**OPENER EXAM: TERM 1 - 2023**

**BIOLOGY FORM 4**

**50 MARKS.**

**TIME 1HR 30 MIN. MARKING SCHEME.**

1. Name the organelles that perform each of the following functions: 2 MRKS
2. Digestion and destruction of worn out organelles.

 **lysosomes**

1. Osmoregulation

 **Contractile vacoules**

1. a) In which kingdom do bacteria belong? 1MRK

 **Monera**

1. Give any **two** benefits of bacteria to man 2MRKS

 **Producing antibiotics; vaccines; hormones and in producing transigenic organisms in modern technology;**

1. Study the dental formula given below:

**I 0; C 0 ; PM 3; M 2**

 **4 0 3 3**

 (a) Identify with reasons the mode of feeding of the animals whose dental formula is

 given above 3MRKS

 **Herbivorous; Absence of upper incisors and upper canines ;lack lower canines**

 (b) Calculate the total number of teeth in the mouth of the above animal. 1MRKS

 **15x2=30 teeth**

1. Explain why small mammals such as moles feed more frequently than larger ones such

 as elephants 1MRKS

 **Small mammals have large surface area to volume ratio; hence lose heat quickly to environment; to replace the heat , lost, their metabolism is high making them to feed more frequently**

1. The flow diagram below represents blood clotting process

Prothrombum

Vitamin **K**

Platelets

**Z**

**X**

Ca2+

**Y**

Fibrinogen

 a) Name the proteins represented by the letters; V, Y, Z 3MRKS

 **X- Thromboplastin**

 **Y- Fibrin**

 **Z-- Thrombin**

 b) State the importance of blood clotting 1MRK

**Promotes wound healing; stops further loss of blood/ bleeding; prevents entry of**

 **pathogens/ injection**

 c) Why doesn’t the physiological process above occur in undamaged blood

 vessels 1MRK

 **Blood contain leparin/ anti clotting factor eight; that inhibits blood**

 **coagulation**

1. State **two** major structural differences between fruit and a seed 2MRKS

 **A fruit has two scars while a seed has a single scar**

 **Fruits are covered by epicarp while seeds have seed coats/testa**

1. The eggs of birds are relatively much larger than those of mammals. Explain. 2MRKS

**In birds the embryo develops externally. It is totally dependent on food stored in the egg for its nourishment; In mammals the embryo receives nourishment from the mother through the placenta**

1. Differentiate between continuous and discontinuous variations 2MRKS

**Continuous variation shows gradation in characteristic with intermediate; discontinuous shows distinct characteristics between organisms with no intermediate groupings;**

1. Members of the same species of organism tend to differ due to variation. State **three** causes of variation in organisms. 3MRKS

**mutation;**

**intermixing of genes already in the population through sexual reproduction recombination;**

**crossing over during prophase of meosis I**

**interdependent assortment of chromosomes, during metaphase of meosis I**

1. Wekesa and Wanjiku who are siblings are both normal as their parents but have a hemophilic brother. Give the Genotype of their parents. 2MRKS

 Father XHY ;

 Mother XHXh ;

1. There are at least 205 known sex – linked recessive disorder
2. Name **any two** of them. 2MRKS

 **Colour blindness; haemophilia;**

 **Sickle cell anaemia;**

1. State a reason why sex – linked recessive traits tend to effect the male child. 1MRK

 **Part of X chromosome has homologous portion on the Y chromosome therefore if the X has the recessive trait, it will show on the male phenotype**

1. State why if a mother has the trait all her sons will have it. 2MRKS

**The son inherits the X chromosome from the mother while the daughter inherits the**

 **X chromosome from the father;**

1. State the meaning of the following terms giving an example in each case: 2MRKS
2. Sex-linked genes

 **Genes which are located on the sex- chromosomes and therefore are transmitted along with them. Example Haemophilia ; colour blindness;**

1. Multiple alleles

 **Where more than two genes control a particular characteristic/ trait;**

 **Example ABO blood group system;**

1. Give an example of a sex-linked trait in human on: 2MRKS

**Y** – Chromosome

**hairy pinna, pre-mature boldness; ; (any one)**

1. **X** – Chromosome

**- haemophilia (bleeders disease); colour blindness; (any one)**

1. Study the genetic chart below showing the inheritance of the gene responsible for haemophilia in a family.





a) Write the genotype of individuals A, B, F 3MRKS  **A – XhY;**

 **B – XHY;**

**F – XHXh**

 b) A member of this family labelled **F** marries a haemophiliac male. What will be the

 phenotypic ratio of the offspring? Show your workings using a genetic cross.

 XH Xh; X Xh;Y;



(b)

 4MRKS

1. Other than the condition stated above, state any other **two** common genetic disorders

 that result from gene mutation. 2MRKS

 **Albinism; sickle cell anaemia; colour blindness; chondrodystrophic dwarfism;**

1. In man blood group inheritance is controlled by multiple alleles in which allele **A** is co dominant to allele **B**. a woman heterozygous for blood group **A** married a man heterozygous for blood group **B**

 a) State the genotype of both parents 2MRKS  **Woman AO**

 **Man BO**

 b) Using a punnet square, show the genotypes of F1 generation. 4MRKS

 **Parental genotypes**

 **i**

|  |  |  |
| --- | --- | --- |
|  | **A** | **O** |
| **B** | **AB** | **BO** |
| **O** | **AO** | **OO** |

 c) State **one** application of knowledge of blood group inheritance in man 1MRK

 **Determining compatible blood groups in blood transfusion**

 **Cases of disputed paternity settlement**