Biology II

012

12 /11/ 2015 08.30AM - 11.30AM

REB
Rwanda Education Board

ADVANCED LEVEL NATIONAL EXAMINATIONS, 2015

SUBJECT: BIOLOGY

PAPER II: THEORY

COMBINATIONS: - BIOLOGY-CHEMISTRY-GEOGRAPHY (BCG)
- MATHEMATICS-CHEMISTRY-BIOLOGY (MCB)
- PHYSICS-CHEMISTRY-BIOLOGY (PCB)

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your names and index number on the answer booklet as written 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 question paper until you are told to do so.
3. This paper consists of **two** sections: **A** and **B**.
   - **Section A**: Attempt **all** questions. **(70marks)**
   - **Section B**: Attempt any **three** questions. **(30marks)**

SECTION A: ATTEMPT ALL QUESTIONS. (70MARKS)

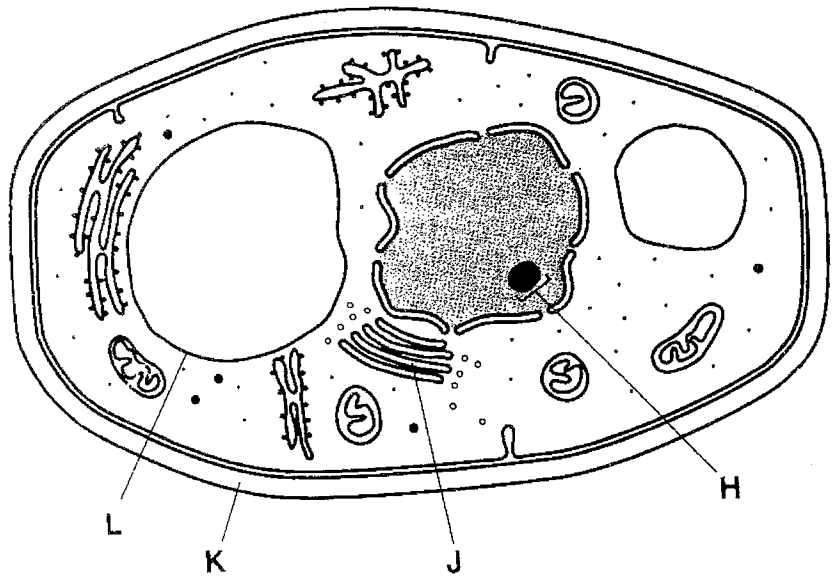
1) (a) The scientific name for human beings is Homo sapiens. Using this information and your knowledge of classification, fill the missing parts in gaps in the table below.

(4marks)

Kingdom:	.....
Phylum:	.....
Class:	mammalia
Order:	primates
Family:	Hominadae
.....:	Homo
.....:	Homo sapiens

(b) The system of classification shown above is described as hierarchical. What does this mean? **(2marks)**

2) The diagram below shows the structure of yeast- like fungus that lives in human lungs. It is eukaryotic.



(a) Name structures H, J, K, and L. **(4marks)**

(b) State two ways in which the structure of a prokaryotic cell differs from the one shown above. **(2marks)**

3) (a) What is the function of ribosomes? **(1mark)**

(b) In each of the following, name the organelle being referred to:
(i) Possesses structures called cristae
(ii) Contains chromatins
(iii) Synthesises glycoproteins
(iv) Digests worm out organelles **(4marks)**

4) Polysaccharides, such as glycogen, amylopectin and amylose, are formed by polymerization of glucose.
(a) Describe how the structure of glycogen differs from the structure of amylose. **(2marks)**

(b) Describe the advantages of organisms in storing glycogen rather than storing glucose. **(3marks)**

5) (a) The protein, haemoglobin has a globular structure. What does this mean? **(2marks)**

(b) How is the structure of globular protein linked to its function? **(4marks)**

6) (a) What are the basic components of a nucleotide? **(3marks)**

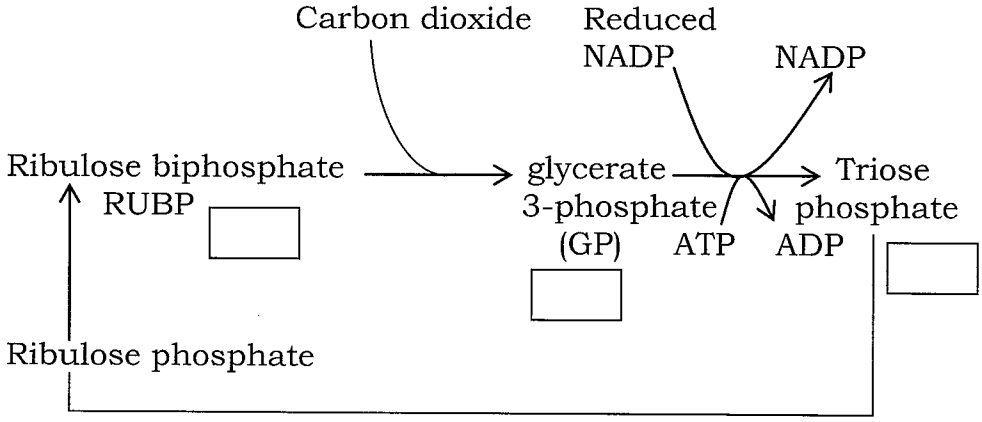
(b) In terms of structure of DNA molecule, explain why the base pairing are not adenine with guanine and thymine with cytosine. **(3marks)**

(c) The bases on one strand of DNA are TGGAGACT. What is the base sequence on the other strand? **(1mark)**

7) (a) Plasmodium falciparum is the causative agent of most severe forms of malaria. It is distributed throughout the tropics.
Explain why malaria is restricted to the tropics. **(3marks)**

(b) Cholera is transmitted by food and water that is contaminated with faecal matter. Suggest three measures that might be used to limit the spread of this disease. **(3marks)**

8) The diagram below shows the main stages in the light-independent reaction in photosynthesis.



(a) Write in the boxes in the diagram the number of carbon atoms in each of the relevant substances. **(1mark)**

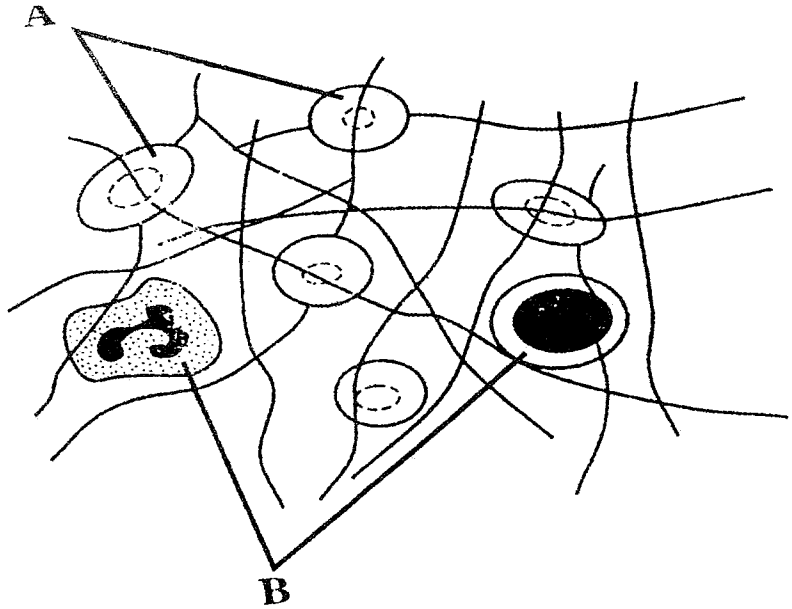
(b) What is the role of ATP in the conversion of:

(i) Glycerate -3-phosphate to triose phosphate. **(1mark)**

(ii) Ribulose phosphate to Ribulose biphosphate. **(1mark)**

(c) A plant was allowed to photosynthesise normally. The light was then switched off. Explain why there was a rise in the amount of glycerate-3-phosphate in the chloroplast of this plant. **(2marks)**

9) The diagram below shows a blood clot.



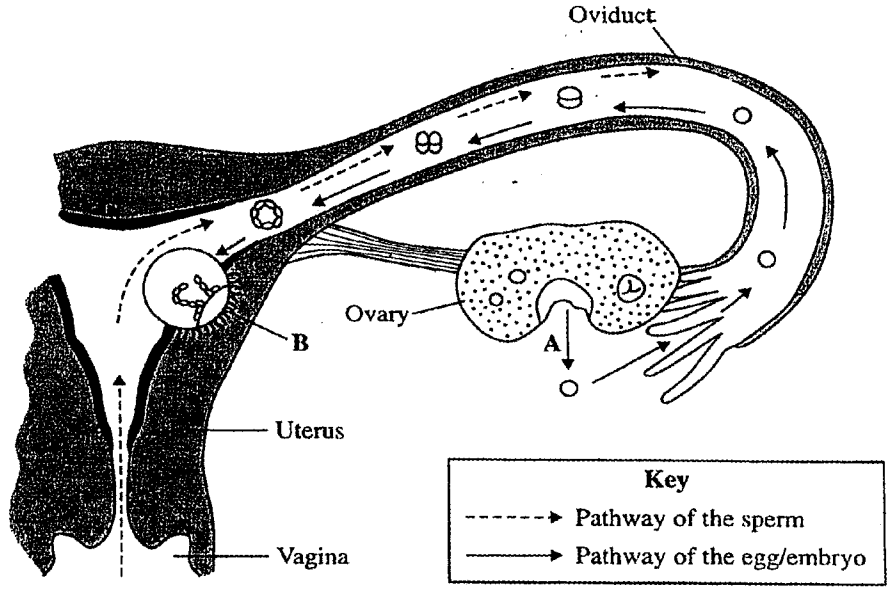
(a) (i) Name the type of blood cells labelled A. **(1mark)**

(ii) What is the function of blood cells labelled A? **(1mark)**

(iii) How does blood cell labelled B defend the body? **(2marks)**

(b) When you cut yourself, you bleed and quickly a blood clot form to prevent further bleeding. Explain how this helps a person to stay healthy. **(3marks)**

10) The diagram shows part of the female reproductive organs.



(a) Name the process shown at A. **(1mark)**

(b) (i) Write the letter X on the diagram to show where exactly fertilisation occurs. **(1mark)**

(ii) After fertilisation, implantation occurs. What will then form in the position marked B on the diagram? **(1mark)**

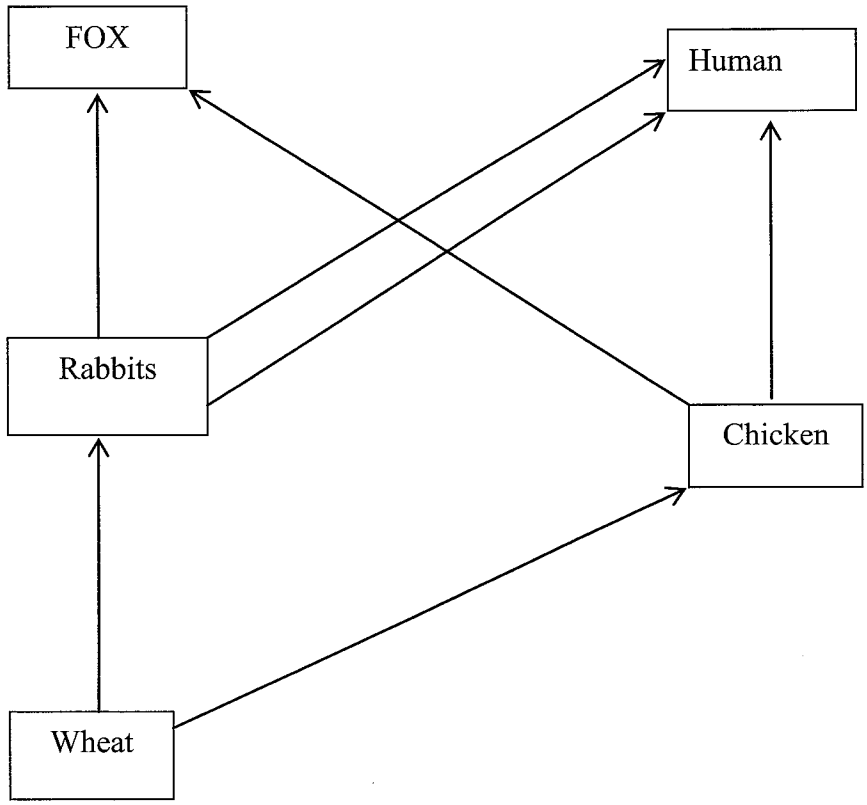
(iii) If fertilisation did not occur, what would happen? **(2marks)**

11) A man claims to be the father of a child who is blood group AB. The man is blood group O and the mother of the child is blood group A.
State with reasons whether the man could be the father of the child. **(3marks)**

12) (a) Define selection as used in evolution. **(1mark)**

(b) Distinguish between directional and stabilising selection. **(2marks)**

13) The diagram below shows a simple food web.



(a) Use the diagram to name: **(3marks)**

(i) A herbivore

(ii) An omnivore

(iii) A producer.

(b) The animals in food web get their energy from the food they eat.
From where do the wheat plants get their energy? **(1mark)**

(c) Draw a pyramid of energy for the following food chain.

Wheat ⟶ Rabbits ⟶ Fox **(2marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30MARKS)

14) (a) Compare the roles of the endocrine and nervous system in control and coordination in animals. **(6marks)**

(b) Explain the roles of synapses in the nervous system. **(4marks)**

15) (a) Explain how meiosis and fertilisation can result in genetic variation amongst offsprings. **(5marks)**

(b) Explain how the environment may affect the phenotype of an organism. **(5marks)**

16) Mass flow hypothesis describes the movement of sucrose solution from high to low pressure.
What evidence is there for and against mass flow hypothesis? **(10marks)**

17) (a) Explain the importance of a human being maintaining a constant internal temperature. **(4marks)**

(b) Describe the role of the hypothalamus in the regulation of body temperature. **(3marks)**

(c) Explain why in a normal healthy individual, the blood glucose level fluctuates very little. **(3marks)**

18) What are the main functions of water to :
(a) Plants? **(4marks)**
(b) Animals? **(3marks)**
(c) All organisms? **(3marks)**