

MARKING SCHEMES
K.C.S.E BIOLOGY PP1
2005-2016
CHAMPIONS REVISION

*****Service Beyond expectation*****

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and materials)**

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available separately

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REVISION HISTORY AND GEOGRAPHY

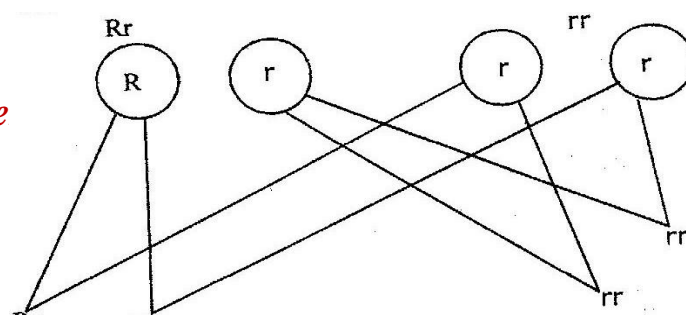
BIOLOGY
K.C.S.E PAPER 231/1 2005
MARKING SCHEME

1. Maintain balance and posture of the body

For more materials Contact Champions Revision on 0725 733 640

2. a) X – Chloroplast
Y – Cell vacuole / sap vacuoles
b) To receive maximum amount of light.
3. Xylem vessels transport water and mineral salts from the roots to the leaves. Phloem tissues transport manufactured food/soluble Organic products of photosynthesis within the plant.
4. a) It is the process through which ancient simpler forms of life underwent gradual series of small changes for many million years, to give rise to the modern species of life // accepts as a theory formed one large single land mass, which later broke up into parts which drifted from one another forming the present day continents.
5. Arachnida
6. Lactic acid
7. -Absorption of water to the soil
- Support in seedlings, leaves and herbaceous plants.
-Opening and closing of Stomata
-Distribution of water from cell to cell
8. -Embryo may not yet be fully developed
-Presence of chemical inhibitors e.g. abscisic acid, inhibit germination.
-Low hormone and enzyme concentrations e.g. gibberellins
-Hard and impermeable seed coats, preventing air and water entry.
-Low temperatures which inactivate the enzymes.
9. It does not easily dissociate and therefore reduces the capacity of hemoglobin to transport oxygen to the tissues.
10. Entamoeba histolytica
11. a) W – Spinal column / vertebral column
Y – Sternum
Z – Intercostal muscles.
b) The external intercostal muscles contract while the internal intercostals relax. This movement pulls the ribs upwards and outwards. The diaphragm contracts (flattens). The thoracic volume increases while the pressure reduces, leading to atmospheric air rushing into the lungs through the nose and trachea hence inflating the lungs.
12. a) 3:1
b) (i) Parent gametes
f₂ generation offspring
(ii) 1:1

For more mate



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- c) Apart of Genes with contrasting characteristics
13. a) E – Malpighian layer
F – Nerve cell
G – Erector pili muscle
- b)i) H – Excretion of waste products of metabolism from the body e.g. excess.
-Water, mineral salts traces of urea, lactic acid etc.
-Temperature regulation in the body brings a cooling effect through
- Loss of excess heat by evaporation of water.
-Keeps the hair and epidermis flexible and water proof
-Contains antiseptic substances for protection against bacteria.
14. a)Transpiration
- b)i)The leafy shoot should be from herbaceous plant
- Cut off the last few centimeters of the stalk under water
-All the air in the capillary tubule should be expelled
-Jelly should be applied around the stem around the rubber bung.
-The end of the capillary fusing should rest in beaker of water.
- ii) Avoid air bubbles.
-For continuity of the flow of water
-Jelly should not touch the xylem vessels because it might block they xylem.
-To avoid introduction of air bubbles in the xylem.
-For continuity of water uptake.
- c) –Temperature
-Humidity
-Wind
-Atmospheric pressure
-Light intensity
-Availability of water
15. a)i)A flower whose ovary is situated below the other floral parts.
ii) A flower with only the male reproductive parts parts (male flower)
- b) Larger anthers.

- Anther loosely attached
- Flexible filament
- Small, smooth and light pollen grains

16. a) - Fungus
-Bacteria

b) Refrigeration
-It inactivates disease causing organisms/micro-organisms.
Irridation –The radiation kills/destroys the micro-organism.
Pasteurization (for milk only)
Canning-Kills the micro – organisms.

17. a)Photosynthesis

b)Heterotrophic – holozoic

c) Small fish pond / dam, rain forests.

d) Algae → Zoo plankton → small fish → bird → large bird.

e)-Snails would increase in number

-Bird M would increase in number.

-Green plants would decrease in number

f) The energy to be passed on from one trophic level to the next is contained in food materials. Most of the food taken in by consumers passed on from one trophic level to the next is consumers passes through the digestive track as undigested matter that is removed as faeces. The digested materials are absorbed in to the bloodstream and conveyed to various tissues of the body. Most of the absorbed food materials are used in respiration, to Produce is lost as heat during sweating, evaporation and transpiration in plants.

g)i) Scavengers e.g. vultures

Decomposers e.g. bacteria

ii) Scavengers feed on dead bodies of herbivores and carnivore // the consumers.

-Decomposers act upon the remains of the producers, consumers, & Scavengers causing decay, to release inorganic materials, which are later re-used by producers to make new organic compounds.

h) i) -Deforestation

-Overgrazing

-Soil erosion

-Hunting, poaching

-Over fishing

-Poor waste disposal // Environmental pollution

ii) **Deforestation**

Lack of trees leads to reduced number producers in an ecosystem.

Overgrazing

Many animals eat away and trample the vegetation hence reducing / depleting the number of producers.

-Lead to gully erosion hence carrying away some of the underground and crawling animals (Consumers)

18. Gaseous exchange in terrestrial plants.

Gaseous exchange in plants involves two main respiratory gases: carbon IV oxide and oxygen. During daytime green plants take in carbon IV oxide for photosynthesis and oxygen for respiration. During photosynthesis oxygen is given out as a by product and released to the atmosphere. In plants such as the flowering plants stomata in the leaves and lenticels in the woody stems and pneumatophores/breathing roots in aquatic woody plants provide the surface for gaseous exchange. Gaseous exchange taken place by diffusion across the respiratory surface.

Stomata

These are located mainly in the leaves and in younger parts of the stem. The opening and closing of stomata is controlled. Mainly by the intensity of light. They are normally open during the day and closed during the night. Several theories explaining the mechanism of stomata opening and closing have been put forward.

1. Photosynthetic theory

Guard cells have chloroplasts. During daylight, they carry out photosynthesis producing surges. The surges increase the osmotic pressure of the cell sap. This causes water to more into guard cells from the neighboring epidermal cells by osmosis.

The results is an expansion and increase in turgidity of the guard cells causing the stomata to open.

In darkness photosynthesis stops. The sugar in the guard cells is converted to starch.

This lowers the osmotic pressure of guard cells causing the to lose water to neighboring cells by osmosis.

The guard cells become flaccid and the stomata close.

The guard cells become flaccid and the stomata close.

2. Starch – sugar interconversion:

The enzymatic conversion of starch to sugar proceeds more readily in an alkaline environment(high PH).The conversion of sugar to starch occurs more readily in an acidic environment (low Ph).During the night, when photosynthesis is not taking place, carbon dioxide accumulates in leaf cells it combines with water to form carbonic acid.

This lower the PH in the guard cells leading to conversion of sugar to starch this decreases the osmotic pressure in the guard cells causing them to lose water to the neighboring epidermal cells. The guard cells become flaccid and the stomata close.

During daylight, when photosynthesis is taking places, the concentration of carbon dioxide in the leaf cells, raising their PH, and favouring the conversion of starch to sugar. This increases the osmotic pressure in the guard cells causing them to take in is an expansion and increase in turgidity of the guard cells causing the stomata to open.

3. Potassium Ion (K⁺) mechanism

When guard cells are exposed to light, their chloroplasts manufacture ATP. The ATP drives a K⁺ pump in the cell membrane of the guard cells. This causes an active uptake of K⁺ into the guard cells from surrounding epidermal cells.

Accumulation of K⁺ in guard cells increases the osmotic pressure of their cell sap. This causes water to move into the guard cells from neighbouring epidermal cells by osmosis. The result is an expansion and increase in turgidity of the guard cells causing the stomata to open.

-At the onset of darkness, chloroplasts stop making ATP and its concentration in guard cells falls rapidly stopping K⁺ pump, K⁺ migrates from the guard cells

Causing them to lose water to the neighbouring cells by osmosis. The guard cells become flaccid and the stomata close.

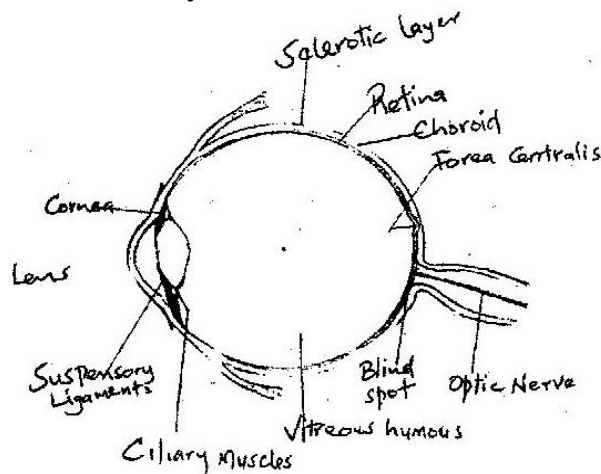
-Water molecules are pumped into the guard cells from adjacent epidermal cells.

-A small extent of gaseous exchange takes place in the stem through structures called lenticels.

These are small gaps in the bark usually circular or oval & slightly raked on the bark surface.

The cells in these areas are thin walled and loosely packed leaving air space which communicates with air spaces in the cortex. Hence O₂ for respiration is taken up & CO₂ is given out.

19. Adaptations of the eye.



The presence of:-

-The **sclerotic** layer which contains tough connective tissue fibres which helps it to support and protect the other parts of the eye ball.

-The **choroids** which contain many blood capillaries which supply oxygen and nutrients of the retina and removes metabolic wastes from eye.

-Its highly pigmented, to prevent reflection of light within the posterior chamber of the eye ball.

-The **retina** which contains photoreceptor cells called cones and rods. It is said to be the light sensitive part of the eye. Cones are adapted for light and colour vision while rods are adapted for dim light vision.

-The **vitreous humour**-Which is under pressure. It helps to maintain the shape of the posterior chamber of the eye ball. It also plays an important part in the refraction of light rays enabling them to be focused on the retina.

-**The cornea**, transparent and curved which helps to play an important role in focusing of the image on the retina. It accounts for the largest refraction of light rays.

-**The aqueous humour** –Contains oxygen and nutrients, which nourish the cornea and the lens. It is under pressure thus helping to maintain the shape of the anterior chambers of the eye. It also plays a part in the refraction of light rays enabling them to be focused on the retina.

-**The Iris is heavily** is heavily pigment, to prevent entry of light into the eye except through its central aperture called the pupil. It contains circular and radial muscles which constrict or dilate the pupil depending on the intensity of light.

-**The lens** is elastic, therefore allows changes in its shape depending on the tension exerted through the suspensory ligaments. This enables it to bring light rays causing from either near or far objects into sharp focus on the retina.

-The ciliary's body Contains the ciliary muscles whose contraction and relaxation alters the tension exerted on the suspensory ligaments.

This in turn alters the shape of the lens enabling it to focus for both near and distant objects.

-**The eyelids** which are movable and opaque structures can be closed through a reflex action to protect the eye from too much light or from foreign objects.

- **The eye muscles** help to move the eye ball within the orbit. The lateral rectus muscles move the eye up and down while the oblique muscles the eyeball in its up and down movement.

-**The lachrymal gland** which continuously secretes a watery, saline and antiseptic fluid called tears. The tears moisten the cornea and wash foreign particles out of the eye.

-**The eyelashes**, which are many hairs, protect the eye from the entry of small foreign particles.

-**The eyebrows** raised portion of the skin above the eye, thickly covered with hair, whose functions are to prevent sweat and dust from entering the eye.

BIOLOGY
K.C.S.E PAPER 231/1 2006
MARKING SCHEME

1. (a) To increase surface area for attachment of respiratory enzymes/ site for A.T.P formation/ site for energy production / site for respiration
(b) (i) Stroma
(ii) Bearing photosynthesis pigments/ chlorophyll/ site for light dependent reaction/ site for photolysis
2. (a) Ovule
(b) Ovary
3. (a) Sclerenchyma; Xylem vessels/ xylem tracheids/ xylem tracheidsrej. Sclereids
(b) Cell take in water and became turgid; (OWTTE)
4. (a) Sebum
(b) Kills micro organisms
- Cools the body
- Getting rid of waste/ excretion
Accept named example. E.g urea, sodium chloride, excess water, uric acid, lactic acid.
5. - Stomata found on upper epidermis to allow efficient gaseous exchange
- Presence of large air spaces/Aerenchyma tissues to enable it float/Bouyant/
- Storage of air
- absence of cuticle to enhance gaseous exchange.
6. (a) - The genetic/ nuclear material is not surrounded by membrane.
- smaller in size/ smallest.
- Lack most organelles/ few organelles/ lack nucleolus
Mitochondria, Ribosome/chloroplast/ lysosomes
Endoplasmic reticulum/ Golgi apparatus
(b) Insecta
7. (a) Thrombosis/Varicose veins/Arterion sclerosis/ Antheroma
Arteriosclerosis
Accept cerebral vascular thrombosis
(b) - Regulation of the body temperature
- Regulation of pH of fluids
- Defense against disease – causing organism/ pathogens/ infection.
- Prevent excessive bleeding by enhancing clotting/ prevent excessive loss of blood

8. Prevents scurvy/ prevent bleeding of gums/ prevent bleeding of gums/ Prevents poor healing of wounds/ prevent degeneration of muscle and cartilages/ prevent red spot on skin/ prevent anemia
Excretion absorption of iron
Enables absorption of iron
Boost immunity
Development of healthy gums
Synthesis/ maintenance of collagen fibres/ connective
9. (a) - Sister chromatids separate
- Sister chromatids move to opposite poles of spindle fibre
- Accept chromatids separate at the centromere to mean chromatids
- (b) - Gamete formation; accept sex cells formation
- Source of variation; rej. Reproduction cells
10. Move towards favorable environment; accept converse
11. Stimulates conversion of excess glucose to glycogen for storage
Enhances break down of glucose; stimulates glucose converts to fats and stored.
- 12 (a) Visking tubing will become turgid; accept will increase in volume / bulges/ swells/ becomes bigger/ expands.
- (b) Sucrose solution is hypertonic/ water is hypotonic; water moves from beaker into visking tube by osmosis though semi permeable visking tubing, making visking tubing turgid.
Or water moves from beaker into visking tubing by osmosis, through semi permeable visking tubing; with hypertonic solution.
- 13 (a) - A.T.P/ adenosine triphosphate rej A.T.P
(b) -Brewing of alcohol accept examples;
- Baking of bread.
- Biogas production
- Compost manure formation
- Silage formation
- Commercial production of citric acid
- Sewage treatment.
- 14 (a) Epigeal – cotyledon are brought above ground surface
Hypogeal- cotyledon remains below surface.
- (b) Required in aerobic respiration/ oxidation; to release energy from food reserve for germination; rej. Oxidation for starch (i.e. starch can not be oxidized before hydrolyzed).
15. Current continents existed as one large land mass/ Pangea/
LaureshiaGuondaland; the present continent drifted leading to isolation of

organisms; organism in each continent evolved along different lines hence emergence of new species,

- 16 (a) Decomposer – recycling of nutrients
(b) Predation – regulation of numbers/ population

- 17 (a) Homodont – having same kind/ type/ similar teeth. Heterodont – having different type kind of teeth
(b) Cutting/ chopping/ Shearing/ Slicing/ crusting

- (c)
$$\begin{array}{ccc} \underline{C} & \underline{0} & \underline{PM} & \underline{3M} & \underline{3} \\ & 1 & & 3 & 3 \end{array}$$

Either capitals or small letters accepted. Their must horizontal line separating upper jaw from lower jaw.

18. (a) emulsification of fats/ breaking into small droplets; Increase surface area for digestion; Neutralizes acidity of chime/ provides alkaline media for enzyme action.
(b) Increase in substrate concentration rise enzyme action up to a certain point and further rise of substrate will have no effect.

- 19 (a) (i) Protoandry – Male reproduction organ/ anthers androecia/ stamens mature earlier than female reproduction organ/ carpels/ stigma/ pistil/ gynoecium.
(ii) Self sterility- pollen grains are sterile to stigma of some plants/ flowers

- (b) – Increases variety;
- Hybrid vigour/ heterosis
- Resistance of disease/ drought/ dry climate/ unfavorable environmental conditions/ Frost; E.g. resistance to virus, fungi, bacterial diseases of pest.

20.(a) Thigmotropism/ Haptotropism; rej. Haptotrophism/ thigmotrophism

- (b) Exposes leaves/ shoots for maximum/ a lot of absorption for sunlight for photosynthesis;
- Enable roots of plants to seek/search water; rej mineral salts/ ions alone.
- Enables plants stems to obtain mechanical support especially those that lack woody stems
- Enables roots to grow deep in soil fro anchorage
- Enable pollen tube to grow towards embryo sac to facilitate fertilization

21.(a) X- motor neurone- accept of motor neuronrej. Axon alone
Y- Sense organ/ receptor

- (b) Acetyl; chlorine/ noradrenaline (Nerepinephrine)

22. (a) They contract and relax, to alter the shape of lens.

(b) **Rodes**

Perceives light of low intensity
Not Sensitive to colour
Have low visual acuity

Cones

Perceives light of high intensity
Sensitive to colour
Have high visual acuity

23. (a) Ear Ossicle – transmits/ magnify/ amplify sound vibration.

Rej. Sound waves

(b) Cochlea – converts sound vibrations into nerve impulse

(c) Semicircular canals- for body posture/ balance

(d) Eustachian tube- balances pressure in middle ear to that of outside.

24. Thin walls/ thin epithelium for faster diffusion of gases/ to reduce distance for faster diffusion.

- Moist for dissolving gasses

- Large surface area for maximum diffusion/ gaseous exchange

- highly vascularized to facilitate diffusion/ to enhance gradient.

- Speed up diffusion

25 (a) A mouse has a larger surface area to volume ratio than a dog, hence losses more energy per unit body weight/ mouse losses heat faster than a dog.

(b) Lactic acid, accept energy/ ATP

26. X- Denitrifying bacteria/ denitrification

Y- Animals/ Herbivores; accept primary consumers

Z- Nitrogen fixing bacteria (in soil) accept Azotobacter.

27. Hydrogen; Oxygen

BIOLOGY
K.C.S.E PAPER 231/1 2007
MARKING SCHEME

1. (a) Binomial nomenclature is a system of naming organisms by giving them two scientific name; the genetic and the specific names.
 (b) - It makes it easier to identify an organism
 - It is easier to describe an organism as it is based on characteristics of the organism
 - Large number of organisms is divided into smaller groups depending on characteristics
 - The whole world uses the same groupings, so that everyone understands each other.

2. (a) Drawing = $\frac{\text{length of the drawing}}{\text{Length of the object}}$
 (b) It is adding a dye to the specimen to make the feature clearer and distinguishable.

3. Plant cells have membrane and cell wall. When the cell is placed or immersed in distilled water, the water is absorbed by osmosis. As cell becomes turgid, the cell creates an inward force, wall pressure that prevents the cell from bursting.

4. From vesicles that transport materials to other parts of the cell e.g proteins.
 - Transportation secretions to the cell surface for secretion e.g. enzymes and mucus
 - They form lysosomes

5.

Diffusion	Osmosis
<ul style="list-style-type: none"> • Involves movement of particles of molecules of liquids or gas • It may be through a membrane or in air • Not affected by PH changes 	<ul style="list-style-type: none"> • Involves movements of solvent molecules • It takes place through a semi permeable membrane • Rate affected by PH changes

6. Take place in the grana of the chloroplast. Light is absorbed and used to split water molecules into hydrogen ions and oxygen, photolysis. Energy is formed and is stored in form of ATP
7.
 - (a)
 - (i) – Pre- molar tooth
 - (ii) – presence of two roots
 - (iii)- Presence of cusps of the crown
 - (b) Has nerve cells that increase sensitivity of the tooth to heat and pain
- Has a blood vessel that provides nourishment to the tooth and remove waste products

8. (a) Vitamin D, Vitamin K.
 (b)- Transmission of nerve impulses
 - Ionic balance/ osmotic balance
 - Contraction of muscles
9. Absence of cuticle to allow diffusion of water
 - Thin walled to reduce distance of diffusion
 - Elongated to increase surface area for absorption of water and mineral salts
 - Presence of large vacuole to increase concentration gradient between cell sap and soil water
- 10 (a) Phloem tissues
 (b) K- companion cell- L – sieve tube
 (c) Supply nutrients and energy to the sieve tubes
- 11 (a) presence of valves
 (b) Have biconcave shape to increase surface area for absorption of gases
 - Thin capithelium to reduce distance of diffusion of gases
 - Absence of nucleus and other organelles
 - To increase packaging of hemoglobin
 - Presence of red pigment hemoglobin that has high affinity for oxygen
- 12 (a) - Pneumatophores
 - Aerenchyma tissues
 - Cuticle
- 13 (a) (i) Ethanol and carbon (iv) oxide
 (ii) Lactic acid
 (b) It is the state when human body undergoes anaerobic respiration producing lactic acid. Oxygen has to be taken into the body to break the lactic acid
- 14 (a) (i) maintenance of a concentration of water and salts ion the body fluid.
 (b) Insulin - Glucagon
- 15 (a) Population – It is all members of a given species in particular habitat at a particular time.
 Community- all organisms belonging to different species interact in the same habitat.
- (b)(i) Capture and recapture method
 (ii) Line transect
- - Produce large number of eggs for increased survival
 - Produce enzymes to digest human skin when penetrating
 - Can withstand low oxygen concentration
 - Have hooks – like structures to attach to the intestinal walls
- 17 (a) (i) Anaphase 1
 (i) Homologous chromosomes separates at the equator
 (ii) Chromosomes start migrating to opposite poles

- (iii) Sister chromatids attached at the centromere
 - (b) Spindle fibres
18. Harmful characteristics from the parents may be passed on the offsprings
- Takes a longer time
 - Few offsprings are produced at a time
- 19
- (a) – absence of water (moisture)
 - Unsuitable temperature
 - Lack of oxygen
 - Lack of light
 - (b) Hypocotyl
- 20
- (a) It is an alternative form of a chromosome, similar in structure but may have different composition
 - (b)
 - (i) Occurs when some nucleotides of a part of a gene break off and disappear
 - (ii) Occurs when the nucleotides of a part of gene become inverted by taking a 180° turn.
 - (c) Testing the genotype of an individual by crossing with the recessive trait
- 21.
- (a) When organisms of the same origin become adapted (modified) in different ways in order to fit in the environment. The organisms are separated due to natural factors.
 - (b) When an organism is exposed to drug for sometime it becomes modified (adapted) to living in presence of the drug. The offspring produced therefore survive in presence of the drug. Hence drug resistant.
- 22
- (a) In the central nervous system (spinal cord)
 - (b) Motor neuron
 - (ii) P- Dendrites
 - Q- Axoplasm (Axon)
 - (d) Insulates the axon
- 23
- (a) Auxin
 - (b) Growth response due to touch of a part e.g. tendrils
- 24
- (a) Have short neural spines
 - (b) – Xylem tissues
 - Collenchyma tissues
 - Sclerenchyma tissues
 - Parenchyma tissues
- 25
- (a) In the stomach there is acid medium and ptyalin only acts at slightly alkaline medium
 - (b) High temperature above 40°
 - (c) Villi- microvilli
26. During birth, breast feeding

BIOLOGY
K.C.S.E PAPER 231/1 2008
MARKING SCHEME

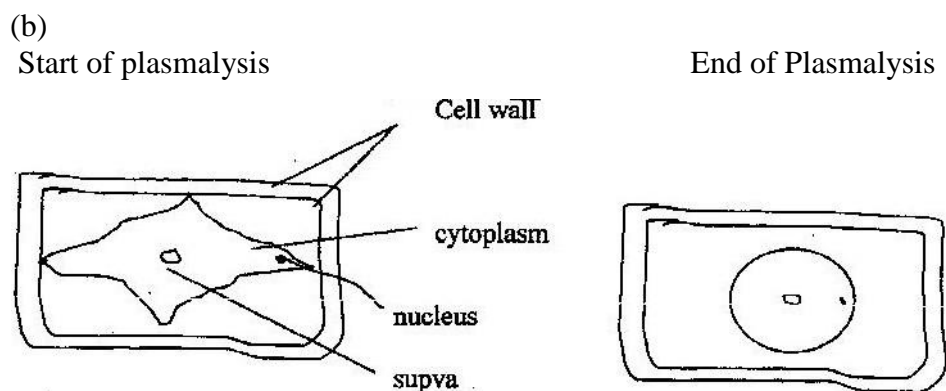
1. (a) xylem
 (b) Phloem
 (c) Apical meristems

2. (a) To remove toxic/ harmful substances/ urea nitrogenous waste from the blood streams

 (b) To return useful substances/ glucose and Amino acids loose into the Bloodstream.

3. (a) Hepatitis (A- E lipids)
 (b) (i) Vibriachlerae
 (ii) Canida/ candida albinism

4. (a) The red blood cell was placed in a hypotonic solution it lost water by Osmosis



5. (a) Temperature PH co- factors, co- enzymes; enzyme product concentration; substance concentration/ metabolic poison

- (b) Temperature- increase in temperature increases rate of enzymatic activity upto an optimum/ low temperature increases enzymatic activity/ too high temp about optimum point denatures enzymes/ enzymatic activity occur at optimum temp.
 Ph- Enzymes work best at optimum ph/ or extreme for ph denatures enzymes.
 Enzyme con – Increase in con increase enzymatic activity occur at optimum temperature
 Co- enzymes – denatures enzymes increasing rate of activity
 Strate/ enzyme cone- increase in concentration increase enzymatic activity upto certain level.

6. (a) Failure of homologous chromosomes to separate during meiosis/ prophase I
Failure of sister chromosomes to separate during meiosis Prophase II
(b) Height/ skin colour/ weight
7. (a) Premedial remains of dead organisms that lived in accent sample
(b) When two dissimilar species/ structures/ organisms of different embryonic origin; change in same and develop similar characteristics/ or modify to perform similar function
8. (a) Anaphase
(b) Chromatids fails to separate off poles
Sister chromatids separate/ pair of chromatid separate
(c) Root tip/ shoot/ cambium
9. (a) Body size; sex; age
10. (a) Antigen B, Antigen A
(b) Flexible/ able to change in shape
11. (a) Ability of organism to maintain a stable/ constant internal/ tissue fluid
(b) Gaseous exchange; Thermoregulation; Osmoregulation; regulation of blood sugar; regulation of pH of tissue fluid.
12. - Transport of protein
- Synthesis/ transport of lipids/ steroids
- Site for attachment for ribosome.
13. (a) Yellow spot/ cornea (centralis)
(b) inverted; Real; reversed; diminished
14. Growth – increase/ decrease in numbers/ change in numbers
Dispersion – Spread/ distribution of organisms in a habitat
Density – Number of individual per unit area
15. Muscles respire anaerobically; resulting in accumulation of lactic acid in the tissue; causing fatigue/ muscle cramps.
16. (a) Photosynthesis
(b) Carbon (iv) Oxide/ Temp/ chlorophyll
17. (a) Few dividing cells/ cells not adjusted to surrounding environment
(b) Most cells fully differentiated/ rate of cell division equals rate of cells dying
18. Transparent to allow light to penetrate photosynthetic tissue/ single layer of cells/ thin to reduce distance over which light penetrate photosynthetic tissue; presence of stomata for gaseous exchange; closely fitting cells to protect inner tissues

19. (a) Cardiac muscle
(b) Contraction of the heart
20. (a) Circulatory system in which blood passes through two capillary systems before flowing back to the heart/ blood passes only once through the heart to complete its circuit in the body.
(b) Fish/ earthworm/ ringworm
(c) Ostium/ Ostin
21. (a) State during which a seed cannot germinate/ state of rest before seed germination; re: inability to germinate.
(b) Abscisic acid
22. Large airspace
Thin cell walls
23. (a) Canine
(b) Pointed/ sharp for piercing/ tearing/ cutting food
(c) (i) C- Absorption of iron/ prevent scurvy/ quick healing of wounds/ best immunity/ antioxidants/ prevents anaemia/ formation of connective tissues/ K – blood clotting
24. Light reaction – Granum/ lamellae/ mitochondria/ thylakoid
Dark reaction - Stroma
25. Bean plant - Dicotyledonae
Reason Leaves have net veined; two cotyledon; tap root system; xylem with phloem in between the arms
Bat Flying mammal
Reason Have sweat glands; 3 ear ossicle; presence of fur; mammary glands
26. (a) Inducing polyploidy/ treatment
(b) Meat tenderizer
27. (Anaerobics) micro organism/ bacteria breakdown harmful substances in sewage
28. (a) Budding
(b) Protandry - Male parts mature before carpels; Strobiliferous
Protogyny - Carpels; pistil; female parts mature before stamen; acc. Strobiliferous mature before anthers
29. Cushions foetus against shock/ mechanical damage/ provide a suitable medium for embryo to grow/ allows movement of foetus/ support reduces friction/ lubrication/ suspends foetus providing support/ prevents desiccation/ drying of foetus.
30. Pelvic girdle
(b) (i) Femur

(ii) Obturator foramen.

BIOLOGY
K.C.S.E PAPER 231/1 2009
QUESTIONS

1. (a) Scales/ scale Reject Trail (1mk)
(b) Most have cell wall made up of cuticle (or cellulose) Rej cellulose alone
 - Most reproduce by means of spores/ sporulation
 - They are eukaryotic/eukaryotic
 - They are heterotrophy/ lack chloroplasts / some are saprophytic while others are Parasitic
 - Have network of myphae/ mycelia
 - Store food in form of glycogen or oil droplets (both must be mentioned)

2. - Obtains food/ nutrients/
- Shelter (Acc Habitat Rej protection)

3. (a) magnification of the object/ image
(b) Regulates amount of light (falling on the object on microscope); Acc: Adjust / control amount of light

4. (a) (seed) dormancy/ Rej Dormancy
(b) (i) Epigeal
(ii) Protection of the delicate plumule; pulls the cotyledons above the ground
(Rej shoot

5. (a) (i) production of plants and animals that have superior/ greater productivity/ have beneficial/ characteristics than either of their parents.
(ii) Condition in which an individual has more than two sets of chromosomes

(b) Rej: cosmic rays as mutagenic on chromosomes
 - Radiations such as alpha, gamma, beta UV and X- rays least one
(Rej: symbols α , β and increases in temperature)
 - Chemicals such as calchicine, phenols, bromate, pesticides At least one
 - Heavy metals e.g. lead mercury Rej symbols
 - Viruses such as Papilloma Rej: mustard gas- affects gene mutation

6. (a) (i) Dicotyledonous; Rej: Dicotyledonous
(ii) Vascular bundles arranged in a ring / presence of vascular
Rej pith- not visible also found in the root of monocots
Rej intra vascular bundle
(b) (Divides to) give rise to secondary thickening (growth/ increase in growth/
diameter/ width of stem/ gives rise to new/ additional xylem and phloem tissues

7. (a) site for protein synthesis
Rej: Autolysis
NB Must mention effects of lytic enzymes
(b) Break down worn out cells/ organelles / food materials
8. (a) The placenta/ takes the role of the ovum of producing the hormone Progesterone (which maintains pregnancy)
(b) Production of gametes/ spermatozoa Acc male gamete/ male sex cells
Production progesterone hormone which maintains pregnancy Acc. Male sex hormones
9. (a) (i) Salmonella typhi; ignore underlining but must be written correct
(ii) Hystolytic/ Eutamoebia
(b) Malaria
10. (a) (i) Order: ceased to function then reduced in size
Are those structures that have ceased to be functional over a long period of time and hence reduced in size.
(ii) Appendix/ coccyx/tail (tail bone)/ semi - lunar folds of cornea of eye/ nictitating membrane caecum/ ear muscles/ body hair/ Acc. Post and nail
(b) Disease causing organisms mutate; and become resistant
11. (a) auxiliary/ lateral buds sprout/ branches will be formed
(b) Decapitation removes the hormone/ ouxins /IAA which is produced in the terminal bud/ the stem tip; abseul/ removal of the hormone/ auxins/ IAA promote branch/ development of auxiliary lateral buds.
12. (a) scapula; Acc: scapular
(b) (i) Humerus *Acc Humerous but rejHumourous*
Rej Ball/ socket, Rej socket and ball joint
(ii) Ball and socket joint
(c) Attachment of muscles
13. (a) In diffusion (Rej movement molecules) molecules move from a highly conc. Region to a lowly conc. Region while in active transport molecules move from a lowly concentration region to a highly concentration region; on diffusion molecules move along conc. gradient while in active transport molecules move against conc. gradient. No energy is required in diffusion while energy is required in active transport/ active requires carrier molecules while carrier molecule not required in diffusion;

22. Large/ powerful for cracking/ breaking/ crushing bone/ slide past each other/ scissor-like for shearing/ cutting/ slicing (off) flesh/ tendons/ skin from bone
23. A component of haemoglobin/ formation of haemoglobin ACC>myoglobing
24. (a) Young people are actively/ rapidly growing hence require more energy than older peopleNB: growth has to be mentioned
 (b) Manual workers require more energy than secretary workers
 (c)Males are more muscular hence require more energy than females
25. Thin walled for easy diffusion of gases/ store a lot of air/ have large air spaces which store air for buoyancy/ for gaseous exchange
26. Inner membrane is highly folded/ have cristae to provide a large surface area/ for attachment of respiratory enzyme.
27. Baking/ brewing
 Rej: Formation of butter, cream, glucose
 - Formation of dairy products- cheese, yoghurt, sour milk
 - Formation of organic acids- oxalic acid, vinegar (Ethamic acid, citric acid, butyric acid)
28. (a)
- | Arteries | Veins |
|--|-----------------------|
| - Thick muscular walls | - This muscular walls |
| - No valves (expect at bases of pulmonary artery and aorta) | - Have valves |
| - Narrow lumen | - Wide lumen |
- (b) Arteriosclerosis/ rej Atheroma – due to the deposition of cholesterol which makes human narrow
29. When humidity in high the air around the leaf gets saturated with water vapour hence) less space for water vapour from the leaf to occupy/ low saturation deficit/ low diffusion gradient/ the difference in concentration of water vapour in the atmosphere and in the air spaces is greatly/ highly reduced.

BIOLOGY
K.C.S.E PAPER 231/1 2010
MARKING SCHEME

1. (a) Cytology: Rej cell biology
(b) Microbiology

2. (a) Stem
(b) i) Monocotyledonae
 ii) Vascular bundles scattered not arranged in a ring;
 Absence of pith; Absence of vascular cambium.
(c) Epidermis

3. (a) Protein synthesis (Accept: site for protein symbiosis)
(b) Destroys worn out organelles/cells/tissues
 Destroys micro-organisms.

4. (a) i) Root hair(cell)
 ii) D – cell wall
 E – cell sap (vacuole)
(b) Controls the functioning of the cell/ controls cell activities

5. A large surface area for efficient diffusion of gases
Moist for gases to diffuse in solution form/to dissolve gases
Thin for efficient/diffusion of gases (across a short distance)
Must be close to body cells/well supplied with blood vessel to active cells
Ventilation mechanism for bringing in air rich in O₂ and expelling air rich in carbon(iv) oxide

6. (a) Maintain balance/posture/control/muscular movement
(b) Control heart beat/ blood pressure/ breathing(rate) control involuntary activities/
response
Accp. Curved examples of v.a e.g. eating, swallowing e.t.c.

7. Haemolysis – process by which red blood cells take in water till they burst; while
Plasmolysis – loss of water from plant cells until the cell membrane is detached from the cell wall/ until the cell become flaccid.

Chilopoda	Diplopoda
<ul style="list-style-type: none"> - A pair of (walking) legs per segment - Body flattened dorsoventrally - Body divided into head and trunk Acc. - Body divided into two body parts - Posterior genital aperture - Has poisonous claws - Have long antennae 	<ul style="list-style-type: none"> - 2 pairs of (walking) legs per segment - Body cylindrical in shape - Body divided into head thorax and trunk Acc - Body divided into three body parts - Anterior genital aperture - Lacks poisonous claws - Have short antennae.

- 8.
- They contain chlorophyll which traps/absorb light (energy)
 - They have grana which increase surface area for accommodation of a large number of chlorophyll molecules for photosynthesis
 - The stoma has enzymes for photosynthesis
9. - Resistance to diseases/pests/adverse weather conditions (Acc. Correct examples e.g. drought, very high/ low temperatures)
- Increased yields
 - Earlier maturity Acc. Early maturity
10. (a) Aquatic / fresh water
(b) Large air space/aerenchyma
Sclereids
Stomata on upper epidermis/absence of stomata in lower epidermis
Absence of cuticles
Poorly developed vascular bundles
11. J – sporangium
- Absorption of soluble substances/ digested food
 - Secretion of digestive enzymes;
 - Anchorage(of mould on substrate); anchorage must be in the right context
12. (a) Place/environment in which (specified)organism lives
(b) A natural unit with abiotic and biotic factors
13. Charcoal in limited supply of air produces carbon(ii)oxide; which combines with haemoglobin forming carboxyhaemoglobin; which is stable/ does not dissolve reducing capacity of the haemoglobin leading to suffocation/ death;
14. a)
X – Starch present
Y – Starch absent

- b) X – acts as a control; Y – CO₂ absent absorbed by potassium hydroxide pellets; Acc correct explanation
15. Emulsification / breaking down of fats into (tiny) droplets
Creating alkaline medium for digestive enzymes/ neutralizing acidic chyme (from the stomach)
16. (a) Herbivorous; RejHarbivores
(b) Lack canines/ incisors on upper jaws
17. Animal form waste products more rapidly than plants/ Produce more metabolic wastes
Animals don't reuse their waste while plants reuse some of their wastes;
18. When temperature is high they dilate; when low they constrict (Acc. Vasodilatation)
19. Higher chances of fertilization
Embryo/gamete is protected from external environment conditions
20. (a) P – sutures
(b) i) Atlas;
ii) Hinge joint
21. (a) Passage of ova/ site of fertilization
(b) Storage of sperms
(c) Hold the testis/ protect the testis
- 22.
- Absence of nucleus, increase of space for packaging haemoglobin(for carrying oxygen)
 - Possession of haemoglobin which has high affinity for oxygen
 - Bi-concave shape creates large surface area for combining with oxygen
 - Ability to change shape/flexible to enable them pass through capillaries.
 - Have carbonic anhydrase which increase CO₂ transportation
 - Are numerous/many to be able to carry max amount of oxygen
 - Has plasma membrane which allow rapid diffusion of gases
23. (a) Use and disuse
Acquired traits can be passed on to offspring
(b) Acquired characteristics cannot be inherited
No evidence to support the theory
- 24.
- Overcrowding
 - Accumulation of toxic wastes
 - Limited resources such as nutrients
25. (a) Provide support

- Enables plants to grow forward light
- (b) In search of nutrients
- Anchorage
26. (a) Failure of homologous chromosomes to segregate during meiosis/ anaphase I/ meiosis I
Failure of sister chromatid to segregate during meiosis/ anaphase II / meiosis II.
- (b)
- i) Down's syndrome; Turner's syndrome; Klinefelter's syndrome
Turner syndrome
Acc. Mongolism for Down's syndrome
- ii) Albinism; single cell anaemia; haemophilia; colour blindness
Chondrotyrophic dwarfism/ Achondroplasia
27. Arteries have thick muscular walls; veins have thin and less muscular walls
Arteries have narrow lumen, veins have wider lumen
Arteries have no valves except at junction with heart; veins have valves at regular intervals.
28. (a) Gymnospermae/ Gymnospermatophyta/ Gymnosperonaphyta;
(b) Needle-like leaves; thick waxy cuticle
Naked seeds; sunken stomata.
29. The inhibition of growth of lateral buds; by auxins; produced by the growing apical bud.

BIOLOGY
K.C.S.E PAPER 231/1 2011
MARKING SCHEME

1. Nephritis
Kidney sytones
2.
 - a) $i^{2/2} C^{1/1} pm^{2/2} m^{3/3}$ or $2(i^{2/2} C^{1/1} pm^{2/2} m^{3/3}) = 32$
 - b) dental catties; periodonties/ periodontal disease/ pyorihoea
3.
 - i) Identify similarities and differences between organisms;
 - ii) Organize scientific knowledge in an orderly system
 - iii) Monitor emergency presence and disappearance of organism in and from earth;
 - iv) Grouping organism for easy study,
4.
 - a) Sacking small insects / small animals
 - b) A trap into which (small) animals fall and get trapped; Acc' examples of small animals e.g. insect / reptiles, arachnids
5.
 - a) Grass grasshopper lizards.
 - b) i) chicken
ii) Grass
6.
 - a) This is the study of the inter-relationship between organisms and their environment;
 - b) The maximum population of a species/ Total number of organisms that a population habitat/ area/ region/ ecosystem can support. V

Or

Total number of population of a species a given habitat/ region/ area/ ecosystem can support without depleting available resources; **rej.** If different species
7. Water was hypotonic to cell sap of adjacent and these cell absorb water through osmosis; and their cell sap became less conc. Than those of next cell; the process was repeated until water reached the sugar solution.
Or
Sugar solution was hypotonic to cell sap of adjacent cells; they lost water by osmosis; cell sap became more conc. than those of next cell; the process was repeated until water was drawn from the beaker.
8.
 - Fused head and thorax/ capholothorax (often) protected by carapace.
 - Gaseous exchange through gills
 - Two pairs of antennae
 - Five more pairs of limbs/ five to twenty pairs of limbs; **rej**five
 - A pair of compound eyes

- Three pairs of mouth parts (consisting of labial pulps / maxillae)
9. A – Dicotyledonae
B – Monocotyledonae
- 10.
- a) i) lactic acid in animals while plastic is ethanol / alcohol
ii) No CO₂ produced in anaerobic respiration in animals while anaerobic respiration in plants produces C
O₂
 - b) Cytoplasm
11. **Fine adjustment knob**
Moves the body tube through smaller distances to bring image/ specimen/ object into sharper/ Sharpe focus.
Stage
Platform where specimen (on slide) is placed.
12. Pylum – Chordate
Class – Aves
13. Source of energy
Storage of materials
- 14.
- a) Dry /arid/ semi-arid/ desert
 - b) Succulent/ freshly stem; reduced leaves/ leaves reduced into thorne/ spines; **Acc.**
Thick stem for storage of water.
- 15.
- a) (To reduce layers of cells) to allow light to pass through
 - b) To make the cell torpid/ prevent drying up;
 - c) To protect lens on objective; exclude air/ dust/ foreign particles;
Hold specimen in position/ place
- 16.
- a) Weakened/ defective valves in veins; causing blood/ body fluid/ tissues fluid to accumulate; (leading to swelling)
 - b) (when exposed to air) they disintegrate/ burst; releasing thromboplastin/ thromborinase.
- 17.
- a) L – Duodenum
M – Pancreace
 - b) i) bile
ii) emulsification/ emulsification of fat; neutralize acidic chime from stomach;
provides alkaline media(for enzyme to work)

- 18.
- Sublingual; submaxillary/ submandibular; parotid
 - Lubricating food; digestion of starch; moistens food; provides alkaline medium; soften food; dissolves food. **Acc**, for correct component of saliva to correct function
- 19.
- Skin
Buccal cavity/ mouth cavity; **rej**mouth
 - Glucose + Oxygen \longrightarrow Carbon IV oxide + water + enery
 $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + ATP/ \text{enery}$
- 20.
- X
 - X has fewer stomata; most stomata in leaf X are concentrated on the lower side
- 21.
- Where different structure evolve to perform different functions (e.g. wings of insect / birds, eye of human and octopus) **rej**; if wrong example given **Acc**; if no example given
 - Missing links; distoration of parts during sedimentation
Destruction of fossilsa by geological activities **Acc**; correct e.gs
- 22.
- Air that enter the lungs has high content of oxygen than air that leaves
 - Air that enter lungs has lower content of CO₂ than air that leaves
- Acc**; air that enter lungs has 20% – 21% Oxygen, air that leaves has 15% - 17% Oxygen
air that enter lungs has 0.03 – 0.04% CO₂, air that leaves has 4.0% CO₂
- 23.
- i) Ovule; **rej**; ovules
ii) Axile
 - orange or any other citrus fruit; lemon, tangerine, grape, lime, tomato, Sodom apple, irish potato, egg plant, thorn apple, banana
- 24.
- i) dominant gene expresses itself in both its homozygous and heterozygous state whole recessive gene can only express itself in the homozygous state.
ii) continous variation is a characteristic for which there is continuum or range while discontinuous variation is a characteristic for which there are discrete/ distinct/ separate/ definite categories or units;
 - (either) all offsprings show dominant characteristics; **or** half offsprings show the recessive while the other halve show dominant characteristics.
- 25.

- a) **Tannin** – softening of leather/ conversion or treatment of hides or skins to leather/ tanning leather/ treatment of leather; manufacture of ink/ printing of fabrics/ dyeing of clothes/ printing patterns in pots
 - b) **Quinine** – treatment of malaria
 - c) **Caffeine** – stimulant in beverages/ increase mental activities/ reduce fatigue
26. Egg/ ovum/ ova; **rej**; ovula
- 27.
- a) Ligament
 - b) Secretes synovial fluid; contains/ holds the synovial fluid in place
- 28.
- a) It is a growth movement in plants/ part of a plant in response to a unidirectional stimulus; **rej**; unilateral
 - b) Accelerates growth in shoots
Can inhibit growth in roots **Acc**; High Conc
Promote growth in roots
Inhibit growth in shoots **acc**; low Conc
29. Activate enzyme; provide a medium for enzymatic activities (to break down stored foods to soluble form); Hydrolyses; dissolves food materials; a medium of transportation of dissolved food substances / Oxygen/ nutrients of growing region (of radicle and plumule); soften seed coat to facilitate emergence of radical

K.C.S.E 2012 BIOLOGY

MARKING SCHEMES

PAPER 1

1. Plants make their own food from carbon (iv) oxide and water in the presence of light photosynthesize/ autotrophic; while animals eat ready made food (some plants and animals heterotrophic);
 - If photosynthesis described all raw materials must be mentioned;
 - Carbon (iv) oxide the (iv) must be bracketed.
- If sources of food for animals is mentioned then both plants and animals must appear.

2. a) Crustaceae/ Crustacea;
 - b) - Head fused with thorax/ has cephalothorax; (Reject 2 body parts)
 - Have two pairs of antennae
 - Have compound eyes/ a pair of compound eyes;
 - Have five to twenty pairs of limbs;
 - Have external gills;
- (Mk first 3 only)
3. a) A - Nucleopore; Accept. Nuclear pore. Reject pore in nucleus
Note: It must be a name, not a description
B - Rough endoplasmic reticulum;
Reject endoplasmic reticulum antennae.

- b) Surface covered with ribosomes; for protein synthesis;
 - Have interconnected channels; for transport of proteins;
 - Part (b) is tied to (a), reject if labelling of "B" in above is incorrect.
 - Interconnected/porous, and channels must be there to score;
 - Feature tied to function

4. a) - The solution was hypotonic/ less concentrated compared to cell sap of pawpaw cylinder cells. Accept the converse.
 - The tissue/ cells gained water by osmosis.
 - Becoming turgid/ longer/ stiff.
 - Reject if contradiction occurs in part I/ Note the sequential marking but proceed if preceding part is not contradictory.
 - Reject use of potato instead of pawpaw;
 - Pawpaw cylinders of same size/ length; placed in isotonic solution; Reject if same length or size and isotonic is missing.
 - Boiled pawpaw cylinders of same size/length; placed in similar solutions. Accept same/ hypotonic/hypertonic solution in this case. Note: Osmosis must not occur in the control:
5. a) Plant C;
- b) Thick cuticle reduce water loss;
 - Low number of stomata reduces water loss;
 - Least number of stomata on upper surface reduces water loss
 - Reject less/ low juice in all species have the feature.
 - Large root surface area enhances water absorption.

6. a) F- Bronchiole; Reject bronchioles;
 G - Intercostal muscles/ external intercostal muscles;
 - Reject internal intercostal muscles.
- b) H- (Pleural membranes) secrete/ enclose pleural fluid (to lubricate lungs);
 - Protect the lungs;
 J - (Diaphragm/ diaphragm muscles) separates chest/ thoracic cavity;
 - Accept it works to effect volume;/ pressure changes in chest cavity necessary for inhalation and exhalation/ ventilation.
 - Accept relevant explanation for the working except that both inhalation and exhalation must be brought out clearly to score;
 * Mk first one only;

7. a) Respiration/Aerobic respiration;
 b) (Potassium hydroxide, removes/ absorbs/ takes away carbon (IV) oxide from the atmospheric air);
 * Accept CO_2 / Reject carbon dioxide;
 * Reject if the carbon (IV) oxide is without IV bracketed.
- c) L - Lime water remains clear because carbon (IV) oxide has been removed;
 - Must explain why carbon (IV) oxide is absent/ missing;
 N - Lime water forms a white precipitate because the respiring cockroaches produce carbon (IV) oxide;
 - Idea of respiration must come out;
 - Reject milky;

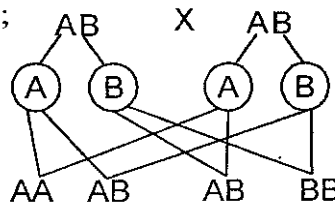
8.

Parental genotypes;

Parental gametes

Fusion

F1 genotypes;



Crossing sign is a must to score

- Complete circles

- Reject if crossing sign shown.

- All must be correct

- Reject BA instead of AB

- Probability is $\frac{1}{2}$ or 0.5/ 50%
 - Reject probability if not simplified
 Using a punet square;
 Genotype AB X AB

	♀	A	B
♂		AA	AB
		AB	BB

-If diagonal line probability is missing or wrongly placed penalize for gametes;

9. - Reduces dehydration/ desiccation; (Reject prevents)
 - Avoid predators;
 (Mk first correct one)
10. Ability of an organism to detect/ perceive/(interpret) and respond to changes in the environment/ stimulus;
 - Detection/ perception and response must BOTH be present to score;
11. a) Can contract continuously without fatigue;
 Their contractions are started by the muscles themselves (and not nerves) They are myogenic. Reject not controlled by nerves,
 b) - Smooth muscles; Reject visceral muscles.
 - Skeletal muscles;
12. a) Fuse adjustment knob;
 Rej fuse adjusting knob/ adjustment knob alone/ coarse adjustment knob;
- b) Avoid refraction of light
 - Prevent melting of the slide;
 - Accept any one
 - Wrong answers negates the correct one:
 - Rejects prevents rusting.
13. - Temperature
 - Surface area;
 - Distance the particles have to travel/ thickness of the membrane. Accept thinness.
 - Diffusion/ concentration gradient;
 - Size/ density of molecules/ particles;
 - Medium of diffusion;
 - Surface area to volume ratio; reject ration for ratio;
 Mk first three
14. a) - Aerobic respiration;
 b) It releases more energy (per unit mass).
 Reject alot of energy alone/ comparison aspect must come cut.
 If units given, they must be correct/ 2880kj/g.
15. - Anhyrogens; accept androgen;
- 16.- - The plant/ flower is self-sterile/ incompatible/ owtte/ not success/ self pollinated;
 covering prevents pollination in flower P; flower Q received pollen from other plants/
 cross pollination/ pollinating wind/ insect; -
17. Carbon (IV) oxide; Nitrogenous wastes/ urea;
 - Reject if (IV) is not bracketed/ if (IV) is in small letters;
 - Reject metabolic wastes/ uric acid/ ammonia
18. - Most of the waste products are harmless;

ancestry/ cell Biology;

- ii) Fossil records/ paleontology/ by comparing the fossils of different organisms/ originate from a common ancestry.

27. Removes excess water/ waste products/ homeostasis/ osmoregulation/ excretion;

28. Open

-Blood flows in haemocoel/ body cavity/ coelom/ schutes (directly in contact with cells)

- Blood flows at low pressure

- Blood lacks pigment for transport of O₂ vs CO₂ of O₂ and CO₂

Closed

Blood confined in vessels;

Blood flows at high pressure;

Blood has pigment for transport

29. - water

- Mineral salts

- Vitamins: Mk first 2

30. a) Smooth endoplasmic reticulum;

b) Golgi bodies/ golgi body/ golgi apparatus;

BIOLOGY
K.C.S.E PAPER 231/1 2013
MARKING SCHEME

- 1.(a) Is when the rate of water loss is more than the rate of absorption and the plant droops;
1 mk
- (b) The rate of active transport increases with increase in temperature up to the optimum temperature;
1 mk
 Further increase in temperature slows down the rate of active transport until it stops because it denatures enzymes;
1 mk
- 2.(a) Animal cell;
1 mk
- (b) - Has cell membrane only/has no cell wall;
 - Has numerous small vacuoles;
 - Has central nucleus;
Max. 2 mks
- (c) Consists of many similar cells performing the same function;
1 mk
- 3.(a) Have mammary glands; have external ears/pinna;
 Body covered with fur/hair;
Max. 2 mks
- (b) Class;
1 mk
- 4.(a) Lubrication; Protection;
2 mks
- (b) Young people are more active; requiring more energy
 Older people are less active; requiring less energy;
2 mks
5. As the cell gains water by osmosis; the sap/cell vacuole enlarges; pushing the cytoplasm outwards; exerting pressure on the cell wall;
Any 3 3 mks
6. 6000(μm)
 55 (cells) ; 109 μm ;
2 mks
- 7.(a) Water molecules cling to each other maintaining a continuous column of water/preventing the break of water column;
1 mk
- (b) Water molecules cling to the sides of the xylem vessel walls;
1 mk
8. 1(a) - Leaf with serrated margin -- go to 2;
 (b) - Leaf with smooth margin -- go to --;
2 mks
9. Presence of myelin sheath for insulation/increases transmission; Axon for transmission of impulses;
 Large cell body controls activities of cell; Nerve endings/dendrites receives impulses from receptors cells;
 Node of Ranvier speeds up impulse transmission.
- (b) Inner membrane highly folded/cristae to increase S A for attachment of (respiratory)

- enzymes. 4 mks
10. Cells loosely arranged; to facilitate air circulation;
Cells have moist surfaces; to dissolve respiratory gases; 2 mks
11. Can receive blood from any donor/ universal recipient; 1 mk
12. (a) (i) Arachnida; 1 mk
(ii) Spider/scorpion/tick/mite; 1 mk
(b) Protoctista/protista; 1 mk
13. Autotrophic nutrition; show alternation of generation;
Limited movement;
Limited excretory products/unspecialized respiratory structures;
Localised growth; 2 mks
14. Alcohol/ethanol; Carbon (IV) oxide; Energy/Adenosine Triphosphate; 3 mks
15. - To increase supply of oxygen to the tissues;
- The oxygen is used to oxidize lactic acid (to carbon (IV) oxide, water and energy); 2 mks
16. Protogyny; protandry; Dioecious; Dichogamy;
Self sterility/incompatibility; Heterostyly;
Presence of structures/substances to attract agents of pollination; Max. 3 mks
17. Ovary /Anther; 1 mk
18. - Acrosome/Lysosome contain enzyme to digest membrane of the ovum;
- Numerous mitochondria to provide energy for movement;
- Long tail for faster movement; Max. 2 mks
19. - Embryo not fully developed;
- Chemical inhibitors/presence of abscisic acid;
- Hard/impermeable testa/seed coat;
- Low hormones/low enzymes concentration; Max. 3 mks
20. Genetically acquired beneficial characteristics which occur spontaneously; are perpetuated through reproduction; 2 mks
- 21.(a) Continents existed as one large Landmass/Pangea/Laurasian and Gondwana Land;
Present continents drifted from it leading to isolation of organisms;
organisms in each continent evolved along different lines hence emergence of new species; 3 mks
- (b) Emergence of new life/species/organisms from pre-existing simple forms, gradually over a long period of time, to present complex forms; 1 mk
- 22.(a) Thigmotropism/Haptotropism; 1 mk

- (b) Part of the tendril in contact with support causes migration of auxins to the opposite side;
 leading to faster cell division/growth on the side not in contact with the support;
 This causes the tendril to curl around the support; 3 mks
23. Use of biconcave/concave lens/divergent lens; to diverge the rays and make image be focussed on the retina; 2 mks
24. - Contains antibodies that defend the body from foreign antigens;
 - Has white blood cells that produce antibodies/while blood cells engulf antigens;
 - Has platelets that initiate blood clotting to prevent excessive bleeding at an open wound/ prevent entry of pathogens; 3 mks
25. - Thin and long to allow for capillarity;
 - Walls lignified to strengthen the stem/to prevent collapse of vessels;
 - Have bordered pits to allow for exchange of materials; Max. 2 mks
- 26.(a) Genes inherited along with the sex chromosomes; 1 mk
 (b) Haemophilia; hairy ears/pinna/nose; colour blindness/red green; blue-green colour blindness;
 Muscular diastrophy; baldness 2 mks
- 27.(a) Complete metamorphosis - eggs hatch into larvae while in incomplete metamorphosis hatch into nymphs which resemble the adult;
 Complete metamorphosis has four stages; egg, larvae, pupa and adult while an incomplete metamorphosis has three stages; egg, nymph and adult. 2 mks
- (b) To allow for growth of the insect; 1 mk
28. (a) Ligaments; synovial fluid; synovial membrane; articular cartilage;
 synovial capsule; a bone with rounded head fitting into a cavity of another bone; Max. 2 mks
- (b) (i) Atlas; (ii) Axis allows movement in all planes; 2 mks
29. - Form joints with the legs to make walking possible; 1 mk
 - Provide large surface area for attachment of muscles; 1 mk
 - Offers support (to the body weight)
30. Absorption of water; support;
 Opening and closing of stomata;
 Feeding in insectivorous/plants; 2 mks

BIOLOGY
K.C.S.E PAPER 231/1 2014
MARKING SCHEME

Answer all the questions

1. State the importance of each of the following in living organisms: (1mk)

(a) Nutrition (1mk)

Acquisition and utilization assimilation of nutrients; O LITTE

(b) Excretion (1mk)

Elimination of metabolic waste products to prevent accumulation to toxic levels

2.a) What is meant by the term seed dormancy? (1mk)

A period (of rest) in which a seed performs to physiological processes slowly and utilizes little food)

b) State three causes of seed dormancy (3mks)

-Chemical / growth /germination inhibitors;

-Hard / impermeable seed coat ;

- Long/ freezing temperatures;rejunfavorable temperature

- Under developed / immature embryo, rej premature/ undeveloped embryo

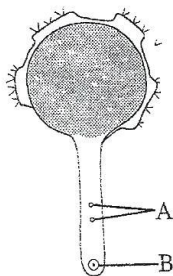
-Low concentration of hormones / enzymes.

3. State two functions of the placenta in mammals . (2mks)

-Exchange of nutrients / oxygen / metabolic wastes between the mother and foetus circulation systems.

-Secretion of progesterone hormones

4. The diagram below illustrates a growing pollen tube



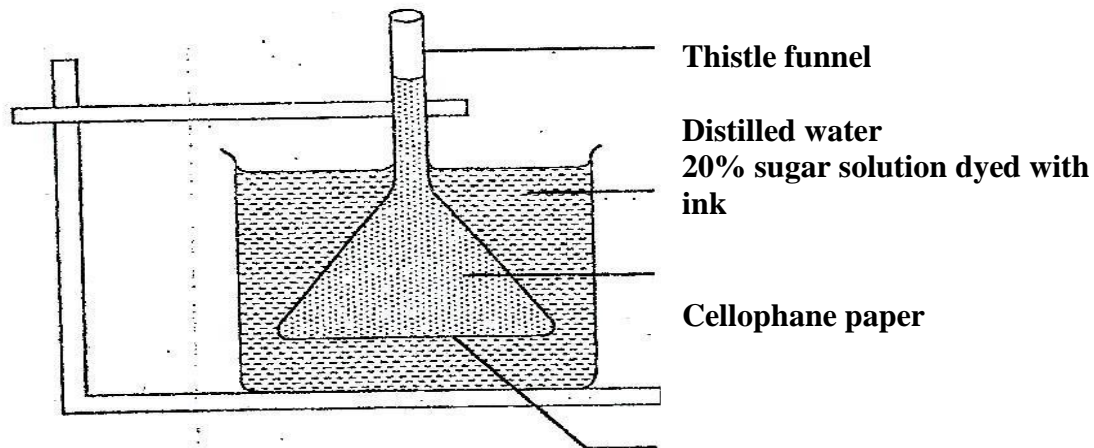
a) Name the part labeled B (1mk)

Tube nucleus

b) Explain the role of the parts labeled A (2mks)

- **One male nucleus fuses with the egg cell nucleus to form a zygote;**
- the other male nucleus fuses with the polar nuclei to form the endosperm.**

5. The diagram below shows a set up for an experiment to demonstrate a certain physiological process.



a) What nature of solution is represented by 20% sugar solution? (1mk)

-Hypertonic solution

b) Explain the observation made on the set up after one hour (2mrk)

- **Volume of sugar solution increases in the (thistle funnel) distilled water in the beaker reduces;**
- **because the thistle / filter funnel gains distilled water by osmosis.**

6. State three roles of auxins in a plant stem (3mks)

- **Cell division**
- **Cell elongation**
- **Development of adventitious roots**
- **Causes apical dominance**
- **Causes tropic responses**

7. A student drew a 6mm long diagram of 6cm long diagram of a plant flower. If the actual length of the flower was 12cm, calculate the magnification of the drawing made by the student.

Show your workings (2mks)

Drawing length in cm

Object length in cm

$$6\text{cm} / 12 \text{ cm} = \times 0.5$$

8. Differentiate between phenotype and genotype as used in genetics (1mk)

- Phenotype is the outward appearance of an organism while genotype is the genetic make-up of an organism.

9. State **two** functions of intervertebral discs in the mammalian skeleton (2mks)

- **Act as shock absorbers**

- **Allow smooth movement between vertebrae / reduce friction between vertebrae**

10. a) Explain two roles of diffusion in human (4mks)

- **Absorption of materials e.g. diffusion of digested food into the blood stream**

- **Gaseous exchange e.g. CO₂ diffuses from capillaries into the alveoli/oxygen diffuses from alveoli to capillaries**

b) What is meant by each of the following terms

i) Crenated cell (1mk)

Crenated cell is a shrunk animal cell that has lost water by osmosis

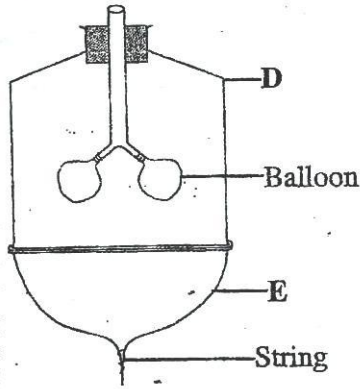
ii) Flaccid cell (1mk)

Flaccid cell is a flabby / shrunk plant cell that has lost water by osmosis

II) State **three** differences between tactic and tropic responses (3mk)

Tactic responses	Tropic responses
Are temporary	Are permanent
Are locomotors	Are growth responses
Are fast	Are slow
Not influenced by growth hormones	Are caused by growth hormones

12. The diagram below represents a model used to demonstrate breathing in mammals



a) Name the mammalian structure represented by the parts labeled D and E.

i. D Rib- cage (1mk)

ii. E Diaphragm (1mk)

b) Explain the observation made when the string is pulled downwards. (1mk)

- **The balloons are inflated**

c) Explain the observation in (b) above (2mks)

- **Pulling down the string increases the volume of D hence decreasing the pressure inside;**

- **The low pressure causes external atmospheric air to rush in and inflate the balloon.**

13. State **one** function of each of the following parts of a mammalian eye;

a) Eye lashes (1mk)

- **Trap foreign particles entering the eye**

b) Lachrymal glands (1mk)

- **It produces fluid / tears which moistens the cornea / wash foreign materials out of the eye; produce fluid / tears with antiseptic properties /kill pathogens / harmful microorganism.**

14. State three structural differences between DNA and RNA (3mks)

DNA	RNA
Double stranded	Single stranded
Has thymine	Has uracil
Has the four nitrogen base pairing pattern	Lack the four nitrogen base pairing pattern

15. a) Which type of mammalian muscles is voluntary? (1mk)

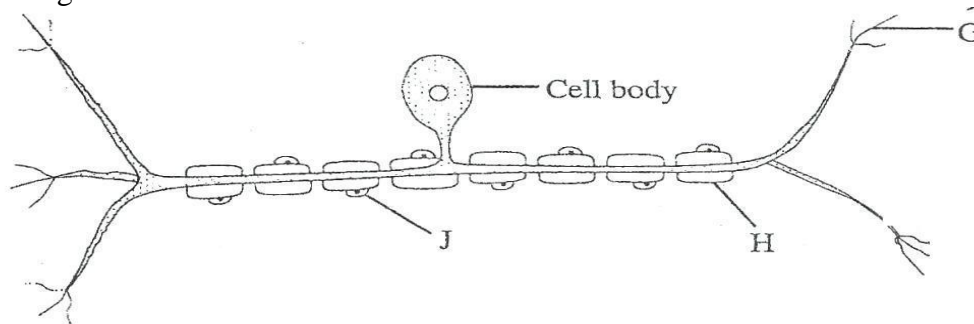
- **Skeletal muscle /striated /stripped**

b) Distinguish between a tendon and a ligament

- **Tendon is an (in elastic) tissue that attaches muscles to bones while ligament is (in elastic) tissue that attaches a bone to another bone**

16.

The diagram below illustrates a nerve cell.



a) Name the type of nerve cell illustrated

(1mk)

- **sensory neurone**

b) Give a reason for your answer in (a) above

(1mk)

- **Cell body is located off the axon/ cell body located outside C.N.S**

c) Identify the part labeled J

(1mk)

- **Schwann cell**

d) State **one** function of each of the parts labeled G and H.

i) **G- Transmit impulses to neighbouring neurons in CNS /receives impulses from sensory organs.**

H- Insulate the axon / speeds up transmission of impulses;

17. Give a reason why the image is not formed when light is focused on the blind spot.

(1mk)

- **The blind spot / lacks both cone rods hence images are not perceived.**

Acc. Photoreceptor cells for cones and rods

18. Explain why

a) Mammalian testes are located to hang outside the body

(2mks)

- To provide a cool environment; that is conducive to food quantity sperm formation.**
- b) Four months after fertilization, ovaries can be removed from a human female, without terminating pregnancy (2mks)

- Progesterone hormones are secreted by the placenta; to maintain pregnancy

19. Why is a burning charcoal stove in a poorly ventilated room likely to cause death of the inhabitants? (3mks)

**- Due to limited oxygen, haemoglobin combines with carbon (II) oxide to form carboxyhaemoglobin/haemoglobin has higher affinity and doesn't readily dissociate hence reduces the capacity of haemoglobin to transport oxygen.
Carbon (II) oxide is therefore a respiratory poison if breathed in.**

20. State one function of each of the following cell organelles

- a) Golgi bodies (1mk)

**- Formation of lysosomes
- Transport of lipids around the cell
- Packing of substances/proteins for secretion.**

- b) Lysosomes. (1mk)

**- Breakdown large molecules / digestion of foods
- Destroy worn out organelles or cells
Acc. Tissues or organelles**

21. Name the type of skeleton that makes up each of the following animals

- a) Locust. (1mk)

- Exoskeleton

- b) Bird. (1mk)

- Endoskeleton

22. (a) Name **two** vestigial structures in human beings (2mks)

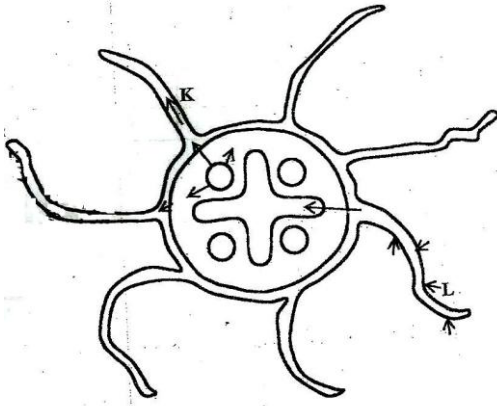
**- Appendix
- Tail / coccyx**

Acc. nictitating membrane

- b) Why are some bacteria able to resist the effect of antibiotics? (2mks)

**- They have a gene resistance / acquire it through mutation
- The gene for resistance is passed for offspring establishing a population of resistant forms.**

23. Below is an illustration of a cross section of a plant root showing the transportation of substances in the plant



a) Name the substances transported along the paths labeled K and L

K; Photosynthetic products manufactured food

L-Water and mineral salts.

b) Give a reason for your answer in L above

- The substances are moved into the (star shaped) xylem;

24. The table provided shows the transportation of substance in the human body.

substance	Transported by blood	
	From	To
Oxygen	M	Whole body
N	Liver	Kidneys
P	Intestine	Whole body

Name the substances represented by

M -Lungs (1mk)

N -Urea /ammonia; rej. Nitrogenous wastes (1mk)

P -Digested food / water mineral salts / vitamins (1mk)

25. State two roles of luteinizing hormones in human reproduction. (2mks)

-Stimulates maturation of gradual follicle / ovulation

-Stimulate corpus luteum to secrete progesterone

26. The table provided show the concentration of sodium and iodine in sea water and cell sap of a plant

	Sodium ion concentration	Iodine concentration
Sea Water	250	35
Cell sap	100	550

a)i) Name the process through which the plant cells take up sodium ions 1mk

-Diffusion

ii) Give a reasons for your answer in (a) (i) above 1mk

-Sea water contains a higher concentration of sodium ions than the cell sap;

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