

NAME \_\_\_\_\_ INDEX NO \_\_\_\_\_

CANDIDATE'S SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

**231/1  
BIOLOGY  
THEORY  
PAPER 1  
JULY/AUGUST 2011  
2 HOURS**

**MAKUENI / KATHONZWENI JOINT EXAMINATION  
Kenya Certificate of Secondary Education  
BIOLOGY  
THEORY  
PAPER 1  
2 HOURS**

**INSTRUCTIONS**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer all the questions in the spaces provided.
- (d) This paper consists of 11 printed pages.
- (e) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For Examiners use only

| Question | Maximum score | Candidate's score |
|----------|---------------|-------------------|
| 1 – 25   | 80            |                   |

**This paper consists of 11 printed pages**

**Turn Over**

1. (a) State the function of each of the following  
(i) Centriole (1mk)

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(ii) Plasmodesmata (1mk)

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2. Differentiate between mechanical digestion and chemical digestion. (2mks)

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3. The figure below is a plan diagram from a cross section of dicotyledonous plant stem.  
D E

Describe how each of the parts labelled D and E are adapted to their function.  
(a) Part D (1mk)

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(b) Part E (1mk)

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4. State two roles of hydrochloric acid in the stomach. (2mks)

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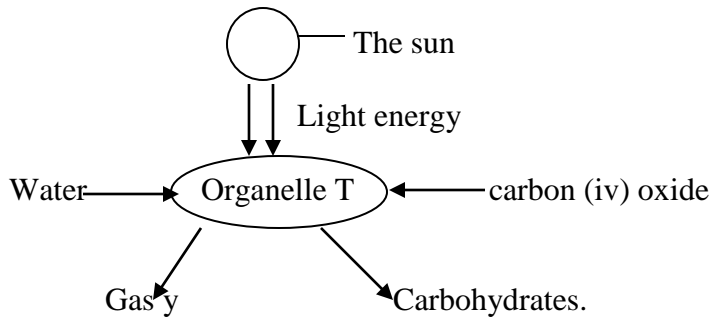
5. State the function of the deoxyribonucleic acid (DNA) molecule. (1mk)

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6. The diagram below illustrates a certain process that occurs in an organelle T



(a) Name.

(i) Organelle T (1mk)

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(ii) Gas Y (1mk)

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(b) Suggest the roles played by each of the following in the process illustrated above.

(i) Light energy (2mks)

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(ii) Water (2mks)

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(iii) Carbon (iv) Oxide (2mks)

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(c) Give three ways in which the carbohydrate produced in the organelle T is assimilated. (3mks)

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7. An organism was found to have the following characteristics.

- Jointed appendages
- Body covered with a hard exoskeleton made of chitin
- Lay eggs which later hatch into young ones
- Has compound eyes
- Body is segmented

(a) Name the phylum to which the organism belongs (1mk)

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(b) To which class does the organism belong? (1mk)

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(c) Give an example of an organisms that belongs to this class. (1mk)

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8. (a) State two differences between epigeal and hypogeal germination. (2mks)

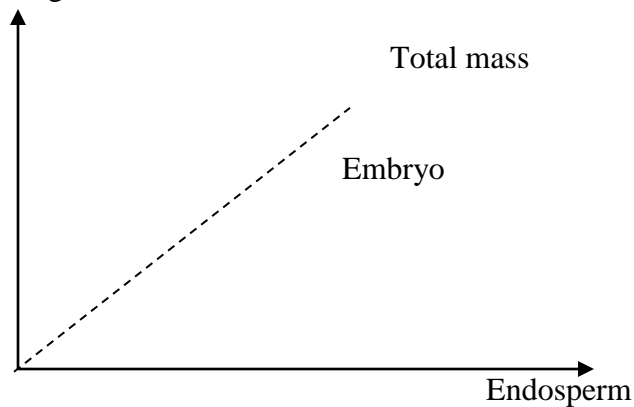
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9. The graphs below show the changes in mean dry mass of endosperm, embryo and total mass of germinating maize.



Account for the:

(a) Decrease in dry mass of endosperm from day 1 to 9

(2mks)

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(b) Increase in dry mass of embryo from day 1 to day 9

(2mks)

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(c) Decrease in total mass to day 6.

(2mks)

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10. (a) Name the method that can be used to calculate the total number of fish in a pond

(1mk)

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(b) (i) State two adaptive features of the parasite *Ascaris lumbricoides*.

(2mks)

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(ii)

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11. (a) Define respiration

(1mk)

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(b) Give two differences between aerobic and anaerobic respiration.

(2mks)

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12. Explain why Lamarks theory of inheritance was discarded

(2mks)

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13. State two adaptations of mesophytes

(2mks)

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14. Distinguish between discontinuous and continuous variation.

(2mks)

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15. In a certain plant species, which is normally green, a recessive gene for colour (n) causes the plants to be white when present in a homozygous state. Such plants die at an early stage. In the heterozygous state, the plants are pale green in colour but grow to maturity.

(a) Suggest a reason for the early death of plants with homozygous recessive gene.

(1mk)

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(b) If a normal green plant were crossed with the pale green plant, what would be the genotypes of the F1 generation. (show your working)

(3mks)

(c) Give an explanation for the occurrence of the pale green colour in heterozygous plants

(2mks)

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16. (i) Explain the meaning of the term test cross

(1mk)

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(ii) Name the chromosomes which determine sex in humans

(1mk)

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17. Study the illustration of fruits and seeds in the diagram below.

A B C

(a) Give the type of placentation in A and B.

(2mks)

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(b) State the type of dispersal of fruit C.

(1mk)

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18. Briefly explain the meaning of the term apical dominance

(1mk)

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19. State two factors which affect the rate of breathing in humans

(2mks)

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20. Distinguish between:

(2mks)

(a) Genotype and phenotype

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(b) Haploidy and diploidy

(2mks)

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21. In an experiment, a piece of brain was removed from a rat. It was later found that the rat had large fluctuation of body temperature. Suggest the part of the brain which had been removed. (1mk)

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22. Musa and Kendi are engaged to each other and will soon get married. Musa has blood group B, with genotype BO, Kendi's genotype is AB. Musa is rhesus negative while Kendi is rhesus positive.  
(a) Work out the possible blood groups of children born of Musa and Kendi. (3mks)

(b) If Musa was rhesus positive and Kendi rhesus negative, what complication may arise? (1mk)

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(c) What advise would you give the couple? (1mk)

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23. Two pieces of raw potato chips A and B were placed in two different solutions in petridishes and left to stand for thirty minutes. At the end of the experiment, A was soft and a bit shrivelled B was turgid and had increased in size.

(a) State the process that was being investigated. (1mk)

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(b) Account for the observations made in each case (2mks)

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24. The diagram below represents a mammalian nephron.  
A B C D E F

(a) Name the structure labelled A (1mk)

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(b) State the substances which are reabsorbed in C (1mk)

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(c) State the hormones responsible for the process to take place at D (2mks)

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E

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25. The diagram below represents components of the sensory system in vertebrates. Study it and answer the questions that follow.

(a) Name the nerve cells A, B and C. (3mks)

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(b) A person with spinal injury is unable to move part of the body below the injury. Explain (1mk)

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(c) Name two types of effectors. (1mk)

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**231/1  
BIOLOGY  
THEORY  
PAPER 1  
JULY/AUGUST 2011**

**MAKA JOINT EXAMINATION 2011  
Kenya Certificate of Secondary Education  
BIOLOGY  
THEORY  
PAPER 1  
MARKING SCHEME**

1. (a) – Formation of flagella and cilia;  
- Formation of spindle fibre during cell division;  
Any one (1mk)
- (b) – Passage of large materials from one cell to another  
- Lethal movement between cells  
Any one (1mk)
- 2 (i) Mechanical digestion is the breakdown of large food particles into smaller particles; by action of teeth/walls of alimentary canal.  
Chemical digestion is breakdown of large molecules into small soluble particles; by the action of enzymes; (2mks)
3. (a) Part D  
- Hollow for free conduction of water and mineral salts  
- Lignified wall for support (1mk)
- (b) Part E  
- Contains cytoplasmic filaments for translocation;  
- Presence of companion cells to provide energy for translocation; (any one) (1mk)
4. - To activate pepsinogen to pepsin;  
- To kill micro organisms e.g. bacteria  
- To provide optimum PH for activity of pepsin and rennin; (2mks)  
Any two
5. - It acts as template in the formation of MRNA which in turn determines the type of protein to be synthesized. (1mk)
6. - Chloroplast (1mk)  
- Oxygen; reject O<sub>2</sub> (1mk)
- (b) (i) – Photolysis of water  
- Formation of ATP to be used in the dark stage reactions; (2mks)
- (ii) - Provides the hydrogen used to reduce carbon (iv) oxide;  
- Provides medium for the reactions; (2mks)

**This paper consists of 5 printed pages**

**Turn Over**

(iii) – Combines with hydrogen to form carbohydrates; (1mk)

(c) – Oxidised to release energy in respiration;  
- Converted into starch and stored  
- Converted to cellulose to form cell wall; (3mks)

7. (a) Arthropoda; (1mk)

(b) Insecta; (1mk)

(c) Bee, moth, butterfly, cockroach, or locust. (1mk)

| 8. Epigeal germination   | Hypogeal germination  |
|--|---|
| <ul style="list-style-type: none"><li>- Occurs in dicotyledonous plants</li><li>- Radicle emerges from the seed and grows downwards into the soil as taproot;</li><li>- Hypocotyl curves upwards and pushes out of the soil</li><li>- Cotyledons are pulled out of the soil still surrounding the delicate tip (plumule)</li></ul> | <ul style="list-style-type: none"><li>- Occurs in monocotyledonous plants</li><li>- Radicle grows downwards into a fibrous roots system still covered by coleorhiza;</li><li>- Epicotyl is elongated enabling plumule to grow upwards covered by the coleoptile;</li><li>- The cotyledon and endosperm remain under the ground;</li></ul> |
| Any 2  |   |
| (2mks)   |   |

9. (a) Food substances in the endosperm are hydrolyzed into simple; soluble substances which are transported to the embryo; (2mks)

(b) Growth has taken place due to synthesis of new cells from the food substances; (2mks)

(c) The rate at which respiration is taking place is higher than the rate of synthesis of new materials to provide energy needed for growth; (2mks)

10. (a) capture – recapture method. (1mk)

(b) (i) Body coat that is resistant to host enzymes. (1mk)

(ii) Larva is able to form a cyst to avoid attack by chemicals in the host. (1mk)

11. (a) Chemical breakdown of complex food substances by use of oxygen to form simple substances and energy. (1mk)

(b) – Aerobic respiration requires oxygen, while anaerobic does not;  
- Aerobic respiration produces more energy than anaerobic respiration;  
- Aerobic respiration takes place mainly in mitochondria while anaerobic respiration occurs in the cytoplasm;  
Any two (2mks)

12. Changes due to use or disuse do not change the genotype and thus cannot be inherited (1mk)

13. 

- Thin leaves;
- Almost equal distribution of stomata on upper and lower surfaces;
- Wide leaf lamina; (increased surface area)
- Many stomata;

(1mk)

Any two (2mks)

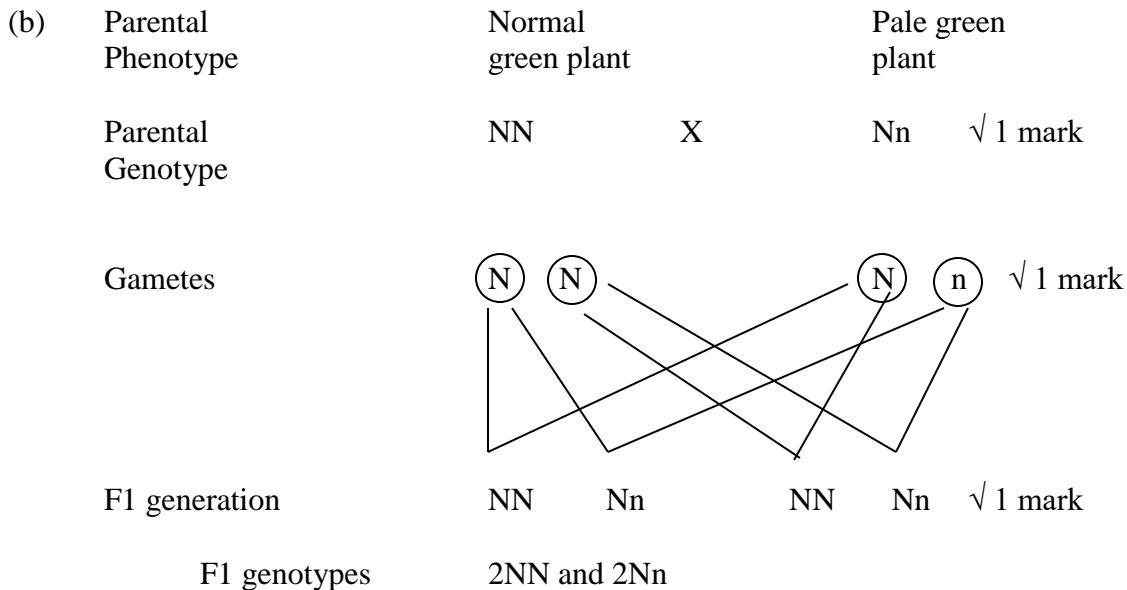
14.

| Continuous variation   | Discontinuous variation  |
|--|--|
| (i) Differences vary from one extreme to the other, with intermediate forms; | (i) Distinct forms; with no intermediate values  |
| (ii) Variations include height, weight and skin colour;                      | (ii) Includes tongue rolling, blood groups, sex and ability to taste, phenylthiocarbial (PTC); |
| (iii) Due to genetic and environmental factors                               | (iii) Due to genetic factors only;   |

Any two

(3mks)

15. (a) Early death because the homozygous recessive plants do not have chlorophyll and cannot make their food through photosynthesis (1mk)



(c) Due to incomplete dominance (codominance) of the gene for normal colour (1mk)

16. (a) A cross carried out to determine the genotype of the offspring showing the dominant character, homozygous or heterozygous. (1mk)

(b) Sex chromosomes/ X and Y chromosomes; (1mk)

17. (a) A – Parietal placentation (1mk)  
B – Axile placentation (1mk)

(b) C – Dispersed by wind because of the wing – like structure (1mk)

18. The inhibition of growth of lateral buds by auxin produced by the growing apical bud; (1mk)

- (a) Activity;
- (b) Age;
- (c) Health status;

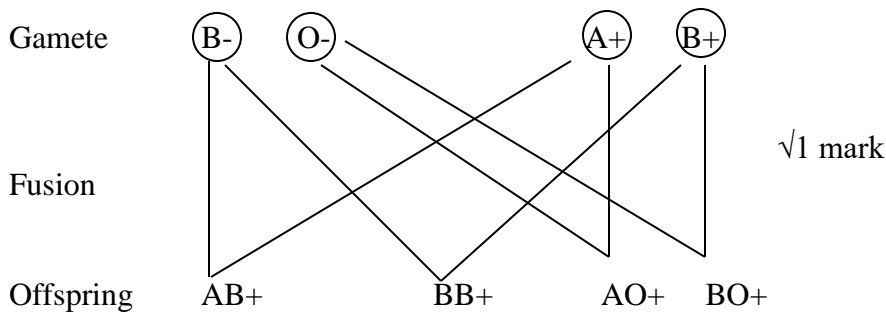
Any 2

(2mks)

20. (a) Genotype is the genetic constitution (make up) of an organism while phenotype is the outward appearance or expression of the genotype. (2mks)
- (b) Haploidy is the existence of half the number of chromosomes in a cell of a particular species while diploidy refers to the full number of chromosomes in a somatic cell of the species. (2mks)

21. Hypothalamus; (1mk)

22. (a) Musa ♂ BO- (B-) Kendi AB+ ♀  
 Parental Blood group B Blood group AB  
 Phenotype  
 Parental BO- x AB + √ 1 mark  
 Genotype



Blood groups AB+ A+ B+ B+ √ 1 mark

- (b) Kendi being rhesus negative and Musa rhesus positive; Kendi can get a rhesus positive baby; first child will be alright but the subsequent positive child, Kendi produces many more antibodies against the child and the child may be a still birth, aborted or develop respiratory problem after birth; (3mks)
- (c) Kendi should be injected with antiglobulin injection within 72 hours after the birth of the first baby to prevent any anti-rhesus antibody production against subsequent Rh+ foetus (1mk)

23. (a) Osmosis; (1mk)

- (b) A - Was placed in a solution that was more concentrated cell sap/hypertonic solution of its cells. The cells therefore lost water through osmosis; (1mk)  
 B - Was placed in a more dilute (hypotonic) solution; cells in B gained water by osmosis and become turgid; (1mk)

24. (a) Efferent vessel/efferent arteriole; (1mk)

- (b) All glucose; all amino acids; some water; all vitamins; some mineral salts; (any one) (1mk)  
 Rej. If all is missing in glucose; amino acids and vitamins; for water and mineral salts it should be some.

- (c) D - Antidiuretic hormone; acc. ADH;  
 E - Aldosterone hormone; Rej Adrenaline;

25. (a) A – Sensory neurone;  
B – Relay neurone;  
C – Motor neurone; (3mks)
- (b) This is due to failure of the nerve impulse from the brain; to pass the area of injury and reach the receptors below the point of injury; (1mk)
- (c) Glands and muscles (1mk)  
Rej if one given.



NAME \_\_\_\_\_ INDEX NO \_\_\_\_\_

CANDIDATE'S SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

**231/2  
BIOLOGY  
THEORY  
PAPER 2  
JULY/AUGUST 2011  
2 HOURS**

**MAKUENI / KATHONZWENI JOINT EXAMINATION  
Kenya Certificate of Secondary Education  
BIOLOGY  
THEORY  
PAPER 2  
2 HOURS**

**INSTRUCTIONS**

- This paper consists of two sections A and B.
- Answer ALL questions in section A in the spaces provided after each question.
- In section B, answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.
- Candidates will be penalized for not following instructions in this paper carefully.
- All working must be clearly shown where necessary.

For Examiners use only:

| Section | Question | Maximum score | Candidate's score |
|---------|----------|---------------|-------------------|
| A       | 1        | 08            |                   |
|         | 2        | 08            |                   |
|         | 3        | 08            |                   |
|         | 4        | 08            |                   |
|         | 5        | 08            |                   |
| B       | 6        | 20            |                   |
|         | 7        | 20            |                   |
|         | 8        | 20            |                   |
|         | Total    | 80            |                   |

**This paper consists of 9 printed pages**

**Turn Over**

**SECTION A (40 MARKS)**

**Answer all questions in the spaces provided.**

1. How are the following structures of a leaf adapted to their function?

(a) Petiole

(2mks)

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(b) Veins

(2mks)

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(c) Palisade mesophyl

(2mks)

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(d) Guard cells

(2mks)

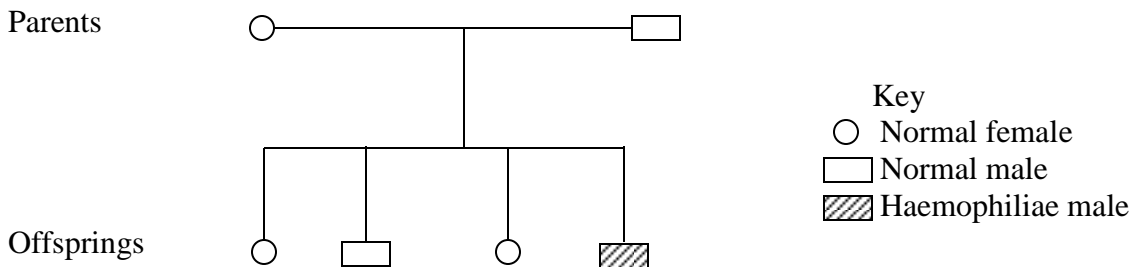
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2. Study the pedigree chart below showing the inheritance of the allele responsible for haemophilia in a certain family.



(a) Write down the parental genotypes

(2mks)

Father \_\_\_\_\_

Mother \_\_\_\_\_

(b) Suppose one of the daughters in the pedigree with the same genotype as the mother marries a haemophilia male, what would be the phenotypic ratio of normal children to haemophilic children. Show your working. (5mks)

(c) Name the type of gene mutation that causes the disorder above. (1mk)

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3. The population of fish in a pond was estimated using capture – recapture method

(a) What equipment was used. (1mk)

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(b) Describe the procedure used in the experiment (5mks)

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(c) State the formular for calculating the total population of fish in the pond.

(2mks)

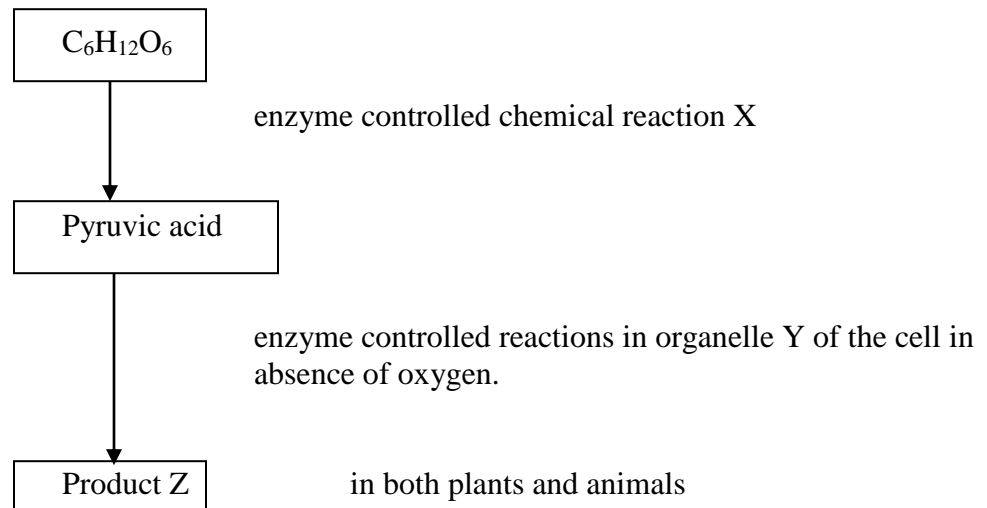
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4. Study the flow chart below of a process that takes place in both plants and animals



(a) Name the above process

(1mk)

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(b) (i) In the above process name the chemical reaction represented by X.

(1mk)

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(ii) Name the part of the cell where the enzyme controlled reactions in b (i) above takes place. (1mk)

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(c) Name the product Z in

(i) Plants

(1mk)

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(ii) Animals

(1mk)

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(d) What would be the fate of pyruvic acid if oxygen supply is availed in the mitochondria of an animal cell. (2mks)

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(e) What is meant by the term oxygen debt. (2mks)

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5. (a) (i) State two reasons why clot formation is important when a blood vessel is cut. (2mks)

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(ii) Explain what happens if a clot forms in a blood vessel in the head. (2mks)

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(b) State two components of the diet that are needed in blood clotting. (2mks)

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(c) Name two proteins that are involved in clot formation. (2mks)

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**SECTION B (40 MARKS)**

**Answer question 6 compulsory in the spaces provided after each question and either question 7 or 8 in the spaces provided after question 8.**

6. Two sets of pea seeds were germinated. Set A was placed in normal day light condition in the laboratory while set B was placed in a dark cupboard. After a few days, shoots lengths were measured twice daily and their mean lengths recorded as in the table below

|                      |    |    |    |    |    |    |    |    |
|----------------------|----|----|----|----|----|----|----|----|
| Time in hours        | 0  | 12 | 24 | 36 | 48 | 60 | 72 | 84 |
| Set A – length (mm)  | 12 | 14 | 20 | 23 | 28 | 31 | 47 | 54 |
| Set B – lengths (mm) | 17 | 23 | 28 | 35 | 48 | 62 | 80 | 94 |

Using the same axes, plot graphs to show length in millimeters of set A and set B against time. (8mks)

(b) From the graph state the mean shoot length of each set of seedlings at the 66<sup>th</sup> hour. (2mks)

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(c) Account for the differences between curve B and A (3mks)

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(d) Explain what would happen to set B of the seedlings if they were allowed to grow under conditions of darkness. (4mks)

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(e) State three external conditions which must be constant for both set ups. (3mks)

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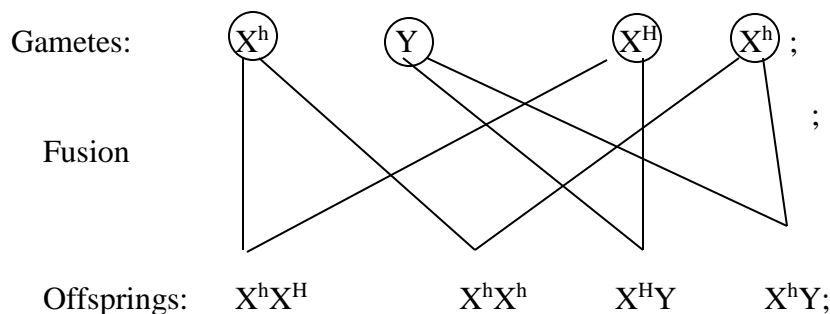
231/2  
**BIOLOGY**  
**THEORY**  
**PAPER 2**  
**JULY/AUGUST 2011**  
**2 HOURS**

**MAKUENI / KATHONZWENI JOINT EXAMINATION**  
**Kenya Certificate of Secondary Education**  
**BIOLOGY**  
**THEORY**  
**PAPER 2**  
**MARKING SCHEME**

1. (a) It has a lignified xylem; that supports/hold it in a suitable position; (2mks)
- (b) Have xylem vessels for transport of water/mineral salts; and phloem tubes for translocation of food; (2mks)
- (c) – The cells have numerous chloroplasts to absorb (maximum) light;  
 - Cells are closely fitted/placed next to the upper epidermis to trap/absorb maximum light; (2mks)
- (d) – Inner walls are thick while outer walls are thin to control opening and closing of stoma/size of stoma;  
 - Has chloroplasts for photosynthesis; (2mks)

2. (a) Father –  $X^HY$ ;  
 Mother –  $X^HX^h$       rej if genotypes interchanged or if sex chromosomes is absent

(b) Parental genotypes:       $X^hY$       x       $X^HX^h$       reject if cross absent



Phenotypic ratio:      1Normal: 1 haemophiliac;  
 Acc. 1: 1 (Normal: haemophiliac)

(c) Substitution;

3. (a) Fishing net; bucket; means of marking; (permanent/waterproof ink/tag) (any 1, 1 mark)  
(1mk)
- (b) – Capture the fish using a net and put them in a bucket with water;  
 - Count and mark each fish using permanent ink or tag;  
 - Record and return/release marked fish back to pond;  
 - Allow time to pass – (24 hours or more) and recapture/catch again;  
 - Count the marked and unmarked fish and record; (5mks)
- (c)  $\frac{FM \times SC}{MR}$ ; FM = First marked  
 SC = Second catch  
 MR = Marked recaptured; (2mks)
- NB: Acc. If whole description appears in the formular.
4. (a) Anaerobic respiration; rej respiration alone (1mk)
- (b) (i) Glycolysis;  
 (ii) Cytoplasm; (2mks)
- (c) (i) Alcohol/ethanol; carbon (iv) oxide and energy; rej if one product is given plus energy.  
 (ii) Lactic acid, energy; (2mks)
- (d) Pyruvic acid will further be oxidised; by oxygen into carbon (iv) oxide, water and energy; rej if all products not mentioned. (2mks)
- (e) The amount of energy required to get rid of the lactic acid that accumulated in the body tissues when its supply is less than demand; (1mk)
5. (a) (i) – Prevents loss of blood (that would lead to anaemia);  
 - Prevent entry of micro-organisms;  
 - initiates healing of the wound;  
 (Mark first two only) (2mks)
- (ii) Blood flow to brain cells is blocked/lack of oxygen/nutrients to brain cells; which lead to stroke; (2mks)
- (b) Calcium ions;  
 Vitamin K; (2mks)
- (c) - Fibrinogen;  
 - Prothrombin;  
 - Enzyme thrombokinase;  
 Mark first two only (2mks)
6. (a) Axes – 2mks  
 Scale – 2mks, point of origin, upper limit shown, correct plotted points  
 Points – 2 mks all must be correct  
 Curves – 1mk ½ mk each must be continuous  
 Identification – 1mk (8mks)

(b) Set A –  $37 \pm 1$ ;  
Set B –  $70 \pm 1$ ; (2mks)

(c) There is faster increase in shoot length/faster shoot growth in set B than set A;  
Because there is faster cell division and cell elongation in shoots of set B due to darkness;  
This is to enable the plants to obtain light; (3mks)

(d) The plants will grow tall with weak stems; they will exhaust the food reserve in the cotyledons; and  
will not synthesize any food due to lack of light; and finally die; (4mks)

(e) Amount of water supplied;  
Carbon (iv) oxide concentration;  
Oxygen concentration;  
Temperature;  
Mark first three (3mks)

7. Comparative anatomy/taxonomy; members of a phylum/ group show similarities; organisms have similar structures/similar organs performing the same function/e.g. digestive system, urinary system, nervous system/any correct example; vestigial structures e.g. vertebrate heart.  
The pentadactyl limb/any correct example of divergent evolution e.g. beaks of pinches/birds; these are called homologous structures/organs  
Analogous structures/different structures performing the same function; wings of insects, bats and birds; cell biology/cytology; occurrence of organelles e.g. mitochondria, endoplasmic reticulum etc in all cells; this points to a common ancestry;  
Fossil records/paleontology; These are remains of organisms preserved in naturally occurring materials for many years; They show morphological changes of organisms over along period of time; e.g. skull of man leg of horse;  
Comparative anatomy; vertebrate embryos are morphologically similar; suggesting that the organisms have a common origin/ancestry; acc. Any two named embryos. Acc larvae of mollusca and annelid (trochophore).  
Geographical distribution; present continents are thought to have been a large land mass joined together; As a result of continental drift; isolation occurred bringing about different patterns of evolution; example of species that migrated are liamas, aguers, panthers – S. America  
Lion, Carmel – Africa } Award 1mk  
Tiger – Asia } any correct  
Marsupials – Australia } example.

Comparative serology/comparative physiology;

Acc. Blood groups/Rhesus factor. Antigen antibody reactions; reveal same (phyogenetic) relationship among organisms/common ancestry; acc. Structure of haemoglobin/blood groups being similar.

NB: Mark common ancestry once through out.

Total points 23, max 20 mks

8. Sulphur based chemicals e.g. sulphur (iv) oxide; produced by (food preserving) industries; affect gaseous exchange/makes acid rain/damage plant leaves; acc. Chlorine gas, oxides of nitrogen, hydrogen sulphide from sewage/decomposing organic matter/mines/any correct gaseous pollutant.  
Aerosols; sprayed to control plant diseases/pests; also affects respiratory organs of animals; The chemicals are residual and persistant (not easily broken down)/depletion of ozone layer by CFC; acc. Pesticides, herbicides. Insecticides, paint sprays, agro-chemicals acaricides etc.  
Smoke/fumes; produced in areas with (heavy) industries/fire/ (high density) of motor vehicles; which burn fuels/oils/coals/wood; This cause carbon (II) oxide poisoning; Affect respiratory sytem/ Visibility;

Fumes also settle on leaves and stop photosynthesis; excessive production of carbon (iv) oxide causes green house effect/temperature inversion as a result of heating in lower rears of atmosphere.

Sound/noise; produced incessantly/continuously by machines/heavy vehicles/aeroplanes/trains; Affect hearing in animals; RJ. Hearing diseases for affect hearing.

Dust; produced in industries producing cement generate dust; which finally settles on plant leaves limiting photosynthesis;

Cutting/removal of vegetation; interferes with carbon cycle;

Radioactive emissions' from mines/bombs/nuclear reactors; those that produce energy may cause cancer.mutations/death;

Mark industries once, affect respiratory organ once, settling on leaves once/affect photosynthesis once.

Acc. Quarries for dust producing & dusty roads.

Acc. Radiations for radioactive emissions.

Acc. A lot of carbon (iv) oxide for carbon cycle.

22 points maximum 20mks

NAME \_\_\_\_\_ INDEX NO \_\_\_\_\_

CANDIDATE'S SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

**231/3  
BIOLOGY  
PRACTICAL  
PAPER 3  
JULY/AUGUST 2011  
1 ¾ HOURS**

**MAKUENI / KATHONZWENI JOINT EXAMINATION  
Kenya Certificate of Secondary Education  
BIOLOGY  
PRACTICAL  
PAPER 3  
1 ¾ HOURS**

**INSTRUCTIONS**

Answer ALL the questions in the spaces provided.

You are required to spend the first 15 minutes of 1 ¾ hours allowed for this paper reading the whole paper carefully before commencing your work.

Additional pages must not be inserted.

For Examiner's use only

| Question    | Maximum score | Candidate's score |
|-------------|---------------|-------------------|
| 1           | 15            |                   |
| 2           | 11            |                   |
| 3           | 14            |                   |
| Total score | 40            |                   |

**This paper consists of 7 printed pages**

**Turn over**

1. (a) You are provided with solution S1, S2 and S3. Using some of solution S1, carry out food tests shown in the table below. (6mks)

| Food substance | Procedure | Observations | Deductions |
|----------------|-----------|--------------|------------|
| Starch         |           |              |            |
| Reducing sugar |           |              |            |

(b) Divide the remaining solution S1 into three equal portions using a measuring cylinder and transfer into labelled test tubes.

(i) Into portion one add 1cm<sup>3</sup> of solution S2 and 4cm<sup>3</sup> of solution S3.

(ii) Into portion two add 1cm<sup>3</sup> of solution S2 and boil for 5 minutes.

(iii) In portion three add 1cm<sup>3</sup> of solution S2.

Leave the set-ups for 40 minutes and carry out food tests in each portion. Record your observations in the table. (3 marks)

| Test    | Observation |                |
|---------|-------------|----------------|
| Portion | Starch      | Reducing sugar |
| ONE     |             |                |
| TWO     |             |                |
| THREE   |             |                |

I Account for the results in portions two and three.

(i) Portion two.

(2mks)

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(ii) Portion three

(2mks)

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(d) What was the effect of solution S3 on solution S1

(1mk)

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(e) State a part in the body of man where the process under investigation may take place. (1mk)

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2. The animal shown below was discovered by a student during an ecological study.

(a) (i) To what phylum would the animal be placed?

(1mk)

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(ii) Give two reasons for your answer in a (i) above

(2mks)

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(b) (i) In to which class does the animal belong?

(1mk)

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(ii) Give one reason for your answer.

(1mk)

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(c) Below are photographs of animals. Use the dichotomous key given to identify the animals into their correct classes, order or phylum. Ensure that the dichotomous key is complete.

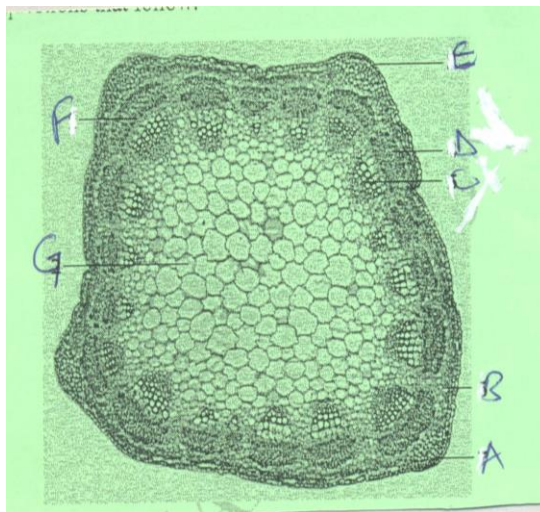
P Q R S U T

- |    |  |              |
|----|--|--------------|
| 1. | (a) More than four pairs of legs .....     | Go to 2      |
|    | (b) .....                                  | go to 3      |
| 2. | (a) Body dorso- ventrally compressed ..... | Chilopoda    |
|    | (b) .....                                  | Diplopoda    |
| 3. | (a) Presence of wings .....                | go to 4      |
|    | (b) Absence of wings .....                 | go to 5      |
| 4. | (a) One pair of membranous wings .....     | Diptera      |
|    | (b) .....                                  | Lepidoptera. |
| 5. | (a) Presence of chelae .....               | Crustecia.   |
|    | (b) Absence of chelae .....                | Arachnida.   |

| Organism | Identity | Steps followed |
|----------|----------|----------------|
| P        |          |                |
| Q        |          |                |
| R        |          |                |
| S        |          |                |
| T        |          |                |
| U        |          |                |

(6mks)

3. The photograph below represents a transverse section of the stem of a plant. Study it and answer the questions that follow.



- (a) (i) State the class of the plant from which this section was obtained. (1mark )

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

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- (b) Name the parts labelled C and G. (2 marks )

C \_\_\_\_\_

G \_\_\_\_\_

(c) State the functions of part D and F.

( 2 marks )

D

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F

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(d) Name the part labeled A and state it's function.

( 2 marks )

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(e) The photographs below show a certain physiological process which occurs in plants.

(i) State the physiological process shown by the photographs.

( 1 mark )

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(ii) Name the cells labelled X and Y.

( 2 marks )

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(iii) Describe the process that leads to the appearance shown by photograph B at night. ( 3 marks )

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231/3  
**BIOLOGY**  
**PRACTICAL**  
**PAPER 3**  
**JULY/AUGUST 2011**

**MAKUENI / KATHONZWENI JOINT EXAMINATION 2011**

**Kenya Certificate of Secondary Education**

**BIOLOGY**  
**PRACTICAL**

**MARKING SCHEME**

1. (a)

| Procedure   | Observation                                 | Deduction                  |
|---|---|----------------------------|
| Put a little liquid S1 on a white tile.<br>Add one drop of iodine solution ;                      | Blue – black colouration appears ;          | Starch present ;           |
| Put 1cm <sup>3</sup> of liquid S1 in a test tube.<br>Add equal volume of benedicts solution. Heat | Blue colour of benedicts solution remains ; | Reducing sugar(s) absent ; |

( 6 marks )

- NB: - Procedure must be correct to score in observations and deductions.  
 - Penalise for deduction if observations are wrong.  
 - Reject / penalise fully if no heating when using benedicts solution or heating involved when using iodine solution.  
 - Penalise if iodine is used instead of iodine solution.

(b)

| Portion | Starch                     | Reducing sugar (s)  |
|---------|----------------------------|---|
| ONE     | Blue – black colouration ; | Green colouration / blue colour of benedicts solution remains ; |
| TWO     | Blue – black colouration ; | Blue colour of benedicts solution remains ;                     |
| THREE   | Blue – black ;             | Yellow / brown / orange colouration                             |

( 6/2 marks )

- (c) (i) Portion two has starch; boiling denatured enzyme in solution S<sub>2</sub> thus starch could not be converted to reducing sugars ; ( 2 marks )
- (ii) Enzyme in solution S<sub>2</sub>; hydrolysed / converted / digested some of starch into reducing sugar; giving a positive test / yellow / brown / orange with benedicts solution. ( 2 marks )
- (Reject if some is omitted )

*This paper consists of 2 printed pages*

**Turn Over**

- (d) Solution S<sub>3</sub> could have denatured the enzyme ; (It is an acid )  
 (e) Mouth / duodenum ; ( Mark only one )

Total 15 marks

2. (a) (i) Arthropoda; (Reject anthropoda anthropods )  
       Reject wrong spelling  
 (ii) - Jointed appendages ;  
       - Segmented body ;  
       - Presence of distinct mouth parts ; ( 2 marks ) (First 2 only )
- (b) (i) Arachnida ; ( 1 mark )  
 (ii) - Presence of four pairs of legs ;  
       - Head fused with thorax forming cephalothorax / body divided into two parts ; (2 marks )
- (c) Penalise if the key is not completed  
 1(b) Less than 4 pairs of legs ..... go to 3  
 2 (b) Body cylindrical ..... Diplopoda  
 4(b) Two pairs of membranous wings .... Lepidoptera

| Organism | Steps followed | Identity    |
|----------|----------------|-------------|
| P        | 1b; 3a; 4b     | Lepidoptera |
| Q        | 1b; 3a; 4a     | Diptera     |
| R        | 1b; 3b; 5a     | Crustecia,  |
| S        | 1b; 3b; 5b     | Arachnida;  |
| T        | 1a, 2b         | Diplopoda   |
| U        | 1a, 2a         | Chilopoda   |

(12/2 = 6 marks )

NB: Steps followed must be correct to score for identity otherwise penalize fully. TOTAL ( 11 marks )

3. (a) (i) Dicotyledonae ; rej dicotyledon ( 1 mark )  
 (ii) Vascular bundles in ring form ; ( 1 mark )  
       Accept stem has pith or presence of cambium in stem.  
       Penalise a(ii) if a (i) is wrong
- (b) C – Xylem tissue; rej xylem vessel ( 1 mark )  
 G – Pith ; ( 1 mark )
- (c) D – Site for translocation ; ( 1 mark )  
 F – Site for secondary growth ; ( 1 mark )
- (d) A – Collenchyma tissue ; ( 1 mark )  
       Provides mechanical support to the plant ; ( 1 mark )
- (e) (i) Opening and closing of stomata ; ( 1 mark )  
       Rej. Opening alone or closing alone.
- (ii) X – Guard cell; (rej guard cells ) 1 mark )  
       Y – Epidermal cell ; ( 1 mark )
- (iii) Photosynthesis stops in darkness thus sugar in guard cells is converted to starch;  
       which is osmotically inactive ;  
       Guard cells become flaccid as they lose water to neighbouring epidermal cells ; (3 marks)  
       ( Total 14 marks )

