and sporangium

50. Which of the following is **not** correct about blood platelets?

- A They have no nucleus.
- B They are formed in the red bone marrow.
- C They neutralize the toxins in the blood.
- D They help in clotting of blood.

51. What does the part labeled I represent in the diagram below?



- A Soil and mineral salts
- B Carbon dioxide and water
- C Sunlight
- D Oxygen and water

52. The organelles responsible for transportation of materials from one part of the cell to the other is

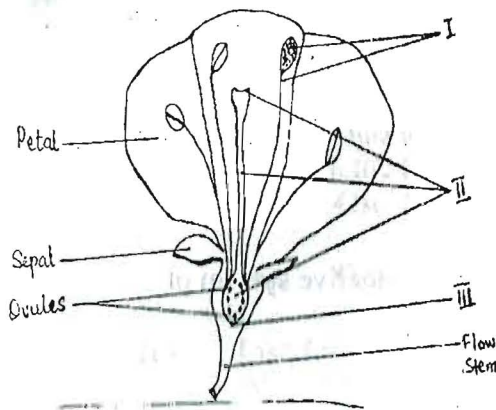
- A endoplasmic reticula.
- B chloroplast.
- C cell wall.
- D vacuole.

53. The possession of chloroplast by green plants enables them to display a mode of nutrition known as

- A. hylozoism.
- B. holophytism.
- C. empiphytism.
- D. saprophytism.

Turn Over

The diagram below represents a typical flower. Use it to answer questions 54-56.



54. The part of the flower labeled **III** is called the
- A corolla.
 - B stamen.
 - C pistil.
 - D receptacle.
55. The parts labeled **II** are collectively called the
- A pistil.
 - B stigma.
 - C corolla.
 - D anther.

56. The parts labeled **I** are collectively called the
- A. pedicel.
 - B. filament.
 - C. whorl.
 - D. stamen.
57. Which of the following is **not** included in the theory of natural selection?
- A. Struggle for existence
 - B. Offspring show variation
 - C. Inheritance of adaptive structures
 - D. Disappearance of functionless organs
58. Which of the following is **not** a behavioral adaptation used by social animals?
- A. Cryptic
 - B. Mimicry
 - C. Flash
 - D. Season
59. Which of the following variations is applicable to a weight lifter?
- A. Continuous variation
 - B. Discontinuous variation
 - C. Hereditary variation
 - D. Acquired variation
60. Which of the following animals exhibits territoriality?
- A. Bees
 - B. Lizards
 - C. Rabbits
 - D. Bats

STOP!

**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
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PAPER 2
ESSAY
[60 marks]

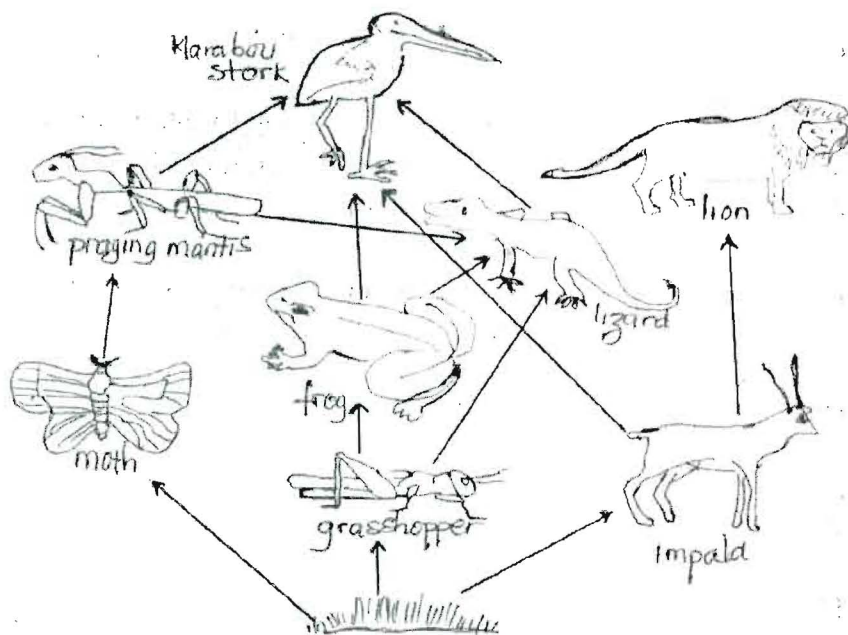
1½ hours

Answer **all** the questions in this part. Use black or blue ink 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. (a) Draw a large labeled diagram (10-12cm) of the reproductive system of a *human female*.
 - (b) Briefly explain the formation of the following:
 - (i) identical twins; and
 - (ii) fraternal twins.
 - (c) (i) What is fertilization?
 (ii) Briefly explain *external* and *internal* fertilization.
2. Use the diagram below to answer the following questions.



- (a) What is the name of the diagram above?
- (b) Name the following consumers:
 - (i) primary
 - (ii) secondary
 - (iii) tertiary consumers.
- (c) If the grasshoppers were lost, suggest **one** possible effect on the moth population. Explain your answer.
- (d) What is the original source of energy for the diagram?

3. (a) Explain the terms:
(i) Parasitism;
(ii) Commensalism.
- (b) Mention the following:
(i) **One** fungal parasite of a plant and its host.
(ii) **One** bacterial parasite of humans.
- (c) List **four** symptoms of malaria and mention **five** methods of controlling malaria in West Africa.
4. (a) What is drug abuse?
- (b) Explain how the following can affect the normal functioning of the brain:
(i) drug abuse; and
(ii) alcohol abuse.
- (c) Explain the **psychological** and **physiological** implications of drug dependence.
5. (a) A lady of blood group **B** has a child of blood group **O**. She says that a certain man is the child's father. When tested, the man's blood group is found to be **AB**. Could he be the child's father? Explain your answer fully.
- (b) In humans, albinism (**a**) is recessive to normal coloring (**A**). Explain how **two** parents with normal coloring could produce a child who is an albino.
6. (a) Discuss the term '*genetic engineering*'.
- (b) Explain the importance of genetic engineering in the following fields:
(i) medicine;
(ii) pollution; and
(iii) agriculture.

END OF PAPER