

BUTULA SUB-COUNTY BIOLOGY PAPER 2 MARKING SCHEME 2021

1. The table below shows variations in the form of carbon (IV) oxide is transported in the blood at rest and during physical exercise.

Form of transport	At rest (mole/litre)	During exercise(mole/litre)
Dissolved carbon (iv) oxide	0.52	0.97
Hydrogen carbonate ions	12.34	13.68
Carbon iv oxide bound to protein	0.26	0.16
Total carbon iv oxide in plasma	13.12	14.81
pH of blood	7.42	7.09

a) Explain why more carbon (IV) oxide is transported in the form of hydrogen carbonate ions. 3mks

•The presence of carbonic anhydrase enzyme which speeds up/ catalyzes the conversion of carbon (IV) oxide to weak carbonic acid which dissociates into hydrogen ions and hydrogen carbonate ions.

•The hydrogen carbonate ions diffuses out of the red blood cells into the blood plasma.

b) Account for the high total plasma content of carbon (IV) oxide during exercise. 2mks

•There is high rate of respiration to provide more energy for exercise/ muscular activity. This releases more carbon (IV) oxide into blood plasma

c) Explain how one's involvement in the exercises affects blood pH.

2mk

The high rate of respiration during physical exercises results into production of more carbon (IV) oxide / faster accumulation of lactic acid. This lowers the pH of blood plasma/ increases acidity of blood plasma.

d) Name the protein responsible for transport of carbon (IV) oxide in the blood.

1mk

Haemoglobin.

2.a.W---Sebaceous gland

X...erector pili muscles (2mks)

b) y—conducts sweat from sweat gland to the surface of the skin

z—secrete and extract sweat (2mks)

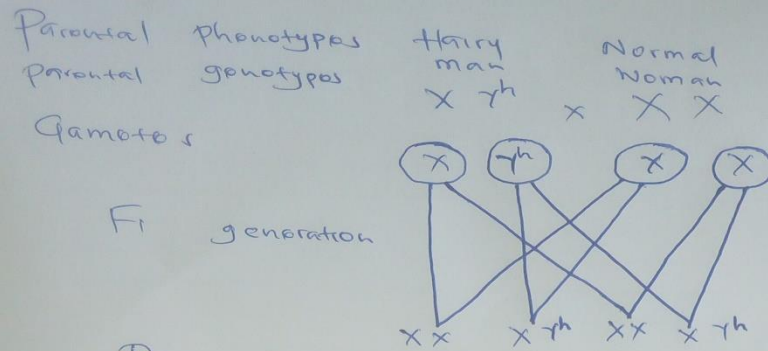
c.the arterioles constricts;decreasing blood flow near the body surface;discouraging heat loss;to the environment through radiation and convection.(4mks)

3. 3. a) define the term genetics

1mk

b) tufts of hair in the ear pinner is thought to be sex-linked characteristics found on the Y chromosome.

i. if a man hairy ears married a woman, what is the likelihood that all their sons would have hairy ears. Show your working. 4mks



- Pros
- Open gametes
 - Fusion line penetrating into the gametes
 - Fusion lines meeting before reaching gametes
 - Hanging fusion lines
 - Across missing at the gametes
- Accept: Use of a punnet square.

Genotypes: $X Y^h$ x $X X$

$\begin{matrix} \text{♀} \\ \text{♂} \end{matrix}$	X	Y^h
X	XX	$X Y^h$
X	XX	$X Y^h$

ii. name other sex-linked characteristic found in man

1mk

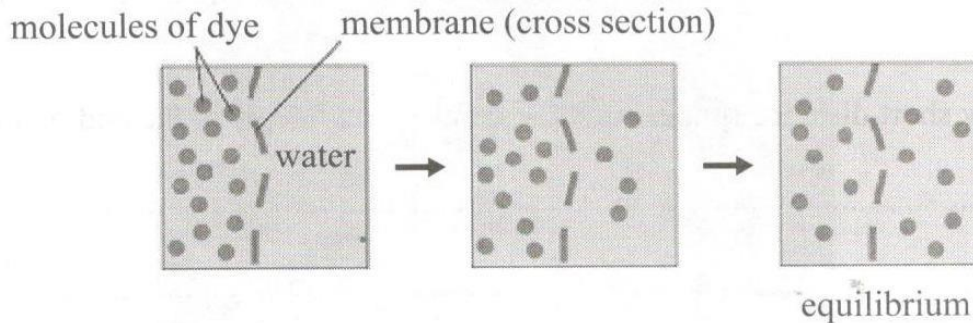
- hemophilia
- pre mature baldness
- color blindness

c) Klinefelter's syndrome

turners syndrome

down syndrome

4. 4. The set up below illustrates a certain physiological



a) Name the physiological process. (1mk)

diffusion

b) Give two examples of the process named in a) above in plants. (2mks)

Gaseous exchange/ excretion of carbon (IV) oxide.

Absorption/ uptake of mineral ions.

Translocation/ transport of manufactured food.

c) State two ways by which the movement of the dye in the set up would be slowed down. (2mks)

Increasing thickness of the membrane.

Using less dye/ adding more water/ reducing concentration gradient

. lowering temperature

d) **What is the significance of diffusion in pollination?** **1mk**

• Insects that carry out pollination are attracted by the smell from the flowers. This may lead to pollination.

e) Differentiate between wall pressure and turgor pressure.

Wall pressure is the inward pressure exerted by the cell wall on the cell membrane to resist expansion as the cell takes in water through osmosis.

Turgor pressure is the outward pressure exerted by the expanded vacuole on the cell wall as the cell takes in water through osmosis.

5. a) $P = \frac{F.C.M \times S.C}{S.C.M}$

$$\left(\frac{240 \times 160}{40} \right) ;$$

$$= 960 \text{ grasshoppers.};$$

b) Capture and recapture method;

c) i) Sweep net

ii) Nail vanish/indelible ink;

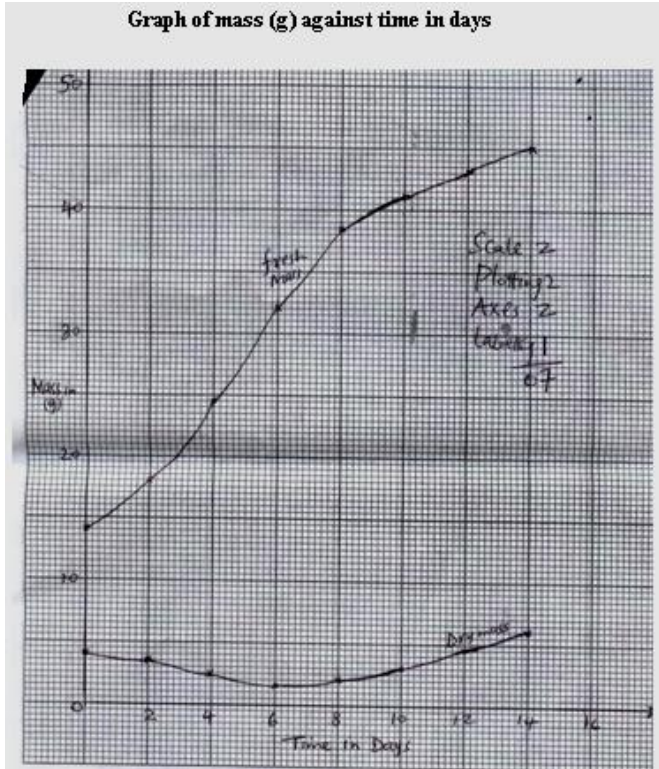
d) - No migration/No movement into and out of the study area;

- There is even distribution of the grasshoppers in the study area;

- There is random distribution of the grasshoppers after the first capture;
- No birth or deaths of grasshoppers during the field study;

- e) i) Arthropoda;
 ii) Insecta

Reject spelling Arthropod insect. (total 8mks)



b) i) $2.75g \pm 0.5$;

ii) $39.5g \pm 0.5$;

c) i) Absorption of water hence rapid increase in mass;

ii) Decrease in dry mass; food stored is oxidized/used in respiration to provide energy needed for germination;

d) Photosynthesis occurs; Plumule and foliage leaves are developed;

e) To give an average; reduces error in measurement/for accuracy.

f) i) embryo maturity; germination inhibitors; lack of hormones; lack of enzymes; impermeable seed coat. Any @ 1 mark.

ii) water/moisture; oxygen; warmth any 1 @ 1mark.

g) Thin cell walls; dense cytoplasm; no vacuoles. Any @ 1mark.

7.a) substrate specific

Protein in nature hence affected by change in temperature and pH

Work in small quantities

Catalyse reversible reactions

b)The meal is ingested through the mouth;its chewed /masticated by teeth;to reduce /break into smaller particles mixed with saliva from salivary gland;the food is then rolled by the tongue into boluses and pushed down into the oesophagus/swallowed;the boluses move by peristalsis into the stomach;constant contraction and relaxation of the stomach wall mix the food;presence of food in the stomach further stimulates production of gastric juice which contains pepsinogen and renin/chymosin;pepsinogen is activated to pepsin by hydrochloric acid;pepsin breaks down proteins into peptides;renin converts /coagulates the proteins/caseinogen in milk to casein;it is then pushed into the duodenum(through pyloric sphincter);pancreatic juice in the duodenum contains trypsin (secreted in inactive form trypsinogen),which digest proteins into peptides ,in the ileum intestinal juice/succus entericus is secreted; it contains peptides enzyme/which breaks down peptides into amino acids;it also contains polypeptides enzyme which breakdown polypeptides into amino acids;completing the process of digestion of proteins,the amino acid molecules pass through the epithelial of the villi and the capillary walls/are absorbed into the blood stream;(by active transport).the undigested /indigestible proteins/food substances pass through to the colon/large intestine where water is absorbed,leaving a semi solid waste material being passed on to the rectum;then out of the body through the anus(as faeces);

8 (a)

Meiosis	Mitosis
Homologous chromosomes associate with one another	Homologous chromosomes do not associate with one another
Takes place in two nuclear divisions/phases each having four stages	Takes place in one nuclear division/phase of four stages
Produces four daughter cells each haploid	Produces two daughter cells each diploid
Occurs in reproductive organs leading to formation of gametes	Occurs in somatic cells leading to growth and repair
Chiasma formation takes place and may lead to variation	No chiasma formation therefore no crossing over hence no variation;

4mks

(b) (b) Fertilization is the fusion of the male and female nuclei in the embryo sac; The male gamete is contained in the pollen grain; produced in the anthers; The female gamete is found in ovules; within the embryo sac; After pollination, the pollen grain absorbs nutrients from the stigma; and forms an outgrowth called the pollen tube; which grows down the style to the embryo sac taking along the male gametes with it; The pollen grains usually adhere to the stigma as a result of the stigma cells secreting a sticky substance; which also stimulates the pollen grain

to germinate sending down its pollen tube; The growth of the pollen tube into the stigma, through the style to the ovary, is by pushing its way between the cells ;where it gets its nourishment from the surrounding tissues;

As the pollen grain germinates; the (pollen) tube nucleus occupies a position at the tip of the growing pollen tube; the generative nucleus divides by mitosis; into two male gamete nuclei; which follow behind the tube nucleus as the pollen tube grows down the style. The pollen tube enters an ovule through the micropyle; and when it reaches the centre of the ovule it penetrates the wall of the embryo sac and bursts open; the(pollen) tube nucleus disintegrates leaving a clear way for the entry of the male nuclei; One of the male nuclei fuses with the (functional)egg cell nucleus; to form a diploid zygote; which develops into an embryo; while the other male nucleus fuses with the polar nuclei to form a triploid nucleus; which develops into a primary endosperm; this gives the double fertilization which is unique in flowering plants; 23max 16