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

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) Scherenchyma; Xylem vessels/ xylem tracheids/ xylem tracheids rej. 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, tactic 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
   Antherosclerosis
   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/ Pingea/ Laureshia Guondaland; 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) C $\frac{0}{1}$ PM $\frac{3}{3}$ M $\frac{3}{3}$

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

(a) – 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 neurone rej. 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**	**Cones**
Perceives light of low intensity	Perceives light of high intensity
Not Sensitive to colour	Sensitive to colour
Have low visual acuity	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 PAPER 231/2 KC.S.E 2006
MARKING SCHEME

1. (a) X- Femur
Y- Tibia
Z- Fibula

(b) (i) Synovial fluid
(ii) Lubrication of the joint/ shock absorption
Distribution of pressure

(c) Ligament

(b) Ball and socket joint allows movement in all planes while the illustrated allows movement in one plane only. Accept 360^0 for all planes 180^0 for one plane.

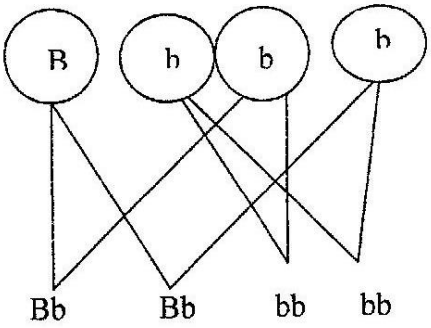
(c) Olecranon process.

2. (a) Albinism; sickle cell anemia; Haemophilia; colour blindness

(b) (i) Occurs when chromatids/ chromosomes break at 2 places and when rejoining the Middle piece rotates and joins in an inverted position.
(ii) Occurs when a section of chromatid break off and becomes attached to another chromatid of another chromosome.

Parental genotype gametes Bb x bb

if other letters are used, penalize at parental genotype



	B	b
b	Bb	bb
b	Bb	bb

$\frac{2}{4} \times 100 = 50\%$

3 (a) Pyramid of numbers is a diagrammatic representation of the number of organism, at each trophic level in a food chain; While biomass is a diagrammatic representation of dry weight organism at each trophic level in a food chain.

(b) Insufficient utilization of food resource/ wastage
Through respiration
Though excretion

(c) Run two ropes of parallel to each other a metre apart
Counts of shrubs are made between two ropes at marked points/ whole belt and recorded) repeat the process severally at least 3 times and obtain the average; calculate area of belt transect; calculate the population for whole area.

$$\frac{\text{Total area x count per belt}}{\text{Belt area}}$$

4 (a) Root

(b) Presence of root hairs
Presence of endodermis
Xylem star shaped at centre
Phloem at arms of the xylem

(c) J- Epidermis
K- Phloem
L – Xylem

(d) - Absorption of water
- Absorption of minerals salts

5. (a) Chorion

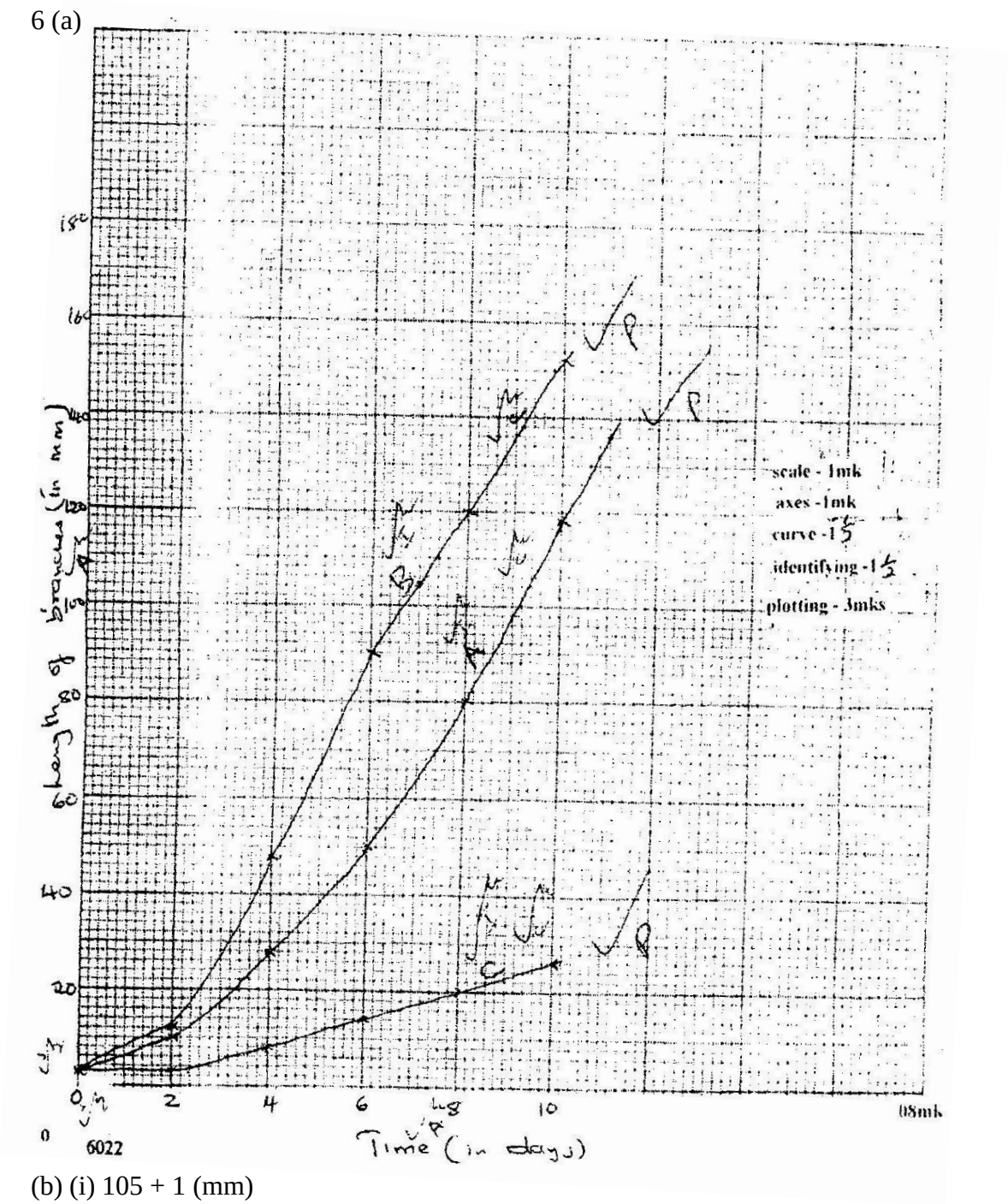
(b) (i) Arteries; veins

(ii) More food nutrients; more oxygen in veins less food nutrients more excretory products in arteries

(c) Highly vascular zed; large surface area
- Presence of secretory cells

(d) Cushion/ absorb shock

6 (a)



(b) (i) 105 + 1 (mm)
(ii) 134 – 140 (mm)

(c) **Graph A:** The tip of the shoot which was removed contained indole acetic acid (IAA); which causes apical dominance/ inhibits growth/ development of more lateral buds; hence lateral buds sprouted/grew.

Graph B; the gibberellic acid which was added on the cut. Promotes formation of lateral branches of stems, hence the fast growth of branches on shoot b.

Graph C; The shoot tip which remained intact contains IAA which inhibits growth/ development of lateral buds; hence little change of length of lateral branches.

(d) Control

(e) Increase productivity

(f) Promote cell division, and cell elongation

7. The afferent arteriole which is the branch of renal artery supplies blood to glomerulus; The afferent arteriole has a wider diameter than the afferent arteriole; this causes high pressure; leading to ultra filtration. The walls of the blood capillaries are one cell thick hence glucose, amino acids, (vitamins, hormones) salts, (creatinine) urea and water filter into Bowman's Capsule to form glomerular filtrate; White blood cells/ red blood cells and plasma proteins such as (Globulin, fibrinogen, platelets) are too large to pass through the capillaries: the filtrate flow into the proximal convoluted tubule; where amino acids (vitamin) and all glucose are selectively reabsorbs back into the blood stream. Many mitochondria provides energy for re- absorption of these substances against concentration gradient/ by active transport. The Glomerular filtrate flow into loop of henle. Water in descending loop moves by osmosis into the blood capillaries; sodium chloride is actively pumped from the ascending arm of loop henle into the blood capillaries. The glomerular filtrate flow into the distal convoluted tubule, water is absorbed from distal convoluted tubule into blood capillaries; the glomerular filtrate flows into collection tube/ duct from where more water is reabsorbed into the blood stream.

Antidiuretic hormone influences the amount of water reabsorbed (depending on osmotic pressure of blood); The glomerular filtrate from collecting duct now referred to as urine; is emptied into pelvis. The urine passes though pelvis and ureter into bladder out of the body through urethra.

8. Water exists as a thin film in the soil between soil particles. The concentration cell sap is greater than that of the surrounding solution in the soil; Thus drawing water molecules across the cell wall and membrane into the root hair cells; by osmosis; water drawn into the root hair cell dilutes the cell sap/ makes it less concentration than that in the adjacent cell into the cortex cells. (By osmosis); across the endosperm by active transport; into the xylem vessels (of the root); Then conduct the water up into the xylem (vessels) of the stem; into xylem of leaves. Water is pushed/ rises up the stem by root pressure (in the xylem vessels) water would rise by capillary; cohesion, and adhesive forces; water moves as a continuous an uninterrupted water column in the xylem (vessel) up the tree to the leaves. As water vaporizes from the spongy mesophyll cells; their cells sap becomes more concentrated than adjacent water flows into the cells from other surroundings cells; which in turn takes in water from xylem vessels within the leaf veins. This creates a pull / suction force/ transpiration pull that pulls a stream of water from xylem vessel in the stem and roots; the transpiration pull maintains continuous column of water from the roots into the leaves (transpiration stream).

BIOLOGY PAPER 3 (231/3) 2006
MARKING SCHEME

1 (a) Cervical region/ neck region (1 mark)

(b) K - Atlas
M - Axis
N - Cervical vertebra (3 marks)

(c) Wide neural canal
Absence of Centrum
Small neural spine (3 marks)

(d) spinal cord (3 marks)
Odontoid process

(e) S - Facets for articulation (2 marks)
T - For passage of blood vessels

(f) Occipital condyle (1 mark)

(g) U - Post zygapophysis
Y - Odontoid process
R - Centrum (3 marks)

2. (a) (i) The stem from L_1 is firm/ hard/stiff
The stem from L_2 is soft (2 marks)

(ii) Solution L_1 is hypotonic to the cell sap
Water moved into the stem cells by osmosis
Cells of the stem become turgid;
Solution L_2 is hypertonic
Water moves out of the cells by osmosis making the cells flaccid
(5 marks)

(b) (i) Material in L_1- The slit opens wider, and they bend backwards.
Material in L_2 The strips remain close together (3 marks)

(ii) In L_1 cells in the inner surface/ cut surface enlarged more because they took in more water; (by osmosis) than the outer cells which have cuticle.

3. (a) (i) Set A - Normal conditions/ in light
(ii) Set B - In the dark
(iii) Set C - Subjected to unilateral light (3 marks)

(b)

	SET A	SET B	
(i)	Green plants	Pale yellow plants	
(ii)	Large leaves	Small leaves	
(iii)	Short stems	Long stem	
(iv)	Thick stems	Thin stems	(4 marks)

(c) (i) Etiolation (1 mark)
(ii) To reach light (1 mark)

(d) Positive phototropism (1 mark)

(e) (i) Auxins migrate to the dark side
(ii) Causing faster growth of cells on the dark side
(iii) Resulting in the curvature of the shoot towards the source of light (3 marks)

K.C.S.E 2007 BIOLOGY PAPER 1
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 easies 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**
• Involves movement of particles of molecules of liquids or gas • It may be through a membrane or in air • Not affected by PH changes	• Involves movements of solvent molecules • It takes place though 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 180^0 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 fro 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 neutron

(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 40^0

(c) Villi- microvilli

26. During birth, breast feeding

K.C.S.E 2007 BIOLOGY PAPER 2 ANSWERS

1 (a) K- Pleural membranes L- Alveolus
M- Intercostal muscles

(b) Has c- shaped cartilage rings that support it preventing it from collapsing and allow free flow of air

- Inner lining has secreting cells that trap fine dust particles and micro-organisms
- Inner lining has hair like structures called cilia that enhance upward movement of the mucus to the larynx

(c) Diffusion

(d) Mycobacterium tuberculosis

2 (a) The amino acids are broken into amino group (NH_2) and carboxyl group (CoOH). The amino group combines with hydrogen forming highly toxic ammonia
It immediately combines with carbon (iv) oxide forming urea that is less toxic.

- The carboxyl group converted to carbohydrates and then oxidized or converted into neutral fats and deposited on the parts of the human

(b) Bowman's capsule

- Proximal convulated tubule
- Distal convulated tubule

(c) (i) Less water reabsorbed the blood stream and dilute urine produced
(ii) Diabetes insipidus

3 (a) (i) Protandry – stamens mature and pollen grains are shed off before the stigma matures

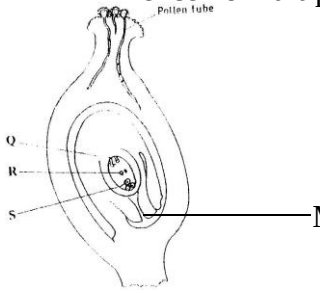
(ii) Self sterility – Pollen grains from the anthers cannot grow on the stigma of the same flower or plant

(b) (i) Q – Antipodal cells
R- Polar body/ polar nucleaus
S – egg cell

(ii) Path the rough which the male gametes reach the embryo sac to enhance fertilization

(iii) Prevent other pollen grains from developing into pollen tubes hence no multiple fertilization of embryo sac.

c)



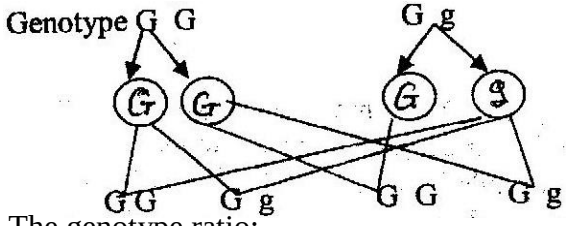
Type of muscle	Where found
(i) skeletal	Attached bones and skeleton
(ii) Smooth	Walls of tabular structures
(iii) Cardiac	Heart muscles

(b) Ball and socket joint- allow movement in all directions i.e 360^0
Hinge joint – Allow movement only on one plane i.e 180^0

(c) It's a slippery fluid that lubricates the joints reducing friction during movement

(d) Prevents drying out of organism
Controls size of the organism
- Provides protection against microbial infections and mechanical injury

5 (a) Parental homozygous X heterozygous
Phenotype purple grains Purple grains



- The genotype ratio:
2 homozygous purple coloured grains
2 heterozygous purple coloured grains

(ii) All purple coloured grained maize plants

(b) Deliberate modification of characteristics of an organism by manipulate genes and DNA by transferring genes from one organism to another

(c) It is when best characteristics are developed from both parents and offspring better than either parent.

6 (a) See graph next page

(b) (i) 15: 45
(ii) 12:45

(c) 0.79 + 0.02 grammes

(d) The food that had been manufactured the previous day had been converted to soluble sugars and was being translocated to other parts of the plant.

(e) 0645 hours and 15 45 hours

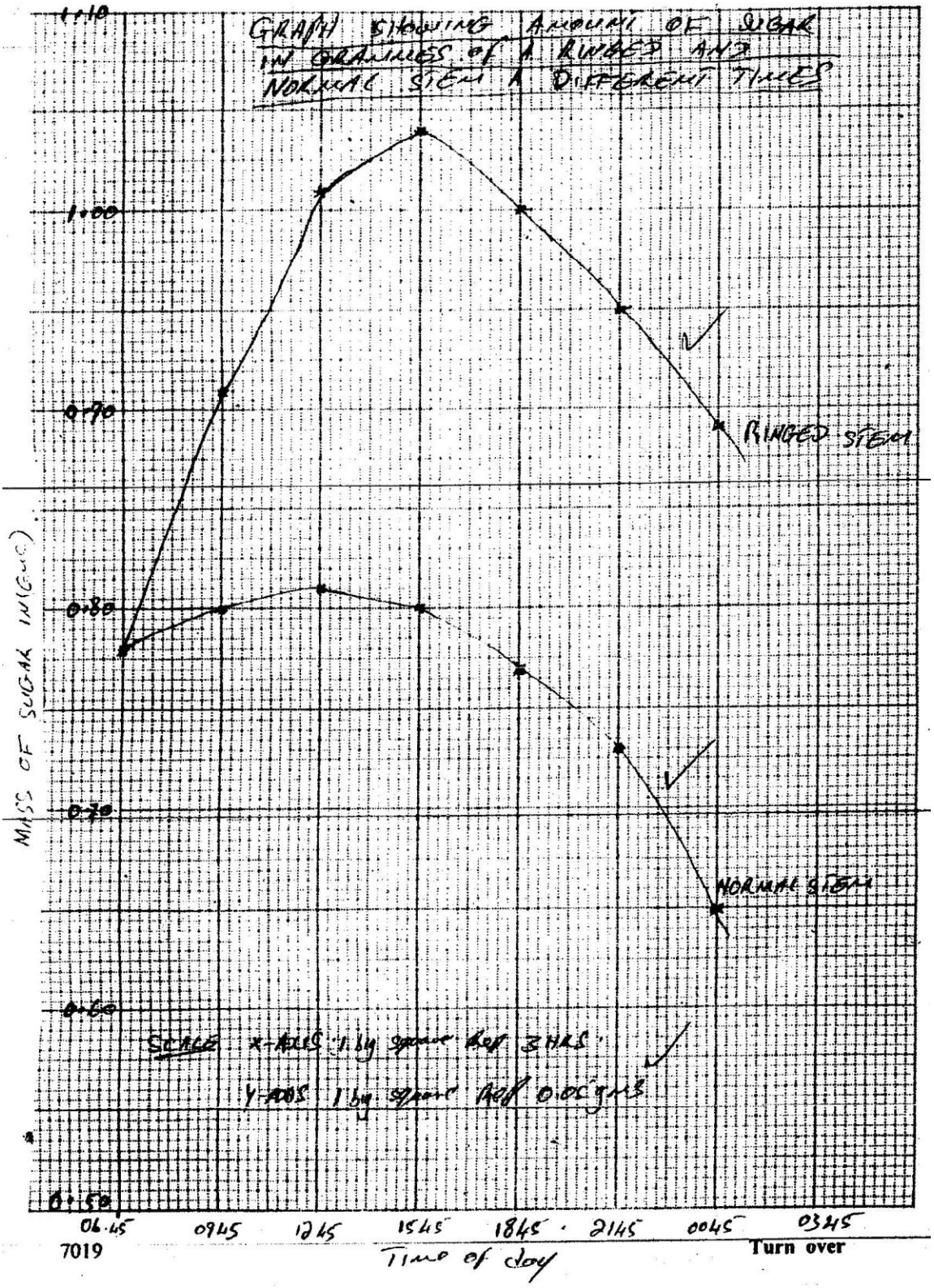
- There was low concentration of sugars early in the morning as there was little translocation
- As day progresses the light intensity increases and more food is manufacture thus more translocation increasing concentration of sugars

(ii) 15 45 hours and 0045 hours

- The light intensity is decreasing reducing rate of photosynthesis. Less food is manufactured hence less is translocation
- As it turns dark there is no photosynthesis reducing concentration of sugars translocated.

(iii) Sieve plates
- Cytoplasm strands

(f) Amino acids
- Soluble fats/ lipids



7. The ear is an organ involved in perceiving sound and maintaining body balance and posture. It is made of the following sections

Pinna – That is funnel shaped structure made of skin and cartilage. It receives sound waves and directs them to the ear tube.

External/auditory meatus – That is a canal lined with air and wax. It allows passage of sound waves to the middle ear. The hairs and wax trap dust particles that enter the ear.

Tympanic membrane – That is a thin flexible sheet-like structure receives sound waves and pass the vibration to the ossicles.

Middle ear that is composed of

Tiny bones known as ossicles – They are anvil and incus. They amplify vibration from the tympanic membrane.

Eustachian tube – That connects the ear to the nasal cavity. It balances pressure on both sides of the tympanic membrane.

Oral window – That is a thin flexible membrane that opens into the inner ear. it receives vibrations from the ossicles and passes them to the inner ear.

Inner ear that is compost of;

Vestibular apparatus- That are the semicircular canals, utricles and saccules. They help in maintenance of body balance and posture.

Cochlea – That is a coiled structure that has sensory cells for hearing. It connected to the auditory nerve that is involved in transmission of sounds to the brain

8. It is addition of substance into water that may cause harm to organisms and are disruptive to ecosystem.

The causes of water pollution include:

- Industrial effluents that may be toxic chemicals which may kill the aquatic organisms. It can be controlled by treating the effluents before discharging them.
- Hot water that reduces concentration of oxygen killing the animals. It is controlled by placing high penalties on factories discharging hot water.
- Oil spillage from oil tankers that reduces oxygen in water, penetration of light intensity and clog feathers of marine birds. It can be controlled by regular servicing of oil tankers.

Domestic effluents that include:

- Untreated sewerage that causes water borne diseases. It can be controlled by treating sewerage before being discharged.
- Detergents that cause eutrophication causing reduced oxygen concentration. It is controlled by banning phosphate based detergents.

Agricultural effluents that include:

- Pesticides and herbicides that have heavy metals that they may cumulates along the food chain killing the higher animals. It is controlled by use of biological control of pests.
- Inorganic fertilizers that have nitrates and sulphates that cause eutrophication is controlled by use of organic fertilizers.

  Silting due to soil erosion reduces penetration of light to the plants and clog respiratory surfaces of animals. It is controlled by proper methods of soil erosion and proper farming methods.

BIOLOGY PAPER 3 (231/3) 2007
PRACTICAL

1. (a)

3 (a) Leaves with serrated margin/ toothed/ saw like/ teeth like
4 (b) Leaves opposite
5 (a) Leaves pinnate (3 mks)

(b)

Specimen	Identity	Steps followed
P	Compositae	1b, 5a, 6a
Q	Nyctaginaceae	1a, 2a, 3b
R	Commelinaceae	1a, 2b
S	Bigoniaceae	1b, 5b
T	Papilioncea	1b, 5a, 6b
U	Malvaceae	1a, 2a, 3a,4a
V	Verbenaceae	1a, 2a,3a, 4b

(12 mks)

2.

(a) Food Substance: Starch (1 mk)
Procedure: add (2) drops of iodine to solution P (1 mk)
Observation: Bluish black/ blue/ black (1 mk)
Conclusion: Starch present (1 mk)

(b) Food substance: Reducing sugar (1 mk)
Procedure: (1 ml) of solution P, add equal amount of Benedict's solution/S
Warm/ heat/ boil the mixture (2 mks)
Observation: Green to yellow to Orange/ Brown (1 mks)
Conclusion: Reducing sugar present (1 mk)

(c) Procedure: place a drop of solution P into a filter paper. Gently dry over flame (2 mks)
Observation: No permanent translucent spot/ mark (1 mk)
Conclusion: Lipids absent (1 mk)

3.

(a) J - Lungs
K - Gills (2 mks)

(b) Gaseous exchange/ External respiration (1 mk)

(c)

- X - Ring of cartilage
- Y - Lung
- Z - Heart (3 mks)

(d) (i) 1: Gill rakers
2: Gill arch/ bar

3. Gill filament (3 mks)

(ii)

- Rake like/ projections for trapping solid particles
- Rake like/ pointed / tooth like/ needle like projections for trapping/ sieving/ filtering solid particles form reaching and damaging the filaments
- Many/ numerous/ long filaments to increase surface area for gaseous exchange (4 mks)

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

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

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

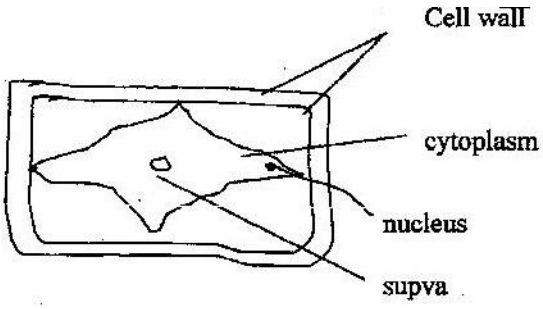
   (b) To return useful substances/ glucose and Amino acids loose into the Bloodstream.

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

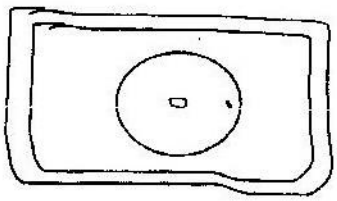
4. (a) The red blood cell was placed in a hypotonic solution it lost water by Osmosis

   (b)

Start of plasmalysis



End of Plasmalysis



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 homoslogenous same 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) Fexible/ 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 crumps.

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) Ostuim/ Ostin
21. (a) State during which a seed cannot germinate/ state of rest before seed germination; rej inability to germinate.
    (b) Absisicic acid
22. Large airspace
    Thin cell walls
23. (a) Canine
    (b) Pointed/ sharp for piercing/ tearing/ cutting food
    (c) (i) C- Absorption of lien/ prevent scurvy/ quick healing of wounds/ best immunity/ ant oxidants/ prevents anaemia/ formation of connective tissues/ K – blood clothing
24. Light reaction – Granum/ lamellae/ mitochondria/ thylokoid
    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; mammaring glands
26. (a) Inducing polyploidy/ treatment
    (b) Meat tenderizer

27 (Anaerobics) micro organism/ bacteria breakdown harmful substances in sewage

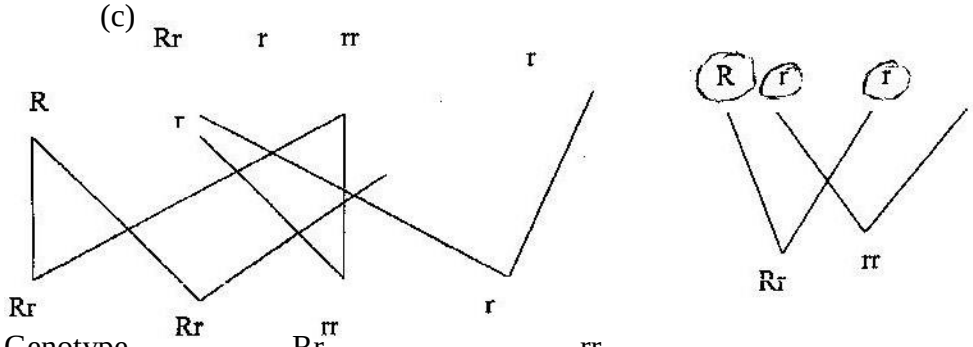
28. (a) Budding
    (b) Protandry - Male parts mature before carpels; Styameic
    Protogyny - Carpels; pistil; female parts mature before stamen; acc. Styme mature before anthers

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) Obturatar foramen.

K.C.S.E 2008 MARKING SCHEME
BIOLOGY PAPER 2

1. (a) Oestrogen
Progesterone
(b) Promotes healing (promotes repair (of the uterus)
Causes thickening (of the uterine lining) vasculation
(c) (i) Leutinizing hormone rej LH
(ii) Causes ovulation
Induces graafian follicle to become corpus iterum
Stimulates corpus inteum to release progesterone
(d) 12^{th} , 16^{th} , 14 + 2

2. (a) Round seed plants
Wrinkled seed plants
(b) R and r
r and r / both r / r accept of the gamete are circled
(c)



Genotype Rr rr
Phenotype Roundheads wrinkled seeds

	R	R
r	Rr	Rr
r	Rr	rr

(a) Cross between individuals of unknown genotype with a homozygous receive individual/ organisms
Cross both an individual showing a character for dominant gene with a homozygone recessive individual/ organism

3. (a) Photosynthesis
(b) Light (energy)
Chlorophyll
(c) Oxygen – used in respiration, oxidation
Released into the atmosphere
Glucose – used in respiration
Converted to sucrose or starch for storage
Used in formation of sturdiness allulose cell wall/ cytoplasm

4. (a) **(i) Plants**
Expose the surface area of leaf to sun light for photosynthesis
Ensure flowers are exposed to pollution
Expose fruits seeds to disperse
To resist breakage (due to their own weight and that of the organism)
(ii) Animals
Attachment of other body organs

To protect delicate organs
Maintain body shape/ form
Enable movement/ locomotion
Attachment of muscles

(b) Enable animals to search for funds
Enable animals to search for shelter
Enable animals to search for water
Enables animals to search for breeding
Enables animals to escape predator/ harmful conditions

5. (a) L_1

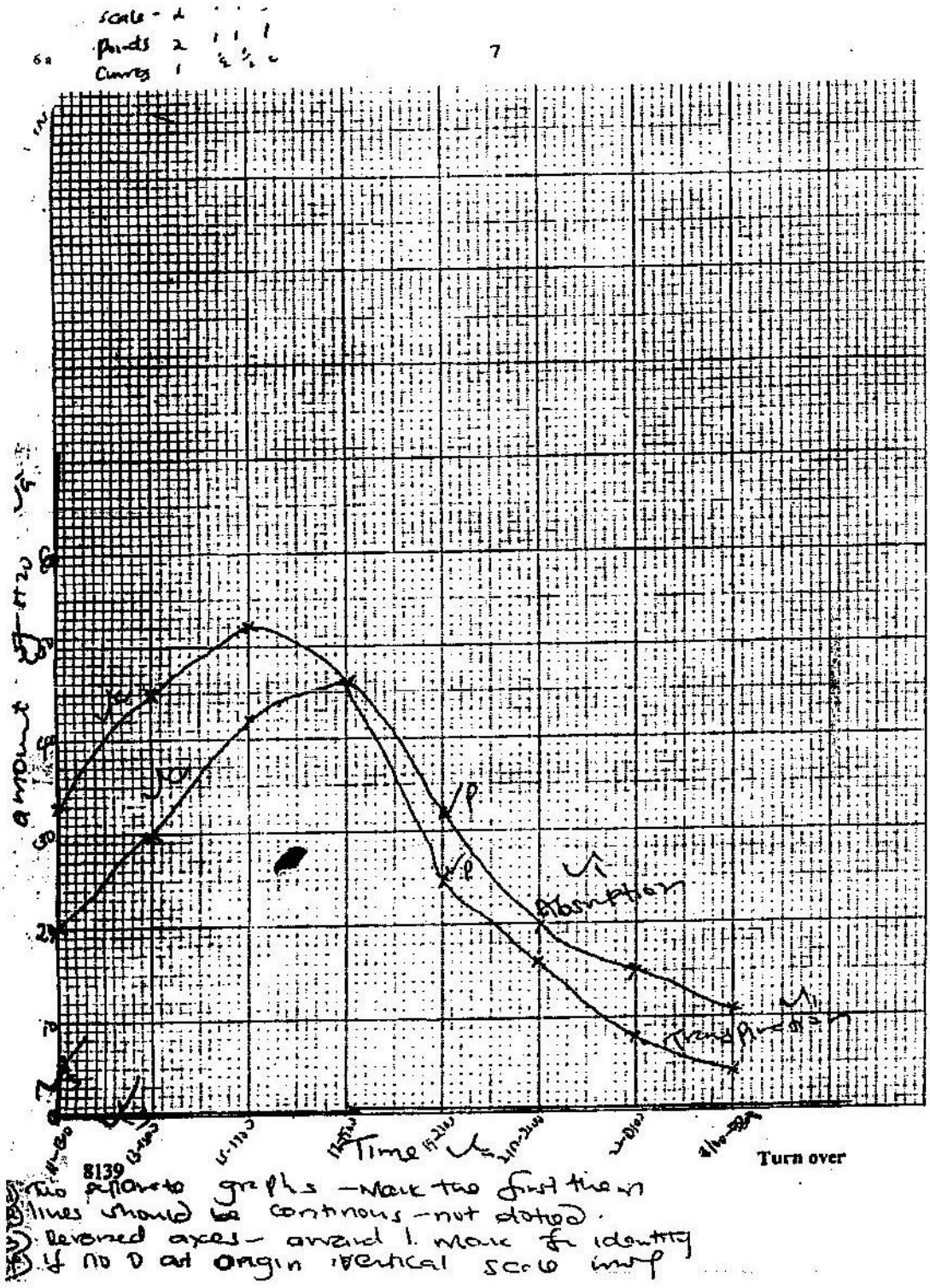
Inner cells gained water by Osmosis; hence increased in length; epidermal cells did not gain water because they are covered by a water proof cuticle leading to currature.

L_2

Inner cells lost water by osmosis; leading to (flaccidity) decrease in length; epidermal cells did not lose water due to waterproof leading to currature

(b)
Support in (herbaceous) plants
Absorption of water
Opening and closing of stomata
Movement of water from cell to cell
Leading in infectious plants
Folding of leaves in the Mimosa

6. (a) Graph
(b) 17.001- 19.99 hrs
(c) (i) Transpiration
1100 – 17000 (rapid) (in the rate of transpiration) due to high light intensity/ high temperature
(ii) 17000 – 0300 hrs decrease (in the rate of transpiration) due to low light intensity/ absence of light/ in temperature.
(iii) Absorption
11.00 – 1900 hrs. Increase (in the rate of atmosphere) of water to replace water lost- through transpiration.

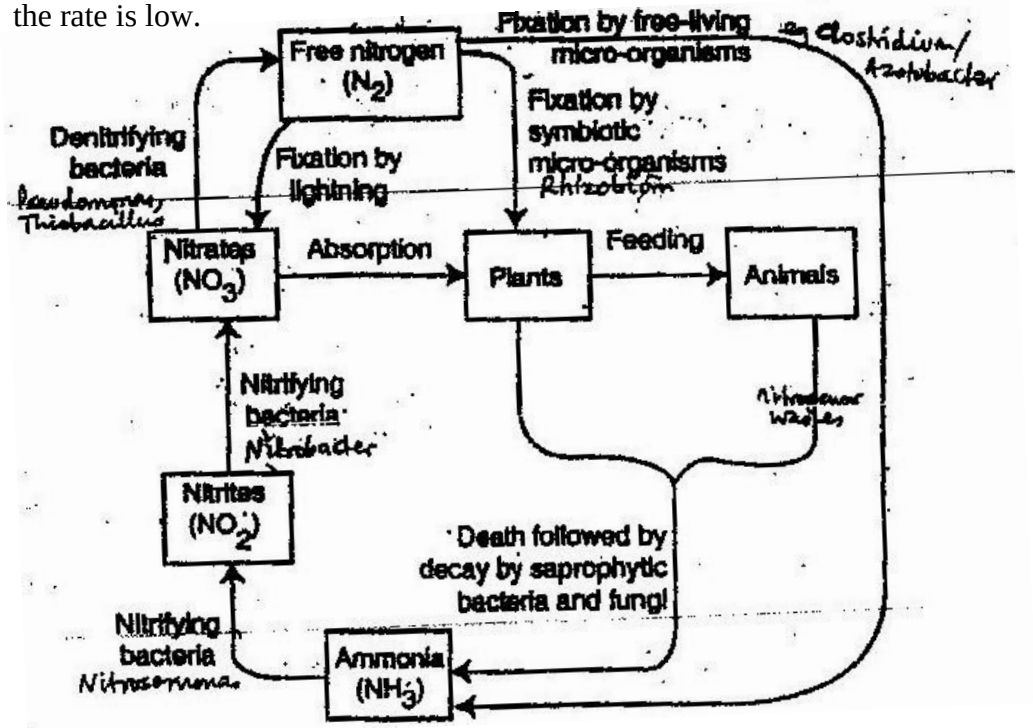


1900 – 0300 hrs; decrease (in the rate of absorption of water) due to the fact that rate of transpiration has declined

(d) Both transpiration and absorption decrease accept decrease

(e) Wind; light, atmosphere pressure, humidity; temperature
Temperature - at high temperature the rate is higher/ at low temperature the rate is Low.

(f) Wind- rate of transpiration is high when it's windy/ lower when air still
Humidity – when humidity is low, the rate of transpiration is faster/ when its High the rate of transportation is low
Pressure- the rate is high at low atmosphere pressure at high atmosphere pressure the rate is low.



During thunderstorm/ lightning; nitrogen gas combines with O_2 to form nitrogen oxides; nitrogen oxides dissolve in water to for nitric acid; acid is deposited in the soil by rain, nitric acid combines with chemical substance to form nitrates/ nitric acids dissolves to form nitrates which are absorbed by plants symbiotic bacteria/ such as rhizobium; which are found in root nodules of leguminous plants, fix free nitrogen to nitrates.

Free living bacteria/ clatridium/ azotobacteria fix nitrogen to all rates
Nostoc algae/ chlorella/ anaemia/ ix nitrogen to nitrates.

Plants use Nitrates to form plant proteins
Animals feed on plants and convert plant proteins into animal proteins
Plants/ animals die and decomposed by bacteria/ saprophytes/ fungi decomposing plants/ animals/ release ammonia which is covered to nitrates/ by nitrosomomes nitrococcus bacteria
Nitrates are converted to nitrates; by nitrobacteria
Nitrates in the soil can be converted to free nitrogen/ denitrification by some fungi; pseudomonas/ hulobacillus denitrifying bacteria.

8. (a) Highly vascularized/ network of blood capillaries
L.S.A (for G.E)
Thin membrane/ epithelium/ one cell thick wall/ thin lining; rej thin walls moist lining

(b) **Breathing in**
External intercostals muscles contract; internal, intercostals muscles relax lifting/ raising the ribcage upwards and outwards; muscles of diaphragm contract. It flattens the volume of the thoracic cavity increases; pressure decrease; higher air pressure in the atmosphere forces air into the lungs

Breathing out
External intercostals/ muscles relax; internal intercostals muscles contract moving the ribcage downwards and inwards; the muscles of diaphragm relax, the diaphragm assumes dome shape; volume of thoracic cavity decreases; while pressure increases; higher pressure forces air out of the lungs

K. C. S. E 2008 MARKING SCHEME
BIOLOGY PAPER 3 PRACTICAL

1. (a) A. Liver
B. Stomata
C. Spleen
D. Small intestine/ Eleum
G. Duodenum

(b) E Stores feaces/ undigested material/ indigestible materials
F It contains/ harbours/ store bacteria which produces enzymes/ cellulose which digest cellulose/ digestion of cellulose bacteria that digest cellulose.

(c) Diagram

(d) (i) Male
(ii) Presence of the prostate gland/ testes/ seminal vesicles

(e) (i) $^{9(cm)}/_{15\,(cm)}$ = 0.6 / $_{3/5}$ $^{9.1cm}/_{1\,(cm)}$ = 0.606
9.2 cm / 15 (cm) = x 0.613
NB: Units must be given
NB: mg x 0.6 – 0.613

(ii) Length on photo 14.6 + 0.1 = 14.5 cm/ 14.60c/14.7

(iii) At mg x 0.6 = $^{14.5\ cm}/_{0.6}$ = 24.16 cm/$^{14.6\ cm}/_{0.6}$ = 24.33cm
147 cm
0.606 = 24.257 cm

at mg x 0.61 = 14.5 cm
0.61 = 23.77cm 14.6cm/0.61= 23.934
14.7cm
0.61 = 24.098

(iv) at mg x 0.613 = $^{14.5\ cm}/_{0.613}$ = 23.654

14. 7 cm = 24.098
0.61

14.7/0.613 = 23.980
Length range = 23.654 – 24.5 cm

2.

Substance	Food substance being tested for	Procedure	Observations	Conclusion
S	Proteins	To food substance/ S add sodium hydroxide; add copper sulphate solution	Colour changes to purple/ violet	Protein present
T			No Colour change/ Remains blue	Protein absent
U		Colour changes to (light) purple; violet because its for the extreme	(trace) protein present	

NB. Wrong spelling of reagent or percentage and also observation and conclusion
Wrong chemical formula by underlining

3.

Specimen	Mode of dispersal	Adaptive features
K	Animals (s)	Hooks, persistent calyx alome sauce with hook
L	Animal (s)	Fleshy/ juicy/ succulent
M	Wind	(parachute of hairs/ pappus/ hairy/ hairlike projection
N	Wind	Winged (perricap)/ winglike extension
P	Animal/ animal	Fleshly; juicy
Q	Self mechanism/ self explosive mechanism	Lines of dehiscence/ lines of weaknesses

b). ii) Axile/central; axil/axial. Free central

c). Seed/endocarp.

K.C.S.E 2009 BIOLOGY PAPER 1 MARKING SCHEME

1. (a) Scales/ scale Reject Trail (1 mk)

(b) Most have cell wall made up of cultic (or cellulose) Rej cellulose alone

- Most reproduce by means of spores/ sporulation
- They are eukanyotee/eukaryotic
- They are heterotrophy/ lack chloroplasts / some are saprophytic while others are Parasitic
- Have network of myphae/ mycelia
- Store food inform 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 Dormincy

(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 mutageous 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 spront/ bronches 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 rej Humourous***

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;

(Acct if table of companion used

(b)

(i) absorption of water from the soil by root hair cells/ movement of water between plant cells/ from cell to cell/ opening one closing of stomata/ support in herbaceous plants due to turgidity / feeding in insectivorous plant.

(ii) Water reabsorption by blood capillaries from renal tubules/ absorption of water in colour dicututary/ canal/ gut movement of water from cell to cell in animals.

14. Parenchyma/ collenchymas

15. Cytoplasmic streaming / Acc: cyclosis for cytoplasmic streaming

16. (a) Tracheole Rej: Trachea/ Tracheole system

(b) Moist for gases to dissolve (in solution) Branched/ ramify

Numerous tubes to increase surface area (for gaseous exchange)

17. Some wastes e.g gases easily diffuse out

Waste products are mainly made from carbohydrate and (NB: must mention some/ most) hence are not as harmful as proteineous materials/ waste products are formed slowly / little accumulation of wastes/ plants are leas active/ some waster products (such as 0_2 and are usable- recycled; some waste products are store in non- toxic forms in leaves, flowers, fruits and old bark.

18. (a) Rate of photosynthesis increases as CO_2 concentration increases up to a certain level/ optimum level and (vise versa)

NB: Must mention up to optimum level or certain level

Acc: Reverse: The rate of photosynthesis decreases with decrease in CO2 concentration until it stop rate of photosynthesis increases as the light intensity up to an optimum level (and vice versa)

19. (a) Leads to eutrophication; causes water bone disease

- Kill organisms in water;/ reduce amount of oxygen in the water/ reduce the quality of water for consuming change water PH; ? interferes with food charus/ trophic levels.

(b) Respiration/ defecation/ excretion

20. Belt transect/

Line transects

21. Pancreases releases glucagons to stimulate liver cells to convert stored glycogen to glucose; fat converted to glucose/ reduces rate of respiration. Rej if source of glycogen is the liver.

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 people NB: 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, yoghourt, sour milk

- Formation of organic acids- oxalic acid, vinegar (Ethamic acid, citric acid, butyric acid)

28. (a)

Arteries	Veins
- Thick muscular walls - No valves (expect at bases of pulmonary artery and aorta) - Narrow lumen	- This muscular walls - Have valves - Wide lumen

(b) Arteriosclerosis/ rej Atheroma – due to the deposition of cholesterol which makes human narrow

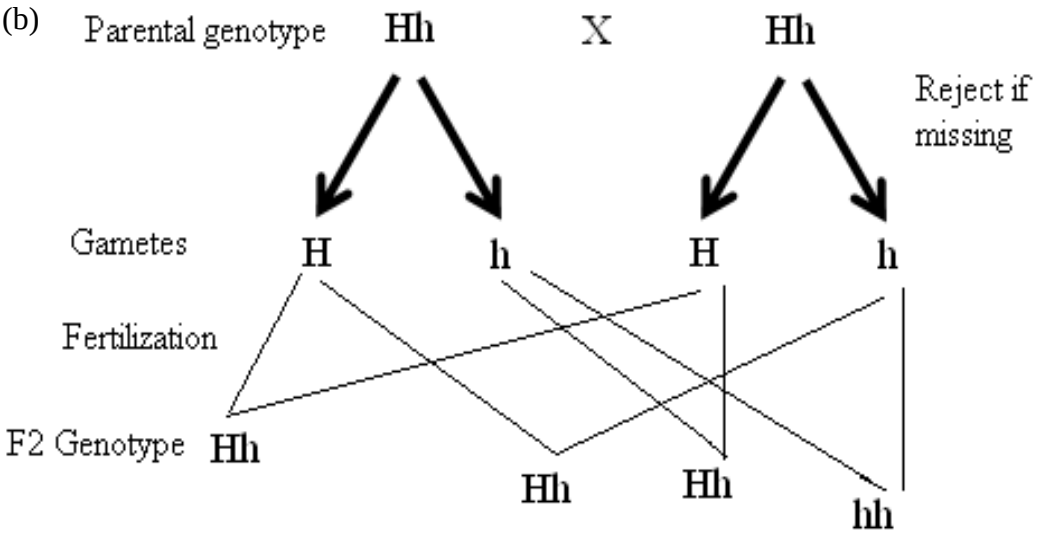
29. When humidity in high the air around the leaf gets saturated with water vapour hence) less space for water vapour from the leaf to occupy/ low saturation deficit/ low diffusion gradient/ the difference in concentration of water vapour in the atmosphere and in the air spaces is greatly/ highly reduced.

K.C.S.E 2009 BIOLOGY PAPER 2 MARKING SCHEME

1. (a) (i) HH; and hh;

(ii) Hh

(b)



(c) The RJ if namation on the left is wrong if give the gene for purple colour is dominant/ gene for white colour is recessive;

2. (a) Herbivorous Rej Herbivore Acc Herbivory

(b) Tooth J is narrow/ sharp/ chisel like while tooth L is broad/ ridged

Accept: J has one root while L has 2/3/4 roots

Functional

Tooth J is used for cutting while tooth L is used for grinding

(Acc cutting for biting)

(c)

(i) Diastema

(ii) For manipulation of blood by tongue

(d) Calcium phosphate; Rj calcium/ phosphorous/ phosphate

3. (a)

(i) Using a living organism to regulate/control/ reduce/ check the population of another organism

(ii) Lady bird (beetle) used to control Aphids in coffee

- Cats used to control rats in the store/ snakes
- Wasps used to control coffee mealy bugs

(b) enrichment of water bodies with nitrates/ phosphates/ sulphates

Acc. NO^{-}_{3} (aq) $NH4^{+}$; due to discharge of sewage/ domestic effluent kitchen water containing water detergents/ run off water fertilizer; leading rapid growth of aquatic plants/ phytoplankton's

(accept: nutrients phosphates)

(ii) (Proliferation of plants) block light from reaching plants underneath which will not photosynthesize the plants die and decompose leading to lack/ depletion of O2; animals also die/ suffocate.

(c) Nitrogen IV oxide/ sulphur iv oxide. Accept nitrogen dioxide sulphur dioxide

4. (a)

(i) Circular muscles of the Iris contract (C/C) while radial muscles relax (R/R) reducing the size of the pupil; hence less light enters the eye.

(ii) The retina is protected from damage

(b) Choroid has a dense network of blood capillary from which nutrients diffuse out to supply the eye.

(c) The blind spot has no photoreceptors/ rods & cones. Hence no impulses are generated to be transmitted to the brain (for interpretation)

5. (a)

Root hairs/ roots absorb water by osmosis; cells of plants become turgid; leaves become firm/ spread out plant becomes firm/ upright

(b)

(i) Collencyma

(ii) Xylem/ tracheid/ vessels/ schlerencyma

(c) - Steering

- Balance

- Braking, changing direction

- Prevent fish from pitching/ up & down movement

6. (b) 33^0C and 51.5 ($\pm$ 0.5^0C)

32.5 - 33.5 and 51.0 – 52.0

(c)

(i) As temperature is increased rate of reaction is increased/ more products are formed (per unit time) because enzymes become more active

(ii) As temperatures increases rate of reaction decreases less products are formed (unit per time) because enzymes become denatured by high temperatures.

(b) Increase in enzyme concentration and substance concentration

Rj. Increasing number of enzymes

Acc. Increasing number of enzyme

(e)

(i) Pepsin, remain/ chymosin

(ii) Wall of stomach/ gastric gland/ oxyntic/ pariental/ cell produced Hydrochloric

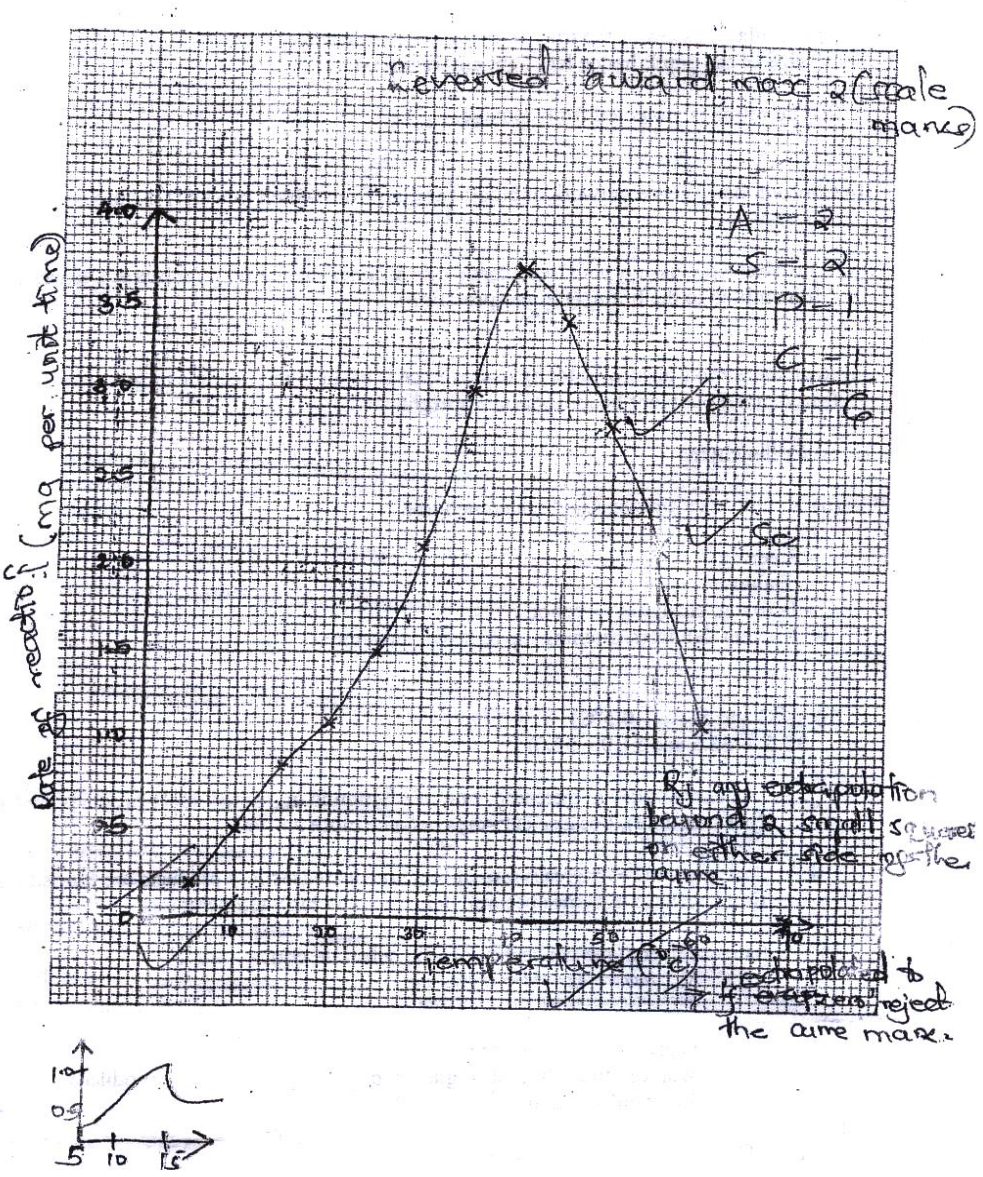
(f)

(i) Duodenum

(ii) Bile juice/ SANS any correct salt e.g. $NaHCO_3$

Acc: Bile

7.



Insect pollination / Entomorphilous flowers

- are scented to attract insects have stick stigma for pollen grains to stick on.

  Are brightly coloured to attract insects.
- Have nectarines to secrete nectar; nectar attracts insects
- Have nectar guides to guide the insects to the nectarines
- Stigma/ anthers are located inside the flower / tubular a funnel shaped

  corolla to increase chances of contact by insects

- Sticky/ spiny/ spiky pollen grains which stick on the body of insects and on stigma
- Large/ conspicuous flowers to be easily seen by the insects/ attract
- Anthers firmly attached to filament for insect to brush against
- Have landing platform to ensure contact with anther and stigma
- Mimiory to attract (male) insects/ flowers mimic female insects which attract
- Anthers firmly attached to filament for insect to brush against
- Have landing platform to ensure contact with anther and stigma
- Mimiory to attract (male) insects/ flowers mimic female insects which attract male insects for mating e.g. orchids. (13 mks)

WIND POLLINATED/ ANEM ORPHILOUS FLOWERS

- Anthers/ stigma hang outside the flowers to increase chances of pollination; style/ filament is long to expose stigma/ anthers
- stigma is hairy/ feathery/ branched to increase surface are over which pollen grains land/ to trap pollen grains;
- Pollen grains are smooth/ dry/ light/ small to be easily carried by wind; large amount of pollen grains to increase chances of pollination
- Anthers are loosely attached to filaments to enable them sway easily to release pollen grains; pollen grains may have structures which contain air to increase buoy any 3 flowers have long stalks holding them out in the wind

(8 mks)

8. **Regulation of blood glucose**

The normal amount of glucose in the blood is 90 mg/ $1000m^3$ increase in blood sugar level is detected by cell of the (batacelss) pancreases, which secrete insulin; insulin stimulates the liver to convert excess glucose to glucogen. Further excess glucose is converted to fats. Excess glucose is also oxidized to energy (carbon iv) oxide & water/ respiration.

Decrease in blood sugar level below the normal level is detected by the (alphacells) by the pancreases. Which secretes glucogen that stimulates the liver, to convert glucogen to glucose, fats/ amino acids are converted to glucose, and there is reduced oxidation of glucose until the normal level of blood sugar is attained.

Deamination / excess amino acids are deaminated (removal) of amino acid group, the amino group is converted to ammonia which combines with carbon (iv) oxide to form urea that is excreted through the kidney, urea is excreted through the skin as sweat. (4 mks)

Detoxification/ poisonous substances are converted to less harmful compounds. (1 mk)

Thermoregulation/ maintenance of body temperature heat is generated (in the liver) by chemicals activities, the heat is distributed (3 mks)

$NH_2 + H \rightarrow NH_3$

$2HH_3 + Co_2 \rightarrow Co\ (NH_2)_2 + H_2O$

Ammonia urea

BIOLOGY PAPER 3 MARKING SCHEME

	BONE	IDENTITY OF THE BONE	WHERE FOUND
1.(a)	K	- Humerus	Fore limb/foreleg/ front leg/ups arm/ upper fore limb rej Hand/ fore arm
	L	-Scapula/ shoulder blade	Shoulder/ pectoral region Rej- pectoral giral
	M	- Femur	Hind limb/ hind leg/ thigh/ Upper hind leg
	N	Tibia/ shin bone	Hind limb/ hind leg/ lower hind limb
	P	Ulna – Radius	Forearm/ fore limb/ arm/ Lower/ fore le/ front leg
		Rej only one answer	

(b) 1. Condyles Rej- Cendyle

2. Glenoid cavity

3. Head/ head of femar Rej. Head of humerous

4. Patella groove Rej: groove alone due to omission

5. Ulna/ shaft of Ulna/ shaft

(c)

(i) Scapula/ shoulder blade

(ii) Ball and socket ii tied to i

Posterior end

(i) Radius and ulna

(ii) Hinge ii tied to i

(e) Muscle attachment limit the movement of radius and ulna/ limit the movement at the joint prevents overstretching O.W. He limits movement in more than one place.

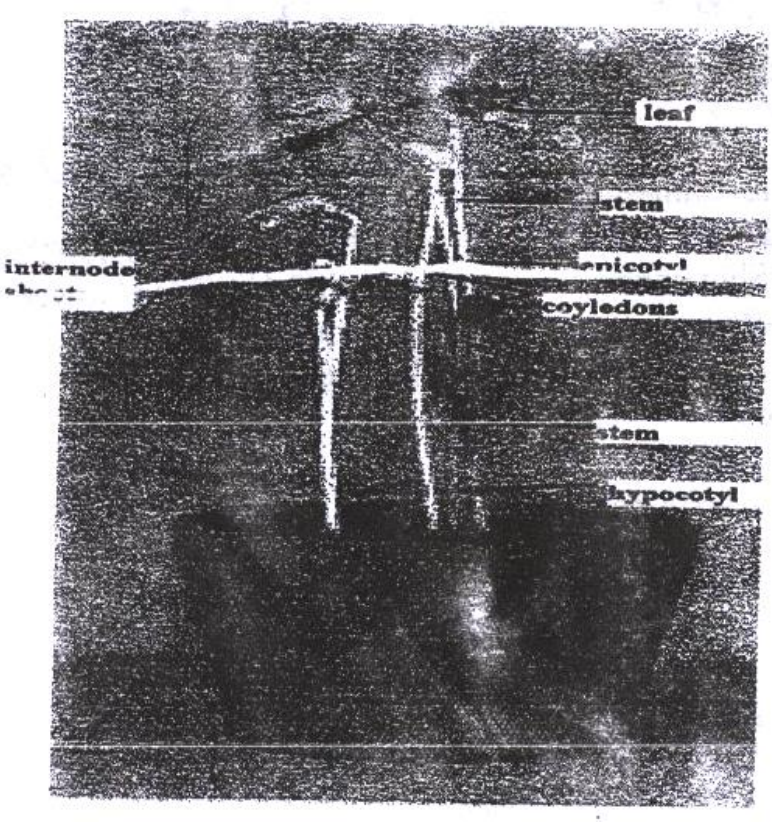
2.

Substance	Food substance being tested for	Procedure	Observation	Conclusion
P	Reducing sugar	Add Benedict's solution hat / boil / warm in hot water bath)	Green to yellow to orange/ brown	Reducing sugar present
Q	Reducing sugar	Add Benedict's solution. Heat/ Boil/ warm in hot water bath)	No colour change/ blue colour remains	Reducing sugar absent/ reducing sugar present after hydrolysis
	Non Reducing sugar	Add dilute hydrochloric acid ix, boil, cool Add sodium hydrogen carbonate until fizzing stops add benedict's heat	Green to yellow to orange/ brown	Presence of non reducing sugars/ reducing sugar present after hydrolysis Rej. Reducing sugar present Rej Reducing sugar present

Deny for wrong spelling of benedict's solution

- *In the table, mark reducing sugar, add benedict's solution, heat any once*
- *Led non- reducing sugar under play indication se*

3. (a) Mark 11st three clockwise from top



(b) i. epigeal germination
(ii) Cotyledons above ground/ soil

(c) W- Grow in dark/ insufficient light/ absence of light
X- Grown in light/ sufficient light/ adequate light

(d) (i) Etiolation
(ii) To reach light/ search/ look / get/ obtain/ seek light

	W	X
(e)	- Long intermode/ stems/ tall plant	- Short intermodes/ stem/ plant

- Thinner stem	- Thicker stem
- Small leaves	- Big/ large leaves
- Yellow or light green leaves stem/ cotyledons	- Green leaves/ stems/ cotyledons/ seedlings

(f) Seedlings subjected to unilateral/ unidirectional source of light causing auxins to migrate / diffuse to the dark side of the shoot/ high concentration of auxins on dark side; causing faster growth on that side than the lit side/ faster cell elongation/ faster cell enlargement/ faster cell growth on the side than the lit.