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MARKING SCHEME

1. They produce, they grow Respond to stimuli/ irritability

2. Protein synthesis – Ribosomes
   Transport of cell secretions – Endoplasmic reticulum

3. Food Spoilage
   Poisoning / cause disease

4. Water in RBC moves out by osmosis and the RBC shrinks
5. Provide energy required for splitting water molecules/ photosynthesis.
6. A - Scrus – acc. Sori
   B- Rhizome
7. Nitrogen
   Making cell walls
   Magnesium / mg
8. Evidence does not support Larmacks theory
   Acquired characteristics are not inherited characteristics are found in reproductive cells only
9. Sickle cell anaemia (Rej. Bleeders disease)

SECTION B

10. (a) K-Enzymes/ Sucrose/ Invertase/ Saccharise
    L- Inhibitor Acceptance any example e.g. any acid

    (b) – Addition of sucrose/ substrate
    - Optimum/ suitable/ correct / right pH
    - Removal of products

    (c) - Competed with substance: for active site (of K)
    - Acc. L made the medium acidic; unsuitable for K
    - L occupies active sites

11. (a) A – Epidermis B – Pith

    (b) C – Transport manufactured food / translation; Rej. Digested food
    D – Produces new cells/ divides to give new cells. Accept secondary Thickening/ growth/ produces phloem & xylem.
    E- transport minerals salts/ minerals/ salts alone

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(c) - Xylem in central/ Star shaped
- Phloem in arms of xylem
- Root hairs present in root / has pilferous layer
- No pith in root

12. (a) To absorb CO; reacts with CO_2

(b) To provide moisture to generating seeds. Accept water for moisture

(c) (i)

(ii Oxygen in the tube is taken up for germination CO absorbed by higher pressure outside tube

13. (a) - Green plants – Grasshoppers – Lizards – snakes -
Green plants – Grasshoppers – Lizards – Cats
- Green plants – Mice – Snakes – Hawkers
- Green plants – Mice – Snakes – cats

(b) – Mice

(c) Lizards eat Hawk snakes, Rej. If any primary, tertiary consumer is given

(d) (i) Most plants will die / dry

(ii) (same) organisms may starve to death

(iii) (same) organisms may migrate

14. (a) (i) P – will tend/ grow towards light Q – will remain straight/ little/ no growth

R – will remain/ grow straight / Acc. Grow upwards

(ii) P – Growth substances or hormones/ auxins/IAA are produced by the stem tip. They move downwards and get disturbed to the side away from the side of light. Where they cause more rapid growth/ cell division/ elongation (that results in bonding)

The source of auxin has been removed and the auxins are not affected by light because the era has been covered. (b) Tip will bend towards the light (c) All the seedlings will grow upwards.

SECTION C

15. (a) - Sigmoid of the curve shown (b) - 92 acc. 93

(c) $\frac{110 - 78}{4} = 8.0$ (cells/ min)

(d) 31.5 (mins)

(e) (i) A to B Lag phase / slow growth phase

(ii) B to C Exponential /log/rapid growth phase

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(f) Slow/ reduced growth due to limiting environmental factors (Accept any example) rate of multiplication is almost the same as the death rate, Acc: few cells are still diving Rej. Growth for multiplication but acc. Reproduction.

(g) – Low death rate/ low mortality;

- Rej. Decrease in death rate/ reduced death rate
- High birth rate/ high fertility acc. Increased birth rate
- Improved medical services: Acc. Increased medical facilities
- Enough food/ availability of food
- Absence of war/ political stability/ peace
- Improved standard of living

(h) Measure the total area of the habitat, throw or mark out the quardrat in the area for the study; at random. Identify label the various species of the plants in the quardrat; count plants of each species; record the numbers, repeat the process (owtte) work out the average per quardrat for each species in the area/ calculate the population for the total area in Nairobi.

16. (a) (i) Large; brightly coloured corolla/ inflorescence/ florets/ bracts to attract Insect

(ii) Scented to attract insects

(iii) Have nectary guides/ nectarines/ that directs insects/ secret nectar to attract insects.

(iv) Pollen grains rough/ spikey/ sticky/ surface; to stick on insects body

(v) Special shaped corolla tube; to enable insects to land

(vi) Anthers are situated inside the flowers to ensure that they are in contact with the insect

(vii) Sticky stigma; for pollen to stick or to adhere

(b) (i) Oestrogen

Repair/ heal endometrium/ wall of uterus; which is destroyed in menstruation

(ii) Progesterone

Stimulates the thickening of the uterus; increases the blood supply to the endometrium. Inhibits the production of follicle stimulating Hormone.

(iii) Luteinising hormone

Responsible for maturation of the graafian follicles/ causes ovulation/ stimulates corpus luteum; to secrete progesterone.

17. (i) Mammalian Kidney

Blood reaches the kidney from the renal/ renal artery enters the kidney; then branches into capillaries/ glomeruli/ in the Bowmna's capsule, blood vessels leaving the capsule/ efferent are those entering it/ afferent

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causing high pressure to develop in the glomeruli. This forces the plasma/ causes ultra filtration into the capsule. The filtrate contains waste products (acc. One example) The filtrate moves into the proximal/ first convolulated tubule; where selective reabsorption of glucose amino acids, some water and vitamins take through the loop of henle; excretory products/ urea, excess water and salts acc, one example) pass into the distal tubule, where the remaining useful substance (acc. One example e.g salts and water) are reabsorbed; The filtrate passes into the collecting tubule; where more reabsorption of water takes place: Excess water, urea and salts (all three must appear)/Urine are removed through the ureter.

(ii) Green plants

CO_2 / O_2 /H_2O diffuse through the stomata lentils/ hydrathods some toxic wastes are converted into non – toxic substances; these are deposited in certain tissues of the plant/ stored in ageing structures. Resins/ tannins – are exuded though the bark of the stem; or lost during leaf fall.

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MARKING SCHEME

1. - Controls/regulates/ enzymes/ synthesis is the material for inheritance
2. - Sexual transmitted
   - Blood transfusion
   - Sharing needle/syringes/ razors
3. After vigorous activity when blood fall below normal
4. scurvy
5. Arthropoda
6. Capable of interbreeding; to produce viable offsprings
7. (a) To split water/ Photosynthesis/hydrous (b) Glucose/carbohydrate/ starch/ sugar.
8. Store chemical salts/sugar/blood/; maintain shape of cell. Osmotic gradient the bring about movement of water.
9. Presence of special structure that attract agent of pollination protandry; protogency; monoecism; self – sterility.
10. (a) O_2 is necessary for germination
    (b) Germination in B; no fermentation
11. Gametes form new offspring
12. To increase the chances of fertilization and survival of species

SECTION B

13. (a) Drive out oxygen / air
    (b)Avoid killing yeast cells/ denaturing enzymes in yeast

(c) To prevent air from getting into the glucose and yeast Suspension

(d) Limewater turns milky

(e) Used boiled yeast on glucose

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14. CO_2 diffuses into tracheoles follows the trachea; not through spiracles Stomata pores / stomata; cuticle Acc. Lenticels.

15. (a) $\frac{374 \times 400}{80}$

(b) - There was even distribution of crabs

- No movement in and out of regions; no migration

- There was random distribution of errors after the first capture.

(c) – Capture/ recapture; capture release recapture.

16. (a) – Phototropism

(b) Auxins / hormones; move diffuse to the demised/ away from the light side; causing elongation/ growth on the dark sides hence bending

17. (a) Anaemia/ low blood volume/ loss of iron/ low red blood cells/ low haemoglobin; leading to low oxygen; loss of nutrients and dehydrations.

(b) Blood clotting

18. Parents Bb x Bb

Gametes B b B b

(c) Transfusion; taking fluids) eating iron rich food stuff/ taking iron tablets.

F_1 generation BB Bb Bb bb

(b) 3 black 1 brown

19. (a) K- Root hair

L- Xylem vessel

(b) Water moves from the soil into the root hair by osmosis; because concentration of cell sap is higher than water in the soil; the cell sap in the root hair is diluted, thus making it less concentrated than neighboring cell; therefore water moves into the neighboring cell; it is actively secreted into structure L. (c) Active transport/ diffusion

SECTION C

20. (a) 10 HRC and 31 HRC

(b) (i) A and B

The number of bacteria dividing are few: bacteria are adjusting conditions: few are dying therefore high increase in population

(ii) B and C

,

More cells are dividing due to suitable environment/ favorable conditions; few are dying; therefore high increase in population

(iii) C and D

No population change; number produced is equal to number dying.

(c) Accumulation of toxic wastes; that kills bacteria; depletion of nutrients leading to competition of space.

(d) (i) The population will remain the same

(ii) Temperature not conclusive for division

(g) – Food to be sufficient for population

- Social amenities/ education; health services

21. The cornified layer is made up of dead cells, that prevent entry of bacteria and prevent physical damage; melanin protects the body against U-V variation; sebaceous glands produce a chemical/ ring substance which is of blood vessel; which when the body temperature is high dilate and heat is lost or when body temp is low blood vessels constrict. And heat is retained. Hair when it is called, stands and traps air between themselves; to retain heat/ stop heat loss or when it is hot hair lies flat close on the skin; so does not trap air, and therefore heat is retained and sweat is lost; the skin has sweat glands which produces sweat; sweat evaporates thus cooling the body.

22. Lower plants/example Bryophyta/pterophyta; produces spores which develops to new plants; budding an overgrowth arises from plant drop off; and develops into a new plant; common in lower plants yeast.

- Fragmentation – e.g Spirogyra; breaks off and grows into a new plant
- Vegetative propagation: common in higher plants involves growth of new plants from buds/bubils
- Root stem/ tubers/ leaves: possesses buds; which develops to new plants
- Corns; have terminal buds that grows vertically and produce a new plant
- Runners; have lateral buds that produce new plants

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MARKING SCHEME

1. (a) Golgi apparatus

   Packaging of synthesized materials; Accept correctly named materials e.g glycoproteins

   (b) Ribosomes

   Transport of the packed materials, secretion of packed materials; Manufacture synthesis of proteins.

2. The animal belongs to the class – Arachnida;

3. Alcohol, carbon dioxide and energy; - accept Ethanol, C_2H_5OH/CH_3H_2OH.

4. – Lignified thickened to prevent collapsing (Acc. Strengthened add strength) - Narrow to facilitate capillary:

5. Cerebrum cerebral hemisphere/ cerebral cortex;

6. (a) Mosquito larvae/ Pupae are killed; Accept suffocation/ Breaking life cycle of Mosquitoes

   (b) Pollution of environment/ oil expensive, other aquatic are killed; accept Contamination.

7.

Biceps	Gut Muscles
Striated	Unstriated
Multinucleated	Uninucleated
Long Fibres	Short fibres
Cylindrical	Spindle Shaped

8 (a) Disease the person was suffering from

Diabetes inspidus ref. Diuresis/ water diabetes

(b) Hormone that was deficient

Antidiuretic hormone/ ADH/Vasopressin

9. Fossil (records) paleontology; geographical distribution
   Comparative anatomy/taxonomy; cell biology
   Comparative serology; comparative embryology
   Comparative immunology

10. Vitamin D- Rickets/Osteoporosis
    Iodine- Goitre

SECTION B (40 MARKS)

11. (a) Grass → Grasshoppers → Guinea fowls
    Grass → Termites → Guinea fowls

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(b) Lions would compete with leopards
Gazelle numbers would reduce
Grass would increase

(c) Grass; rej. Plants

12. (a) Long sighted ness/ hypermetropia

(b) Eye ball too short/ eye lens are unable to focus because they are flat/weak, unable to focus the image on the retina; eyes are unable to accommodate/ change their focal length

(c) By wearing convex / biconvex lenses; accept converging lenses

13. (a) strong air/ winds
High temperature
Low humidity; accept dry conditions/ sunlight

(b) Absence of leaves/ stomata absent
Transpiration; / little transpiration

(c) Arid/dry/ desert/ accept semi- desert
Reason
Low rate of water loss; accept more/ a lot of water loss
Wet/Moist/aquatic
Reason
High rate of water/ high rate of transpiration /acc. A lot of water loss

14. (a) E- Denitrifying bacteria; e.g pseudomonas denitrifications
J- Nitrifying bacteria; Nitrobacteria reject nitrosamines

(b) H- Death decay/ decomposition; excretion/ Aminonification putrefaction egestion.
F- Nitrogen fixation

(c) Plants

15. (a) Deamination

(b) Removal of excess amino acids availing energy in the body formation glycogen/ fat for storage.

(c) Proteins

(d) Essentials amino acids are acquired from food Non- essential are synthesized in the body

16. (a) White
Give a reason – Fewer numbers/ lower ratio; lower in numbers/ absence of white in parents & absence in offspring.

(b) Heterozygous Rr. Accept appropriate letters
Rejects R.w appropriate/ letters (o-dominance)

(c) Double recessive /rr/ homozygous (recessive) 17. (a) Figure 1 R:
Figure 2 T: Accept growth

(b) Development of the foetous/zygote/fertilized/ova/egg/embryo

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(c) Style

(d) R;P;

(e) X

SECTION C: (40 MARKS)

18. (a) (i) Bamboo plants

4 and 6

(ii) Maize plants

12 and 14

(b) (i) Bamboo

(ii) It had accumulated more weight and therefore greater dry weight

(c) Maize plants have reached maturity/maximum height food being manufactured (in green parts); is utilized for growth storage primary in the cob.

(d) Increase in weight – bamboo reject both increase/ decrease accept bamboo and maize increase/ decrease.

(e) (i) Dry weight instead of fresh weight

Fresh weight is dependant on the amount of water present in the plants and this fluctuates depending on environmental factors.

(ii) Weight and height

Both given a better measure of growth

(f) Average height

At every 2 weeks measure the height of samples of plants in each plot: Divide the total height by the number of plants in each of plot.

Average dry weight

Harvest the sample measure of the plants in each plot; dry to constant weight:

And divide by the number of plants

(g) Being monocots/ lack (Inter) fascicular cambium:

19 (a) An association between two organism; where one benefits; and the other is adversely affected. Or an association where an organism lives in or on another living or organism: obtaining from it and causing harm without necessary killing it.

(b) Has hooks/suckers: for attachment to wall of intestines: long; to increase surface area for absorption of food: award increase in S.A for absorption once. Secretes enzymes/to neutralize digestive enzymes; (mucus inhibitor substance/anti enzymes)

Hermaphroditic: to ensure reproductive/ self fertilization.

Production of many eggs: to ensure survival Segment for egg dispersal:

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More than one host; for transmission: e.g T solium – pig (Intermediate host) T. Saginata. Long to fit in the intestine/ increase surface area for (flatten) Absorption of food;

Anaerobic survive in the gut with low O_2.

20. (a) Breakdown of (complex) food substances by enzymes; to simpler compounds (which can be absorbed)

(b) Small intestines are long/coiled: to offer large surface area for digestion and absorption:

The walls are muscular: for peristalsis/ inner walls posses mucus glands/ accept goblet cells that secrets mucus; for lubrication; and protection of wall from digestive enzymes:

The inner walls have digestive glands: that secret (digestive) enzyme:

The inner walls have villi: to increase surface area, absorption/ diffusion; accept 'epithelium is one cell thick'

The Villi have numerous blood vessels: for transport of the end products of digestion; accept at least two correctly named examples/ end products of glucose amino acids/ mineral salts vitamins.

The villi also have vessels for transport of fats/lipids

Accept illustrations of cell are thick epithelium

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MARKING SCHEME

1. Blood has no antigens and does not cause agglutination (with other types)
2. Yellowing of leaves/stunted/ growth/chlorosis/ lack chlorophyll
3. Skeletal muscle cell

   Mitochondria

   Palisade cell

   Chloroplasts
4. To facilitate transportation of gases/ Exchange of gases; if gases are mentioned (both must be O_2 and CO_2
5. Symbiotic/ both benefit/ mutual benefit; correct description of mutual benefit
6. (a) Phototais

   (b) To avoid desiccation/ drying/ dehydration Escape from predators;
7. (a) Femur

   (b) Ball and socket
8. (a) wind

   (b) To enable it trap pollen grains in the air; reject catch/ attach for trap
9. Turgidity

   Presence of collenchymas (in the cortex)
10. –Light intensity decreases with depth light limiting

    - Temperature decreases with depth
11. – Use of unsterilized instrument;

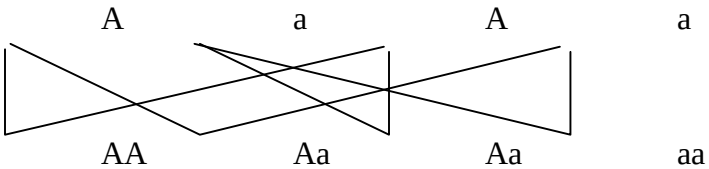
    - Temperature decreases depth
    - blood transfusion
    - Mother to the foetus/ mother to baby infant/ breast milk/ sharing of instruments e.g needles syringes, razor blade e.t.c
    - Mixing of infected blood through cuts

12. (a) Aa, Aa, Acc, both are Aa

    (b) Normal children AA, Aa,

    Genotype of the albino child

    Albino child aa,



(c) 25% ¼

13. (a)

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Meosis	Mitosis
(i) Reduction/ having chromosomes/ haploid no. of chromosomes cells.	Maintenance of chromosomes number/ diploid no. of chromosomes/ cells
(ii) Takes place in reproductive cells/ glands gamete formation	In somatic cells/ body cells/ for growth
(iii) Crossing over takes place/ variation	No crossing over no variation
(iv) 4 daughter cells 2 division processes	2 daughter cells 1 division processes

(b) X or / x and Y; Rej XY, X alone, XX

Ova?

X/XX

14. (a) Light; Rej: light intensity

(b) Test for starch

(c) (i) The covered part of the leaf remain brown/yellow/ retain color

Of iodine, and the uncovered parts turned blue/ black; rej blue alone black alone.

(ii) Starch was formed in the covered part of the leaf (because of the presence); while starch was not formed in the covered part of the leaf (because of lack light)

(d) To destarch the leaf; OWETT

15. (a) (i) Species A;

(ii) The rate of multiplication/ growth in A is faster than of species B

(b) (i) One year and three years

1-3 years shortage of resources more suitable environmental

Conditions/ such as food space e.t.c resource were not limiting hence the population increased exponentially rapidly; acc correctly named resource e.g food space.

(iii) Three years and seven years

3-7 years shortage of resources/ limiting/ birth rate equals death rate; hence the population had become stagnant/ constant; acc;

Environmental resistance has set in rej. Incorrect resources e.g PT and T. (c) Species A would decrease (because of there is less competition with species A/ More resources available. 16. (a) (i) Protozoa

(ii) Unicellular/ single celled

(b) N- Contractile vacuole

P – Cilia, Acc cilium

Q – Gullet/cytopharynx

(c) Cilia

Streamlined body.

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17. (a) (i) Sensory neurone/sensory nerve cell; reject sensory nerve

(ii) Cell body on a branch/ at the side of axon/off the axon/cell body unipolar both axon and dendron are long.

(b) T- myelin sheath; Acc Neurilema

(c) Direction of impulse from receptor towards cell body.

18. (a) If axes reversed allow marks for identification of curves only max 2

Correct scales

Correctly leveled axes

Curves reject broken lines for curves

(b) 0-1 hour.

i) Acc constant/low/below normal levels in blood; No/little digested foods/glucose from the intestines/gut/alimentary canal/absorption.

ii) 1-2 hours

Sharp increase in concentration of glucose in blood; (more) absorption of glucose; after digestion of the meal.

iii) 2-4 hours.

Glucose concentration declining/decreasing; less glucose being absorbed; (more) glucose being converted to glycogen in the liver/tissue/used for (tissue) respiration.

iv) 5-7 hours.

Concentration of glucose stabilizes/constant/ this is the normal glucose level concentration in the blood.

(c) The concentration of glucose in the iliac vein is lower than in the hepatic portal vein because it hasn't been stored in the liver to be used respiration. Portal vein because most of it was stored/used up by the liver/other tissues/respiration.

(d) Proteins take longer to digest.

19. Comparative anatomy/taxonomy.

Members of a phylum group show similarities; organisms have similar structures/similar organs performing similar functions e.g. digestive system/urinary system, nervous system. Any correct example i.e. vertebrate heart.

The pentaductyle limbs/ any correct example; these are homologous organs/structures. Homologous – same origin structure different functions. Analogous structures – different structures performing the same function e.g. wings of insects, bats and birds. Analogous different origin structure, same function convergent.

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Fossil records/palaeotology

These are remains of organisms preserved in naturally occurring materials for many years show morphological changes of organisms over a long period of time.

Comparative embryology.

Acc. Any 2 names embryos> vertebrate embryos the morphologically similar; suggesting the organisms have a common origin/ancestry.

Geographical distribution.

Present conditions are thought to have been a large land mass joined together, as a result of continental drift; isolation occurred bringing about different patterns of evolution i.e. The Ilamas in the Amazon resemble the Camel. Any other example e.g. Kangaroos in Australia, Jaguar in South America, Camel in Africa.

Comparative serology/physiology.

Antigen/antibody reactions/Rh factor/blood group/haemoglobin structure; reveal some phytogenetic structure. Relationship among organism/common ancestry.

20. The mammalian intestines are relatively long/coiled/folded. This allows food enough (enough) lime/increases surface area for digestion and absorption of products of digestion. The intestinal surface area for absorption. The glands have enzymes which secrete enzymes for digesting e.g. of correct enzyme, maltase, sucrase, lactase, enterokinase and peptidases. Some glands/goblets cells also produce mucus which protects the intestinal wall from being digested, reduce friction. Intestines have opening of ducts which allows bile/pancreatic juice into the lumen. The intestines have circular and longitudinal muscles whose contraction/relaxation/peristalis leads to the mixing of food with acc. At least enzymes/juices facilitating rapid digestion and helps pus food along the gut. Intestines are well supplied with blood vessels to supply oxygen/remove digested food. Presence of lacteal vessels for transport of fats/lipids.

Have thin epithelia to facilitate fast/rapid absorption/diffusion. Allow increase in surface area for absorption only.

Cell biology/cytology. Occurrence of cell e.g. mitochondria, ribosome's, nucleas, cytochromes organelle point to a common ancestry.

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MARKING SCHEME
SECTION A

1. Active transport
   Diffusion
   Mass flow
   Cytoplasmic streaming Any two

2. Lactic acid is poisonous to tissue and must be removed.
   To increase supply of oxygen to tissues.

3. Brings about change of genetic materials; which leads to variations; that enable organisms to exploit new environments/resistance to disease/high yields in plants

4. Assists to eliminate disadvantages characteristics.

5. Shelter Food, Oxygen Removal of CO_2 breeding sites.

6. Ability to pollinate
   Response to (tactic, nastic, tropics) Stimuli
   Ability to exploit localized nutrients/ability to photosynthesize
   Ability to disperse seeds/fruits-propagation

7. a) Co dominance
      Acc; partial/incomplete/equal
   b) 1 red flower 2 pink flowers
      1 white flower Acc 1:2:1

8. Lack of variation;
   Acc. No Hybrid Vigour
   Disadvantages traits/are retained within the species

SECTION B (40 MARKS)

9. a) B- Cerebellum
      C- Medulla Oblongata ; Acc Oblongata alone . Rej. Medulla alone

   b) Control locomotion
      motor area/sends impulse to affectors/controls
      Voluntary

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Vision/hearing/smell/taste.

Personality speech;

Mediates cranial (any three)

c) Loss of muscle co-ordination/balance

10.

Classes	Organisms	Reasons
Insecta	Praying Mantis Tsetse fly	3 body parts 3 pairs of legs
Myriapoda	Centipede Millipede	Many segments Many legs
Arachnida	Tick Spider,	2 body parts 4 parts.

Rej; if mixed Acc; it its one and correct.

11. a) Most enzymes in the body function within a narrow range of temperature;

High temperature denature enzymes

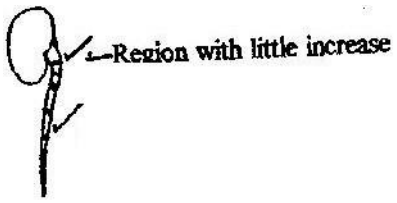
Low temperature inactive /inhabit enzymes

b) Sugar in a raw material for respiration, hence less energy, available to body/low/rate of metabolism.

12.a) i) -Region of elongation (rapid) growth in a root.

-Region with more increase ink mark

- To provide moisture/water for growth (germination)

ii) 

Region with more increase ink (mark) iii) To provide moisture/water for growth (germination) b) i)

Oxygen

Oxidation of stored food; to provide energy (for germination)

ii) Cotyledons

Store food necessary for germination; protecting the plumule.

13 a) A community consists of all plants and animals (organisms of different species in a habitant interacting with each other.

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b) Use the capture and recapture methods; Catch the grasshoppers count and mark using permanent ink; record and release; and allow time 1 to 2 hours; recapture and count the marked and the unmarked; total population is equal to the number of marked and unmarked grasshoppers in the second sample multiplied by number marked grasshoppers in the first sample; divided by the number of grasshoppers marked in the second sample that were recaptured.

14. a) Trypanosome

b) i) Locomotion

ii)

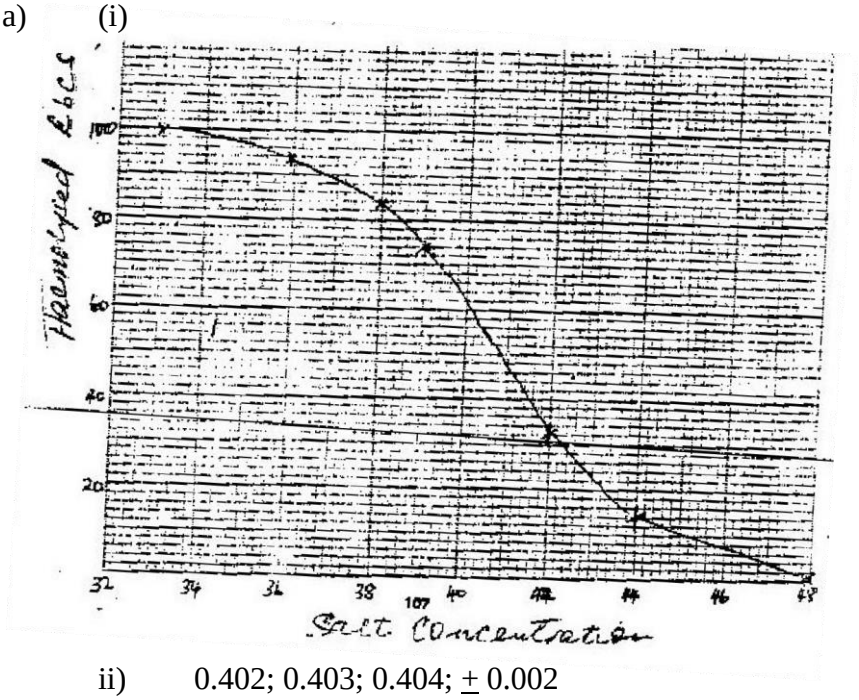
c) Sleeping sickness/trypanosomiasis

d) -Orally ingested including boring through bites

-Sexually; cuts and wounds (contaminated) needles syringes/surgical instruments; contaminated blood transfusion.

SECTION C 40 MARKS)

15. a) (i)



ii) 0.402; 0.403; 0.404; $\pm$ 0.002

iii) 9-10-11%

b) Account for the results obtained at:

(i) 0.33 percent salt contration.

Less concentration // hypotonic // dilute than blood cells cytoplasm/ red blood cells; water is drawn in by osmosis the cells swells and eventually burst.

(ii) 0.48

(ii) 0.48 percent salt concentration.

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Concentration of cytoplasm same as concentration of salt solution/isotonic; therefore no net movement of water; hence no heomolysis.

c) Percentage of cells haemolysed would still be zero? Becomes turgid; but does not burst; due to the cell wall.

d) The cells would absorb water due to osmosis, swell and become turgid. The cell sap move conc. than surrounding water gate into the cell by osmosis; the cell swells/becomes turgid; but does not burst due to the cell wall

16. Muscles of diaphragm contract; causing the diaphragm to flatten (from dome position. The external intercostals muscles contract internal intercostals muscles relax pulling the ribcage upward/forward and outward in man.

These movements increases the volume of the thoracic cavity; reducing the pressure; of the thoracic cavity; compared to atmospheric pressure; this causes the atmospheric air to rush into the lungs.

(Through the nostrils, trachea bronchioles and alveoli).

b) Theory- photosynthesis

Guard cells have chloroplasts; in the presence of light; photosynthesis occurs in guard cells, producing sugar in guard cells; osmotic pressure increases/osmotic potential lowers; water from neighboring /adjacent cells enter into guard cells; causing turgidity of guard cells; causing turgidity of guard cells.

Theory 1.

Guard cells have chloplasts; in the presence of light photosynthesis occur in the guard cells of stomata; producing in the guard cells; osmotic pressure increases/lowers osmotic potential water from the neighboring /adjacent cells, enter into guard cells; causing turgidity of guard cells .

The inner walls of the guard cells are thicker than outer walls; so during turgidity the inner walls stretch more; causing the guard cells to bulge outward; stomata opens.

Theory 2.

Guard cells have chloroplasts (Day) in light; photosynthesis occurs in the leaf/guard cells lowering the CO_2 concentrations; this increases PH/alkalinity which triggers of enzymatic conversion of starch to sugar (glucose); leading to low osmotic potential/ increased osmotic pressure in guard cells; guard cells absorb water from epidermal cells; thus becoming turgid; the inner walls are thicker than the outer walls; outer walls stench more than inner walls; causing guard cells to bulge outwards, stomata opens;

In the absence of light (night); no photosynthesis; CO_2 concentration increases due to respiration; PH lowered/ acidity increases; sugar converted to starch; osmotic

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pressure lowered/ osmotic potential increases; guard cells lose water to adjacent epidermal cell becoming flaccid; stomata close.

Day low H+ high PH opens stomata.

Starch glucose.

Theory 3

Guard cells have chloroplasts; in light AT produced; the energy drives K+ irons from adjacent epidermal cells into guard cells; accumulation of K+ raises osmotic pressure (lower osmotic potential) of guard cells; guard cells absorbs water from adjacent epidermal cells; becoming turgid; the inner walls are thicker than the outer walls so outer walls stretch more than inner walls causing guard cells to bulge outward. Stomata opens.

In the absence of light (night) ATP rapidly decreases; no energy of potassium +ions pump ion; migrate by diffusion from guard cells to adjacent epidermal cells; become flaccid; the thinner outer walls of guard cells shrink (OWWTE; thicker inner walls reduces their curvature/OWTTE; thus closing the stomata.

17. Sulphur based chemicals e.g. sulphure dioxide gas H_2S Cl_2 HCl_2 produced by (food preventing) industries /sewages matter, Affect gaseous exchange/makes acid rain /damages plants leaves.

Acc. Pesticides, Herbicides, Insecticides, Acaricides, paint sprays,

Aerosols

CFCs sprayed to control (plant) disease and pests, also affect respiratory organs of animals; the chemicals are residuals and persistent (not easily) broken down deplete.

Ozone layers; smoke/fumes produced in areas with (heavy) industries and (high density of motor vehicles / fire which burn fuel/oils wood coal; These visibility; fumes also settle on leaves and stop photosynthesis (excessive) production of carbon dioxide causes the green house effect/Temp. inversion as a result of heating in lower layers of atmosphere; sound /noise produced incessantly b machines/ heavy vehicles/aircraft; affects hearing in animals; Dust, industrial production of (cement) generates dust; which finally settles on plants leaves limiting photosynthesis; removal of vegetation/cutting of trees; interferes with.

The carbon cycle; radioactive emissions; from nuclear reactors/mines/ x-rays machines bombs cause mutation/cancer/death.

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BIOLOGY PAPER 231/1 K.C.S.E 2000
MARKING SCHEME

1. *(a) Cones*
   Discrimination of colours/ details/ accurate/ vision colour perception/ sensitivity to high intensity/ bright
   (b) Rods
   Dim light vision/ low light intensity

2. *Due to stiff competition of resources leading to elimination/ exclusion of one species; acc. Currently named example food*
3. *Presence of Rhizoids*
   -Lack of vascular tissue/ absence of both xylem and phloem
   -Body parts not differentiated/ not organized into roots, stem and leaves.
4. *– Brewing industries; baking*
   - Manufacture of medicine/ antibiotics
   - Food e.g. mushrooms yeast also provides vitamin B, and B2
5. *– Maintenance of constant levels of water/ salt/ ions/ osmotic pressure/ for optimum conditions of metabolism/ cellular functions*
6. *– Attachment of powerful back muscles that maintain posture flex the vertical column/ support viscera/ abdominal organs*
7. *(a) Fossils records*
   Gives evidence of types of plants/ animals/ organism that exist at a certain geological age. Long ago
   Gives evidence of morphological/ anatomical. Structure/ changes that have occurred over a long period of time.
   (b) Comparative anatomy.
   Gives evidence of relationship among organisms
   Gives evidence of common ancestry of a group of organisms; e.g. structural/ functional relationship among organization
8. *Oxygen is required for respiration that produces energy necessary for active transport e.g. oxidation of food for respiration*
9. *The adult and larvae exploit different food/ don't compete for food/ pupa can survive adverse conditions/ pupa being a non- feeding state enables organisms to go through adverse conditions*
10. *– Curved/ sharp/ hooked strong beaks fro killing / tearing/ ripping off flesh from bones*
    - *Curved/ strong/ sharp claws for grabbing/ holding prey*

SECTION B

11. *(a) X– Spongy mesopyll (cell) layer*

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(b) Y – Cuticle

(c) Broad/ flat leaf (lamina) to provide large surface area or absorption of gases

Thickness: allow gases to pass though fast

Presence of stomata for efficient diffusion of gases

Presence of air spaces for easy defuses

12. *(a) RR and rr*

(b) (i) red

(ii) complete dominant; i.e Rd dominant/ white recessive

(c) Ratio of filial generation: 3: 1

(I.e. in every 4 flowers 3 are red 1 is white

Therefore 480 red flowers means ¾ of the total number

Total number of flowers $\frac{480 \times 4}{3} = 640$

So ¼ of 640 flowers are white in F_2 *plants*

¼ x 640 = 160 flowers

13. *(a) Heat loss by conduction/ convection from the blood vessels*

The body skin to the cold water, the cooler blood leaving skin enters general circulation cooling the whole body.

(b) Vasoconstriction; thus less blood flowing to the skin reducing heat loss.

Sweating eases heat produced through metabolism

Accept shivering producing heat

14. *(a) Crop*

Potatoes / tomato

Disease

Tomato/potato bright/ Acc. Tomato rot

(b) Use of fungicides

Eradication of infected crop/ uprooting/ burning of infected plants

Use biological control

Use of disease resistant varieties

Crop rotating

15. *(a) (i) 78/78 mg/* $100cm^3$

(ii) 8.5^{th} *and* 29.5^{th} */ 8min 30 sec and 29 min 30 sec*

(iii) 47 mg/100cc; Acc. 47

(b) - The demand for oxygen is more than the supply

- leading to anaerobic respiration. Acc. Lactic acid converted to glucose/Glycogen

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(c) *Lactic acid is oxidized (to form CO_2 and H_2O)*
Acc. Lactic acid is converted to glucose/ glycogen

16. *(a) Genetic variation/ hybrid/ crossbreed*
(b) favorable characteristics of parent remained
Exploit parents favorable conditions
Acc. New plants adapts parental favorable conditions
Short life cycle/ early maturity/ faster reproduction
Large store of food supply
Independent of two parental/ organisms reproduces without another fertilization/ pollination

17. *(a) (i) Goat*
(ii) It is a grazer and a browser
(b) Insufficient grass in bush/ aren't adapted to eating twigs/ not browsers/ are grazers
(c) (i) Domestic animals - total counts
Wild animals – total counts; aerial counts/ quadrat/ Belt transect/ capture/ recapture
(ii) Analyzing gut counts, studying dentition/ breaks/ claws/ parts

(d) Observation
Examine droppings
Dissecting a sample of animals/ study structure/ nature of digestive
System/ size of caecum/ length of intestine/ chamber
(e) Irrigation
Competition; diseases
Predation; human activity/ man accept any correct
Parasitism
(f) Poaching, cropping/ culling/ licensed spot hunting
(g) Pollution; translocation
Burning trees, charcoal- deforestation

18. *Inferior lobe of pituitary gland secretes F.S.H which causes grafian follicle develops in the ovary. It also stimulates ovary tissue/ ovary/ follicle walls secret estrogen which repairs, heals uterine wall, oestrogen stimulates inferior lobe of pituitary gland produce L.H. for ovulation. It also causes grafian follicle change into corpus interim L.H stimulates corpus luteum secret progesterone which causes proliferation of the uterine walls; in preparation of implantation; oestrogen/ progesterone inhibits the production of F.S.H (by anterior lobe of pituitary) thus no more follicle develop; and oestrogen production reduces; 14 days later progesterone level rises inhibits production of L.H from anterior lobe of pituitary gland produce L.H for*

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ovulation. It also causes grafian follicle change into corpus interim L.M stimulates corpus luteum secret progesterone which causes proliferation of the uterine walls in preparation of implantation; oestrogen/ progesterone inhibits the production of F.S.H (by anterior lobe of pituitary) thus no more follicle develop; and oestrogen production reduces; 14 days later progesterone level rises inhibits production of L.H from anterior lobe of pituitary gland/ The corpus luteum stops secreting progesterone, and menstruation occur when the level of progesterone drops; (anterior lobe of pituitary starts secreting F.S.H again.

19. *Broad/ wide/ flat lamina provides large surface area for absorption of (O) and sunlight, thin to ensure short distance of CO_2 reach photosynthesis/ palisade cells; presence of stomata guard cells for efficient diffusion of O_2 gaseous exchange / H_2O vapour transpiration/ CO_2 into the leaf transparent cuticle epidermal cells; for light penetration into palisade cell which contains chloroplast next to upper epidermis; these receives maximum light for photosynthesis. Chloroplasts have chlorophyll, which traps light energy.*

    Leaves have vein, xylem and phloem to transport products of photosynthesis to other part of the plant.

    Air spaces on spongy mesopyll, easily circulates gases/ CO_2 diffuse into palisade cells.

    Mosaic arrangements of leaves; enable leaves to trap sunlight.

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BIOLOGY PAPER 231/ 1 K.C.S.E 2001
MARKING SCHEME

1. *Interbreed to produce fertile/ viable offspring*
2. *Utilize energy from the sun to manufacture food/ photosynthesis; for subsequent tropic level/ consumers/ other organisms*
3. *A, B, AB, O*
4. *– ovary/ accept ovules*
5. *Act as valves for regulations of food movement/ to close or open various parts of the canal.*

   - Churning (acc. mixing food with enzymes) pushing food along peristals
6. *The surface area to volume ratio is higher in calves than in adults; hence adults retain more heat than the young.*

   - The surface area to volume ratio is lower in adults than in calves; hence calves loose more heat than adults.

7. *– Ribosomes*
8. *(a) Open/ lacuna*

   (b) (i) Hepatic portal vein

   (ii) Pulmonary vein
9. *– Inversion duplication, deletion, translocation, non- disjunction*
10. *– Mesophyll cells/ spongy mesophyll/ palisade mesophyll/ stomata/ substomatal chambers; lenticels; cuticles.*

SECTION B

11. *(a) (i) Efferent arteriole/ vessels*

    (ii) Loop of henle

    (b) Ultra – filtration (acc. Pressure filtration) rej. Filtration

    (c) Glucose (acc. Blood sugar)

    (d) (i) Disease – diabetes mellitus (acc. Sugar diabetes)

    (ii) Hormone – insulin

    (e) – Small Bowman's Capsule/ Groleruli`; Rej few Bowman's capsule

    - Loop of Henle

12. *(a) (i) More active sites of enzymes available, for a large number of molecules of substrate; hence increase in the rate of reaction (rapid of fast increase in the rate of reaction)*

    (ii) B and C

    Enzymes/ substrate are in equilibrium / All active sites are occupied; hence rate of reaction is constant.

    (b) Raising concentration of enzymes

    (c) P^H, temperature, inhibitors/ cofactors

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13. (a) *A – Nitrogen fixation D – absorption*

(b) *Nitrate/ nitrates/ NO_2*

(c) *Denitrifying bacteria/ Denitrifiers*

(d) *(i) Leguminous plants, (acc. Legume/ acc examples e.g beans peas)*

(ii) Roots nodules; rej root or nodules alone; acc; root

(e) – Killing / reducing of composers

- *Killing/reduction of nitrogen fixing bacteria/ nitrogen fixing microorganisms*
- *Destruction of leguminous plants*

14. (a) *(i) Tt, Tt*

(ii) Tt and Tt

(iii) 1TT; 2Tt; 1tt/ 1 tall homozygous; 2 tall heterozygous

1 short homozygous 1:2:1

(b) *Crossing a homozygous recessive organism with an organism which shows dominant characteristics.*

15. (a) *water, temperature moisture (Acc. Warmth)*

(b) *Mobilize/ hydrolyze stored food/ active enzymes/ breaking*

Of dormancy softening the testa / seed coat (acc. As a solvent/ transport media.)

(c) *Setup A – those in set up A will germinate*

Setup B- those in set up B will not germinate

Setup C- those in set C will not germinate

SECTION C

16. (a) *(i) The more the feed the more the feacal output*

The less the feed the less the faecal output

(ii) The first four months

$$\frac{2.1 + 2.0 + 1.8 + 1.7}{4} \quad \frac{28.0}{4} \quad \left| \quad \frac{-20.4}{4} \quad \frac{7.6;}{4} \quad \right| \quad 1.9 \text{ (kg)}$$

The last two months

$$\frac{14 + 0.1}{2} \quad \frac{29.5}{2} \quad \left| \quad \frac{-28.0}{2} \quad 1.5 \quad \right| \quad = 0.75\text{kg}$$

iii) Fast/ rapid/Active growth hence increase in weight

The last tow months

Slow growth, reached maturity

iv) Feed X

Give reason for your answer

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Group A gained (more) weight, on less food while group B lost weight on more food.

b) growth, repair, protection, energy production

c) a solvent, transport medium.. Hydrolyses of food, maintenance of temperature.

17 a) i) Tympanic membrane.

Receives sound waves (from the air); and vibrates / transforms sound wave into vibrations to transmit them to the ear osssicles / malleus; acc. Hammer for malleus.

ii) Eustachain tube.

Equalizes the air pressure in the middle ear to that in the outer ear.

iii) Ear ossicles

Amplify / transmits vibrations from the tymphanic membrane in the inner ear / venestra ovalis / oval window.

b) There are three semi – circular canals; arranged in planes at right angle to each other; at the end of each canal is swelling called ampulla's which contains receptors.

The movement of the cause movement of the fluid in at least one canal, the fluid movement deflects / displaces the coperta and thus stimulating the receptors / sensory hairs, the impulse / nerve sensory impulse is transmitted / conducted to the brain; by auditory nerve, about the movement of the body / head.

18. a) pollen grains stick in the stigma surfaces; that surface of stigma producers a chemical substance; which stimulates the pollen grain to produce a pollen tube / germinate. The pollen tube/ germinate. The pollen tube grows down (into the tissues of style) from where it derives nutrients; the generative nucleaus divides to give rise to two male nuclei and the antipodal cells; when pollen tubes disintegrates and make nucleus fuses with the egg cell and forms the zygote. The other male nucleus fuss with the two polar nuclei to form a triploid nucleus. The process involves double fertilization.

b) Integument change into seed coat / testa; Zygote into embryo;

Ovary wall into fruit; Ovule into seed; triploid nucleus into endosperm Style dried up / fall off leaving a scar / corolla dries up (falls off) stamens dry 'up. Ref; Degeneration disintegrates.

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BIOLOGY PAPER 231/ 1 K.C.S.E 2002
MARKING SCHEME

1. Cephalothorax; prosona
2. a) Rhizobium Nitrogen fixing bacteria
   b) Symbiosis / mutualism
3. a) Substances that activate enzymes
   b) Metallic ions e.g. iron / mg / Zn / Cu /(accept correct iron forms)Fe 2+, Mg2+, Ca2+, Mn2+, Co2+ , Kl, mo2+, (Reject wrong charges).
4. Endosperm material was being oxidized / hydrolyzed / converted into new cytoplasm new material for growth / food used for growth.
5. High yielding / hybrid vigor / heterosis; resistance to decrease early maturity.
   Resistance to drought / salinity.
6. Oxyhaemoglobin acc. HbO2 / HbO
7. Cattle are mainly grazers while others are browser. 8. a) Ball and socket
   b) Hinge
9. Stomata, lenticels: (reject cuticle)
10. Converted into fatty acids and stored beneath skin (adipose tissue)
11. Y CHROMOSOME
    Tuft and hair sprouting from pinna / baldness; hairy pinna;

    X CHROMOSOME
    Colour blindness / haemophilia.
12. a) A A photosynthesis
        B Decomposition / decay
        C Respiration
    b) X Bacterial
       Y Fungi
    c) Regulate the CO2 in the atmosphere.
13. a) Meiosis
    b) Ovary
    c) parent must be the 2n top; any ‘n’ is a gamete
    d) Non – dysfunctions
    e) increased yields / highbred Vigor, Resistance decreases Resistance to drought.

14. (a) Emergence of present fauna and flora/ new life
    Term/ species/ organisms from pre-existing forms gradually over a long period of time.

    (b) Standing upright/ erect posture. Higher intellectual capacity/ higher brain/bigger capacity; communication through language speech.

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(c) Divergent basic structural form is modified to serve different functions;
e.g. vertebrate forelimbs, break structure in birds/ feet in birds' convergent different structures are modified to pass or similar functions e.g. wings and birds and insects/ eye of human and octopus, vertebrates for humans e.g. squeal, legs of vertebrae and insects .

15. (a) Genus
(b) Ileum/ colon/ duodenum/ intestines/ of humans or intestines of pig
(c) Lack of elaborate elementary canal (simple guts) can tolerate raw corn
Thick cuticle pellicle, reject the outer covering lays many eggs
Mouthparts for sucking partly digested food

16. (a) R. Sieve pore
S- cytoplasmic strand, cytoplasmic filaments rej. Proto plasmic strand)
Cell labeled T
(b) Translocation (L is tied with structures) (c)
Thickened and lignified.

17. (a) Bulbils/ suckers, Aerial tubers
(b) Plant with desired qualities is able to grow on an established root system which lack desired qualities
(c) Early maturity/ short life span
Good qualities of parents are retained
Independent of fertilization/ pollinated dispersal
Large areas covered in a short time have large store of food

18. (a) – For exchanged axis award maximum 3 marks for points x identity The scale must however be correct. For graphs on separate axis mark both and award the highest mark.

(a) Axis = 2
(b) Scale = 1
(c) (plotting) = 1
(d) curves) = 1

(b) X = 120 + -3)
Y = 140 + -3

(c) Person X is capable of regulating glucose while person y is likely to be diabetic.
X – Insulin

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(d) X insulin released, excess glucose is converted into glycogen (in liver) must be mentioned if insulin is not mentioned

Y Insulin not released, thus the decline is due to glucose being released in urine.

(e) A.T.P / Adenosine triphosphate

(f) Deaminated; resulting in formation of ammonia

Ammonia combines with CO_2 to form urea (and H_20); Urea is passed out in Urine carbohydrate group is oxidized/ stored as glycogen

19. - Indole acetic acid/IAA/ Auxins

Promote cell division tropic responses, (accept cell division in cambium)

Promote formation of absecission layers/ bring abrupt leaf – fall

Promote fruit formation (parthenocarpy)

Promotes cell differentiation (of vascular tissue)

Causes apical dominance/ inhabit growth and development of lateral buds

Promote growth of adventitious roots (on stems)

IAA + cytokine induce formation of callus tissue (during healing of wounds) N.B if this point for cytokines it should be marked

GIBBECETINS (accept GA3)

Promotes cell division / cell elongation in dwarf varieties

Parthenocapy/ initiating formation of IAA/ setting of fruits after fertilization

Formation of side branches (of stems) and dormancy (in buds); inhibit growth of adventitious roots.

Activates (hydrolytic) enzymes during germination/ promotes germination of seeds/ breaks seed dormancy.

Affects leaf expansion and shapes / retard leaf absecission

CYTOKININS' Accept any correct example kinetin 8 zeatin

Breaks dormancy (in some species); promotes flowering in some species

Promotes cell division (in presence of IAA)

Stabilizes proteins and chlorophyll

Promotes root formation

Low concentration encourages leaf senescence/ high concentration protein increased cell enlargement

Promotes flowering (in some species)

,

Ethylene / Ethene / C2114 (reject ethane)

Stimulate lateral bud development

Ripening of bananas/ fruits

Induces thickening of stem/ inhabits stem elongation

Promotes germination of certain seeds/ acc promotes flowering in pineapples

Causes abscission pf leaves/ fruits/ leaf fall abscisic acid / ABA

High concentration of ABA stomata closure (by interfering with uptake of potassium ions

Inhibits germination/ growth of embryo/ cause seed dormancy

Causes abscission of leaves/ fruits / leaf fall

Inhibit elongation growth, inhibit sprouting of bud/ induces dormancy in buds (accept Dormin causes/ dormancy in buds/ seeds

Traumatin

Heal wounds by callus tissue formation

Florigens

Promote flowering

20. (a) **Hydrostatic**

Exoskeleton

Endoskeleton

(b) Cervical vertabrae

Vertebraterial canals for passage of (vertebral) artery; atlas has (broad) surfaces for articulation with condylyses of skulls to permit nodding

Axis has adenoid process/ protein Centrum to permit rotary/ turning act as a pivot for atlas/ skull/ movement of atlas/ Branched / forked/ short/ broad transverse processes, for attachment of (neck) muscles; ace zygopophysis, for articulation between vertebrae (acc. Vertebraterical canals and zygopophogen if shown on a diagram of the vertebrae

Has a short reduce neural spine, for attachment of (neck) muscles, has wide / larger neural canal; for passage of spinal cord/ alternatively has wide neural for protection of spinal cord.

Lumbar

Broad/ long/ neural spine for attachment of (powerful back) muscles long/ large/ well development/ transport processes for attachment of muscles (that maintain posture and flex the muscles)

Has metamorphosis and hypothesis for muscle attachment large/ thick centrums for support

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Prezygapophysis/ post/ zygapophysis for articulation between vertebrae (acc. Anapophysis for hypopyses)

Sacral Vertebrae

Anterior vertebrae has a well developed transverse process, which are fused to the pelvis girdle/ articulate with pelvic girdle

Vertebrae fused, for strength transmit weight of the stationary animal to the rest of the body.

Sacrum has a broad base/ short neural spine; for attachment of (back)

BIOLOGY PAPER 231/1 K.C.S.E 2003
MARKING SCHEME
SECTION A (20 MARKS)

Answer all the questions in this section in the spaces provided.

1. a) Anaerobic respiration / fermentation; Acc. Alcohol production / drawing dough.
   b) Brewing/ Banking.
2. Chordata
3. By pollen tube that grows through style
4. a) Rhizobium
   b) Convert nitrogen into nitrates / convert nitrogen into proteins / convert N2 into nitrogenous Compounds / foxed N2 into nitrates.
5. a) Ulna
   b) radius;
   Humerus;
6. Analogous structures – structures which (appear similar and) perform similar functions but have different origins.
   Homologous structures – structures which have a common origin but (have evolved to) perform different functions.
7. a) Zone of cell division Acc cell multiplication
   Zone of cell elongation / enlargement; Acc expansion for elongation
   b) To protect root tip
8. Absorption of water; accept absorption of salts / calcium / iron; secretion of mucus
9. a) lignin
   b) Phoem
10. Numerous chloroplasts to absorb light / epidermis have chloroplasts to absorb light.
    - Deeply divided / truncated leaves / branched leaves to increase surface area.
    - Large air spaces for storage of air / buoyancy; acc parenchyma tissue for storage of air
    - Have no cuticle to facilitate exchange of gases
11. Salmonella typhi; Acc.Bacteria / salmonella alone

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SECTION B (40 MARKS)

12. a) Genes are located on the sex chromosomes; they are transmitted along with those determining sex.

b)- Colour blindness

- Hair ears / pinna
- Haemophila
- Baldness

c)

13. a) i) Oxygen ii) Carbon dioxide b) Oxyhaemoglobin

c) i) The blood plasma except blood cells and proteins; that has filtered out of the capillaries.

ii) It is a medium of exchange of substances/ materials between capillaries and body cells; supply nutrients to cells / supply oxygen to cells / remove waste products from cells.

d) i) Hepatic portal vein

ii) Pulmonary artery

14. a) Swallow plenty of sea water to increase amount of water in the body

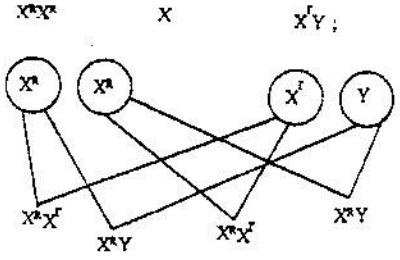
- Have chloride secretory cells in the gills to remove excess salts
- Eliminate nitrogenous wastes in form of trimthylamine exide which requires little water for elimination.
- Few / small glomeruli; thus slow filtration rate in the kidneys.

b) Less ADH secreted (by pituitary gland); causing less reabsorption of water in the kidney tubules; thus resulting in dilute urine.

15. a) i) Thigmotropism / haptotropism ii) Contact with support; causes migration of auxine to enter the side; causing faster growth on the side away from centre of surface (causing tendrils curl around support.)

b) Escape injurious stimuli / seek favorable habitats; move towards light / stimuli.

c) Induce foot growth in stem cutting



Accept Punnett Square

♀ \ ♂	X^r	Y
X^R	X^RX^r	X^RY
X^R	X^RX^r	X^RY

- Selective weed killers
- Encourage apical dominance
- Encourage sprouting of side brances
- Breaking seeds dormancy
- Induce pathencarpy
- Promotes flowering
- Induce fruit fall
- Accelerates ripening of fruits.

16. a) i) study of a single species within a community / ecosystem / habitat / environment. ii) Synecology?
Study of natural communities within an ecosystem

b) **Leaf** **Habitat**
A aquatic / fresh water B Forest; Terrestrial C Arid / semi arid; desert.

c) Sunken
Hairy
Reserved rhythm
Small stomatal pore

SECTION C (40 MARKS)

17a)

b) $\frac{80 - 18}{2.5} = \frac{62}{25}$ 2.48C /Min

c) **Control**

d) Rate was faster in tube A; because the film of methylated sprit evaporated; removing heat from the tube;

e) Convection ; radiation

f) Lower rate of heat loss;

g) i) birds
Feather ii)
Mammals?
Fur

h) i) external temperature changes Temperature
ii) Internal temperature changes
Hypothalamus

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Q 18. Sclerotic layer – (made up of collagen fibres thus) protects the eye maintains shape of eyeball.

Cornea - Allows light to enter the eye

- Refracts light towards retina

Conjunctive - Protects cornea

Eyelids - Protects cornea from mechanical & chemical damage / protects eye form entry of foreign particles.

- protects retina from bright light (by reflex action)

Choroids –(Contains black pigment which)prevents reflection of light within the eye / absorbed light.

-Nourishes the eye / retina / supply oxygen / remove CO2

Ciliary muscles – Alter shape of lens during accommodation

- Ciliary body produces aqueous humour.

Suspensory ligaments – adjusts shape of lens during accommodation
Lens – Refracts light rays / focuses light on retina Vitrerous aqueous humour once.

Aqueous Humour – Nourishes cornea / lens

Refracts light

Irus – (pigmented thus) – gives the eye its colour / absorbs light controls amount of light entering the eye / adjusts size of pupil impulses.

Pupil – light enters the eyes through pupil.

Retina – has photoreceptor cells / rods / cones / image formation ;l generates impulses.

Fever / yellow spot – visual acuity / most sensitive part of retina with only cones.
Blind spot – point where nerve fibre emerges from the optic nerve / where the optic nerve leaves the eye / point where blood vessels & nerve fibres enter the eye. **Optic nerve** – transmit impulses to brain.

Q19. Water dispersed fruit / seeds

- Mesocarp / seed has air spaces thus light / buoyant to float.
  Therefore carried away by water.
- The fruit / seeds are protected from soaking by water proud pericarp.
-

Animal dispersed fruits / seeds

Presence of hooks for attachment to animals; thus carried to other placed

Fruits are brightly coloured; succulent; aromatic attract animals, which feed on them.

The seed coats are registrant to digestive enzymes; thus carried to other places on them.

The seeds are dropped always from parent plant in faeces/ droppings.

Self dispersed fruits / seeds / explosive mechanisms

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The dry pods / fruit split (along lines of weakness / satures)

Scattering seeds away from parent plant

Wind dispersed fruits / seeds

Censer mechanism

Perforated capsule is usually loosely attached to stalk / the long stalk is swayed by wind scattering seeds.

Presence of hairs / wing – like structure, floss / extensions which increase surface area / for buoyancy making is easy for fruits / seeds to be blown away

Fruits / seeds are light due to small size; therefore easily carried a ways by wind.

K.C.S.E 2004 MARKING SCHEME

BIOLOGY PAPER 231 /1

1. a) Intervertebral disc.
   b) -Act as a cushion / absorbs shock;
   - Reduce frictions; flexibility of the vertebral column. Rej. prevent avoid.
2. - Natural immunity is inherited / transmitted from parent to offspring; - Acquired immunity is developed after suffering from a disease / thought vaccination.
   * Accept innate / inborn for natural Rej. Born with it.
3. Has air spaces; which store gases for gaseous exchange buoyancy; Acc. Floating.
4. -Ethanol / Alcohol -Energy / ATP/ 210kj / heat; Rej. atp, formula of alcohol.
5. Prophase 1;
6. a) Myopia/ shortsightedness / short sight
   b) Concave lens / divergent lends; to diverge the rays so that the image is focused on the retina Acc. Concave.
7. a) Stores hydrolytic enzymes for destruction of worn out organelles / cells / tissues / digestion of bacteria. / pathogens;
   Acc. Digestion of food / accept autolysis.
   b) processing / packaging synthesized and transporting of packaged cell materials;.
   Production of lysosomes/ secretions of packaged material;
8. Insecta; Rej insects/ exopoda
9. Nitrogen;
   Magnesium;
   Iron, acc. Magnesium ion/ iron rej symbols of elements
10. Thickened walls/ lignified accept lignin
11. Parthenocarpy
12. (a) RR WW

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(b) Parental genotypes RW x WW

Gametes R W R W

Fertilization

Offsprings RR RW RW WW

(c) (i) Phenotypic ration Red Pink White

1 2 1

(ii) 1RR : 2RW; 1WW

(a) (ABO) blood grouping; blood groups; reject Rh factor

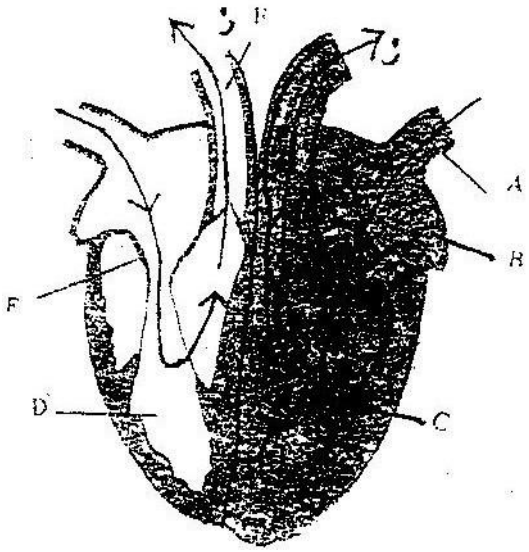
13. (a) A Pulmonary vein

B Left atrium I auricle

E Tricuspid valve

F Pulmonary artery

(b)



(b) The left ventricle ‘C’ pumps blood a longer distance to all parts of the body; while the right ventricle ‘D’ pumps blood to a shorter distance/ to the lungs; therefore the left ventricle has thicker walls to generate exert more pressure.

14. (a) Lamarckian

Inheritance of acquired characteristics/ Environment induces production of inheritable character which is then inherited.

Darwinian

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Inheritance of genetically acquired characteristics/ character happens to appear spontaneously which then gives advantage to organisms therefore better-adaptable characters are then inherited by natural selection.

(b) (i) Have a common (embryonic) origin modified to perform different functions; vertebrae for limb/ pentadactyl limb

Example

Vertebrate fore limb/ pretadactyl limb; acc beaks of birds (fee of birds/ mouthparts in insects.

(ii) Have different (embryonic) origins (but have evolved) to perform similar functions.

(iii) Are greatly reduced in size and therefore caused to function

Acc. Third digit of wing of bird

- Halteres in flies
- Presence of hind limb (buds) in python
- Human ear muscles

Example

Human appendix / kiwi (flightless bird) with reduced wings/ vestigial wings in flies human hair/ presence of hind limbs in python; reduced pelvic girdle of whale.

15. (i) anther Insect Wind

Small short anther firmly Large/ long anthers/ loosely attached to

Attached to elements filaments

(ii) Large heavy/ spiky small/ light/ smooth

(iii) Small/ sticky Long feathery

Reject short stigma/ negative comparisons

(b) Source of variation/ hybrid acc. Production of hybrid

Rej heterosis/ vigour

16. (a) The movement of molecules; from a region of high concentration to a region of low concentration; until the molecules are uniformly distributed

in the medium) Acc. Particles for molecules; Rej substance for molecules

(b) (i) The higher diffusion gradient between (two points) the rate of diffusion; acc converse.

(ii) The higher the surface area:: Volume ratio, the faster is the rate of diffusion ; acc converse

,

(iii) Increasing temperature increases the rate of diffusion; acc converse.

(c) Reabsorption of glucose/ some salts in the kidney/ by kidney tubules;

- Absorption of digested food/ from the alimentary canal
- Reabsorption of useful material in the blood stream
- Accept sodium pump mechanism in the nervous system, the nerve cell Rej. Sodium pump mechanism alone.

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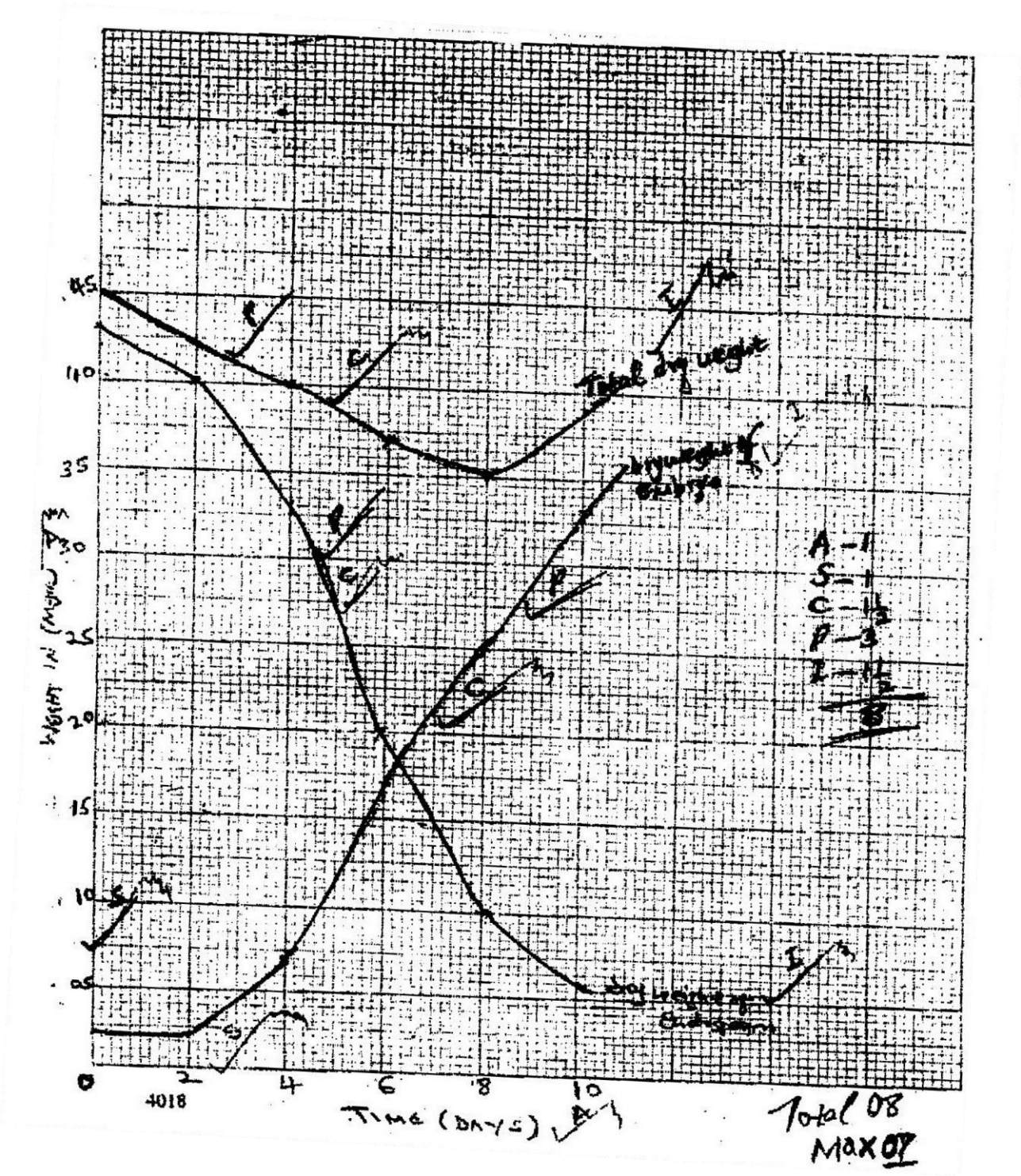

(b) 38.5 (mg); Acc. + 0.5 (i.e. 38 – 39)

(c) (i) Hydrolysis of starch into simple sugars; which are translocated to the embryo;

Respiration/ to give energy/ heat/ gases

Acc. Simple sugar oxidized

Rej. Oxidation of starch/ endosperm.

(ii) New materials are synthesized from protein); bringing about growth of embryo; acc new cells/ protoplasm synthesized

,

(iii) The rate of respiration is faster than that of synthesis of materials for growth

(iv) First leaf (carried out photosynthesis) leading to growth

(d) (i) Presence of absiscic acid/ germination inhibitors;
Embryo not fully developed
Absence of hormones/ enzymes that stimulate germination
Impermeable seed coat; rej hard seed coat
Acc. Inactive enzymes/ hormones/ absence of gibberellins/ cytokinins.

(ii) – Unsuitable / unfavourable temperature
- absence of light
- lack of water
- lack of oxygen
- rej. Premature for immature

(c) Dense cytoplasm
- Thin cell wall
- Absence of vacuoles (cell sap)

18. The skin is made of epidermis and dermis. The epidermis is made up of three layers. The outermost layer is known as cornified layer; made up of dead cells that protect against mechanical damage/ desiccation/ microbes; the granular layer; is made up of living cells that give rise to the cornified layer, the malpighian layer; contain actively dividing cells that rise to new epidermal cells, that contain melanin that protects the skin against ultra violet rays.

- The dermis has several components has sweat glands' sudondic glands that produce sweat; sweat evaporates carrying it with latent of vaporization) thus reducing the body temperature; under cold conditions little/ no.
- Sweat is produced thus heat is conserved; the sweat contains water/ sodium chloride/ uric acid/ urea; the skin is excretory organ.
- Has hair, the hair stands erect to trap air when temperature is low to reduce heat loss/ lies flat to allow heat loss when the temperature is high.
- Has nerve endings, which are sensitive to stimuli/ such as heat/ cold/ pain/ pressure/ touch
- Has subcutaneous fats/ adipose tissue, that insulate the body against heat loss.
- Has arteriole; that vasodilate when temperature are high to lose heat by radiation/ convection (see converse)

,

- Has sebaceous gland; which secrete sebum, an antiseptic/ water repellant/ that prevent drying/ cracking of skin/ skin supple

  Acc blood vessels/ capillaries for arterioles to supply food/ nutrients/ oxygen/ remove excretory products.

19. **Wind.**

  In windy conditions the rate of transpiration increases; wind disperses fruits/ seeds; is an agent of pollination; acc. Spores for seed.

Temperature

Changes in temperatures affects the rate of photosynthesis and other biochemical reactions/ metabolic reactions/ enzymatic reactions/ enzymatic reactions, temperature increases rate of transpiration;

Lights

Plants need light for photosynthesis, some plants need light for flowering/ photoperiodism/ seeds like lettuce require light for germination.

Humidity

When humidity is low, the rate of transpiration increases;

PH

Each plant requires a specific pH to grow well/ acidic/ alkalinity/ neutral;

Salinity

Plants with salt tolerant tissues grow in saline area, plants in estuaries adjust to salt fluctuations;

Topography

North facing slopes in temperature lands have more plants than south facing slope

Plants on windward side have stunted/ distorted growth;

Acc. Comparisons of mountains and valleys

Acc. Description of other areas with other topographies e.g. River valley rainfall/ water

- Fewer plants in areas/ semi arid and
- Water is needed for germination/ is a raw material for photosynthesis/ dissolves/ minerals salts/ provides turgidity for support/ fruits/ seeds

Pressure;

Variation in atmospheric pressure affect availability of CO+2+ which affects photosynthesis and low pressure increase rate of transpiration; and affect amount of oxygen; for respiration

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Mineral salts/ trace elements

- Affects distribution of plants in the soils
- Plants thrive well where there are mineral salts in the soil

Plants living in the soil deficient in particular mineral element have special methods obtaining it; for example legumes obtaining from nitrogen by fixation or carnivorous.

K.C.S.E 2005 BIOLOGY PAPER 1(THEORY)
MARKING SCHEME

1. Maintain balance and posture of the body
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 under went 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, inhabit 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 hystolystica
11. a) W – Spinal column / reutebral column
    Y – Sternum
    Z – Intercostal muscles.

b) The external intercostals muscles contract while the internal intercostals. Muscles relax. This movement pulls the ribs upwards and outwards. The diaghragm muscles

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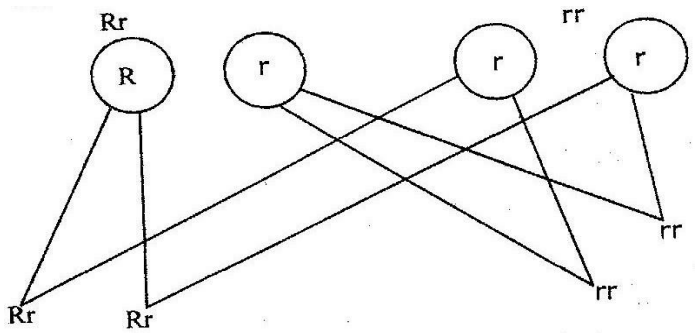
contracts (flattens).The thoracic volume increase while the pressure reduces, leading to atmospheric air rushing into the lungs through the nose and trachea hence inflating the lungs.

12. a)3:1

b) (i) Parent generation gametes f_2 offspring



(ii)1:1

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

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-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

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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 at 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.

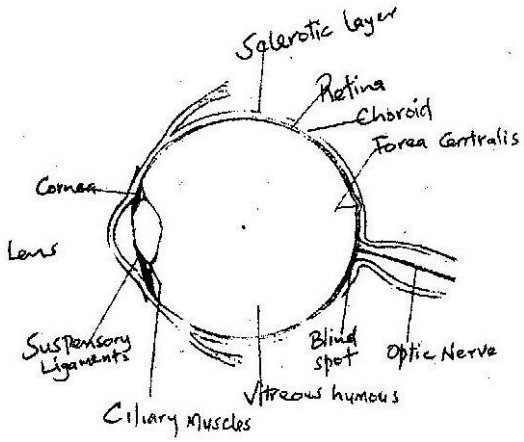
-At the onset of darkness, chloroplast stop making ATP and its concentration in guard cells falls rapidly stopping K+ pump, K+ migrate from the guard cells Causing them to lose water to the neighbouring cells by osmosis. The guard cells become flaccid and the stomata close.

-Water molecules are pumped into the guard cells from adjacent epidermis 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 area are thin walled and loosely packed leaving air space which communicates with air spaces in the cortex. Hence 0_2 for respiration is taken up & $C0_2$ is given out.

19. **Adaptations of the eye.**



The presence of:-

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-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 Iens** 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 forea. -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 whole 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.

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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,

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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.

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(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

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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

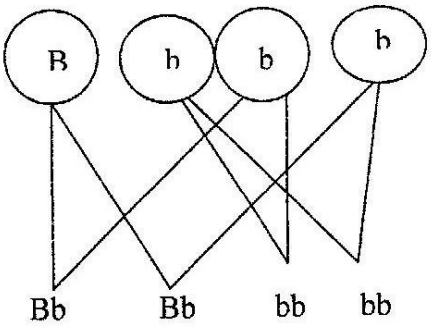
(b) Ball and socket joint allows movement in all planes while the illustrated allows movement in one plane only. Accept 360^0 for all planes 180^0 for one plane.

(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

2 x 100 = 50%
4

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.

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(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

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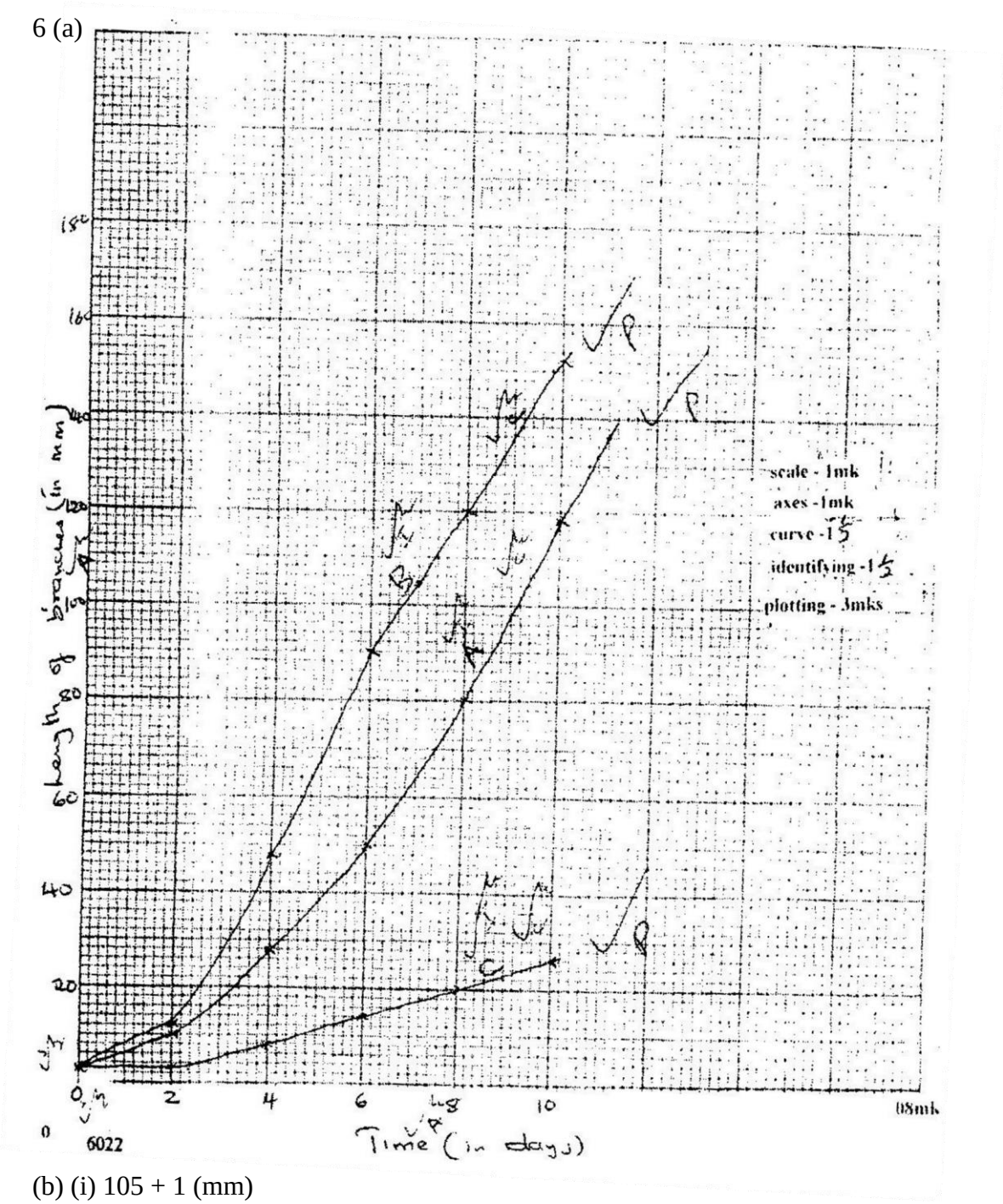
6 (a)



(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.

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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).

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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)

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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.

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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.

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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

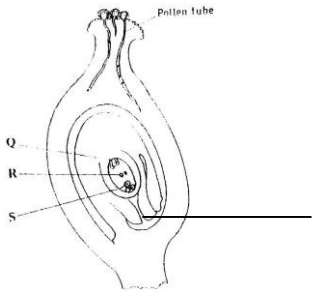
R- Polar body/ polar nucleaus

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)



Micropyle

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

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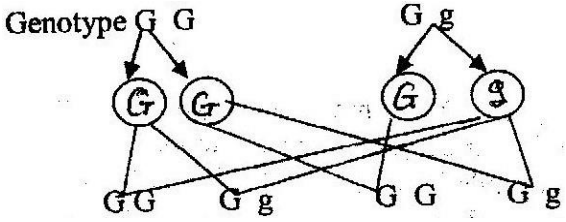

- The genotype ratio:

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

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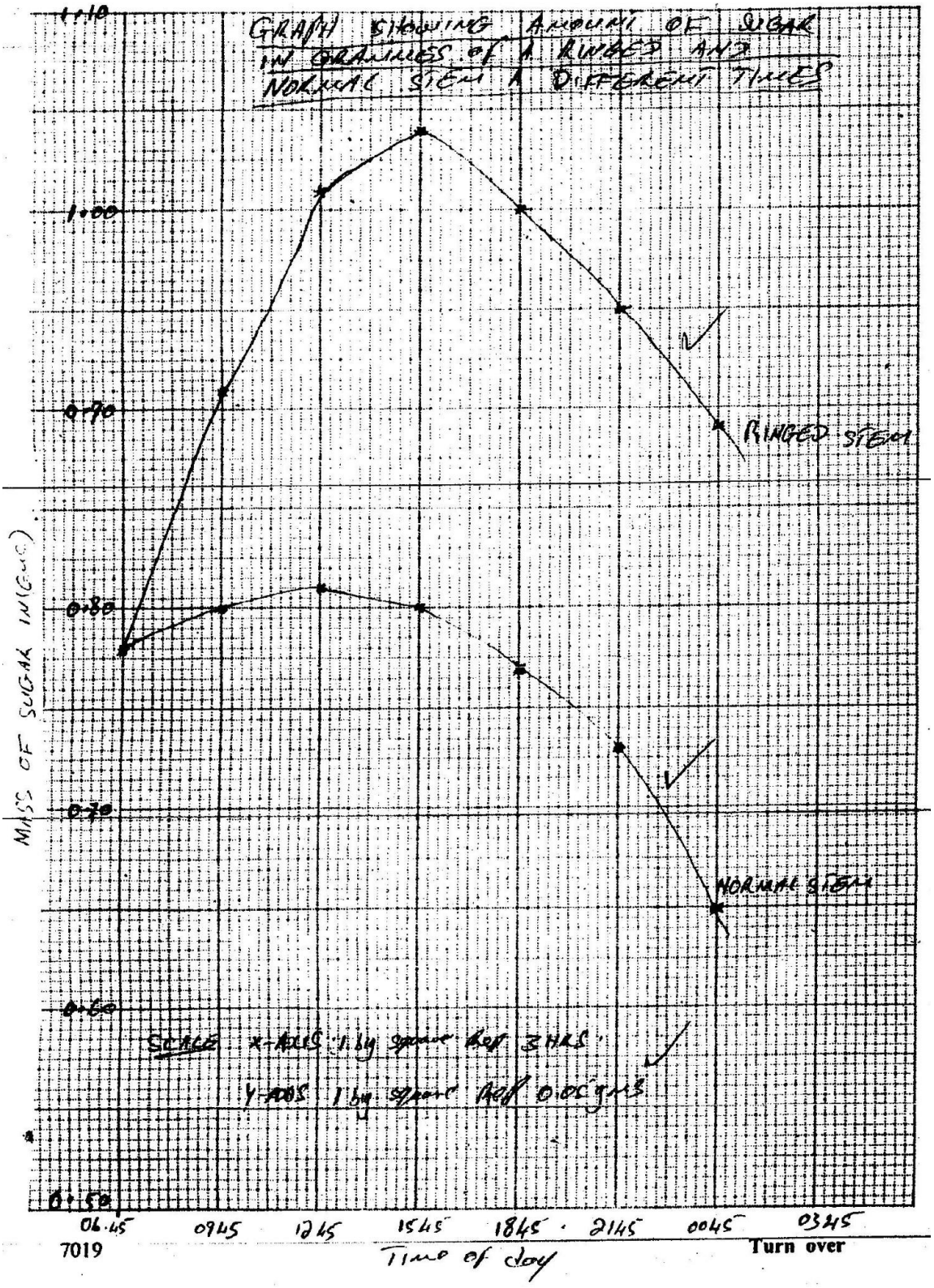

7. The ear is an organ involved in perceiving sound and maintaining body balance and posture. It is made of the following sections

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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.

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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)

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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

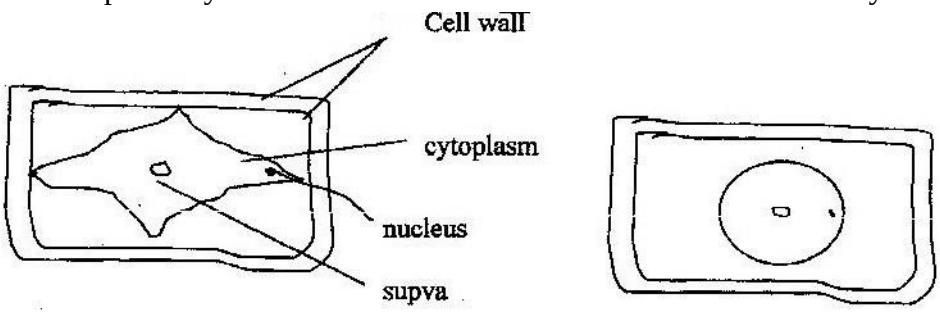
(b) To return useful substances/ glucose and Amino acids loose into the Bloodstream.

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

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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.

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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

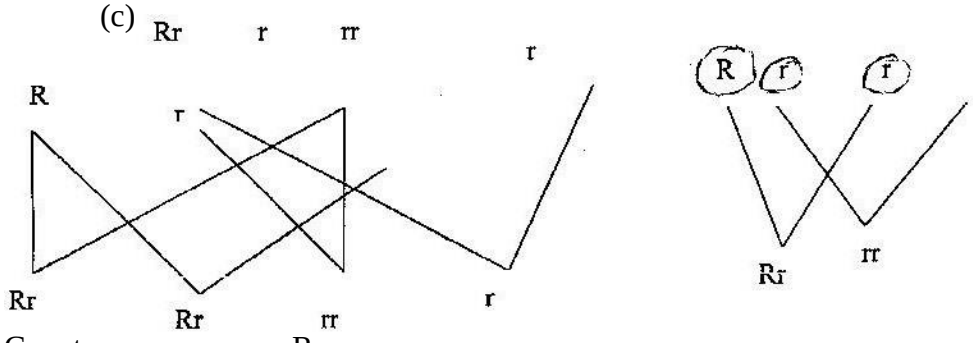
2. (a) Round seed plants

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

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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.

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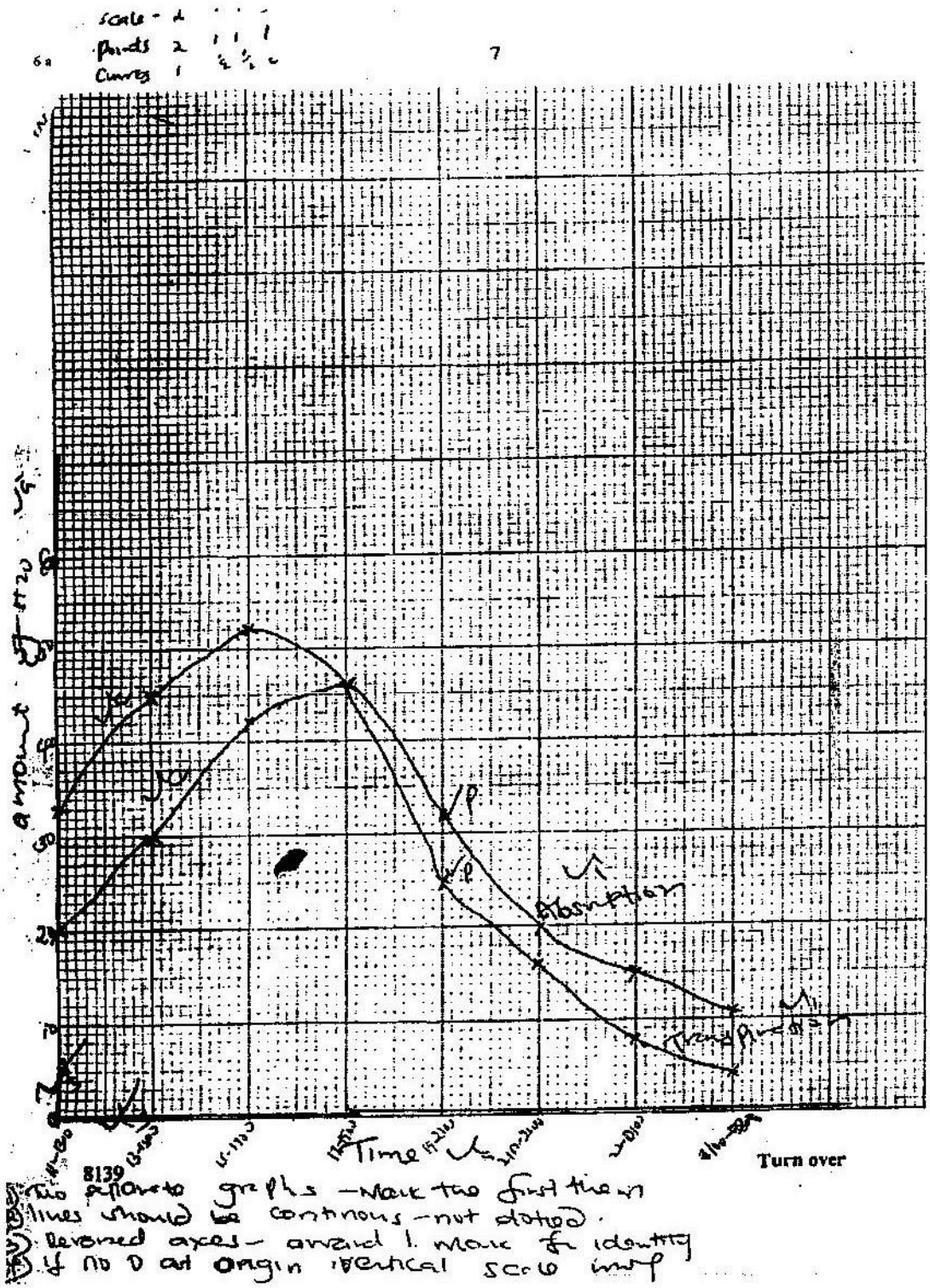

1900 – 0300 hrs; decrease (in the rate of absorption of water) due to the fact that rate of transpiration has declined

(d) Both transpiration and absorption decrease accept decrease (e) Wind; light, atmosphere pressure, humidity; temperature

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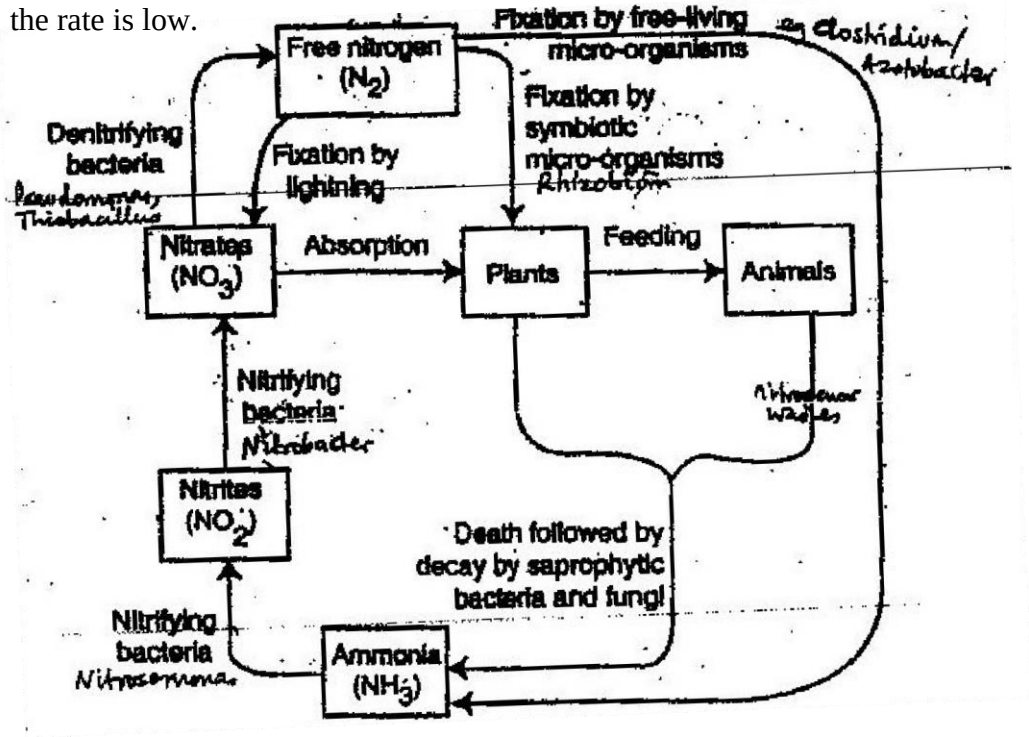
Temperature - at high temperature the rate is higher/ at low temperature the rate is Low.

(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.

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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

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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) $\frac{9(cm)}{15\ (cm)} = 0.6 / \frac{3}{5}$ $\frac{9.1cm}{1\ (cm)} = 0.606$
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 = $\frac{14.5\ cm}{0.6}$ = 24.16 cm/$\frac{14.6\ cm}{0.6}$ = 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 = $\frac{14.5\ cm}{0.613}$ = 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.

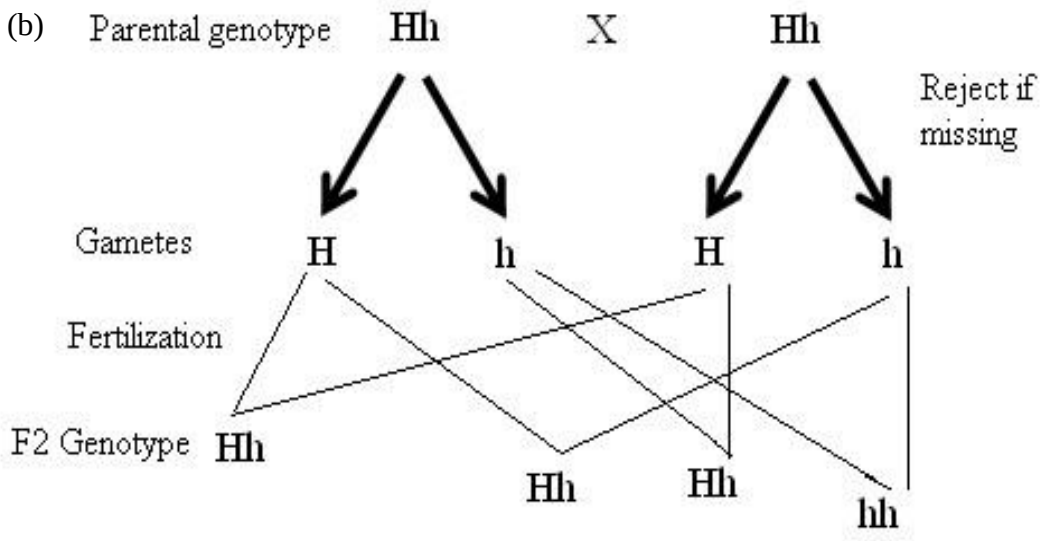
K.C.S.E 2009 BIOLOGY PAPER 2 MARKING SCHEME 1.

(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)

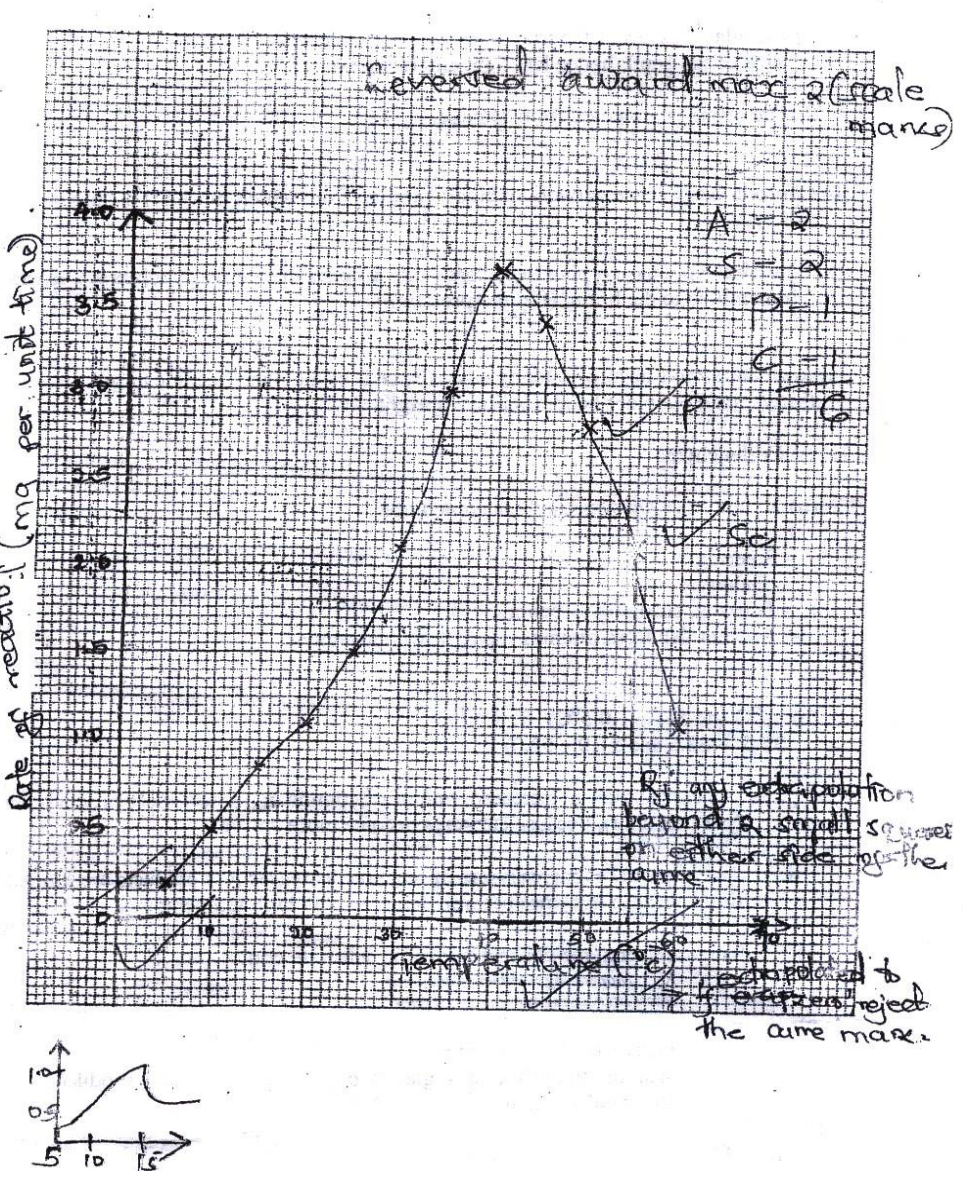
(i) Duodenum

(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)

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$NH_2 + H \rightarrow NH_3$

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

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

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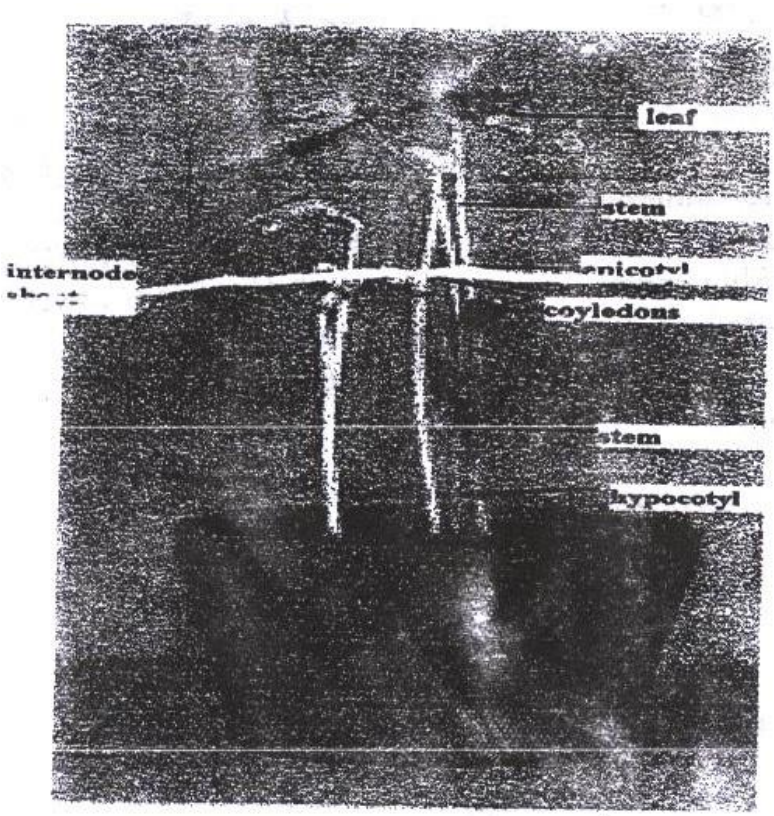

(b) i. epigeal germination

(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 - Thinner stem	- Short intermodes/ stem/ plant - Thicker stem
	- Small leaves	- Big/ large leaves

,

- Yellow or light green leaves - Green leaves/ stems/ cotyledons/ stem/ 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.

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