**TERM 2 - 2023**

**BIOLOGY – PAPER ONE (231/1)**

**FORM FOUR (4)**

**Time - 2 Hours**

**Name …………………………………………….……… Admission Number …………….**

**Candidate’s Signature ………………….…...………... Class ……………………………**

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name and admission number on the space provided.*
2. *All questions are* ***compulsory****.*
3. *Answer all the questions in the spaces provided after the questions.*
4. *Wrong spelling of technical terms shall be* ***penalized****.*
5. *This paper consists of 13 pages.*
6. *Candidates should check the question paper to ascertain that all pages are printed as indicated and that no question is missing.*

|  |  |
| --- | --- |
| **Max**  **Score** | **Student’s Score** |
| **80** |  |

***Answer all the questions in this paper.***

1. a) Name the instrument used to measure the level of humidity in the environment during an ecological study (1 mark)

……………………………………………………………………………………..………………

1. Give **two** reasons why an ecosystem is said to be a self-sustaining unit. (2 marks)

………………………………………………………………………………………….…………………………………………………………………………………………………….…………………………………………………………………………………………….…………………

1. Modern technology has enabled scientists to analyze genetic material of living organisms to reveal order of Nitrogenous bases in their Deoxyribonucleic Acid (DNA) through a process called Gene Sequencing. Give **two** ways in which this development has been beneficial to genetic research. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. State the importance of the following features of a respiratory surface. (2 marks)
2. Being moist.

……………………………………………………………………………………………………………………………………………………………………………………………………………………………..

1. Having thin lining.

……………………………………………………………………………………………………………………………………………………………………………………………………………………………..

1. Name the causal organisms for the following diseases. (2 marks)
2. Amoebiasis …………………………………………………………………………….
3. Cholera …………………………………………………………………………………
4. The following is a reaction that takes place in the human body

Ammonia + Carbon (IV) Oxide Compound **Q** + Water

1. Name the enzyme that catalyses this process. (1 mark)

………………………………………………………………………………………………

1. Why should Ammonia be converted to Compound **Q** before being excreted? (2 marks)

……………………………………………………………………………………..………………………………………………………………………………………………………….….………

1. Previously, human insulin was extracted from cows but currently, insulin is produced through use of a strain of bacteria called *Escherincia coli*.

i) Why is it advantageous to produce insulin by use of *E. coli* instead of using cows? (1 mark)

………………………………………………………………………………………….…………………………………………………………………………………………………………….…

ii) Why is synthetic insulin administered as an injection and not orally? (1 mark)

………………………………………………………………………………………………………………………………………………………………………………………...........................

1. The diagram shown below is a section of the human alimentary canal.



**X**

**Y**

1. Why is the part labelled **Y** referred to as a vestigial structure? (2 marks)

……………………………………………………………………………….……………………

1. State **two** roles of part labelled **X** . (2 marks)

………………………………………………………………………………………….……………………………………………………………………………………………………….……………………..

1. Name the disease conditions that result from inadequate amounts of the following in the human body: (2 marks)
2. Vasopressin ……………………………………………………………………………
3. Iodine ………………………………………………………………………………….
4. A picture of interaction between two animals in the same ecosystem is shown below.



**S**

**T**

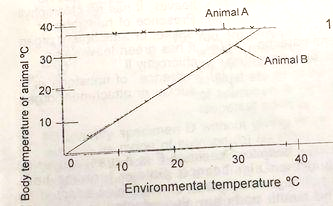
1. What is the advantage of the feeding relationship illustrated above. (1 mark)

………………………………………………………………………………….…………………

1. Why would animal **S** have a shorter alimentary canal than **T**? (2 marks)

……………………………………………………………………………….…………………………………………………………………………………………………….……………………

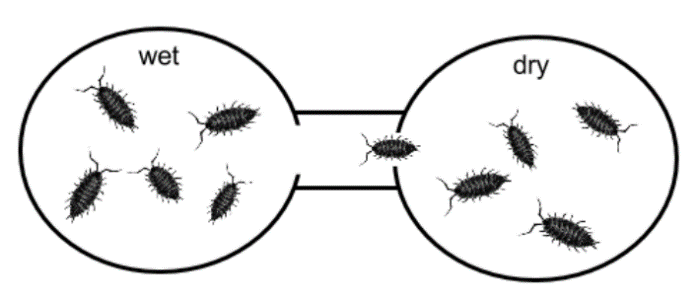
1. The graph of body temperature changes of two animals is shown below



1. Which animal represents a poikilotherm? ……………………………………… (1 mark)
2. State **two** advantages animal **A** has over animal **B.** (2 marks)

…………………………………………………………………………………………………………………………………………………………………………………………………..

1. Name the organelle found in animal cells but absent in members of the following Kingdoms. (2 marks)
2. Plantae ……………………………………………………………………..………………….
3. Monera …………………………………………………………………..……………………
4. An image of behaiour of an insect is shown in the diagram below.



1. Name the response shown above …………………………………………………. (1 mark)
2. What is the survival importance of the response shown above to the insect? (1 mark)

…………………………………………………………………………………………………………………………………………………………………………………………………………

1. Form 3 learners encountered the skull below during a field study.



1. One of the learners mentioned to the class that the animal with the skull above belongs to Class Mammalia. Give a reason to support the student’s suggestion. (1 mark)

………………………………………………………………………………………………...……

1. Give **two** functions of the skull to the animal. (2 marks)

……………………………………………………………………………………...………………………………………………………………………………………………………………...…….

1. Different types of flowers are shown below.



**X**

**Y**

1. Which letters refer to flowers with the following descriptions: (2 marks)
2. Perigynous ……………………………………………………………………..
3. Hypogynous ……………………………………………………………………
4. State the function of part labelled **X.** (1 mark)

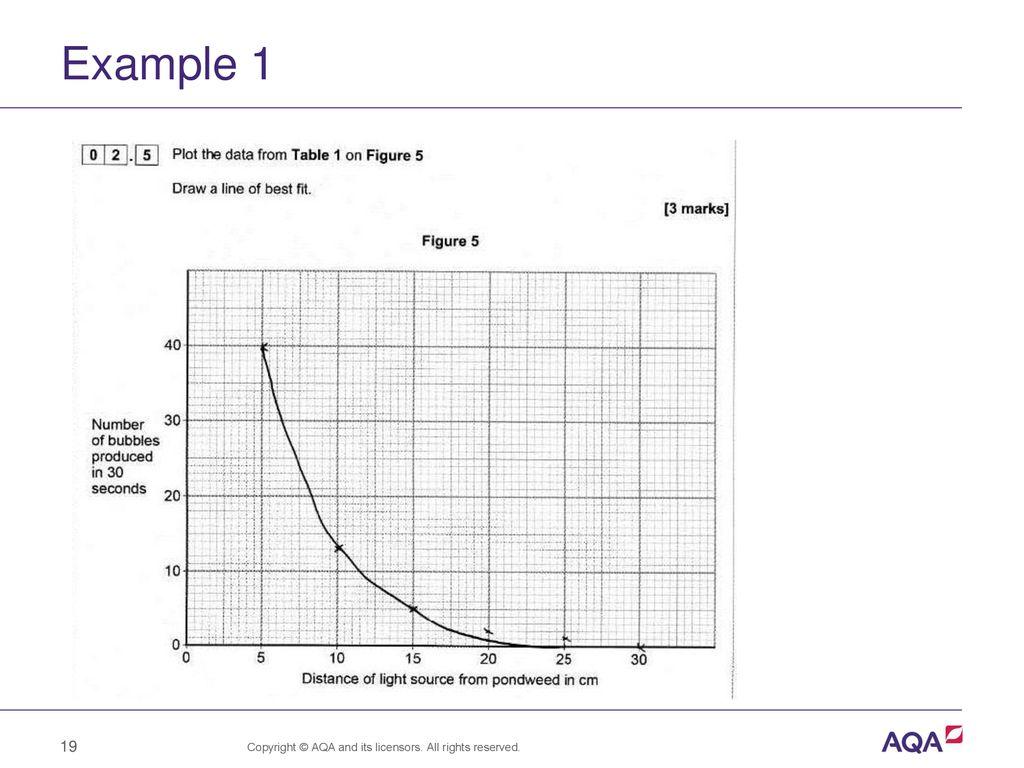
………………………………………………………………………………………...……………

1. Name the growth response by which pollen tube grows to reach the part labelled **Y.**

(1 mark)

……………………………………………………………………………………………………...

1. The following graph shows the relationship between light and amount of bubbles formed in an experiment involving pondweed.



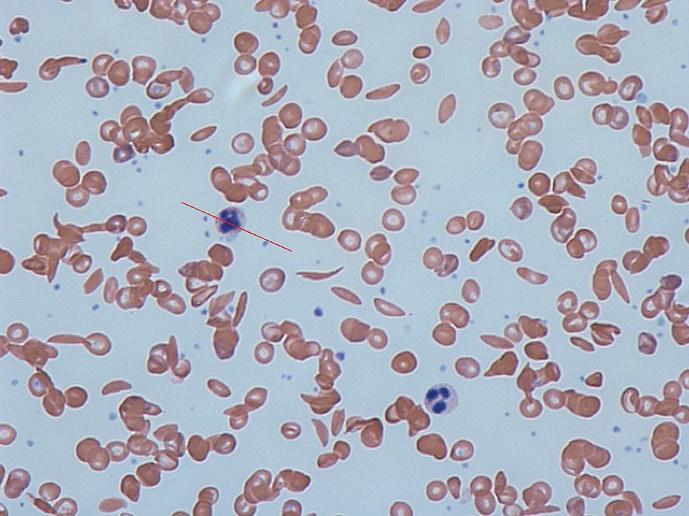
1. Name the process responsible for bubble formation. (1 mark)

……………………………………………………………………………………….……………

1. Account for the amount of bubbles formed at 5cm. (3 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. The photograph shown below is of blood from a patient observed under a microscope.



**G**

1. State the function of cell **G** in the human body. (1 mark)

……………………………………………………………………………………………………...

1. Identify the genetic disorder represented by the photograph shown above. (1 mark)

……………………………………………………………………………………………….……..

1. Using **A** to represent the normal gene and **T** to represent the defective gene:

i) Write the genotype of the person with the genetic disorder named in (b).

(1 mark)

…………………………………………………………………………………………………

ii) Write the genotypes of offsprings obtained from a marriage of two persons with the genetic disorder shown above. (2 marks)

………………………………………………………………………………………………....

1. Why is there a higher prevalence of the genetic disorder above in malaria-prone areas?

(1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

1. State the advantage organisms with the following features have over the rest.
2. Inter-ventricular septum in their hearts. (1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

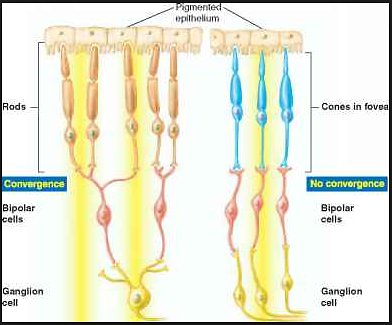
1. Sexual form of reproduction. (1 mark)

…………………………………………………………………..………………………………..

1. Explain **two** ways in which the excretory system adapts the desert rat to water conservation. (2 marks)

………………………………………………………………………………………..………………………………………………………………………..……………………………………………………………………………………………..……………………………………………….…

1. Use the section of eye retina shown below to answer questions that follow.



**A**

**B**

a) What is the survival importance of having both cells **A** and **B** in the same eye of an animal? (1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

b) i) Which letter represents the cell that gives the eye a high visual acuity? (1 mark)

………………………………………………………………………………………………..……

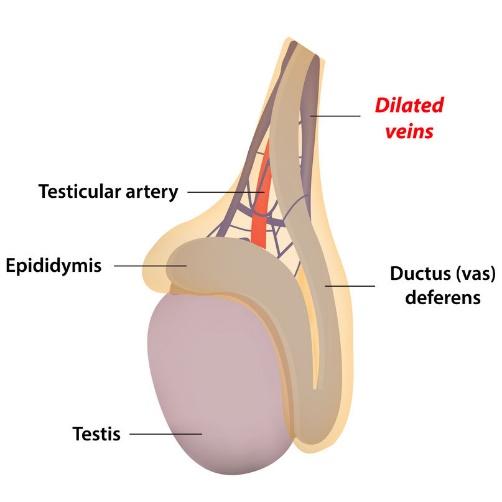
ii) Give a reason for your answer in b (i). (1 mark)

…………………………………………………………………..…………………………………

1. A field of view of a light microscope with a radius of 2.5mm had 10 cells along its diameter. Determine the diameter of one cell in micrometers. (3 marks)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………………………………………………………………………………..………………………………………………………………………..…………………………………………………………

1. An illustration of the human testis is shown below.



1. State the following functions of the human testis. (2 marks)

i) Endocrine function ………………………………………………………………….

ii) Reproductive function ………………………………………………………………

1. The blood vessels leaving and entering the testicles are close to each other and blood flow shows a counter current flow. Explain the significance of this to the testis. (2 marks)

…………………………………………………………………….…………………..……………………………………………………………………….…………..……………………

1. An image of germinating seed is shown below.



1. Give a reason to show that the above is an illustration of epigeal germination. (1 mark)

…………………………………………………………………..…………………………………

1. What is the significance of the shoot emerging in a curved manner as shown. (1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

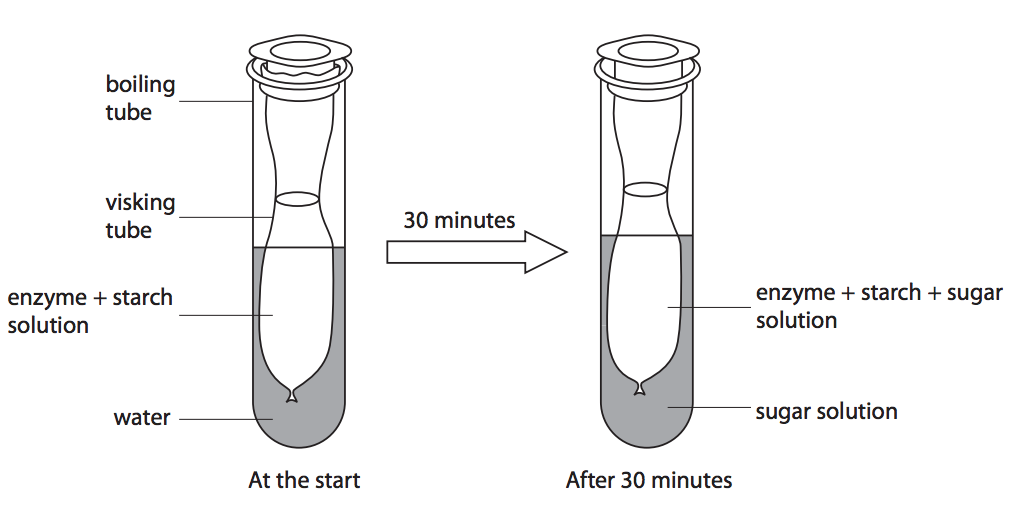
1. Tar present in burning tobacco has been found to be carcinogenic leading to lung cancer.
2. Name a plant waste product that can be used in lung cancer therapy. (1 mark)

………………………………………………………………………………………………..……

1. State **two** means of lung cancer treatment. (2 marks)

………………………………………………………………………………………..………………………………………………………………………..……………………………………………………………………………………………………………………………………..…………

1. The diagram shown below represents an experiment done by Form 1 students and they obtained the results after 30 minutes.



1. Which physiological process was being investigated in this experiment? (1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

1. State **two** adjustments learners could have done in the set up in order to obtain the same results within 10 minutes or less. (2 marks)

………………………………………………………………………………………..……………………………………………………………………………………………..………………………………………………………………………..…………………………………………………

1. Account for the results obtained after 30 minutes. (3 marks)

………………………………………………………………………………………..……………………………………………………………………………………………..………………………………………………………………………..…………………………………………………

1. Distinguish between an allograft and an autograft. (2 marks)

………………………………………………………………………………………..………………………………………………………………………..……………………………………………………………………………………………..…………………………………………………

1. State **two** principles of the theory of chemical evolution on origin of life. (2 marks)

………………………………………………………………………………………..………………………………………………………………………..……………………………………………………………………………………………..………………………………….………………

1. a) What is an allergen? (1 mark)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………

b) Describe how an allergic condition occurs in a human body. (3 marks)

………………………………………………………………………………………..………………………………………………………………………..…………………………………………………………………………………………………………………..…………………………………………………………………………………………………………………...……………………………………………………………………………………………………………………...