

## DR G MBASHI EDUCATION

## BIOLOGY 1

## WORKED EXAMPLE -01

Time 3:00 HOURS

## SECTION A (70 Marks)

Answer **all** questions in this section. Each question carrier's ten (10) marks

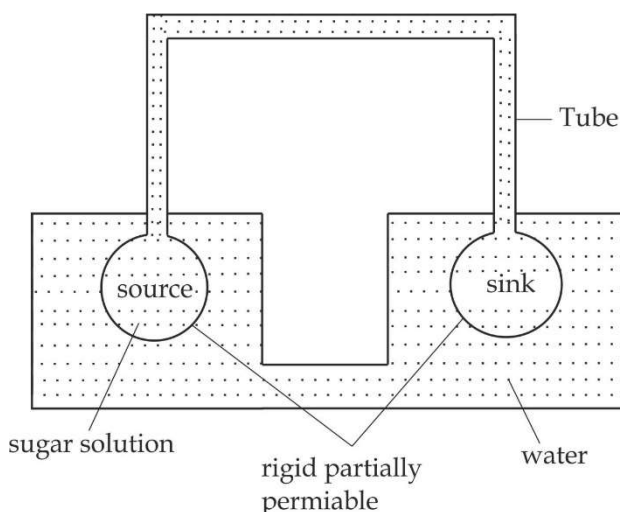
1.
  - a. Outline three features of lipids as respiratory substrate. (03 marks)
  - b. Give the features of alveolus which enable it to suit its function. (05 marks)
  - c. Explain why oxygen is arranged at the end of respiratory chain as final acceptor. (02 marks)
2.
  - a. Suggest the problems faced by taxonomists. (04 marks)
  - b. State six factors to consider when making a taxonomy key. (06 marks)
3.
  - a. Draw a well labelled diagram of typical prokaryotic cell. (05 marks)
  - b. Assess the similarities of features you labelled on the diagram above and the features found in mitochondria. (02 marks)
  - c. By giving three points show how enzymes differ from a catalysts. (03 marks)
4.
  - a. Give two main features which makes cellulose suitable for structural formation. (04 marks)
  - b. Explain three classes of co – factors. (06 marks)
5.
  - a. Malate shunt has effect on carbondioxide and hydrogen pump; Argue for this statement. (04 marks)
  - b. What advantages of the statements in above 5(a). (02 marks)
  - c. State the digestive roles that will be impaired if the following parts of digestive system are damaged:
    - i. Colon
    - ii. Salivary gland
    - iii. Gall bladder
    - iv. Teeth(04 marks)
6.
  - a. How does the size of stimulus affect nerve impulse transimittion? (03 marks)
  - b. Explain the role played by the following parts in maintaining body balance.
    - i. Semi – circular canals
    - ii. Utriculus and sacculus(05 marks)

- c. Explain the two advantages of refractory period and one advantage of adaptation. *(02 marks)*
7. a. As a student when you look at your fellow students in your school; You can observe many differences between students. Suggest four causes of those differences among students in your school. *(04 marks)*
- b. Why farmers are encouraged to use seeded crop plants than vegetative crop plant? *(03 marks)*
- c. Briefly explain the cortical reaction during fertilization. *(03 marks)*

### SECTION B (30 Marks)

Answer **two (2)** questions in this section. Each question carrier's (15) marks

8. a. The gastrulation is the three layered embryo.  
i. Name these layers *(02 marks)*  
ii. State the role of each layer *(03 marks)*
- b. State the impact of gastrula if it will not be formed during embryonic development. *(03 marks)*
- c. Identify two hormones produced after fertilization for maintenance of pregnancy. *(02 marks)*
- d. For each identified hormone in above 8 (c). State the site of secretion and one function of each hormone. *(04 marks)*
9. The diagram below shows a physical model to illustrate the principle of mass flow in plants.



- a. Explain the concept of mass flow. *(02 marks)*

- b. Use the information in the diagram to explain how mass flow of materials between source and sink occur. *(04 marks)*
  - c. Give two evidences to show that sugar transported from source to sink does not only involve passive movement by mass flow. *(02 marks)*
  - d. Give the weaknesses of the mass flow hypothesis. *(04 marks)*
  - e. Give explanation on the evidence of mass flow hypothesis. *(03 marks)*
10. a. What is Basal Metabolic rate? *(02 marks)*
- b. Explain about seven (7) factors that affect Basal Metabolic rate of an organism. *(07 marks)*
  - c. Describe the respiratory pathway of fats and oils. *(04 marks)*
  - d. Why Krebs cycle is sometimes called:
    - i. Citric acid cycle
    - ii. Tri carboxylic acid cycle. *(01 mark)*

## 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.

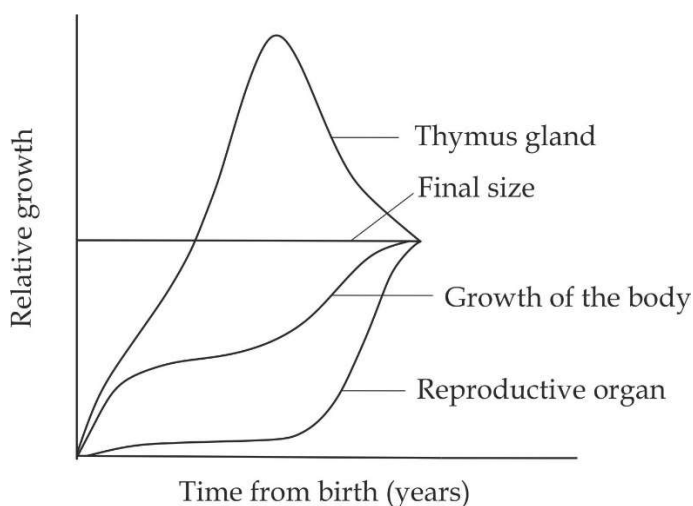


Figure 1

- 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)*

## DR G MBASHI EDUCATION

## BIOLOGY 1

## WORKED EXAMPLE -02

Time 3:00 HOURS

## SECTION A (70 Marks)

Answer **all** questions in this section. Each question carrier's ten **(10)** marks

1. a. During cell differentiation, various cell organelles are modified to suit their functions. One of the method through which cell is modified is by having cell organelles which help it to function effectively. Give reasons why the following cells are equipped with large number of lysosomes.
    - i. Salivary gland
    - ii. Cells lining digestive system
    - iii. Leucocytes
    - iv. Cells lining uterus (04 marks)
  - b. Give reasons for the following biological observations.
    - i. Meat deteriorate unless refrigerated. (02 marks)
    - ii. Plant cells would still produce ATP even if all mitochondria were removed. (02 marks)
  - c. Name the part of cell surface membrane which act as:
    - i. Receptor site for chemical messengers such as hormones and the neurotransmitters. (01 mark)
    - ii. Controller of passage of polar molecules and ions. (01 mark)
- 
2. a. In three points explain what would be problem if organisms were not grouped into ranks. (03 marks)
  - b. Assume that you are laboratory technician at Mkululu secondary and you are asked to order some animal species for your form four (IV) students. The species which you want to order are; *Rattus rattus*, any two rana species, *Periplaneta Americana*, *Lumbricus Terrestris*, taenia sp and any two species of Columba.
    - i. Write correctly the names of species to be ordered. (02½ marks)
    - ii. Using your knowledge of binomial nomenclature explain two rules that are violated in the above names. (04 marks)
- 
3. a. At the base of brain there is endocrine gland X whose removal results into poor growth and shrinkage of genital organs, thyroid glands and adrenal cortex.
    - i. Name the gland X. (01 mark)
    - ii. Name five trophic hormone produced by gland X. (05 marks)

- b. Synthetic hormone have been of great use in improving life of human and animal husbandry. Explain practical application of the following hormones:
- i. Synthetic progesterone hormone (02 marks)
  - ii. Synthetic oxytocin hormone (02 marks)
4. a. Justify the following biological facts:
- i. Photosynthesis is not possible without photolysis of water. (02 marks)
  - ii. Bile does not contain enzymes yet it is important for digestion. (02 marks)
  - iii. If the pancreas is tied tightly with the rope, a person will usual experience indigestion but not diabetes. (02 marks)
- b. State four (4) roles of Hydrochloric acid in gastric digestion. (04 marks)
5. a. The aim of respiration is to produce ATP however during initial stage of respiration ATP is used to phospholyze glucose to form glucose 6 Phosphate. By giving five points, explain the main importance of phosphorylation of glucose to form glucose - 6 - Phosphate. (05 marks)
- b. When a person breath in, there are some of change occur in breathing system. As an expert provide a knowledge to form two students of Azania Secondary School on the changes occur during breathing in. (05 marks)
6. a. A certain organic compound X contains elements C.H.O. Substance X gives negative test with iodine and Benedict solution. When treated with enzyme A from small intestine, substance X gave Y and Z. Y is Aldose and Z is Ketose.Both Y and Z gave positive test with Benedict Solution.
- i. Identify substances A, X, Y and Z. (04 marks)
  - ii. Write the word equation to show conversion of X by A to Y and Z. (02 marks)
- b. Write four roles of Pentoses in living things. (04 marks)
7. a. i. How does competitive inhibitors of an enzyme take place? (02 marks)
- ii. Are enzymes inhibitors important in biochemical pathways of the cell? (02½ marks)
- b. Distinguish between prosthetic groups and coenzymes. (02½ marks)

**SECTION B (30 Marks)**

Answer **any two** (02) questions in this section

8. a. Explain two (2) factors in nervous system that ensures unidirectional flow of nervous impulse. *(05 marks)*
- b. Explain how transmission speed of nervous impulse is affected by;
- i. Axon diameter
  - ii. Myelin sheath *(05 marks)*
- c. In two points, show the significance of tactic movements in living things. Support your explanation with examples. *(05 marks)*
9. a. Explain how do the following affect Basal Metabolic rate:
- i. Body size
  - ii. Body composition
  - iii. Hormonal level
  - iv. Health status *(06 marks)*
10. a. Give an account on the nervous and hormonal control of secretion of the following digestive juices;
- i. Saliva
  - ii. Pancreatic juice
  - iii. Bile juice *(09 marks)*
- b. Explain how plant converts light energy to biochemical energy during light depend reaction of photosynthesis. *(06 marks)*



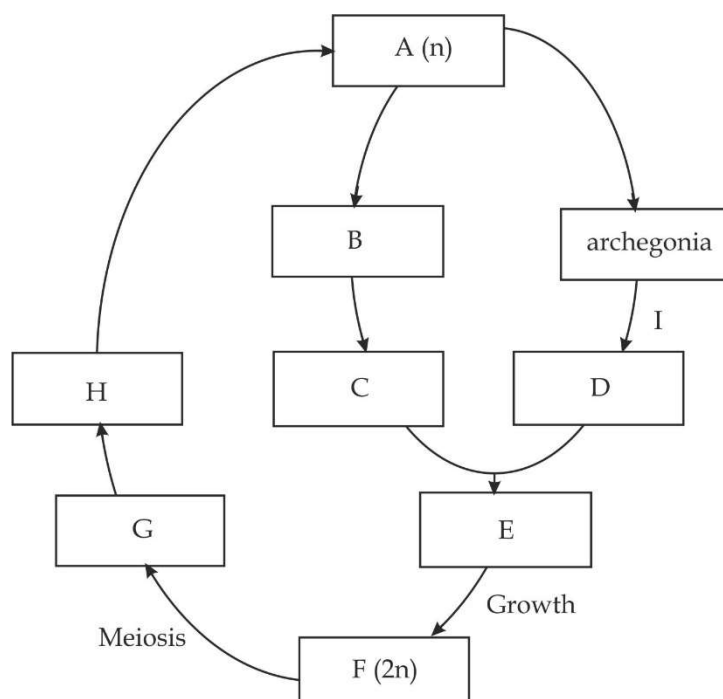
## DR G MBASHI EDUCATION

## BIOLOGY 2

## 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; (05 marks)
- i. Kidney stones

- 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)

## DR G MBASHI EDUCATION

## BIOLOGY 1

## WORKED EXAMPLE -03

Time 3:00 HOURS

## SECTION A (70 Marks)

Answer **all** questions in this section. Each question carrier's ten (10) marks

1.
  - a. The skin of a frog functions as a respiratory surface. What features account for its suitability for this role? (08 marks)
  - b. How may the absence of oxygen switch off the Krebs cycle and the electron transport? (02 marks)
2.
  - a. Explain why molecule of amino acid are described as "Zwitterions". (05 marks)
  - b. If mitochondria were to perform the function of chloroplast, what modification would be required? (05 marks)
3.
  - a. Give five (5) adaptations of spermatozoa. (05 marks)
  - b. Draw the structure of pollen grain and label it fully. (05 marks)
4.
  - a. Giving evidences, explain the phrase "*synapse* ensure unidirectional flow of impulse". (05 marks)
  - b. Explain how mammalian eye will respond when the refraction of light ray are coming from near object? (03 marks)
  - c. Briefly explain why objects are more seen clearly at night by not looking directly at them. (02 marks)
5.
  - a. An individual has a problem of liver cirrhosis to the extent that almost the whole liver is affected. Explain the problems encountered by this individual related to digestion (give four points). (04 marks)
  - b. Explain the role of RuBP and NADP<sup>+</sup>. (03 marks)
  - c. Why the rate of photosynthesis in C<sub>4</sub> plants is not enhanced by higher atmospheric carbondioxide concentration yet in C<sub>3</sub> plant it is. (03 marks)
6. Assuming you are a taxonomist and you want to order some plant species for the home garden. The species to be ordered are mangifera Indica, Pisum Sativum, jatropha Curcas seed, jatropha curcas stem, hibiscus sp.
  - a. Write correctly the name of species to be ordered. (02 marks)
  - b. Using your knowledge of the rules of *binomial nomenclature*, Explain the violated rules in above names. (04 marks)
  - c. Why do we need taxonomic hierarchy in classification of living organisms (give four points)? (04 marks)

7. a. i. Explain why at temperature above  $40^{\circ}\text{C}$  mammalian enzyme do not function efficiently? (03 marks)  
ii. When all the active sites of enzyme are occupied, how does increasing the substrate affects the rate of reaction? (03 marks)  
b. Cell membrane contains cholesterol molecules and glycoprotein. What are the importance of these structures (give two points)? (04 marks)

### SECTION B (30 Marks)

Answer **any two** (02) questions in this section

8. a. Describe the events which comprises the mechanism of fertilization in hibiscus flower (diagram are not required). (11 marks)  
b. How oestrus differ from menstrual cycle? (03 marks)  
c. Explain the significance of oestrus cycle. (01 mark)
9. a. i. How is the phloem tissue adapted for the transport of materials. (04 marks)  
ii. State three (3) roles of casparian strip. (02 marks)  
b. i. Explain the main changes that takes place in *foetal circulation* soon after birth. (06 marks)  
ii. Briefly explain why Red blood cells (RBC) loose nucleus and mitochondria at maturity? What are the advantages of this two phenomena? (03 marks)
10. a. i. What would happen if the first enzyme in *glycolysis* is irreversibly inhibited by a toxic substance? (03 marks)  
ii. The initial stage of glycolysis involves the use of ATP. Explain. (02 marks)  
b. i. Outline respiratory pathway when using lipids as substrate. (05 marks)  
ii. Seal and dolphin are divers in sea water. How are they adapted to oxygen uptake? (05 marks)

**DR G MBASHI EDUCATION**  
**BIOLOGY 2**

### WORKED EXAMPLE -03

Time 3:00 HOURS

- 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)
- 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)
- 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)
- 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)
- 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)
- 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)

## DR G MBASHI EDUCATION

## BIOLOGY 1

## WORKED EXAMPLE -04

Time 3:00 HOURS

## SECTION A (70 Marks)

Answer **all** questions in this section. Each question carrier's ten (10) marks

1. a. Draw a diagram of eukaryotic cell (animal cell) as seen under electron microscope, indicates the letters below the organelles responsible for the following(s):
  - A. Synthesis of steroids.
  - B. Formation of lysosomes.
  - C. Breakdown of red blood cells in the spleen.
  - D. Movement of materials inside and outside the cell.
  - E. Control synthesis of ribosomes. (05 marks)
- b. Using four examples, explain how cell differentiation modifies cells to suit their functions more efficiently. (05 marks)
2. a. No digestion occur in large intestine.  
Explain the importance of large intestine in human. (03 marks)
- b. What happen to the end products of digestion of lipids in the small intestine? Explain. (03 marks)
- c. Explain the fate of PGAL (phosphoglyceraldehyde) after it has been made in Calvin cycle. (04 marks)
3. a. Why Latin language is preferred in scientific naming of living things? Give five (5) reasons. (05 marks)
- b. Consider the following name: Funaria hygrometrica.
  - i. Name the taxa that are obviously displayed by the name. (02 marks)
  - ii. From this name only, state three rules which among others have been used to construct it. (03 marks)
4. a. You have seen various facts associated with gaseous exchange and respiration while studying this topic. Account for the following:
  - i. Lipid energy density is usual more than twice than that of the carbohydrate. (01 mark)
  - ii. Instead of the above fact in (i) above still carbohydrate is used as primary source of energy. (01 mark)
  - iii. Cigarette smoking affects the process of respiration. (01 mark)
  - iv. High carbondioxide concentration as a product of respiration is not fatal in plants as in animals. (01 mark)
- b. i. State the precise role of oxygen in cellular respiration. (01 mark)

- ii. Name three sites where gaseous exchange take place in plants. (03 marks)
- iii. What would happen if the cell membrane of the alveoli becomes dry? (01 mark)
- iv. Explain, how cellular respiration does differs from whole body respiration? (01 mark)
5. a. In three (3) points, state the functions of each of the following type of carbohydrates:
- Hexoses
  - Pentoses (06 marks)
- b. Briefly explain how each of the following distorts the natural three dimension conformation shape of proteins:
- Strong acids
  - Urea solution
  - Mechanical force
  - Heat and radiations (04 marks)
6. a. i. Explain clear the statement that nuclear fusion in the embryo sac occurs three times in the course of double fertilization. (03 marks)
- ii. State the three (3) events that occur in the pollen grain when the pollen tube reaches the ovule prior to fertilization. (03 marks)
- b. Placenta serves as a link between fetus and mother, at the same time it acts as a barrier between them. By reference to the functions of the placenta, show how statement means. (04 marks)
7. a. i. If the permeability of the axon membrane to sodium ( $Na^+$ ) ions and potassium ions ( $K^+$ ) increased simultaneously, what effect would this have on the action potential? (01 mark)
- ii. Give two (2) reasons why there is a sudden influx of sodium ions into the axon following an increase in sodium ions permeability of the axon membrane. (03 marks)
- b. Differentiate between sympathetic and parasympathetic nervous system basing on the following features: (06 marks)

Feature	Sympathetic NS	Parasympathetic NS
Area of influence		
Transmitter substance		
Origin of neurons		
Overall effect		
Condition when active		
Position of ganglion		

**SECTION B (30 Marks)**

Answer **any two** (02) questions in this section

8. Elaborate the events and hormonal control of the menstrual cycle.  
(20 marks)
9.
  - a. Analyse the components of double circulation in animals. (03marks)
  - b. In five points, explain the features of fetal blood circulation.  
(05 marks)
  - c. Explain six (6) the differences between foetal and adult circulation.  
(06 marks)
10.
  - a. Draw a well labelled diagram of an unfertilized ovule of a flowering plant and state the roles of any seven parts you have labelled.  
(09 marks)
  - b. Explain the hormonal control of spermatogenesis.  
(07 marks)



## DR G MBASHI EDUCATION

## BIOLOGY 2

## WORKED EXAMPLE -04

Time 3:00 HOURS

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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)*

## DR G MBASHI EDUCATION

## BIOLOGY 1

## WORKED EXAMPLE -05

Time 3:00 HOURS

## SECTION A (70 Marks)

Answer **all** questions in this section. Each question carrier's ten (10) marks

1. a. In living cell, an organelle controls exchange of materials which have been described using different models. By using well known model and accepted, describe the structure. (09 marks)  
b. Name the parts of cell membrane responsible with the following:
  - i. Recognition
  - ii. Prevent freezing (01 mark)
2. a. Sometimes biological catalysts need some kind of booster in their activity.
  - i. Give the proper biological name of the booster used. (01 mark)
  - ii. Explain three types of named booster in 2 (i) that assists the catalyst in its efficiently activity and give vivid example of each. (03 marks)  
b. Explain the medical importance of protein denaturation (06 marks)
3. a. One among the classification system is more realistic, identify it and give four reasons (4) reasons to support your answer. (05 marks)  
b. Construct a simple dichotomous key of the following organisms: Spider, termite, housefly, centipede, cockroach and millipede; recalling the following features: wings, a pair of cerci, body division, antennae and pair of legs. (05 marks)
4. Use your understanding knowledge of the functioning of the mammalian ear to attempt the following:
  - a. Most people feel a pain in their ears when they dive at a depth of 0.5 metres. (02½ marks)
  - b. Experienced divers overcome this pain by pinching their nose and blowing air into their closed nostrils. (02½ marks)
  - c. After spinning around for a short time, people feel dizzy when they stop. (02½ marks)
  - d. During this dizziness, they seem to be spinning in the opposite direction to the way they were actually spinning before. (02½ marks)
5. a. State the location and role of the following in alimentary canal:
  - i. Oxyntic cell (02 marks)
  - ii. Goblet cell (02 marks)

- iii. Crypt of Lieberkhun (02 marks)
- b. Suggest some conditions in which light intensity and temperature might be limiting factors in photosynthesis. (04 marks)
6. a. Why is the usual respiratory quotient in humans ranges between 0.7 and 1.0? (01 mark)
- b. Name four chemical substances which are involved in respiration that would enter and leave the mitochondria. (04 marks)
- c. Make a list of **five (5)** differences between aerobic respiration and photosynthesis. (05 marks)
7. a. What are the causes of *hyperovulation* which lead into dizygotic twins? (03 mark)
- b. If all fertile human families could give rise birth to monozygotic twins, what kind of human population could be? (01 mark)
- c. Explain the stages of birth in humans. (06 marks)

### SECTION B (30 Marks)

Answer **any two** (02) questions in this section

8. a. Explain the importance of glycolysis stage of respiration to the living organisms? (05 marks)
- b. Briefly explain three main stages of glycolysis. (06 marks)
- c. Why does the lactic acid level in the blood continue to rise after exercises when anaerobic respiration has ceased? (04 marks)
9. a. Describe how root pressure assists the uptake of water and dissolved minerals in plants. (03 marks)
- b. Explain how *blood* is regarded as transport, protective and regulatory tissue. (06 marks)
- c. Why blood circulatory system is considered as a close circulatory system while lymphatic system as an open circulatory system. (06 marks)
10. Meiosis process do occur in sexually reproducing organisms only and it is the stage wise process, explain why prophase I under meiosis I is regarded as the longest phase and most important stage. (15 marks)

## DR G MBASHI EDUCATION

## BIOLOGY 2

## WORKED EXAMPLE -05

Time 3:00 HOURS

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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. Pinpoint 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)