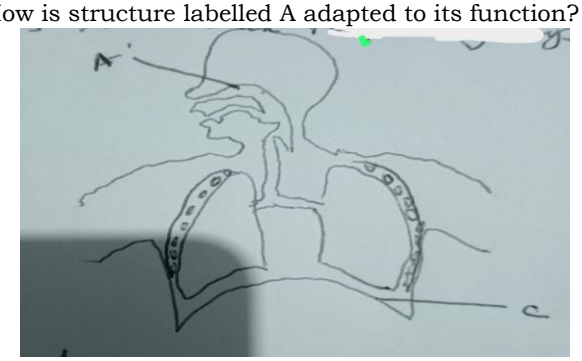
KCSE 2024

BIOLOGY PAPER 2

MARKING SCHEME

1. The diagram below represents the human respiratory system.

a) How is structure labelled A adapted to its function? (4mks)



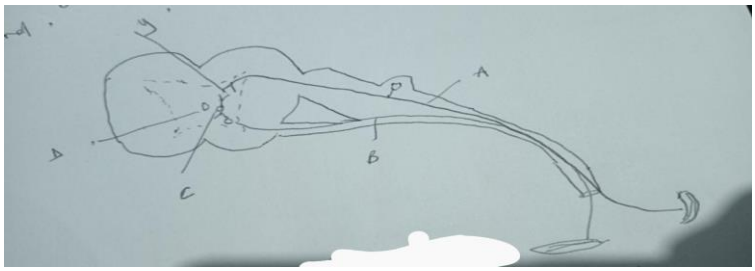
Has hairs to filter solid particles
Has mucus secreting cells to trap solid particles dust
Has numerous blood vessels /capillaries to warm //moisten in cooling air
Has olfactory/sensory cells to detect oduor / quality of air

b) What would be the effect of the diaphragm muscle contraction during breathing in.(3mks)

Diaphragm muscles flattens;
Volume of thoracic cavity// lungs increase;
Atmosphere pressure been higher than pressure inside;
Forces air to rush into the lungs;

c) Give the scientific name of the organism that causes whooping cough? (1mks)

Bordattella pertusis



2. The diagram below represents a section of the spinal cord.

a) State one structural and functional Differences between A and B.(2mk)

Structural any 1mks

A//sensory neuron	**B//motor neuron**
Cell body situated of axon	**Cell body at one end of axon**
Cell body outside cells	**Cell body in CNS**
Receptors dendrites located in sense organs while terminal dendrite located in CNS	**Motor end plate terminates in a muscle// gland**

Functional 1 mks

A//sensory neuron	**B//motor neuron**
Transmit nerve impulse from sense organs to CNS	Transmit nerve impulse from CNS to effector

b) State 3 differences between a simple and a conditioned reflex? (3mks)

Simple reflex	**Conditioned reflex**
Single stimulus to bring about response	**Repeated stimulus to about response**
Simplest form of behavior and is independent of experience	**Involves modification of behavior and dependent on experience**
Sensory and motor components are the same at all times.	**Primary sensory is replaced by a secondary sensory components but the motor components remain unchanged.**

c) Explain how an impulse is transmitted across region y? (3mks)

- When an impulse reaches synoptic knob it stimulates vesicles to move towards the pre-synoptic membrane; releasing acetylcholine// transmitter substance
-transmitter substance makes membrane permeable;
-transmitter substance diffuses across the synaptic cleft to post synaptic membrane which is then depolarized// causing an action potential;

Max 3

3. Students of Furaha Mixed Secondary School were assigned to study a particular ecosystem.

a) Distinguish between ecosystem and ecological niche? (2mks)

ecosystem	**Ecological niche**
Natural compound composed of abiotic and biotic factors whose interactions lead to a self-sustaining system	**Position organism occupies in a habitat// physical space where an organism is found// role in habitat in terms of feeding relationship and other interaction with other species**

b) Name suitable method they would have used to estimate the population of wild animals? (1mks)

Commented [h1]:

i. Aerial count// total count// quadrant// bell transect// capture-recapture/ aerial photography.

ii. Animals are mobile;

c) State 3 methods which could be used to determine the diet of the wild animals? (2mks)

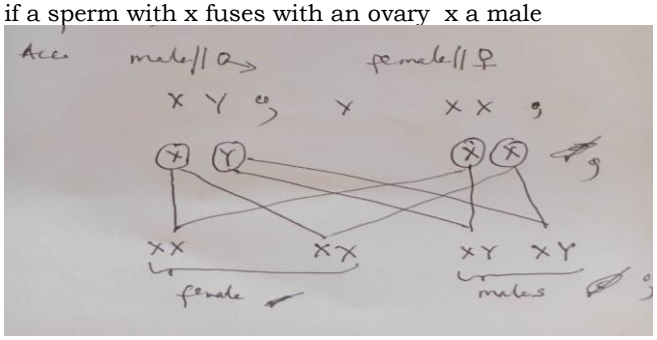
- **Observation**
- **Examining the dropping**
- **Analyze gut content**
- **Study dentition//beaks// claws// mouth parts**
- **Dissecting a sample of the animal// examine structure of digestive system // no of stomach chambers// size of caecum// large intestine**

d) Name biotic factors that could have regulated the animal population? (2mks)

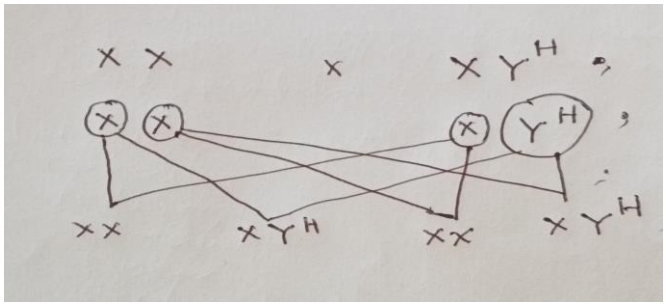
- **Immigration//emigration/migration**
- **Competition**
- **Predation**
- **Parasitism**
- **Diseases**
- **Poaching// hunting// curling//any human activities//man**

4. a) How is sex in humans determined? (3mks)

- males have X and Y // heterogametic
- females have X and X // homogametic
- sperms have either X OR Y, while all female gametes have y chromosomes
- if a sperm with x fuses with an ovary x a male



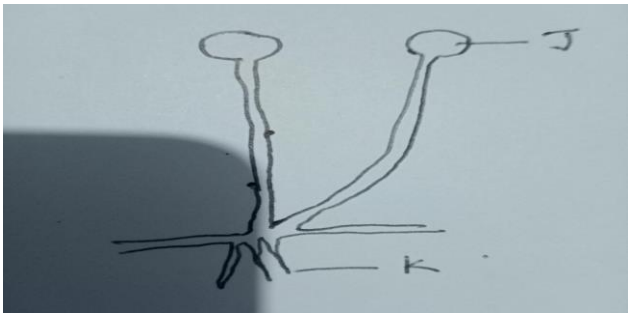
b) In human's hairy ears is controlled by a gene on the Y chromosome.
Using letter Y to represent the chromosomes carrying the gene for hairy ears, work out a cross between a hairy eared man and his wife? (4mks)



c)Girls will not display hairy ears, explain? (1mk)

Girls are XX and gene for hairy ears is only found in Y chromosome;

5. The diagram below illustrates the structure of bread mould.



a) State the function of the structure labelled K? (2mks)

- **Absorption of soluble substance // digest nutrients;**
- **Secretion of digestive enzyme**
- **Anchorage;**

b) Describe the mode of nutrition? (5mks)

Reproduce asexually; by sporulation;

- **Spores develop from a single cell sporangium; which burst on maturity releasing spores; which are dispersed by air currents // wind; germinating to form new generation// form mycelium**

c) State any one economic importance of members of this kingdom? (1mk)

- **Food spoilage**
- **Food (mushroom)**
- **Baking**
- **Brewing**

SECTION B

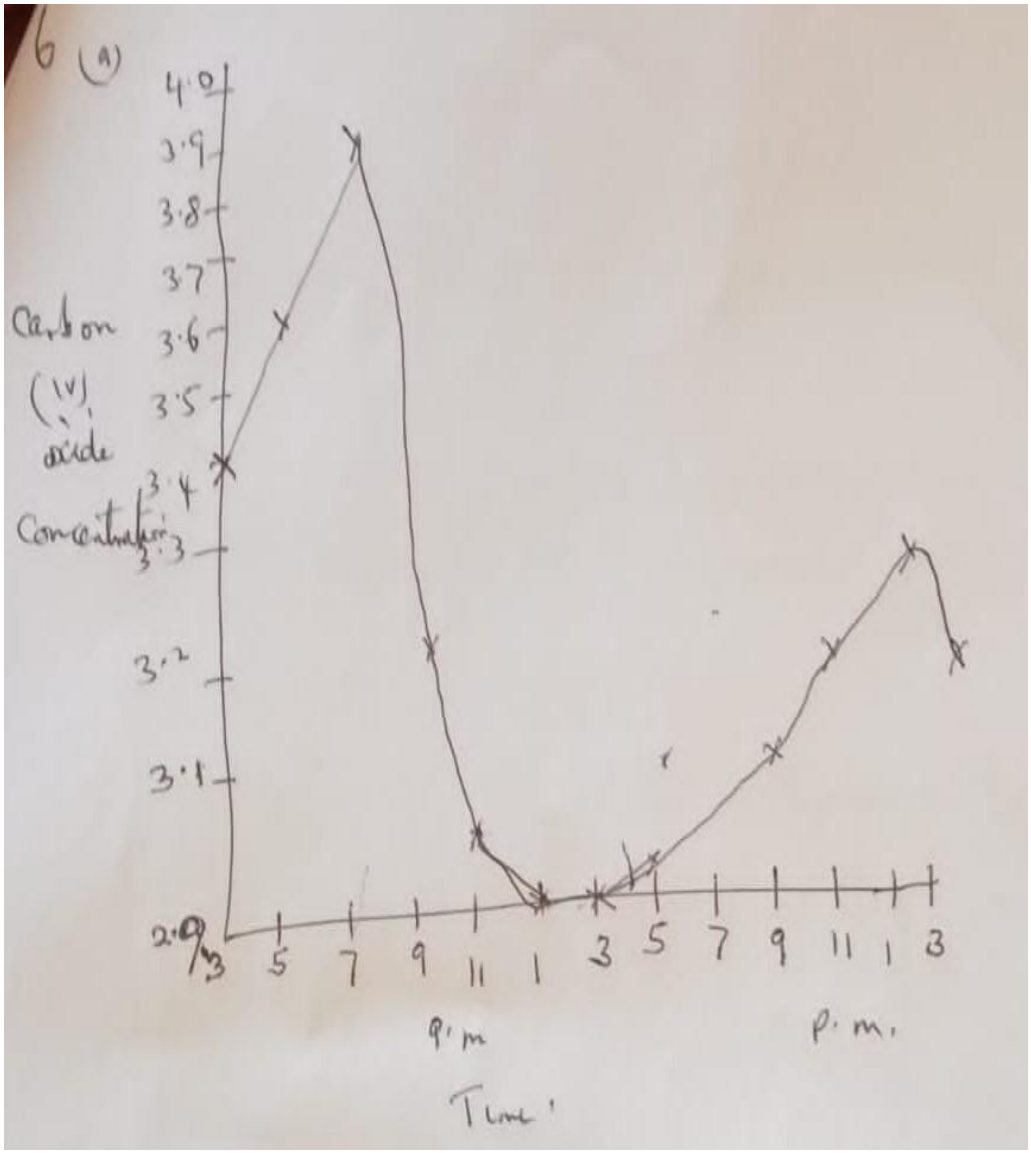
Answer question 6 (compulsory) and either question 7 or 8 in the space provided after question 8

6. In an experiment carried out in a tropical country, carbon iv oxide concentration was measured around a plant in an open air at two hour in travels for a period of 24 hours

- The results were as shown in the table below.

time	%of co2 concentration(x10-2)
3am	3.40
5am	3.60
7am	3.90
9am	3.20
11am	2.95
1pm	2.90
3pm	2.90
5pm	2.92
7pm	3.02
9pm	3.10
11pm	3.20
1 am	3.30
3 am	3.40

Plot a graph of % carbon (iv) oxide concentration against time on the grid provided. (5mks)



b) Calculate the rate of change in CO2 concentration between 4 a.m. and 7 a.m. (2mks)

c) Give a reason for the change in CO2 concentration between:-

i. 7 a.m. to 11a.m (2mks)

- **Rapid decrease in CO2 concentrations due to utilization of co2 in photosynthesis; CO2 concentration**

ii. 12 noon to 4 p.m. (2mks)

- **remains almost constant; photosynthesis rate equals respiration rate // compensation point**

iii. 5p.m. and 5 a.m. (3mks)

- **Increase in CO2 concentration; the rate of photosynthesis drops stops respiration produces CO2 which accumulates**

d) With reasons identify 3 environmental factors that are likely to affect the results (6mks)

Wind –blow CO2 avoiding accumulation of CO2;
Sunlight- affects the rate of photosynthesis hence rate of CO2 consumption;
Temperature- affects the rate of photosynthesis and therefore CO2 around the plant.
Humidity – affects stomatal openings and closing of stomata affecting movement of CO2 around the plant.

Any 2

6. Describe how the male reproductive system is adapted to perform its functions (20mks)

1. Penis; erectile tissue // spongy tissue mussels and blood vessels; filled with blood for erection;
2. Glans- has sensitive nerve ending; stimulation results to granulation;
3. Seminiferous tubules: -
i. long coiled- to provide a large surface are for sperm production.
ii. Inner lining has actively dividing cells – give rise to sperm
iii. Sertoli cells – nourish sperms
4. Inter - glandular//secretes; androgens// testosterone
5. Testis – outside body in scrotal sac; provide cooler environment for sperm production.
6. Epididymis – highly coiled; to store sperms
7. Vasdeferens// sperm duct – narrow tube; connecting epididymis with urethra // ejaculation duct;
8. Seminal vesicle // prostate gland // cowpers glands// bulbs urethral gland
- **Provide sperms with nutrients**
- **Has alkaline fluid to neutralize acid in vagina // urethra**

max 20

8. Explain the role of the following hormones in growth and Development

i. (a) Indoleacetic acid (5mks)

cell division // elongation
Influence tropic movement
Fruit formation// pathenocapy
Decrease in IAA promotes formation of abscission layer// bringing leafs to fall
Cell differentiation

Cause growth of adventurous roots
Cause apical dominance
IAA+ cytokinnins induces cellos hormones

(b) Gibberellin (5mks)

-**Cell division//cell elongation in dwarf plants**
-Initiates formation of IAA// Parthenocarpy// setting of fruits after fertilization.--Formation of side branches of stems//seed dormancy(in buds)
-Inhibits growth of adventitious roots .
-Activates hydrolytic enzymes during germination//Promotes germination of cells //breaks seed dormancy;
-Affects leaf expansion and shape//Retards leaf abscission;

(c) Cytokinnin (5mks)

Breaks dormancy
Promotes cell division
Promote root formation of a shoot
Low concentration encourages leaf
Normal concentration increases increases cell enlargement in leaf
Promotes flowering
Stimulates lateral bond development

ii. Describe role of hormones in insect metamorphosis.(5mks

During larval stage Corpora Allata produces Juvenile hormone; leads to formation of larval cuticle; when the larva matures ,Corpora Allata disintegrates lowering level of juvenile hormone; this stimulates neuro secretory cells to stimulate prothoraces gland ; to produce ecdysone responsible for maulting; leading to laying of adult cuticle.