KIRINYAGA CENTRAL SUB-COUNTY JOINT EXAMINATION - 2015

231/1 BIOLOGY PAPER 1 MARKING SCHEME

1.(a) Golgi bodies / Golgi apparatus
(b) Mitochondria

2. Carbon (IV) oxide produced in respiration is utilized in photosynthesis; oxygen produced in photosynthesis is used in respiration ;

3. Favourable characteristics of parents retained.
Exploit favourable conditions of parents /
New offspring are nourished by parents/
New plants produced in conditions already favourable to the parents/
Shorter life cycles / Early maturity / Early maturity / faster colonisation / faster reproduction;
Independent of two parents / fertilization / pollination;
Large supply of stored food;
(Rej. Asexnal reproduction does not require mating) (mark first 3 mks)

4. (a)(i) Anaphase I
(ii) Homologues chromosomes separate at the equator; chromosomes start migrating to opposite poles;
Sister chromatids attach at the centromere; (mark first one)
(b) Spindle fibres.

5. This is to remove the poisonous lactic acid produced by anaerobic respiration in muscles;
and increase oxygen supply to the tissues; (Rej; Poisonous alone or removal alone)

6. (a) They show alternation of generation;
Have spore bearing structures called sporangia;
Show clearly defined sexual reproduction which are independent of water;
Possess chlorophyll and they are photosynthesis;
Have clearly defined vascular system;
Have true roots, stems and leaves and no flowers. (mark first two)
(b) Spermatophyta are seed bearing plants while pterophyta produce spores;
Spermatophyta have flowers or cones while pterophyta have sporangia;

7.(a) Less anti-diuretic hormone secreted (by pituitary gland) ; causing less reabsorption of water in the kidney tubules; thus resulting to dilute urine / copius urine;
(b) Diabetes insipidus / Diuresis;

8.(a)(i) Cause Graffian Follicle to develop (in the ovary)
Stimulates tissues of the ovary / wall of Graffian Follicle to secrete oestrogen; (mark first one)
(ii) Causes ovulation;
Causes Graffian Follicle to change to copus luteum;
Stimulates corpus luteum to secrete progesterone;
(b) Because testosterone is transported through the blood but not through the vas deferens;

9. (a) Intermittent growth curve;
(b) Arthropoda (Rej. Wrong spelling)
(c) Ecdysis / moulting / shedding of old skeleton;

10.(a) Cellulose digesting bacteria;
(b) Symbiosis / mutualism;

11. Endosperm material was being converted / oxidized; into new cytoplasm / use for growth.
(Acc: endosperm oxidised) (Rej. Endosperm food broken down)

12. (a)(i) Process by which particles move from a region of high concentration to a region of low concentration;
(ii) High concentration of oxygen in the alveoli.
(iii) Thin epithelium;
Rich network of blood capillaries;
Moist surface

13. Heterosis / High yielding / Hybrid vigor;
Resistance of diseases;
- Resistance of drought / salinity;

Early maturity. (mark first two).

14. (a) White blood cells ;
(b) Natural immunity is inherited / transmitted from parents to off springs;
Acquired immunity is acquired after suffering from a disease / through vaccination / vaccination through inoculation / through introducing antibodies. (Rej. Immunisation alone)

15. (a) Movement of water molecules from a region of high (water) concentration to a region of low (water) concentration through a semi-permeable membranes.
(b) - Absorption of water (from the soil);
- Movement of water (molecules) from cell to cell;
- Mechanical support due to frigidity;
- For opening / closing of stomata;
- Feeding in insectivorous plants; (mark first two)

16. (a) Fossil records / paleontology;
Comparative anatomy;
Comparative embryocology;
Geographical distribution;
Cell biology;
Comparative serology; (mark first 2)
(b) Acquired characteristics cannot be inherited;
Inherited characteristics are found in reproductive cells;

17. (a) A - Aquatic / fresh water (Rej. marine)
B - Forest (Rej terrestrial)
C - Arid / semi - arid / desert
(b) Sunken / hairly / reversed rhythm / small / stomatal pores / aparatures; (mark first to appear)

18. (a) Use of turgor pressure / turgidity ;
Use of tendrils and climbing stems ;
Use of xylem / thickened tracheids and vessels;
Use of spines / thorns (mark first one)
(b) Sclerenchyma;
Collenchyma;
Xylem;
Parenchyma; (mark first three)

19. (a) Closed circulatory system.
(b) - Blood flows under high pressure;
- Blood flows at high speed;
- Blood travels for long distances;
- Animal remain active throughout;
- Animals grow into big sizes (mark first two)

20. - The adult and larvae exploit different (food) niches; do not complete for food;
- Pupa can survive adverse conditions / pupa is non-feeding stage for adverse conditions;
- Dispersal phase prevents overcrowding; (mark first two)

21. (a) Genes are located on the sex chromosomes / on X and Y chromosomes; They are transmitted together with those determining sex.
(b) Baldness; colourblindness; haemophilia;
Hairly ears / pinna / nose; duchere
Muscular dystrophy; (Rej: Bleeders diseases)

22.(a) Long sightedness / Hypermetropia (Acc. Long sight)
(b) Convex lens / converging lens; to converge the rays so that the image focus on the retina.

23.(a)(i)To remove toxic / harmful substances / urea / nitrogenous wastes / toxic metabolic wastes;
(ii) To return useful substances / glucose and amino acids (mineral salts back to the bloodstream.
(b) Bowman's Capsules

24. (a) Protease; Lipase;
(b) 35^0C is the optimum temperature for the enzyme to act; at 15^0C enzymes are inactivated since the temperature is low;

25. To know HIV status; so as to take appropriate measures; if positive start medication /negative avoid infection;

26. (a) Effect of unilateral / unidirectional light on shoots;

(b) Seedlings / shoot grows / bends; towards light / growth curvature towards light;

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231/2 BIOLOGY PAPER 2 MARKING SCHEME

1.(a) A - Neural spine; (1 mk)
B - Metapophysis; (1 mk)
C - Centrum; (1 mk)
(b) - To offer a large surface area for attachment of abdominal muscles; (1 mk)
(c) - Provides sites for attachment of muscles and organs;
- To protect inner organs;
- To maintain the body shape;
- To enable movement;
- To provide support; (max 3 mks)
(d) - It is elongated to provide a large surface area for muscle attachment. (1 mk)

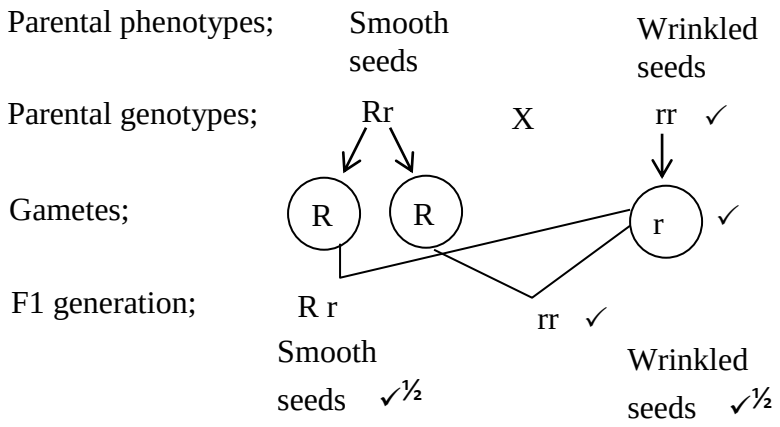
2. (a) Photosynthesis is controlled by enzymes ; the enzymes are denatured at high temperature; hence Decrease in product formation. (2 mks)
(b)(i) The rate of product formation is low and constant; enzymes are inactive at low temperature;
(ii) Rate of photosynthesis is high and constant;
This is the optimum temperature for the enzyme activity; (4 mks)
(c)(i) Light intensity / carbon (iv) oxide; (1 mk)
(ii) Oxygen / glucose / starch; (1 mk)

3.(a)(i) Syringe - afferent vessel / arteriole ; (1 mk)
(ii)Perforated rubber tubing - glomerular; (1 mk)
(iii)Free rubber tubing - efferent vessel / arteriole; (1 mk)
(b) Ultra filtration; (1 mk)
(c) Pressure would force the glucose solution to be filtered into container A; as their molecules are smaller and passes through the perforations; while the beads will collect into container B; as they cannot pass through the perforations; (4 mks)

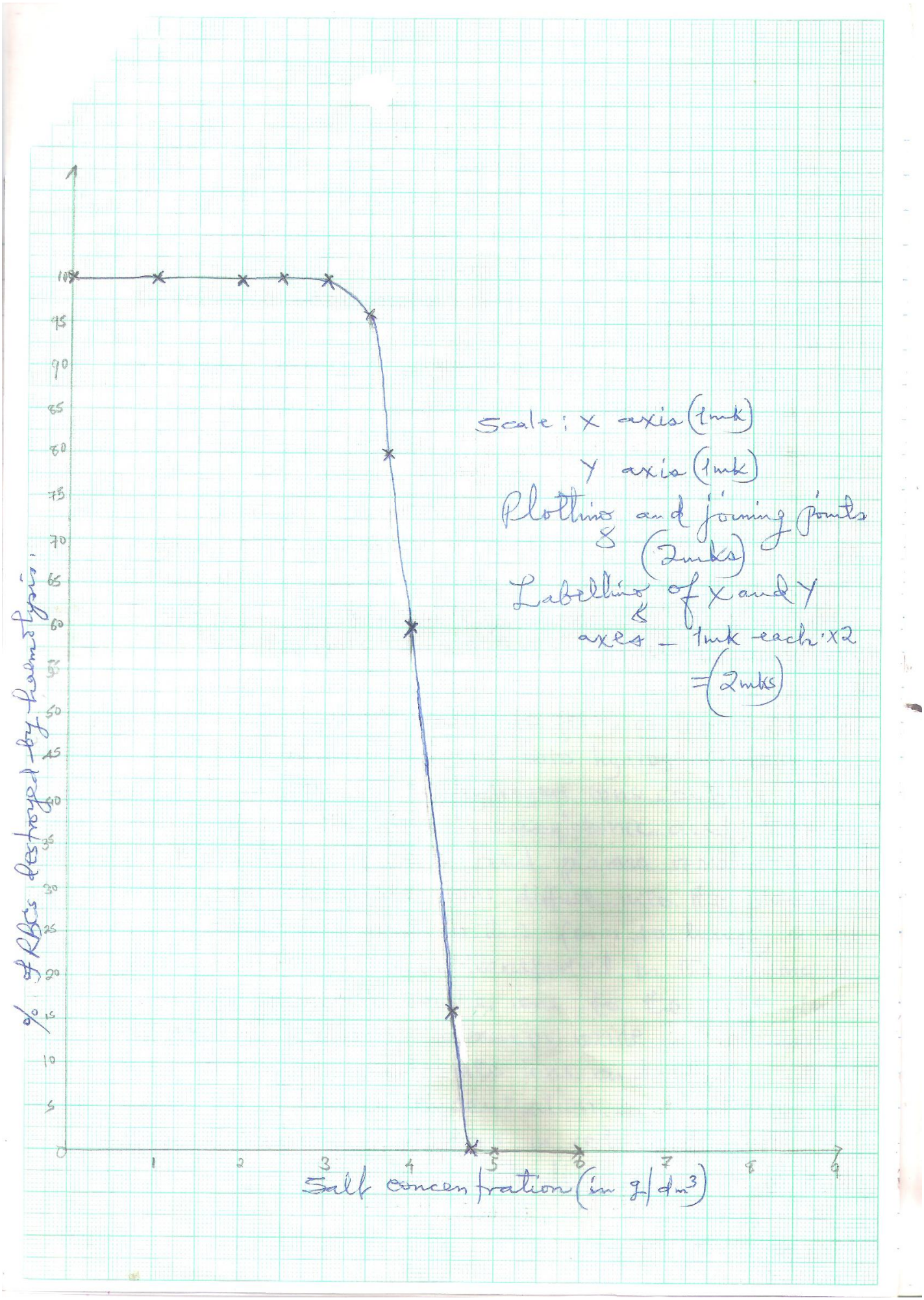
4.(a)(i) 360 + 498 + 546 + 216 + 120 + 72 = 1812/6; = 302 ; (2 mks)
(ii) Decrease in number of impala / prey hence starved to death; emigration / poaching / immigration leading to increased competition ; disease epidemic ; pollution / human activities; (3 mks)
(b)(i) Secondary consumer;
(ii) Tertiary consumer; (2 mks)
(c)(i) Pyramid of numbers;
(ii) Pyramid of biomass; (2 mks)

5. (a) - Smooth seed plant - Rr; (1 mk)
- Wrinkled seed plant - r r; (1 mk)
(b) Smooth seed plant - R and R/® and ®; (1 mk)
Wrinkled seed plant - r and r / (r) and (r) (1 mk)

(c)



6. (a) On the graph.



(b) Haemolysis of red blood cells occurs when they are placed in a hypotonic solution; they gain a lot of water; swell an then burst; (3 mks)

(c)(i) 4.1 g/dm^3; $\pm$ 0.1; (1 mk)

(ii) 3.0 g/dm^3; $\pm$ 1; (1 mk)

(d)(i) 4.7 g / dm^3 $\pm$ 0.1; (1 mk)

(ii) At 4.7 g / dm^3 salt concentration; as there is no haemolysis / haemolysis was zero; (2 mks)

(iii) Isotonic solution; (1 mk)

(e) Osmoregulation; Rej. homeostasis (1 mk)

(f) - Osmosis enables movement of water from one cell to another;
- Osmosis helps in closing and opening of the stomata;
- Osmosis helps in support when cells become turgid in plants;
- Osmosis helps in absorption of water by the root hairs; (max 4)

7. Transport of oxygen gas.
The alveoli have a higher concentration of oxygen gas; than the blood in pulmonary capillaries; oxygen diffuses across alveoli wall, endothelium of capillaries; into red blood cells; where it combines with haemoglobin; to form oxyhaemoglobin; a compound that dissociates easily; it is then transported in this form to respiring tissues; in the capillaries of respiring tissues oxyhaemoglobin dissociates into oxygen and haemoglobin; Oxygen diffuse into tissue cells; along a concentration gradient.

Transport of carbon (IV) oxide.
High concentration of carbon (IV) oxide in the cells stimulates dissociation of oxyhaemoglobin in blood capillaries of the tissues; carbon (IV) oxide diffuses out of the cells tissue fluid, across the endothelium of tissue capillaries; into the red blood cells; where it combines with water to form a weak carbonic acid; which dissociates into hydrogen carbonate and hydrogen ions; hydrogen ions combine with haemoglobin to form haemoglobinic acid; thus pH of the red blood cells and plasma remains constant; the hydrogencarbonate ions diffuse into the plasma and are transported in this form to lungs; a little of carbon (IV) oxide is transported in the plasma in form of hydrogencarbonate ions to the lungs; in the pulmonary capillaries, carbon (IV) oxide is released from the hydrogencarbonate ions and diffuses into the alveoli along a concentration gradient ; the enzyme carbonic anhydrase in red blood cells speed up loading and off-loading of carbon(IV) oxide; (20 mks)

8. - It is relatively long; to increase the surface area for absorption of food and for digestion;
- Lumen has many villi per unit area to increase the surface area for absorption of food; villi have microvilli to increase the surface area for absorption of food.
- Its walls have glands which secrete enzymes that complete digestion; Acc names of enzymes.
- Walls have goblet cells; which secret mucus; for lubrication of food / walls; and to protect the walls from digestive enzymes ;
- Presence of circular and longitudinal muscles; that allow mixing of food by periotalsis;
- It is coiled / folded; to slow down movement of food / to give food enough time for digestion;
- Intestines are richly supplied with blood; to supply oxygen and carry away digested food;
- It has lacteals; for transport of fats / lipids.
- Their walls are thin / thin epithelium; for faster diffusion / absorption of food; (max 20 mks)

KIRINYAGA CENTRAL SUB-COUNTY

231/3 BIOLOGY PAPER 3 (PRACTICAL) MARKING SCHEME

1.(a)(i)

Food substances	Procedure	Observations	Conclusion.
Starch	Add a drop of iodine - If heating reject but continue marking Acc heating and cooling	No colour change (Rej. No observable change Acc colour of iodine retained	Starch absent / No starch
Proteins	Add dilute NaOH soln and Add $CuSO_4$ (Stop marking if heating is there)	Violet or purple (rej. pink)	Protein present
Reducing sugar	Add Benedict's Soln then heat / boil / warm	Colour changes from blue to green to yellow. Turn green	Reducing sugars present. Rej. Glucose Acc simple sugars present Traces of reducing sugars/little amounts of reducing sugars.

(9 mks)

(ii) Starch - No starch because it has been digested / converted to / broken down / hydrolysed / changed to; Reducing sugars / mono saccharide simple sugars / maltose / glucose.
Proteins - Proteins present because their digestion is not complete / continues / is incomplete.
Reducing sugars - Reducing sugars present because they are the end products of carbohydrate/ starch digestion ; OR
Reducing sugars present because they have not been absorbed completely.

(b)(i) Inner surface - Slimy / slippery / wavy / undulating / has protrusions has projections /swellings / folds /lumps (rej. rough)
Outer surface - smooth.

(ii) - Is slimy due to presence of mucus ; secreted by walls of the intestine; to protect the wall of intestine from digestion / to lubricate the passage of food.
- Due to presence of villi / finger like projection; for absorption of digested food;
- Has folds to increase the surface area (for absorption)

2.(a)(i) Divergent evolution; (1 mk)

(ii) Small variations occurred in feet of birds within the population; competition for limited food occurred in the environment; predation as a mode of feeding favoured birds whose feed had long; sharp and curved claw / talons; to kill prey / tear flesh of prey; OWTTE (3 mks)

(iii) All birds had same length of feed; the (aquatic environment favoured long feet talons; leading to continuous natural use of the feet; which kept increasing in length; the longer trait was then passed on to offspring along the generations; OWTTE (3 mks)

(b)(i) E - Radius; (1 mk)
F - Humerus; (1 mk)

(ii)

Figure 1	Figure 3
- Have pentadacty / limb structure	- Have no pentadacty limb structure
- Originate from endoskeleton	- Originate from exoskeleton.
	(Mark first one only) (1 mk)

(ii) Ball and docked joint ; (1 mk

Total marks for the question (11 mks)

3. (a) Pisces reject fish or fishes (1 mk
(i) Presence of fins
(ii) Presence of (overlapping) scale
(iii) Presence of gill / operculum
(iv) Presence of lateral line. (3 mks)

(b) (i) Head $\rightarrow$ tail — smooth
Tail $\rightarrow$ head — Rough (2 mks)

(ii) Scales overlap pointing backwards.
(iii) Minimizes / reduce friction (during motion)
- Prevent mechanical injury.
Rej. Protection for prevent

(c) (i) Tail / Tail fin / tail muscle / caudal fin;
(ii) Pectoral fins; pelvic fins
(iii) Dorsal fin; anal fin (ventral fin)
(iv) Streamlined body / backward facing scale / slimy / mucoid surface