Biology and Health Sciences I

001

02/08/2022 08.30 AM – 11.30 AM

NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2021-2022

SUBJECT: Biology and Health Sciences I

DURATION: 3 HOURS

INSTRUCTIONS:

1) Write your names and index number on the answer booklet as they appear on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
2) Do not open this paper until you are told to do so.
3) This paper consists of **three** sections **A**, **B** and **C**

Section A: Answer **ALL** questions. **(55 marks)**

Section B: Answer **THREE** questions. **(30 marks)**

SECTION C: This section is **compulsory**. **(15 marks)**

4) Use only a **blue** or **black** pen.

SECTION A: Attempt all questions from this section. (55 marks)

1) Write **TRUE** or **FALSE** on each statement below:
   a) Respiration is the chemical breakdown of glucose to release energy in the body. **(1 mark)**
   b) All organisms move from one place to another. **(1 mark)**
   c) All animals carry out locomotion. **(1 mark)**
   d) All living organisms reproduce by asexual reproduction. **(1 mark)**
   e) Photosynthesis is a characteristic of all living things. **(1 mark)**

2) Match the following cell organelles with their functions. **(4 marks)**

Organelles	**Functions**
Chloroplasts	Site for energy production
Nucleus	Site for photosynthesis
Ribosomes	Protein synthesis
Mitochondrion	Contain chromosomes

3) State the similarities and differences between a tree in your school compound and a bird that has a nest on one of its branches. **(5 marks)**

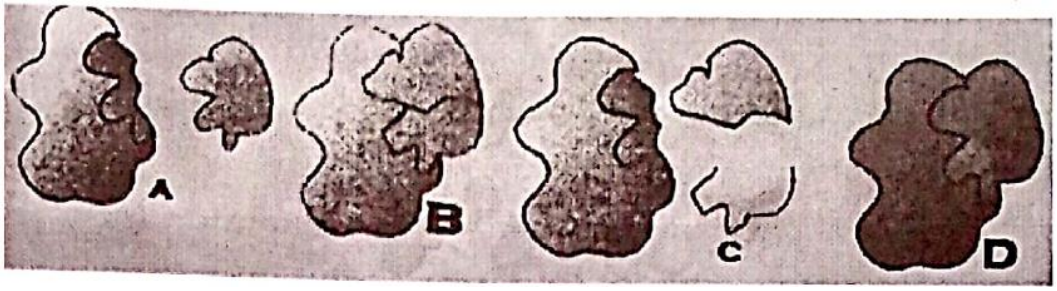
4) Indicate positive results when testing for starch, proteins and vitamin C. **(3 marks)**

Food substance tested	**Positive results / Observation**
Starch	
Protein	
Vitamin C	

5) How is photosynthesis important to:
   a) Plants? **(2 marks)**
   b) Human being? **(2 marks)**
   c) Environment? **(2 marks)**

6) What are the factors that limit the rate of photosynthesis in green plants? **(3 marks)**

7) Observe the images below that represent enzyme's activity on substrate and answer the questions that follow.
   a) Using letters, A, B, C and D show the order of enzyme's activity from the first to the last. **(2 marks)**
   b) Describe the enzyme's activity in each image. **(2 marks)**



8) Explain why breastfeeding in infants is very important. **(3 marks)**

9) Explain how a damaged liver would weaken the digestion of fats in humans. **(3 marks)**

10) Using your knowledge of blood transfusion, fill the table below using a tick (V) where transfusion is possible and cross (X) where it is not. **(4 marks)**

Recipient / Donor	O	A	B	AB
0				
A				
B				
AB				

11) How is the liver involved in the storage process? **(2 marks)**

12) Where exactly does cellular respiratory take place? **(2 marks)**

13) Which hormone prepares the body for action? **(1 mark)**

14) What is a reflex arc? **(1 mark)**

15) Give at least three differences between Mitosis and Meiosis. **(3 marks)**

16) The ability of asexual reproduction to produce many offsprings is disadvantageous. Explain. **(2 marks)**

17) Explain why two different species in an ecosystem can not occupy the same niche. **(2 marks)**

SECTION B: Attempt only three questions (30 marks)

18) Describe the adaptations of the human skin to its functions. **(10 marks)**

19) Describe the process of fertilization in flowering plants. **(10 marks)**

20) A cross between a red flowered plant of a certain species with a white flowered plant produced all pink flowered plants.

(a) Work out the genotype and phenotypes of the offspring from a cross between two pink flowered plants. **(4 marks)**

(b) Name the type of inheritance exhibited above. **(2 marks)**

(c) Define the type of inheritance named in (b) above. **(2 marks)**

(d) If 17324 plants were produced from the above cross, work out the number of white flowered plants. **(2 marks)**

21) Rwanda has put in place a body known as Rwanda Environmental Management Authority (REMA). What measures has REMA put in place to solve the issues environmental degradation in Rwanda? **(10 marks)**

22) During an ecological tour of a lake, a group of students recorded the following observations:

(i) Tilapia feeds on mosquito larvae.
(ii) Mosquito larvae feed on planktonic algae.
(iii) Planktonic crustaceans feed on planktonic algae.
(iv) Hawks feed on tilapia, worms and planktonic crustaceans.

(a) From this record of observations, construct a food web. **(3 marks)**

(b) Construct a food chain that ends with:

(i) Hawk as a secondary consumer. **(1 mark)**

(ii) Hawk as a tertiary consumer. **(1 mark)**

(c) Which group of organisms in this lake are the producers? **(1 mark)**

(d) Using the food web you constructed in (a) above, name:

(i) Two organisms that compete for food in the lake. **(1 mark)**
(ii) The type of food the organisms above compete for. **(1 mark)**

(e) State any two ways by which human beings may interfere with this lake ecosystem. **(2 marks)**

SECTION C: THIS QUESTION IS COMPULSORY (15 marks)

23) (a) You are required to make a well labelled biological drawing of a plant leaf. **(10 marks)**

(b) How is a leaf adapted to its functions? **(5 marks)**