

2005 K.C.S.E MARKING SCHEME  
231/1 BIOLOGY PAPER 1

SECTION A (20 MARKS)

1. Apart from hearing, another function of the human ear is Balance (1 mark)
2. (a) The parts labelled X and Y are  
X Chloroplast  
Y Vesicle/sap vacuole (2 marks)
- (b) The reason why the structures labelled X would be more on one side than the other is:  
To obtain optimum light intensity/in bright light they move away to avoid bleaching  
in dim light they move towards the source for maximum light absorption. (1 mark)
3. The role of the vascular bundles in plant nutrition is  
Phloem - Translocation of food to different parts of the plant  
Xylem - Transports water/Mineral salts to the leaves for photosynthesis/protein synthesis/  
lipid manufacture (Rej. Minerals alone but Acc. mineral ions)  
Support/positions the leaf (lamina) for photosynthesis (3 marks)
4. What is meant by  
(a) Organic evolution: It is the emergence of present forms of organism gradually from pre-existing ones (Some of which no longer exist.) (1 mark)  
(b) Continental drift: It is the drifting apart of the continents from one land mass (Acc. Pangea/gondwanaland) (1 mark)
5. An animal with two body parts and four pairs of legs belong to a class of Arachnida (1 mark)
6. When respiration occurs with insufficient oxygen the substance which accumulates in the muscles is: Lactic acid (1 mark)
7. The importance of osmosis in plants are:  
- Feeding in insectivorous plants  
- Absorption of water (from soil)  
- Movement of water from cell to cell  
- Mechanical support due to turgidity  
- Opening/closure of stomata (any 3)(3 marks)
8. Three factors in seeds that cause dormancy.  
- Immature embryo  
- Impermeable seed coat/testa  
- Growth inhibitors/abscisic acid/ABA  
- Absence of hormones/enzymes that stimulate germination. (3 marks)

9. Carboxyhaemoglobin would lead to death because:-  
It does not easily dissociate there by reducing the capacity of haemoglobin in transport of Oxygen. (2 marks)
10. The organism that causes amoebic dysentery is  
Entamoeba histolytica (1 mark)  
Acc. Enta histolytica  
Rej. Protozoa or any general name

### SECTION B

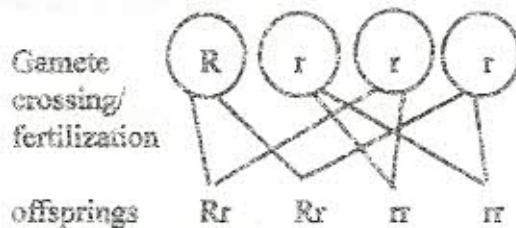
11. (a) The parts labelled W, Y and Z are (3 marks)  
W (Thoracic) Vertebra  
Y Sternums/Sternabrae (bone that make up sternum)  
Z Intercostal muscle/(External) intercostal muscle

- (b) The part labelled Z facilitate breathing in by: (3 marks)  
External intercostal muscle/Z contracts raising ribs upwards and outwards.  
Thoracic cavity increases in volume, (Acc. Lung increase in volume)  
Thus the pressure in the cavity is reduced and air is forced into the lungs.

12. (a) The ratio of red to white flowered plants is (1 mark)  
 $3.15:1 \approx 3:1$

- (b) i) Using letter R to represent the dominant gene, the cross between F1 offspring and a white flowered plant is (4 marks)

Parents  $Rr \times rr$



$C^+$	R	V
$C^0$	Rr	rr
	V	rr

- ii) The genotypic ratio from the cross in b(i) above is (1 mark)  
 $Rr : rr$  genete; grossing; offsprings

- (c) The term allele is:- (1 mark)  
Alternative forms of a gene controlling a particular characteristic

13. (a) The parts labelled E, F and G are (3 marks)  
E malphigian layer  
F nerve ending  
G erector muscle

- (b) The functions in each case of substances secreted by the structures labelled are
- (i) H (Sweat) from H evaporates leading to cooling of the body  
Removal of excretory products/urea/nitrogenous wastes (2 marks)
- (ii) I (Sebum from I) makes the hair water repellent/water proof; makes skin soft/supple/water proof/water repellent;  
Has antiseptic/antibiotic properties (that kill bacteria) kills bacteria (2 marks)

14. (a) The process being investigated is  
(Rate of transpiration) (1 mark)
- (b) (i) Two precautions that should be taken when setting up the experiment are
- Cut shoot under water
  - Apply petroleum jelly to cork - glass connection/bung/glass connection/bung-shoot connection
  - Open reservoir tap (2 marks)
- (ii) Reason for each precaution stated in b(i) above are
- To ensure no air enters leafy shoot/prevent air leaks in the xylem
  - To ensure the apparatus is air tight
  - To remove air bubbles from tubes (2 marks)
- (c) Three environmental factors that influence the process under investigation are
- Temperature
  - wind
  - light (intensity)
  - atmospheric pressure; Acc. Air pressure (3 marks)

15. (a) i) Epigynous flower means:-
- Conditions where other floral parts are positioned/arise above the ovary/ovary in the receptacle/inferior ovary
  - Pickling/chemical preservatives/ vinegar/acetic acid/ benzoate/sodium nitrite/ sodium sulphite kill or stop them from multiplying
  - Drying/dehydration/removal of water to prevent microorganism from thriving in the food. (1 mark)
- ii) Staminate flower means:  
Male flower / stamens only / male parts only (1 mark)
- b) Male parts of wind pollinated flowers are adapted to their function by  
Large anthers loosely attached to filaments, to be easily shaken in the wind  
Small/smooth/light pollen grains, to be easily carried by wind (4 marks)

16. (a) Two organisms that cause food spoilage are:  
 - Bacteria  
 - Fungi (2 marks)
- (b) Two modern methods of food preservation and the biological principles behind it are:  
 i) Pasteurization - food is heated (and cooled rapidly) to kill microorganisms  
 ii) Refrigeration - (Extreme) cold/low temperature render the microorganism inactive  
 iii) Canning - food heated (under high temperature/pressure) to kill microorganisms and sealed to prevent entry of microorganisms (4 marks)

### SECTION C

17. (a) The process through which energy from the sun is incorporated into the food web is Photosynthesis (1 mark)
- (b) The mode of feeding of the birds in the food web is Carnivorous (1 mark)
- (c) Two ecosystems in which the organisms in the food web live are  
 - Aquatic  
 - Terrestrial (2 marks)
- (d) The food chain with the large bird as a quarternary consumer  
 Algae → Zoo planktons → Small fish → Bird J → Large fish (3 marks)
- (e) If bird N migrated the organisms in the food web will  
 i) Move snails (for bird M)  
 ii) Hence increase in population of bird M  
 iii) Green plants reduce as they are eaten by more snails  
 iv) Population of large birds may remain constant/decreased/or increase (3 marks)
- (f) The reason why the energy from one trophic level is available to the next level because  
 Energy is lost through respiration/heat loss/egestion; excretion (3 marks)
- (g) i) The two organisms which play a role in the ecosystems and are not included in the food web are:  
 - Bacteria  
 - Fungi (2 marks)
- ii) The role played by the organisms named in g(i) above is  
 Decomposition (1 mark)
- (h) i) Three human activities that would affect the ecosystems are  
 Air/soil pollution, farming, Agrochemicals/ pesticides/herbicides, fishing cutting of vegetation/deforestation, poaching/hunting/trapping of birds, introduction of new species. (3 marks)

- i) The activities stated in h(i) above would affect the ecosystems through
- Farming causes eutrophication/kills organisms;
  - Pollutants would kill the organisms
  - Introduction of new species lead to competition/predation
  - Hunting/poaching, reduce population of organisms
  - Deforestation causes soil erosion/nesting and perching sites destroyed/food sources destroyed
  - Fishing reduces the number of fish

(3 marks)

18. Gaseous exchange takes place in terrestrial plants through (20 marks)

Gaseous exchange takes place in spongy mesophyll, during the day air diffuses into large air spaces of spongy mesophyll; through stomata; The Carbon dioxide in the air diffuses into photosynthetic cells; in solution form, during photosynthesis Oxygen is produced (Some of the) Oxygen is used in respiration; (while the rest) of Oxygen diffuses out of leaf; through stomata; during the night; air diffuses into air spaces (of spongy mesophyll); The air dissolves in the form of moisture. The Oxygen in the air diffuses; into cells; and is used in respiration; during which Carbon dioxide is produced; the Carbon dioxide diffuses out of the leaf through stomata; to concentrate gradient/diffusion gradient. At night Carbon dioxide accumulates in the leaf since photosynthesis does not take place.

Some gaseous exchange also takes place through cuticle; gaseous exchange occurs through epidermis; (of young, leaves and stems); Epidermis of the root carries out gaseous exchange with air in the soil; some plants have breathing roots; (through which gaseous exchange occurs); Gaseous exchange occurs through lenticels (found on older stems) the cork cells at a lenticel are loosely packed; Gaseous exchange takes place between cork and atmosphere within the loosely packed cells;

19. How the human eye is adapted to its function (20 marks)

Conjunctive is a thin/transparent/tough; to allow light to pass through/protect the eye; sclerotic layer is made up of (collagen) fibres/fibrous; it maintains shape of eyeball/protect the eye; Cornea is transparent/curved light rays/allows light to pass through choroid has (a layer of a tissue with) black pigment; prevents internal reflection of light in the eye;/contains blood vessels/ supply oxygen/nutrients/remove (metabolic) wastes from the eyes;

Retina has cones/rods, for bright colour vision/low light vision; yellow spot has a high concentration of cones; for accurate vision/visual accurate; blind spot has no cones and rods; place where optic nerve leaves the eye; optic nerve has sensory nerve fibres; for transmission of impulses to brain (for interpretation); lens is biconvex/made up of elastic/transparent material/adjust to/focus on far or near objects/allow light rays to pass/for refraction of light rays; ciliary body is made up of muscle fibre; /its glandular; produces aqueous humour; change the shape/curvature of lens; suspensory ligaments are inelastic; hold the lens in position/attach it to ciliary body; iris (is the coloured part of the eye;) has radial and circular muscles; which control size of pupil; pupil is the (small) hole at the centre of iris, through which light passes into the eye, aqueous humour is a fluid; through which Oxygen / nutrients pass to cornea/lens/maintains shape of the eyeball/refracts light rays; vitreous humour is a fluid; which maintains shape of eye / refracts light-rays.

Acc: Transparent for aqueous humour vision and vitreous humour for adapted for passage or refraction of light. No mark for mention but adaptation of structure and one mark for function