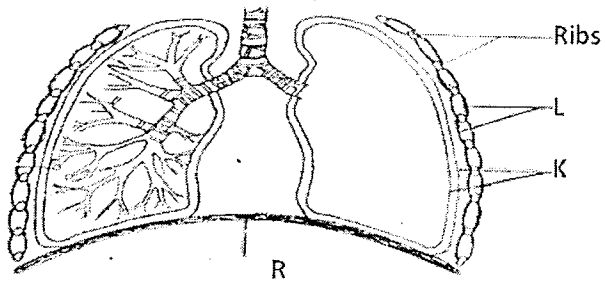
Kenya Certificate of Secondary Education
BIOLOGY 231/2
FORM FOUR2NDTERM EXAMINATION 2019

MARKING SCHEME

SECTION A (40 MARKS)
Answer all the questions in this section in the spaces provided.

1. The diagram below represents a part of thoracic region of a human being;



(a) Name the structures labeled **K** and **L** (2marks)

- **K**
  pleural membrane ;

- **L**
  intercostal muscles; acc external and internal intercostals muscles
  rejintercoastal muscle

(b) How is structure R bring about inhalation (4marks)

- **R (diaphragm) muscles contract; causing it lie flat / flatten; This increases volume of the thoracic cavity/lungs; (hence lowering the pressure inside); since atmospheric pressure is higher than the air in the lungs, air is forced in the lungs**

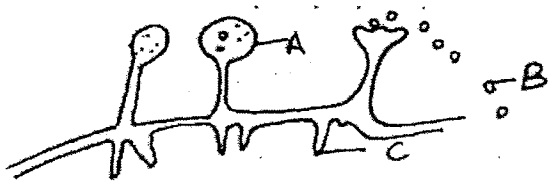
(c) Give the scientific name of the organism that causes whooping cough (1mark)

- **Bordetellapertussis scientific rule to be followed**

(d) Name a vertebra that articulates with the ribs to the back of the chest region? (1mark)

- **Thoracic (vertebra) rej vertebrae**

2. The drawing below represents a mature bread mould (rhizopus).Study it and answer the questions which follow.



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(a) Name the structures labeled A, B and C. (3marks)

A

- **Sporangium;**

B

- **Spore; (rej; spores)**

C

- **Rhizoid; (rej. Rhizoids)**

(b) Identify the type of asexual reproduction represented in the diagram (1mark)

- **Sporulation/spore formation**

(c) Give one function of structure C. (1mark)

- **Absorption of water and mineral nutrients from decaying materials**

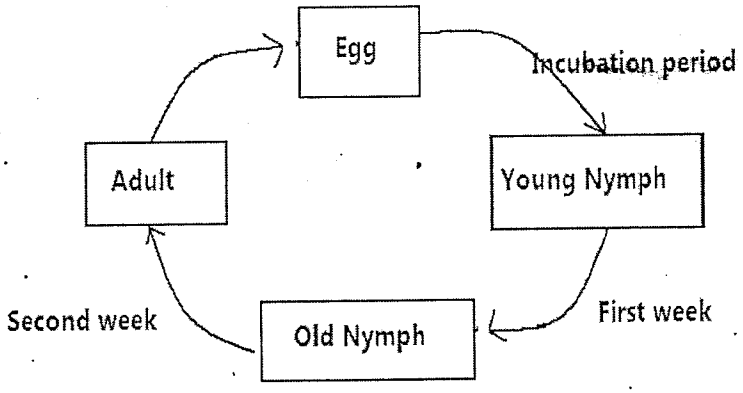
(d) (i) Define the term fertilization. (1mark)

- **Process by which female and male gamete nuclei fuse to form a diploid zygote**

(ii) Compare an ovum cell and a zygote. (2marks)

Ovum	**Zygote**
Haploid	**Diploid**
Lower mass	**Higher mass**

3. The diagram below shows a life cycle of a cockroach



(a) Name the hormone that would be at high concentration during the first and second week and their functions.

(i) First week (2marks)

Hormone

- **Juvenile hormone**

Function

- **forms larval cuticle/ inhibits moulting/metamorphic effects of hormone in the larval stage**

(ii) Second week (2marks)

Hormone

- **Ecdysone / moulting hormone**

Function

- **moulting to allow growth and metamorphosis**

(b) Name the structure that produces hormone named in a (ii) above (1mark)
- **Prothoracic gland**

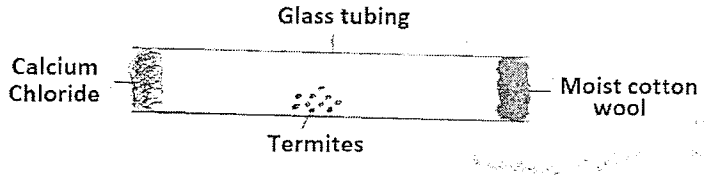
(c) Name the process represented by the life cycle above (1mark)
- **Metamorphosis/ incomplete metamorphosis**

(d) State two importance for the process named in (c) above (2marks)
- **It reduces competition for food since they feed on different food substances**
Adapts the organism to escape adverse environmental conditions

4. A climbing plant twines around the stem of a tall tree.
(a) (i) Name the type of response exhibited by the climbing stem. (1 mark)
- ***Haptotropism/thigmotropism***

(ii) Explain how the response named in (a) (i) above takes place. (3 marks)
- ***Contact with tree cause auxins to migrate to outer side of the stem. Since higher auxin concentration promotes faster growth in shoots, the greater auxin concentration in the outer part causes faster growth than the part in contact with the stem hence the plant twines around the stem.***

(b) An experiment was carried out to investigate the response of white termites to a certain stimulus. Ten termites were placed at the centre of glass tubing. Calcium chloride was placed one end of the tubing and moist cotton wool at the other end as illustrated below.



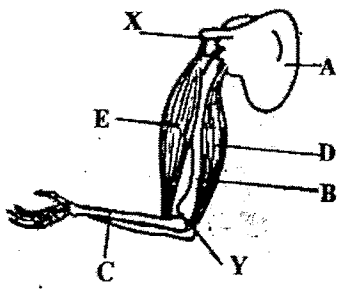
(i) What observations are made after 20 minutes? (1 mark)
- ***Most of the termites will have moved towards the end with moist cotton wool.***

(ii) What type of response is exhibited by the termites? (1 mark)
-vechemotaxis or +vehydrotaxis

(iii) What is the survival value of the above response? (1 mark)
- ***Enable them escape from harmful stimulus***

(c) What is Photonasty? (1 mark)
- ***Non-directional movement of parts of plants in response to changes in light intensity***

5. The diagram below shows the arrangement of bones and muscles in a human arm.



(a) Name the parts labeled **A , B** and **C.** (3marks)

A

- **Scapula**

B

- **Humerus**

C

- **Radius**

(b) Explain how parts **D** and **E** bring about flexing and extending of the arm. (2marks)

- **Flexing- Muscle E contracts while muscle D relax**
- **Extending- Muscle E relaxes while muscle D contracts**

(c) Name the types of joints found at points Xand **Y.** (2marks)

- **X**
- **Ball and socket joint**

Y

- **Hinge joint**

(d) Name a fluid found in all the movable joints. (1mark)

- **Synovial fluid**

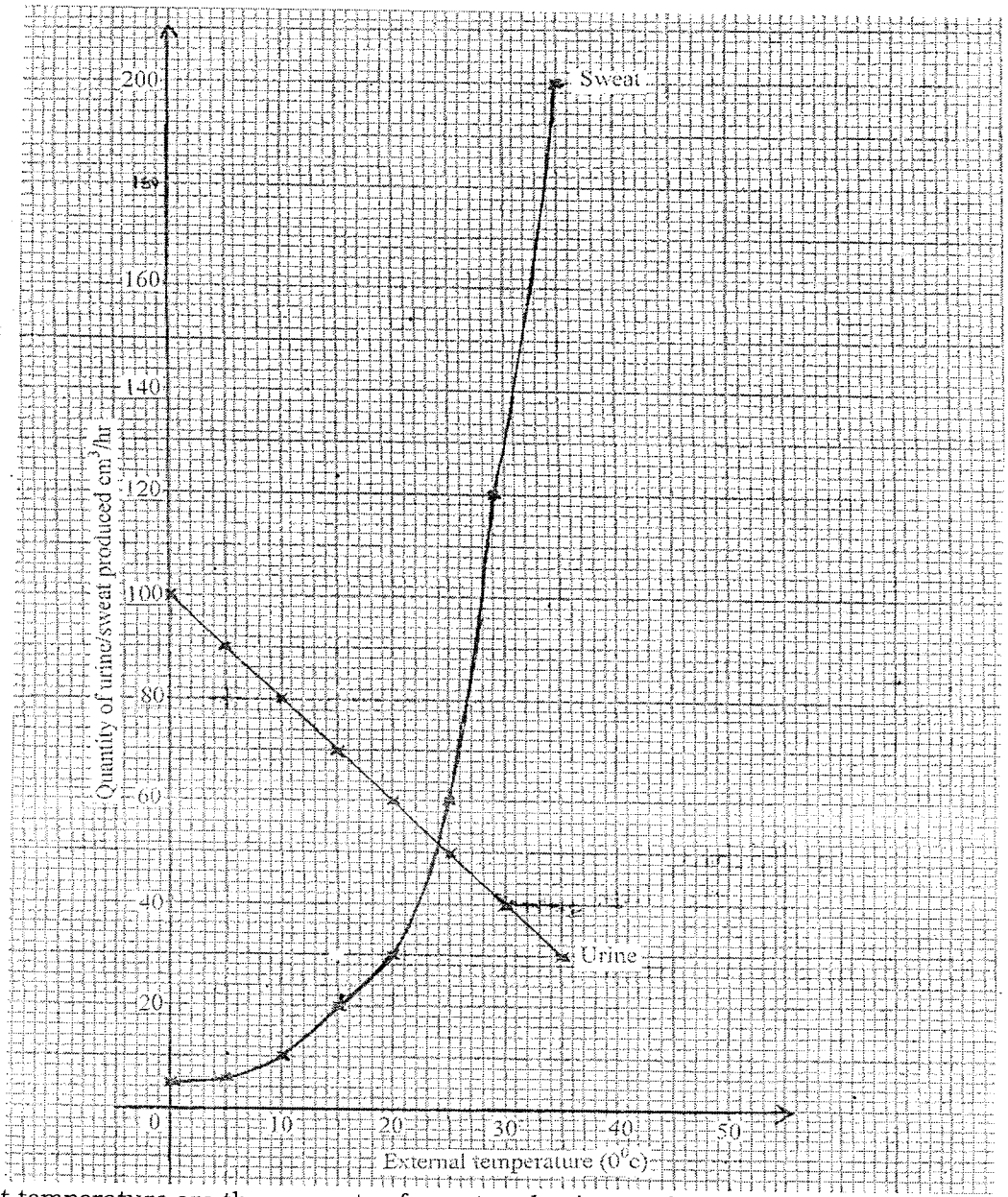
SECTION B (40 MARKS)

ANSWER QUESTION 6 (COMPULSORY) AND EITHER QUESTION 7 OR 8

6. The table below shows how the quantities of sweat and urine vary with external temperature.

External temperature	Urine cm^3/hr	Sweat cm^3/hr
0	100	5
5	90	6
10	80	10
15	70	20
20	60	30
25	50	60
30	40	120
35	30	200

(a) On the same axis plot graphs of the quantities of urine and sweat produced against the external temperature. (7marks)



(b) At what temperature are the amounts of sweat and urine produced equal? (1mark)

-24°c

(c) What happens to the amount of sweat produced as the temperature rises? Explain the observation. (3marks)

- **Sweat production increases with increase in temperature; because high temperatures increase evaporation rate; hence more sweat is converted to vapour; (drawing latent heat from body causing cooling)**

(d) Account for the observation made on the amount of urine produced as the temperature increases (3marks)

- **An increase in temperature decreases amount of urine produced; this is due to increased sweating which raises osmotic pressure of blood; A lot of water is then reabsorbed into the kidney tubules; resulting in production of less urine**

(e) (i) How is the Proximal convoluted tubule adapted to its function? (4marks)

- **Cells lining tubules contain numerous mitochondria; to provide energy for active transport,**
- **Glomerular capillaries have numerous tiny pores for ultrafiltration; (allow small molecular weight substances to pass through and not proteins and blood cells)**
- **Inner surface of epithelial cells of tubules have numerous microvilli; to increase surface area for reabsorption;**
- **Tubule well supplied with blood capillaries; for transport of reabsorbed substances**
- **Proximal convoluted tubules are coiled; to reduce speed of flow of filtrate; and increase surface area for reabsorption;**
- **Thin epithelial lining of the tubule ; for diffusion of substances;**

Mark 4 correctly explained answers (max 4 marks)

(ii) Differentiate between excretion and egestion. (2marks)

- **Excretion – Elimination of metabolic waste products from body/or separation and removal of metabolic waste products;**
- **Egestion – removal of undigested materials from the gut through the anus; (mark as a whole)**

7. (a) Describe how environmental factors increase the rate of transpiration in terrestrial plants (10marks)

- **Increase in temperature; this increases the capacity of air to hold water, more water evaporates from the surface of the leaf increasing rate of transpiration;**
- **Low humidity; less water vapour in air, high diffusion gradient of water vapour hence increasing rate of transpiration;**
- **High light intensity; enhances opening of the stomata, allowing more water vapour to evaporate, increasing rate of transpiration;**
- **Strong air currents (wind); during windy day, water vapour is blown away from the surface of the leaves creating high diffusion gradient; hence increases the rate of transpiration;**
- **Low pressure (atmospheric); low atmospheric pressure increases the rate of evaporation thus higher rate of transpiration;**
- **High amount of water in the soil; more water is absorbed by the plant which increases the amount of water in the leaves thus increasing the rate of transpiration;**

(Total 12marks max 10marks)

(b) Explain the different forms of chromosomal mutation (10marks)

- **Chromosomal mutation change bring about a change in number or structure of the chromosome i.e.**
- **Deletion; Part of chromosome break away and does not rejoin to the original chromosome. Leads to loss of some genes**
- **Duplication; chromosome replicate itself either in whole or as a portion of itself. This causes extra chromosomes.**
- **Translocation; part of the chromosome detaches itself from one chromosome and attaches to another non – homologous chromosome;**
- **Inversion; a part of chromosome gets detached, rotates at 180^0 then rejoins to the original chromosome;**
- **Non disjunction; this is failure to segregate in a pair of homologous chromosome during meiosis ; leading to some cells having extra set of chromosome and others without chromosome;**

(11marks, max – 10marks)

8. (a) Give four effects of hypothyroidism (4 marks)

- **Creatinism in children**
- **Myxoedema in adults**
- **Reduced heartbeat rate**
- **Reduced breathing rate**
- **Low body temperature**
- **Mental and physical sluggishness**
- **Weight gain**

(b) Briefly describe the process of hearing in man (16 marks)

- **The pinna picks up and concentrates sound waves; directing them into the auditory meatus; from where they strike the ear drum; causing it to vibrate; and transform sound waves into sound vibrations; vibrations from the eardrum are transmitted to the malleus; which transmits them to the incus; then to the stapes; the three ear ossicles amplify sound vibrations; as they transmit them to the oval window; From the oval window vibrations are transmitted to the perilymph; of the cochlea; in the cochlea, the vibrations stimulate sensory cell hairs; to generate nerve impulses; which are transmitted to the brain; via the auditory nerve; for interpretation; the brain interprets the impulses as sound; of specific pitch and loudness;**