(10 Qs) MARKING SCHEME

MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

PRE-MOCK EXAMINATIONS 2023

CODE: 231/2 **BIOLOGY – FORM 4** **Paper 2**

APRIL 2023 – TIME: 2 Hours

Name: .....**Adm No:** .....

Class: ..... **Date:** /04/2023

1 – 2a Mr. Okebe
2b – 3b Mr. Calvince
3c – 4e ~~engine~~ Mr. Atago
4d – 5 Ms. Abura
6 – Ogniga / Angoro
7/8 – Aathola / Panhue / Imbuga

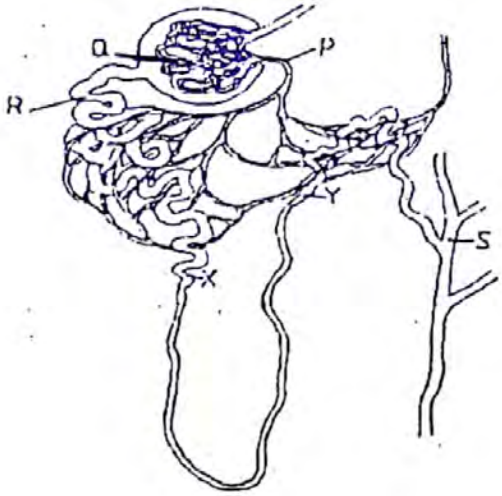
INSTRUCTIONS TO CANDIDATES

- Answer all the questions in section A.
- In section B, answer question 6 and either question 7 OR 8
- Answers **must** be written in the spaces provided in the question paper.
- Additional pages **must not** be inserted.
- Candidates may be penalized for recording irrelevant information and for incorrect spellings.

FOR EXAMINER'S USE ONLY

Questions	Maximum Score	Candidate's Score
1	8 MKS	
2	8 MKS	
3	8 MKS	
4	8 MKS	
5	8 MKS	
6	20 MKS	
7 OR 8	20 MKS	
TOTAL	**80 MKS**	

1 The diagram below represents a mammalian nephron



(a) Name the

(i) Structure labele P..... Efferent arteriole; ..... (1mk)

(ii) Portion of the nephron between point X and Y..... Loope of Henle; (1mk)

(b) Name the process that takes place at point Q..... ultra filtration; .... (1mk)

(c) Name **one** substance present at point R but absent at point S in a healthy mammal. (1mk)

Sugars (Glucose), Amino acid, Vitamins .....

(d) The appearance of the substance you have mentioned in (c) above is a symptom of a certain disease caused by a hormone deficiency. Name the

(i) Disease..... Diabetes mellitus ..... (1mk)

(ii) Hormone..... Insulin ..... (1mk)

(e) State the structural modifications of nephrons found in the desert mammal. (2mks)

- Long loop of Henle to increase surface area for water reabsorption .....
- Has small glomerulus to reduced water ultrafiltration;
- Thick medulla

2 a) What is organic evolution? (2mks)

Emergence of complex form of life from simple forms; over along period of time;

b) State two ways in which Homo sapiens differ from homo habilis. (2mks)

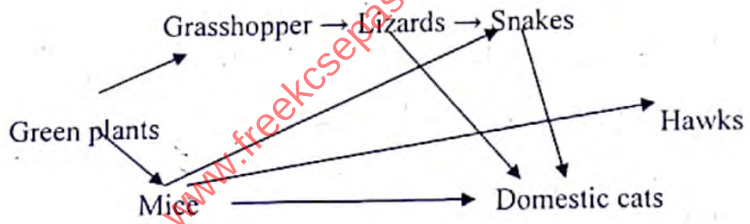
Homo Sapiens	Homo Habilis
1) Higher Brain Capacity	1). Lower brain capacity
2) Highly Developed Culture	2) less cultural development
3) Reduced brow ridge	3) Prominent brow ridge
4) Bipedal	4) Quadripedal.

c) Distinguish between divergent and convergent evolution giving examples in each case (4mks)

Divergent evolution: Where one basic structural form is modified to give rise to various different forms;

Convergent Evolution: Where structures with different embryonic origin are modified to perform similar functions;

3 The chart below shows a feeding relationship in a certain ecosystem



(a) Construct two food chains ending with a tertiary consumer in each case. (2 mks)

Green plants → Grass → Mice → Snake → Domestic Cat

Green Plants → Grass → Grasshopper → Lizard → Snake

Green Plants → Grass → Grass hopper → Lizard → Domestic Cat

(b) Which organism has the largest variety of predators in the food web? (1 mk)

Mice

(c) Name **two** secondary consumers in food web. (2 mks)

Lizard ;

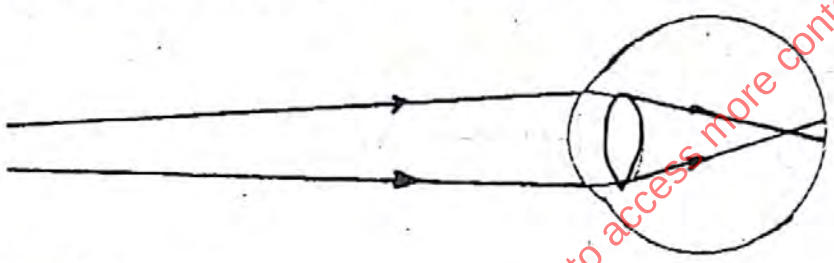
Snake ;

Hawk ;

(d) Suggest **three** ways in which the ecosystem would be affected in there was a prolonged drought. (3mks)

- Reduced grass plant ;
- Reduced mice ;
- Reduced Grasshopper ;

4 The diagram below shows the position of an image formed in a defective eye.



a) Name the defect: (1mk)

Myopia / Short sightedness ;

b) Explain how the defect named in (a) above can be corrected (2mks)

Use of Concave / Divergent lense ; To bring the light to focus on the retina ;

c) Apart from hearing, state another function of the human ear. (1mk)

Body Posture and Balance ;

d) State **two** functional differences between the rods and cones in the human eye. (2mks)

2) State the function of the following structures:

i) Eustachian tube. (1mk)

Equalizes air pressure between the miner ear and outer ear to prevent ear drum distortion ;

ii) Ear ossicles. Amplify sound vibrations ; (1mk)

d)

Rods	Cones
1) Sensitive to low light intensity	1) Sensitive to high light intensity ;
2) Not sensitive to colour	2) Sensitive to Colour ;
3) Has Retinal convergence	3) Lack Retinal convergence
4) No perception of fine details	4) Has perception of fine details

5 Red-green colour blindness is inability to distinguish red and green colours.

It's caused by sex- linked recessive gene.

a)i)In which chromosome is this gene found. (1mk)

X chromosome;

ii)Which part of the eye fails to develop? (1mk)

Retina;

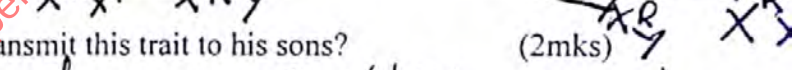
b) A colour blind man marries a homozygous normal woman. Show the genotypes of the resulting offsprings. (Use R to stand for a dominant gene.) (4mks)

Parents ♂ ♀

Parental Phenotype; ~~XY~~ Colour blind ~~XX~~ Normal.

Parental Genotype X^rY X X^RX^R;

Gametes



c)Why is it that the colourblind man cannot transmit this trait to his sons? (2mks)

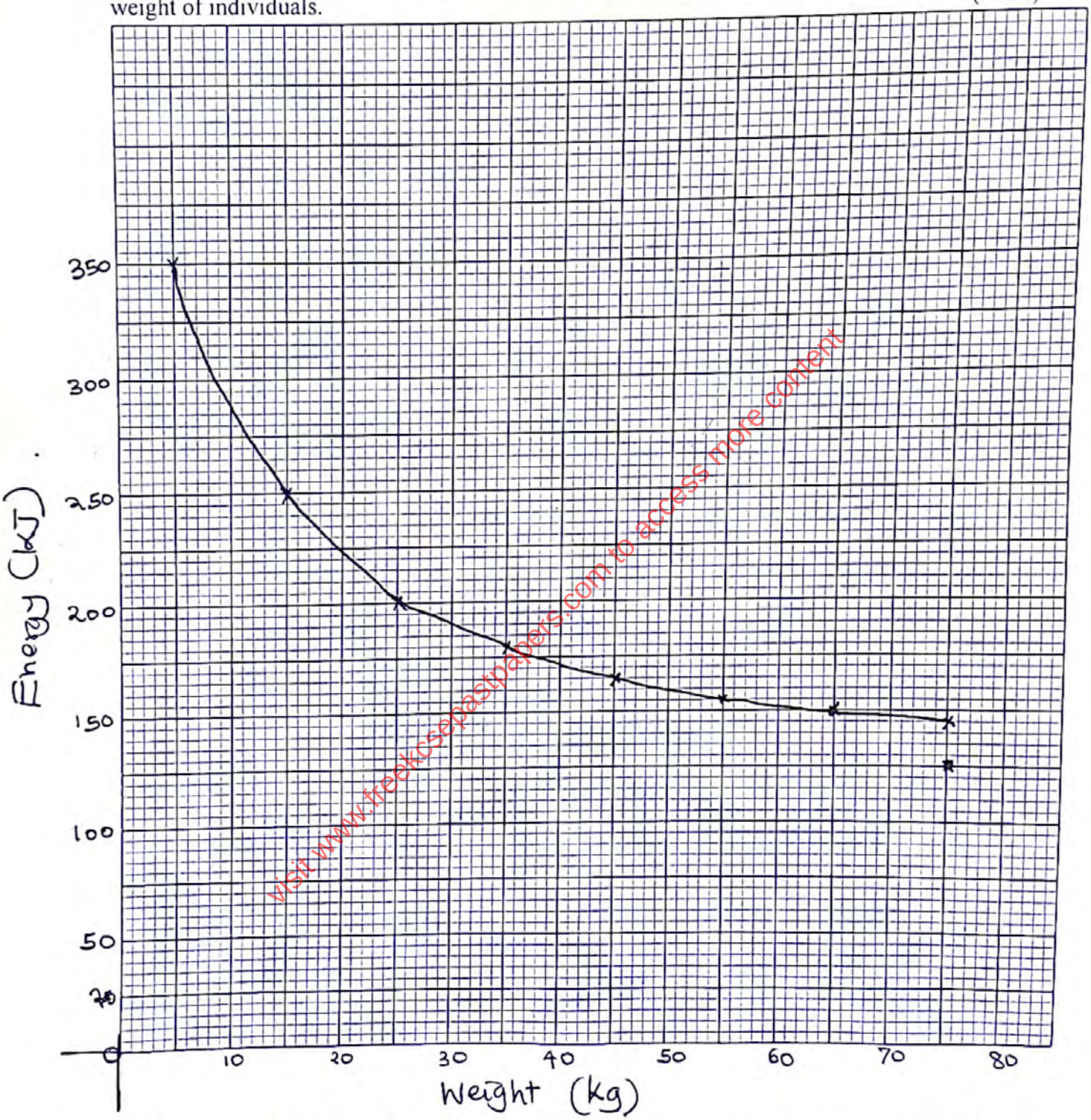
Man has only 1 X chromosome; which is only inherited to daughters;

SECTION B

6 In an experiment to determine the energy requirements per day by persons of different sizes at rest, the following results were compiled.

Weight of individual (kg)	Energy requirement per day at rest (KJ)
5	350
15	250
25	200
35	180
45	165
55	155
65	150
75	145

a) Using a suitable scale, draw a graph of the amount of energy required per day against the weight of individuals. (6mks)



b) From the graph, determine the difference in energy requirements between persons weighing:

i)20kg and 30kg. (1mk)

225 − 190

= 25 KJ ;

ii)40kg and 70kg. 170 - 145 = 25KJ; (1mk)

c)Account for the difference in energy requirements per kilogram of body weight between individuals of 5kg and 75kg. (3mks)

Individual of 5kg has higher energy requirement than individual of 75kg; because individual of 5kg has large surface area to volume ratio than 75kg; hence require loose more heat to the environment;

* d)i) On the graph drawn above, draw a curve that would represent energy requirements of a reptile instead of a man. (1mk)

ii) Account for the difference between the two curves. (2mks)

e) Other than body size, state any **three** factors that determine energy requirement in man. (3mks)

- Basal metabolic Rate;
- Age;
- occupation / Everyday activity;
- Sex;

f) Name food substrate that provides the most and least energy per unit mass:

i)Most energy. Lipids / Fats / oil; (1mk)

ii)Least energy. Carbohydrates; (1mk)

g) Write down a balanced chemical equation of complete oxidation of glucose molecule. (1mk)

Glucose + Oxygen → Carbon (IV) oxide + Water + Energy

7 Discuss seed dormancy, its importance, causes and ways of breaking it. (20mks)

8a) Explain how blood sugar is regulated in the human body. (12mks)

b) Explain the fate of digested protein. (8mks)

7 Seed Dormancy: Temporary inhibition to germination when a seed is in a resting condition, with reduced metabolic reactions; (max 2)

Importance of Seed Dormancy:
- Enables the seed to withstand unfavourable condition;
- Allows time for dispersal of seeds; which ensures colonisation of new habitats and reduce competition for resources;
- Allows time for the seeds to mature before germinating; (max 4)

Causes of Seed Dormancy:
- Immature embryo;
- Presence of hard seed coat (Testa);
- Presence of growth inhibitors; e.g abscisic acid;
- Absence of growth promoters / Hormones; e.g Gibberelins;
- Lack of Oxygen;
- Lack of Exposure of the seed to light for a certain duration of time / Light of right wavelength;
- Lack moisture / water;
- Lack of optimum temperature; (max 7)

Breaking Seed Dormancy
- allow seeds enough time to break immaturity;
- Removal of impermeable testa through scarification, Pin-pricking, use of fires
- Soaking in water to dilute inhibitors; (max 7)
- Treatment with growth promoters;
- Drainage to increase soil air holding capacity;
- Stratification Exposure to cold;

- Removal of mucilage;
- Exposure to long period of heat;

8) a) Sugar Regulation

Increase of sugar above normal/excess

Hypothalamus; is stimulated to stimulate pancrease to secret insulin hormone;

Insulin stimulate liver cells; to convert Excess Sugars to glycogen; or fats; for storage; Inhibits Conversion of glycogen to glucose; Increase oxidation of glucose;

Drop of blood sugar blow normal

Hypothalamus is stimulated; Hypothalamus stimulates pancrease; to secret glucagon hormone;

Glucagon stimulates liver cells; to convert glycogen to glucose + fats; reduce break down of glucose to glycogen; (max 12)

b) Fate of Digested Proteins:

- Component of Structures in living things; e.g plasma membrane/Connective tissue/Hair/Hoves/Nails/muscles;
- Repair of worn out tissues;
- Act as metabolic regulators; e.g Hormones; Enzymes;
- Provision of body immunity; e.g antibodies;
- Broken down during starvation to give energy;
- Transport of Respiratory gases; e.g Haemoglobin
- Lubrication of body tubes; e.g mucus; (max 8)
- Excess amino acids are deaminated;