DR G MBASHI EDUCATION
BIOLOGY 2
WORKED EXAMPLE -01 **Time 3:00 HOURS**

1. a. i. Identify divisions of Kingdom Plantae. ***(04 marks)***
   ii. Define floral formula and floral diagram. ***(04 marks)***
   iii. A floral formula consists of five major symbols indicating from left to right. Outline those five major symbols in floral formula. ***(05 marks)***
   b. i. Draw the structure of moss plant and show the sporophyte and gametophyte generation. ***(05 marks)***
   ii. Briefly explain why most members of the division bryophyta do not grow beyond 2cm long. ***(02 marks)***

2. a. Explain how urea is formed in mammalian liver. ***(12 marks)***
   b. Explain four main roles of mammalian kidney. ***(08 marks)***

3. Study the figure 1 below and answer questions below it.

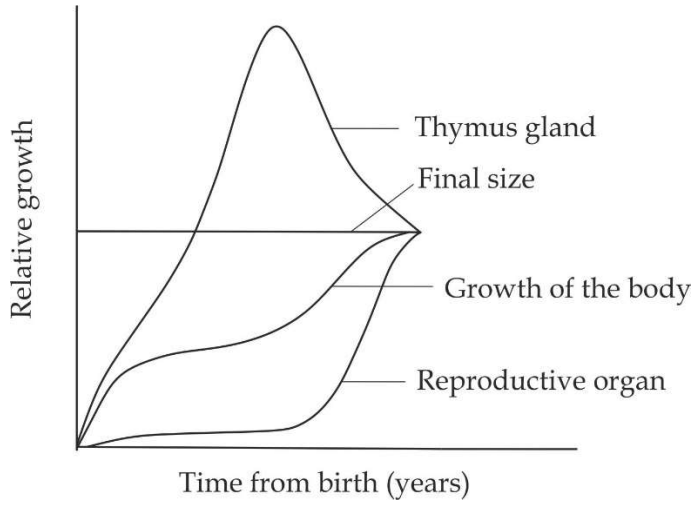

Figure 1

   a. i. Name the pattern of growth represented by figure 1. ***(01 mark)***
   ii. Define the pattern of growth named in 3 (a) (i). ***(02 marks)***
   iii. Give an example of organism which exhibit that pattern of growth. ***(01 mark)***
   iv. In early stages of growth thymus appears to grow rapid. Explain why it is so. ***(02 marks)***

b. Briefly explain four features associated with secondary growth in dicot plants. ***(04 marks)***

4. a. What do you understand by the term organic evolution? ***(02 marks)***
   b. Explain how the following processes lead to organic evolution.
      i. Gene flow
      ii. Mutation
      iii. Natural selection
      iv. Genetic drift ***(16 marks)***
   c. State two weaknesses of the special creation theory of origin of life. ***(02 marks)***

5. a. Define the following terms
      i. Detritus food chain
      ii. Trophic level ***(03 marks)***
   b. i. Describe the types of competition in an ecosystem. ***(04 marks)***
      ii. With four reasons, explain why the pyramid of energy narrows to the top. ***(04 marks)***
   c. Explain how living organisms relate or depend on each other in ecosystem. ***(09 marks)***

6. a. A farmer at Kilimanjaro planted potatoes in his farm. After few weeks he noted that some potato leaves have changed from normal colour to blight. As a form five student, explain this condition to farmer basing on the following
      i. Name the infection attacked the leaves. ***(01 mark)***
      ii. Name the organism that causes the infection and classify it to phylum level. ***(03 marks)***
      iii. Explain any five adaptation of the organism to its mode of life. ***(10 marks)***
   b. State the lowest taxon to which fish and whale are grouped together. Give six reasons to support your answer. ***(06 marks)***

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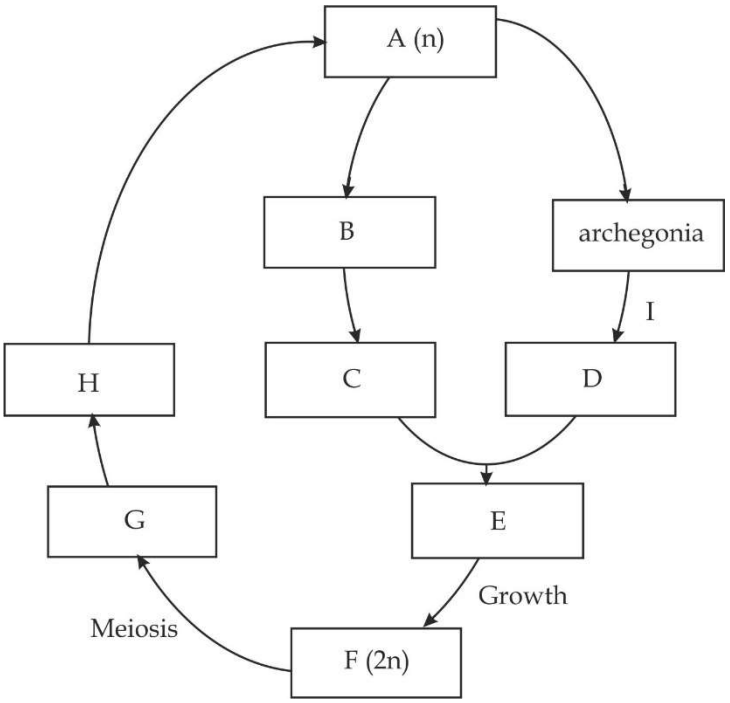
WORKED EXAMPLE -02 **Time 3:00 HOURS**

1. a. The diagram below represents the life cycle of a member of Kingdom Plantae by which the gametophyte generation is always dominant over the sporophyte generation.



i. Write the appropriate terms represented by letters. ***(09 marks)***
ii. Suggest two reasons why water is important in the life cycle. ***(02 marks)***
iii. What is the scientific name of the organism with this life cycle? ***(01 mark)***

b. Fungi are importance and yet are harmful, explain. ***(08 marks)***

2. a. Explain why someone produces few coloured and very concentrated urine during summer or dry hot conditions. ***(06 marks)***
b. Explain how camels conserve the amount of water in their body through urine formation. ***(04 marks)***
c. Describe the following common urinary disorder in human;
i. Kidney stones ***(05 marks)***

ii. Urinary tract infection (UTI) ***(05 marks)***

3. a. Based on the following stages of cell division, differentiate with vivid illustration between mitosis and meiosis:
   i. Metaphase
   ii. Anaphase
   iii. Telophase ***(12 marks)***
   b. Explain the two types of seed dormancy and state causes of each type. ***(08 marks)***

4. a. i. Why is it rare to find haemophilic women? ***(02 marks)***
   ii. Explain the mode of inheritance of carrier female and the haemophilic male**.** ***(06 marks)***
   b. i. State Mendel first law of inheritance. ***(02 marks)***
   ii. How does the chromosome behave based on the Mendel first law of inheritance? ***(06 marks)***
   iii. State characteristics of any genetic code**.** ***(04 marks)***

5. a. i. Briefly explain main three ideas of Lamarck's theory of organic evolution. ***(06 marks)***
   ii. Give four (4) reasons as why almost all biologist reject Lamarck theory at the time it was publish. ***(04 marks)***
   b. i. What is selection as applied to organic evolution. ***(01 mark)***
   ii. Briefly explain how taxonomy, palaeontology and biogeography support the idea of organic evolution. ***(09 marks)***

6. a. Citing at least five main examples, give an account on how economic development activities can alter ecosystem. ***(10 marks)***
   b. What is capture – recapture method. ***(03 marks)***
   c. Outline seven procedures used to estimate population under capture – recapture methods. ***(07 marks)***

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BIOLOGY 2
WORKED EXAMPLE -03 **Time 3:00 HOURS**

1. a. Describe the main problems associated with transition of plant from an aquatic to terrestrial environment. (Give six points). ***(12 marks)***
   b. Explain any six adaptations of the Agaricus compestris to its mode of life. ***(08 marks)***

2. a. Explain the basic components that control homeostatic system in an organism. ***(10 marks)***
   b. Describe the structure and state the roles of the first part of the unifererous tubules. ***(10 marks)***

3. a. With the aid of the cell cycle diagram, summarizes the main events and activities take place in the cell cycle. ***(15 marks)***
   b. Sate the significances of Allometric growth in higher animal like human being. ***(02 marks)***
   c. Briefly explain any two significances of seed dormancy for success of seed dependent reproducing plants. ***(03 marks)***

4. a. i. Give the characteristics of hereditary materials. ***(05 marks)***
      ii. Biochemical analysis of a sample of *DNA* showed that, 33 percent of the nitrogenous bases were guanine. Calculate the percentage of the bases in the sample which should be adenine. Explain how you arrived at your answer. ***(05 marks)***
   b. Two plants which are phenotypically similar may be genetically very different. Explain. ***(05 marks)***
   c. Briefly explain how variation caused by environmental differs from those caused by mutations. ***(05 marks)***

5. a. How the following biological phenomena contributes to evolution:
      i. Mutation iii. Geographical isolation
      ii. Natural selection ***(07½ marks)***
   b. Briefly explain types of fossils that support organic evolution. ***(12½ marks)***

6. a. What is zonation? ***(02 marks)***
   b. Briefly explain any five factors triggers zonation of living organisms. ***(10 marks)***
   c. Draw and briefly explain the predator – prey relationship curve as expected to occur in the ecosystem. ***(08 marks)***

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BIOLOGY 2
WORKED EXAMPLE -04 **Time 3:00 HOURS**

1. A homozygous purple flowered short stemmed plant was crossed with homozygous red flowered long stemmed plant; the F_1 phenotype had purple flower and short stems. When F_1 was test crossed with double homozygous recessive plant, the following progeny was obtained.
   52 purple flower, short stem
   47 purple flower, long stem
   49 red flower, short stem
   45 red flower, long stem
   a. Which characters were dominated? ***(02 marks)***
   b. Carry out crosses to show the formation of F_1 and F_2 generations. ***(18 marks)***

2. a. Discuss how change in pH from its normal level counteracted by the proximal and distal convoluted tubules. ***(04 marks)***
   b. Kidney failure is a common disease affect people. If one kidney fails it is possible to live but if both fail it is fatal. Explain what are the **four** causes and **three** symptoms of acute and chronic kidney failure. ***(16 marks)***

3. a. Identify five ways in which light affect the activities of organisms. ***(10 marks)***
   b. Explain **two (2)** disadvantages and **three (3)** advantages of stratified random sampling. ***(10 marks)***

4. a. What do you understand by the concept of adaptation of organisms? ***(02 marks)***
   b. In 1800s there were many different ideas on how African elephants developed their long trunks. There many elephants were known for having short trunks. Explain the evolutionary concept by using the following theories.
      i. Darwin's theory
      ii. Lamarck's theory ***(10 marks)***
   c. Briefly explain the following evolutionary events
      i. The incompleteness of fossil records
      ii. High prevalence of sickle cell anemia in the sub – Saharan Africa. ***(08 marks)***

5. a. During which stage of the cell cycle do the following events occurs?
      i. Replication of DNA and mitochondria.

ii. Daughter chromosomes move to opposite poles.
iii. Formation of cell plates. ***(06 marks)***

b. Mitosis produce genetically identified cells. Explain why this occurs? ***(04 marks)***

c. Explain the mechanism of primary growth in plants. ***(10 marks)***

6. a. Describe reproduction process among members of kingdom monera. ***(16 marks)***

b. Compare the life cycle of moss and fern plants. ***(04 marks)***

BIOLOGY 2
WORKED EXAMPLE -05 Time 3:00 HOURS

1. a. On her way from school Andunje come across non motile creatures glowing in decaying cow dung. She collected them home to be used as relish. After consumed them, the whole family was admitted to the hospital due to food poisoning.
   i. What is the organism in question? ***(01 mark)***
   ii. Apart from poisonous what other 4 detrimental effects of their kingdom to human. ***(06 marks)***

   b. It was HIV and Ebola, now it is corona perturbing the whole world. Explain four behaviour of virus that make it hard to cure and prevent viral disease. ***(04 marks)***

   c. Locust are disturbing the peace of farmers in Kenya. Identify class of these organisms by giving three reasons. Organisms of this class have successful life.Pinipont four reasons for their success. ***(09 marks)***

2. a. Mama Man'genyata observed that his class I boy pissing yellowish, the other day watery (colourless). She thought there must be a huge problem with her son and decided to take him to the hospital. On her way to hospital, she met Hamisi and told him the problem. Hamisi replied to Mama Man'genyata "there is no problem to your son "this is just normal. Yellowish urine means little water is excreted and watery urine means more water is excreted. This is the mechanism of the body to control amount of solute and water in the body fluid. Using one word, what is this mechanism control water and solute in the body fluid? Describe how endocrine system involved in this control? ***(09 marks)***

   b. The environment might be hot or cold but the endotherm can control internal body temperature, describe two behavioural mechanism and three physiological mechanism in controlling the internal body temperature. ***(11 marks)***

3. a. Annual plant such as maize and bean exhibit sigmoid growth curve, Explain why their growth curve is S – shaped? ***(11 marks)***
   b. Explain how would identify a cell undergoing metaphase during mitosis based on the appearance of its nucleus. ***(09 marks)***
4. a. What are the two types of genetic materials? Describe the differences

between two types of genetic materials. ***(03 marks)***

b. Describe the mechanism of *DNA replication* and how DNA replication is significance. ***(09 marks)***

c. Mrs Mpenza has two haemophilic sons and two normal sons. What is her genotype and that of her husband with respect to this gene? Explain your answer**.** ***(06 marks)***

5. a. Summarizes the Darwin – Wallace theory of natural selection based on three observations and two deduction. ***(05 marks)***

b. Describe the two types of speciation. Give the cause of each type of the speciation. ***(15 marks)***

6. a. Explain what is meant by the term ecosystem? ***(03 marks)***

b. With reference to examples from named ecosystem, explain what do you understand by each of the following:

i. Ecological niche ***(02½ marks)***

ii. Decomposer ***(02½ marks)***

iii. Edaphic factors ***(02½ marks)***

iv. Succession ***(02½ marks)***

c. What is ecological pyramid? Describe the pyramid of numbers with relevant examples. ***(07 marks)***