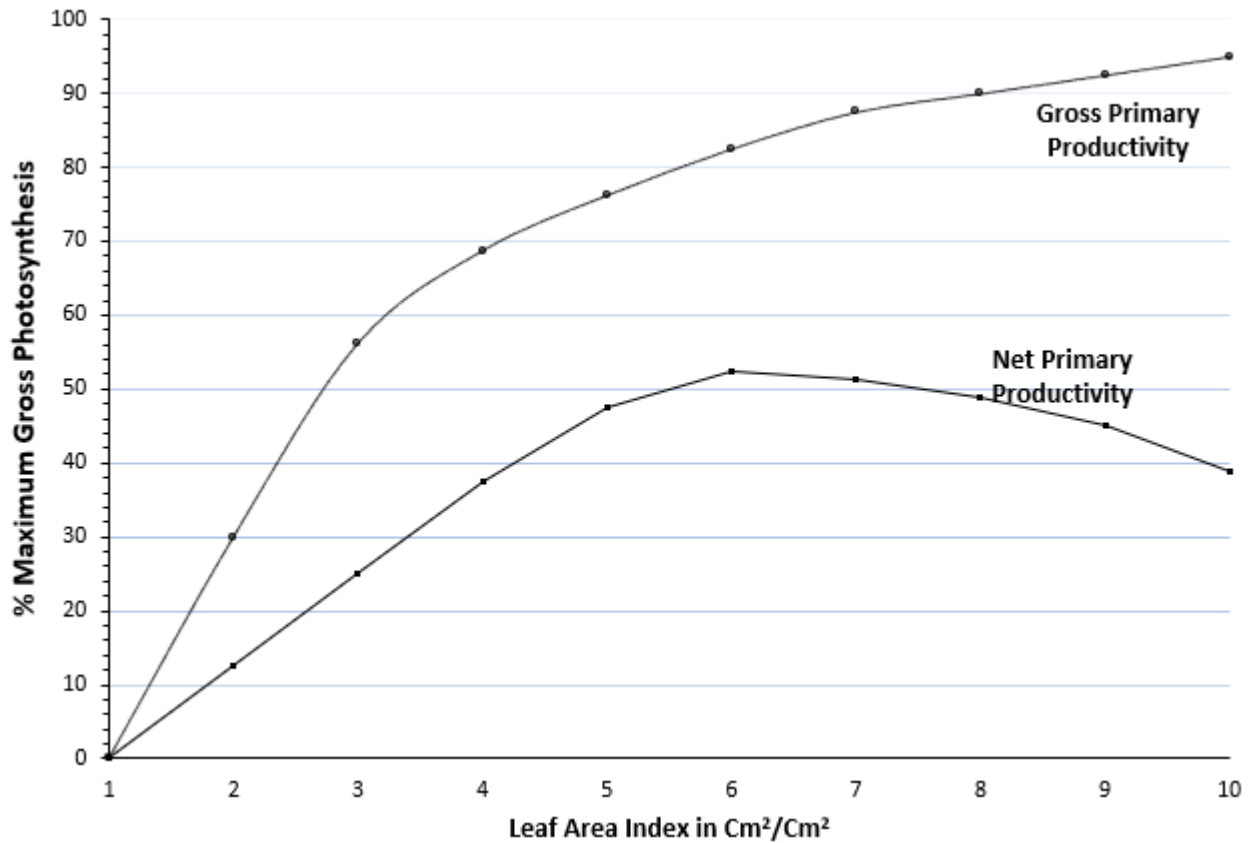


UMSSN A LEVEL INTERACTIVE BIOLOGY SEMINAR 2023 DISCUSSION QUESTIONS

1. Figure shows the influence of leaf area index on Net primary productivity (NPP) and Gross primary productivity (GPP) of a plant species. Study it and answer the questions that follow.



- a) What is meant by GPP and by NPP?
- b) Describe the effect of leaf area index on; (i) GPP (ii) NPP
- c) Explain the difference between GPP and NPP for leaf index values:
 - (i) Below 6 cm²/cm²
 - (ii) Beyond 6 cm²/cm²
- d) Using the figure, explain the following:
 - (i) Necessity of controlling the pests that feed on crop leaves.
 - (ii) The role of herbivores in controlling productivity in nature
 - (iii) What to consider when carrying out pruning
- e) Suggest reasons why plants grown in green houses attain a higher NPP.

TURKISH LIGHT ACADEMY

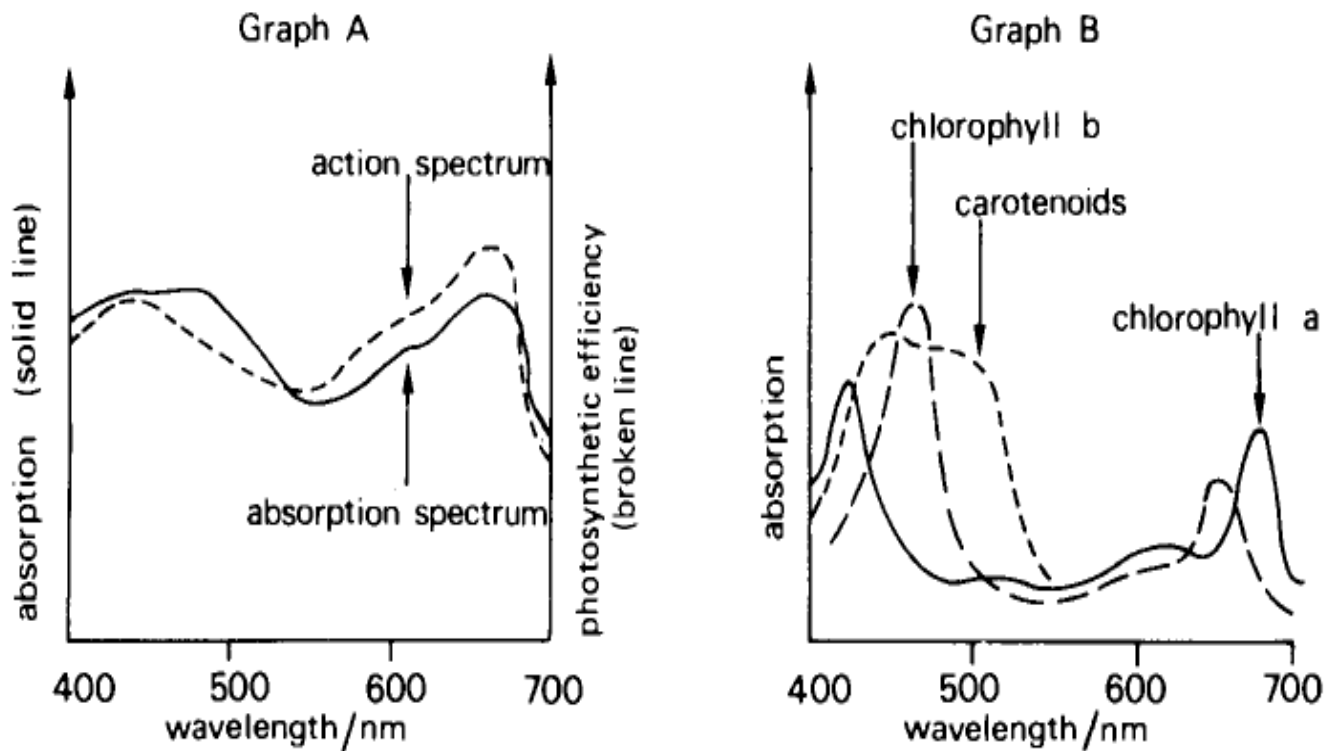
2. a) Describe the term species diversity.
- b) Describe how species abundance can be measured using frame quadrats in random sampling.
- c) Explain the assumptions made while using the capture recapture method.

PRIDE COLLEGE SCHOOL MPIGI

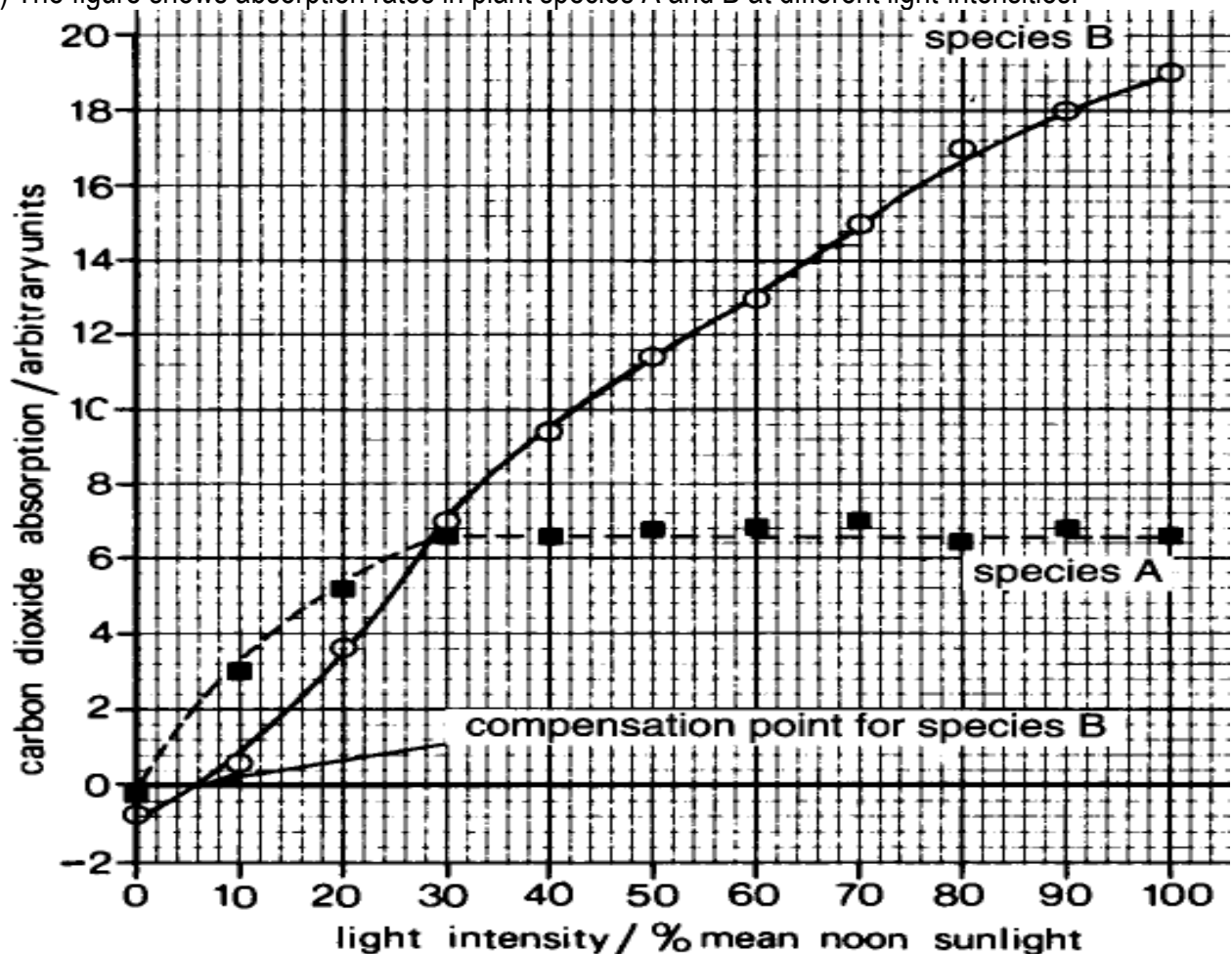
3. a) What is meant by the term genetic code?
- b) Describe how the genetic code guides the process of protein synthesis.
- c) Briefly describe the fate of a polypeptide chain after translation.

KITANTE HILL SCHOOL

4. Graph A shows the absorption spectrum of a solution of pigments extracted from bean leaves and the action spectrum of a bean plant determined by measurement of the rate of photosynthesis when illuminated by different, wavelengths of light. Graph B shows the absorption spectra of three pigments which have been extracted from bean leaves and examined individually.



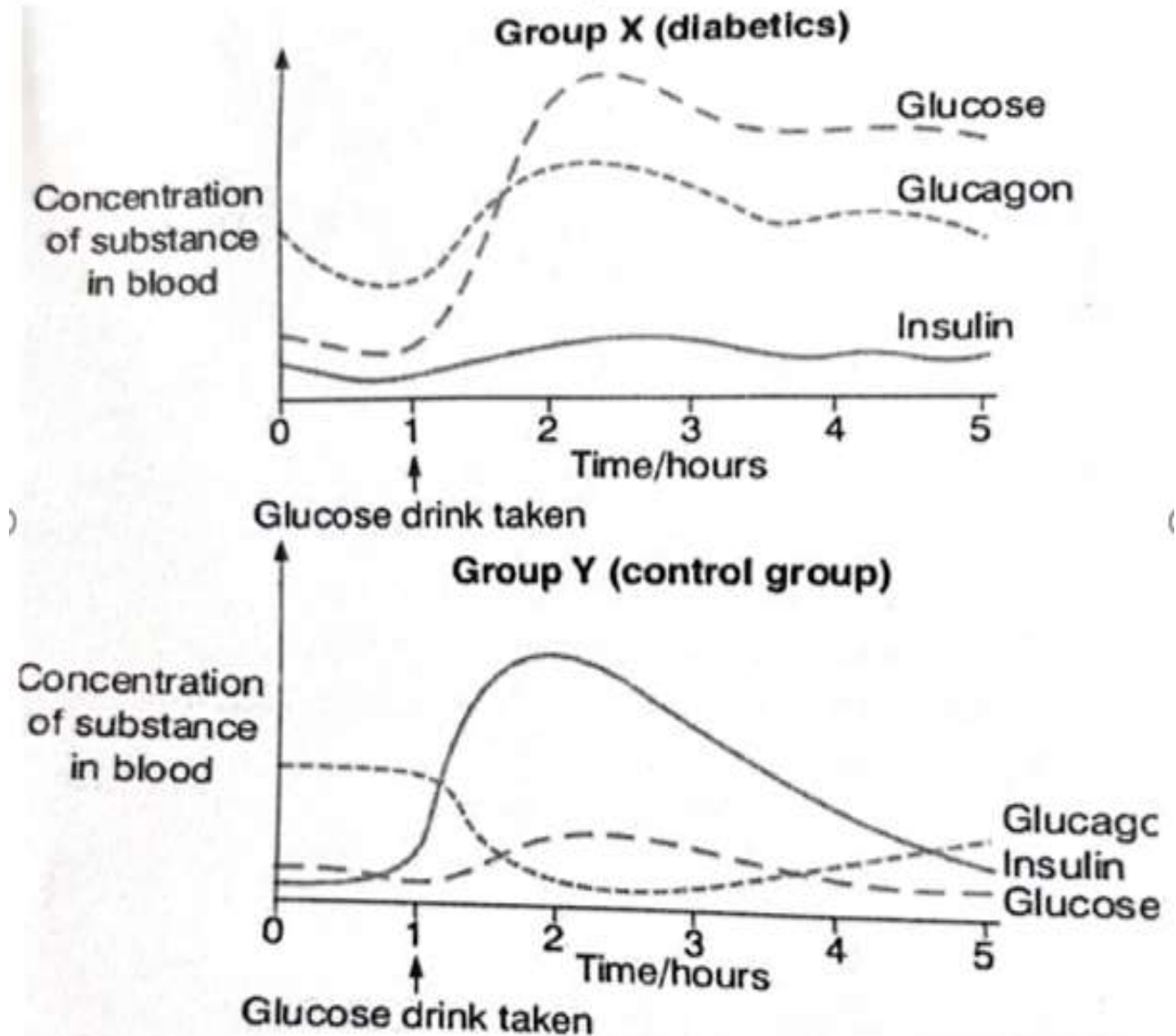
- i) With reference to graph A; comment on the biological significance of the relationship between the action spectrum and the absorption spectrum.
- ii) relate the visible colour of a leaf to the absorption spectrum;
- b) With reference to graphs A and B account for the difference between photosynthetic rate and light absorption at 490nm.
- c) The figure shows absorption rates in plant species A and B at different light intensities.



- i) Compare the two curves.
- ii) Discuss the extent to which species A and species B might be able to grow in the same habitat.
- d) i) What is meant by the term limiting factor?
- ii) From your knowledge of photosynthetic pathways, explain precisely how three named factors can be limiting in photosynthesis.

ST. HENRYS COLLEGE KITOVU

5. An experiment was carried out with two groups of people. Group X had type I diabetes while group Y did not (control group). Every 15 minutes blood samples were taken from all members of both groups and the mean levels of insulin, glucagon and glucose were calculated. After an hour, every person was given a glucose drink. The results are shown in the figure below.



- a) suggest any other hormones that are involved in regulating blood glucose level.
- b) Compare groups X and Y in the way insulin secretion responds to the drinking of glucose.
- c) With reason(s) suggest the change in the glucose concentration of both groups during the first hour.
- d) Using information from the graphs, explain the changes in the blood glucose concentration in group Y after the glucose is drunk.
- e) Explain the difference in blood glucose concentration between group X and Y.
- f) Predict what would happen to the blood glucose concentration of group X if they had no food intake over the next 24 hours.

g) According to the International Diabetes Foundation, in 2021, an estimated 716,000 adults in Uganda had diabetes. About 89% of Ugandans with diabetes are neither on medication nor aware of their status and therefore present to the health system with difficult to treat complications. State the complications that diabetics face and account for the rise in the prevalence of diabetes in Uganda.

ST. KIZITO S.S. NAMUGONGO

6. a) Explain how the leaf anatomy of C₄ plants accounts for the high carbon dioxide fixation of these plants at high temperatures.

b) The table below shows the relative distribution of C₃, C₄ and CAM plants.

Plant	Number of plants at altitude		
	Low	Moderate	High
CAM	Few	Many	Many
C ₃	Very few	Few	Many
C ₄	Few	Many	few

Account for the trends in the;

(i) C₃ plants

(ii) C₄ plants

(iii) CAM plants

c) An investigation was carried out into the response of sorghum to being kept at a low temperature for a short period of time. Soybean plants which are better adapted than sorghum for the growth in subtropical and temperate climates were used for comparison.

Plants of sorghum and soybean were kept at 25°C for several weeks and then at 10°C for three days. The temperature was then increased to 25°C again for seven days. Day length, light intensity and carbon dioxide concentration were kept constant throughout.

The uptake of carbon dioxide as mg CO₂ absorbed per gram of leaf dry mass was measured; at 25°C before cooling, on each of the three days at 10°C and for seven days at 25°C.

The results are shown in the table below.

Plant	Carbon dioxide uptake / mg CO ₂ g ⁻¹				
	At 25°C before cooling	At 10°C			At 25°C (mean over days 4 to 10)
		Day 1	Day 2	Day 3	
Sorghum	48.2	5.5	2.9	1.2	1.5
Soybean	23.2	5.2	3.1	1.6	6.4

i) Compare the changes in carbon dioxide uptake in sorghum and soybean during the three days at 10°C.

ii) Account for the low rate of carbon dioxide uptake by sorghum even when returned to a temperature of 25°C.

MBOGO COLLEGE SCHOOL

7. a) With an importance in each case, outline the major components of the lymphatic system.

b) Describe how the mammalian blood picks up and transports carbon dioxide within the body.

c) Explain the effect of carbon dioxide concentration on oxygen carrying capacity of blood.

SEROMA CHRISTIAN HIGH SCHOOL

8. a) Describe how cones perceive light of various colours using the trichromatic theory.
 b) Explain why the mammalian ear is capable of delivering sounds of different intensities and frequencies.
 c) Distinguish between inhibitory and excitatory synapses. **ST. HENRY'S COLLEGE MBALWA**
 9.a) Explain why nitrogenous waste formation does not normally occur in plants.
 b) Analysis of glomerular filtrate and urine of a mammal yielded the following mean daily values.

		Glomerular filtrate	Urine
Urea		60g	35g
Water		180dm ³	1.5dm ³

- i) If 150dm³ of water is reabsorbed by proximal tubules, calculate the percentage of water that is re-absorbed elsewhere.
 ii) How does the variation in length of loop of Henle of mammalian kidney nephron in different species tell their habitats?
 iii) Account for the role of vasa recta in osmoregulation.
 c) The table below shows the percentage of three compounds in the urine of four different animals.

	Ammonia	Urea	Uric acid
Freshwater fish	56	6	0
Sea water fish	7	81	0
Lizard	0	0	91
Bird	3	4	72

- i) Explain the difference in the main excretory compound in fresh water and sea water fish.
 (ii) Both lizards and birds are terrestrial, egg-laying animals. How do these characteristics relate to the nature of their main excretory product?
ST. BALIKUDEMBE S.S. KISOGA

10. a) The table shows the distribution of the major ions across the membrane of giant axon at rest of squid.

Species of Ion	Concentration in cytoplasm (nM)	Concentration in extracellular fluid (nM)	Equilibrium potential (mV)
K ⁺	400	20	-75
Na ⁺	50	440	+55
Cl ⁻	52	560	-60
Organic anions	385	-	-

Account for the observed differences in the concentrations of ions.

- b) The table below shows the concentration of potassium ions in some of the leaf cells when the stoma is opened and when it is closed.

Cell	Concentration of potassium ions (arbitrary units)	
	Stoma closed	Stoma opened
Guard cell	95	448
Cell X	157	293
Cell Y	199	98
Cell Z	448	73

- i) State what cells X, Y and Z are.

ii) Explain how the observed changes in potassium ion concentration are related to the mechanism of stomatal opening and closure.

c) Differentiate between guttation and transpiration.

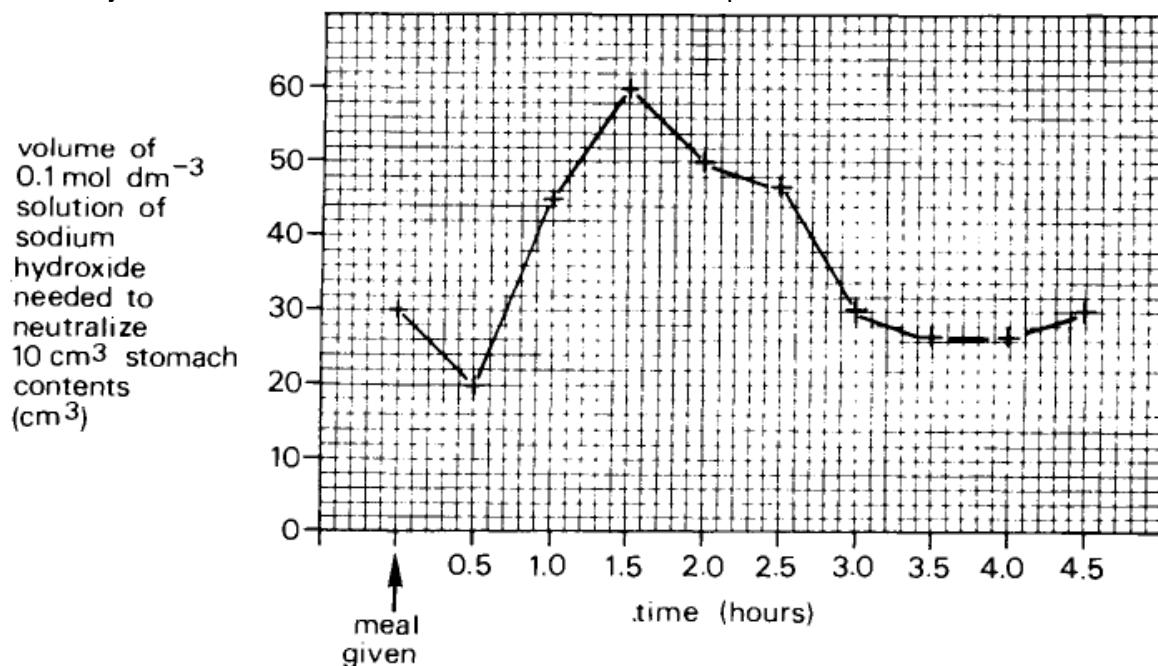
KISUBI MAPEERA S.S

11. a) What are the features of epithelial tissue?

b) Giving example in each case, describe the different types of glands among vertebrates.

KITENDE S.S.

12. Samples of 10 cm³ of the stomach contents of a normal person were removed when a meal was given and at half-hour intervals thereafter. The graph shows the volumes of a 0.1 mol dm⁻³ solution of sodium hydroxide needed to neutralize the acid in the samples.



a) What was the sodium hydroxide equivalent of the basal acid level of the stomach Contents?

b) Why does the acid level fall immediately after eating a meal?

c) Describe and explain the pattern of acid level of the stomach contents between 1.5 and 4.5 hours after the meal.

d) Describe the various mechanisms responsible for the increase in acid secretion shortly after the meal.

e) Name the other substances which are commonly found in the gastric juice of an adult person.

SSAKU S.S.

13. a) i) Below is a table for recording tests for blood transfusions in the ABO system. Place a tick where agglutination does **not** occur and a cross where agglutination would occur.

		Recipients			
		Group A	Group B	Group AB	Group O
Donors	Group A				
	Group B				
	Group AB				
	Group O				

ii) Account for how hemolytic disease of newborn arises in a family and suggest how it could be prevented.

b) i) Describe how innate immunity is achieved in man.

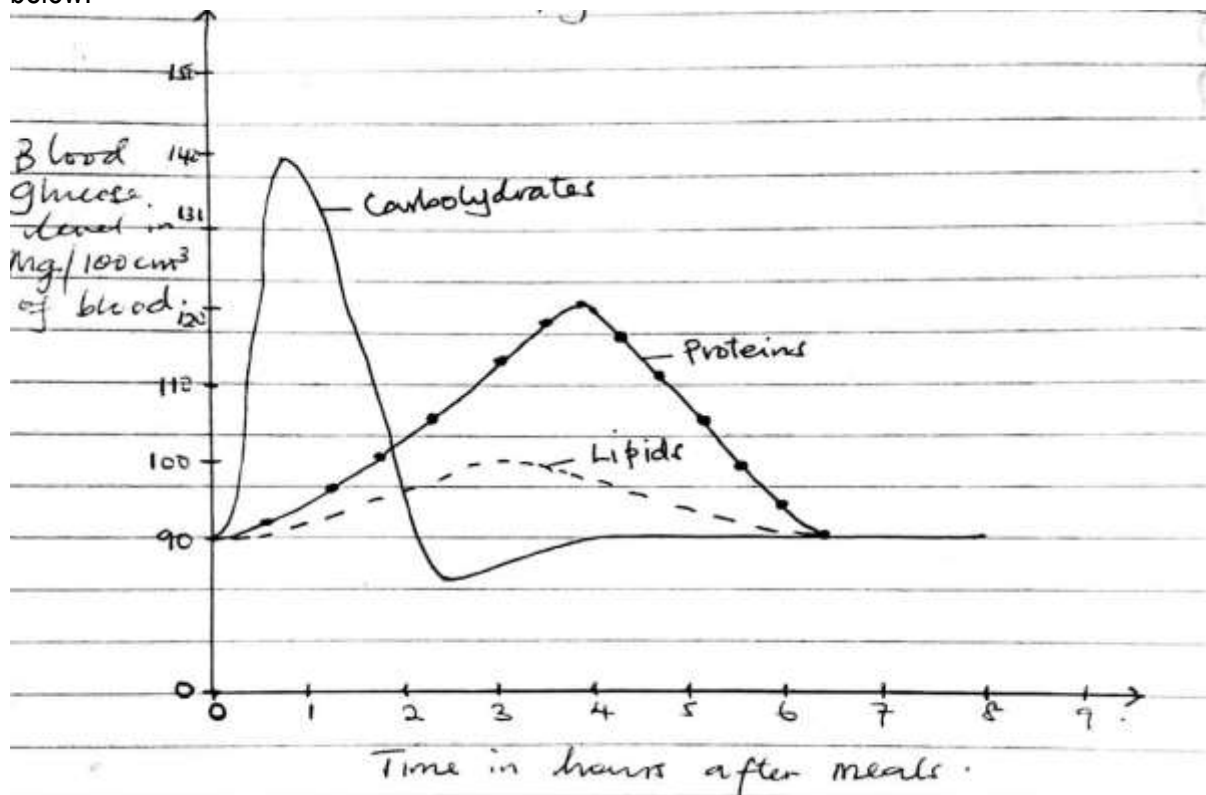
ii) Differentiate between passive and active immunization.

c) Explain the following;

- i) antibody molecules are made of proteins not polysaccharides.
- ii) the thymus gland becomes smaller after puberty.

ST. JOSEPH'S SS NSAMBYA

14. In an investigation, a healthy adult human blood glucose level was measured after eating complex carbohydrate. The experiment was repeated on another day when the same person ate protein and lastly when the person ate fat. The results obtained were plotted on a graph shown below.



- a) Compare the level of blood glucose in the person after carbohydrates meal and protein meal.
- b) Explain the observed blood glucose level in the person after carbohydrate meal from
 - i) 00 hours to 2 ½ hours
 - ii) 2½ hours to 8:00 hours
- c) Explain the blood glucose level in the person after
 - i) Proteins meal
 - ii) Lipids meal
- d) Explain the difference in variation of glucose level after carbohydrates and those of protein meal
- e) What is the significance of the physiological process illustrated in figure above.

KABOWA HIGH SCHOOL

15. a) Describe the role of the mammalian liver in;

- i) protein metabolism,
 - ii) detoxification,
 - iii) carbohydrate metabolism
- b) Discuss the extent to which plants carry out homeostasis.

HILTON HIGH SCHOOL

16. a) Give in account of the adaptations of mammals to a carnivorous mode of life.

b) Contrast the teeth of a herbivore and those of a carnivore.

c) Discuss the expression 'carnivorous plants'.

ST. JUDE S.S MASAKA

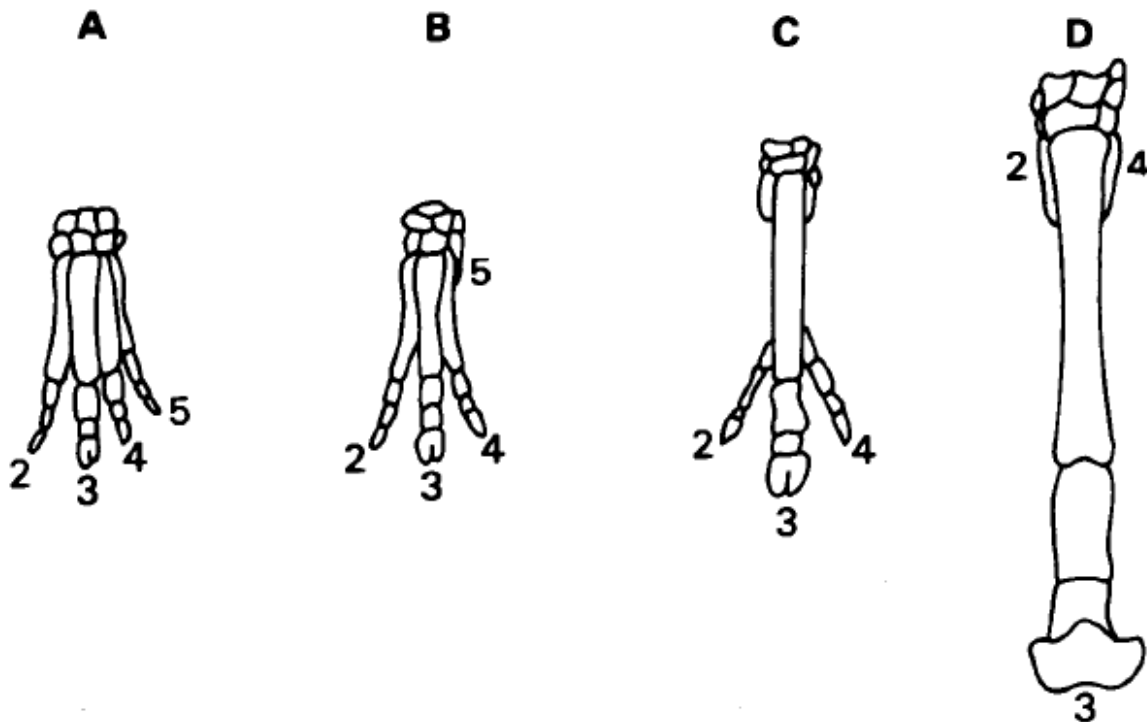
17. a). Describe the significance of oxidative decarboxylation in a plant cell.

b) Explain the chemiosmotic theory of energy formation.

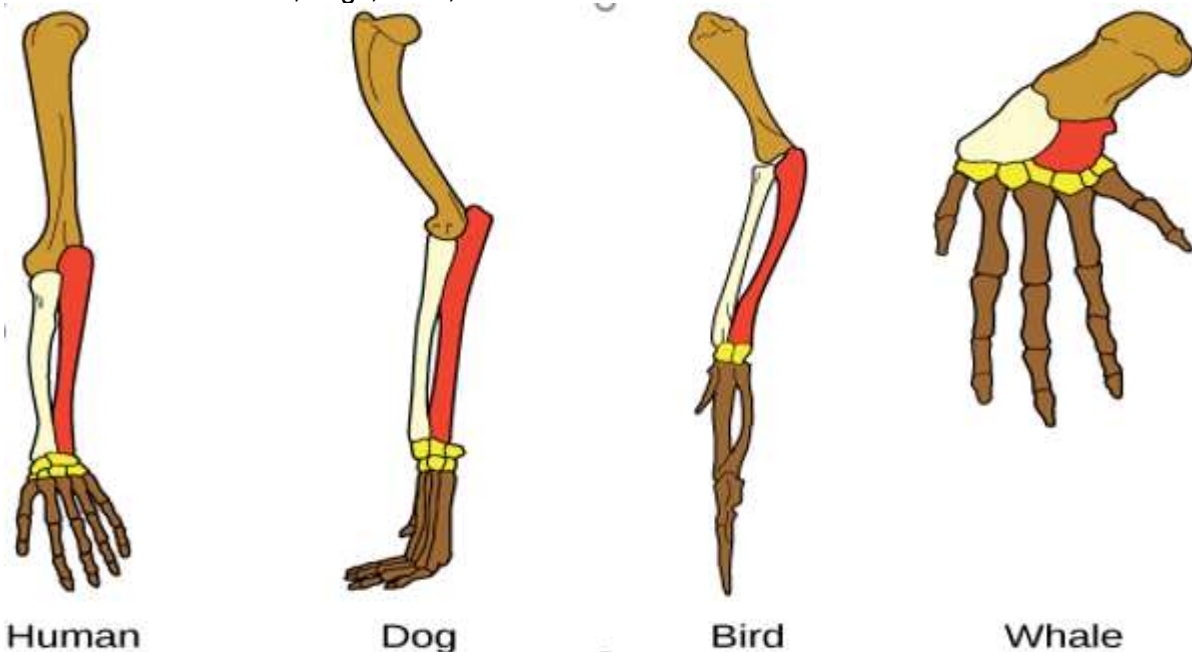
c) Describe the respiratory metabolism of glycerol in the cytoplasm of the cell.

HOPEFUL FUTURE S.S. KAYUNGA

18. a) Figure shows, in chronological sequence from A to D, fossils of the forelimb skeletons of four related mammals.



- To which modern mammal are these most closely related?
 - Describe briefly the structural changes seen in the fossil sequence
 - What are the possible adaptive advantages of these structural changes?
 - State two methods by which these fossils might be dated.
- b) Some organisms have features that have different functions, but similar structures. One example is the forelimb of humans, dogs, birds, and whales.

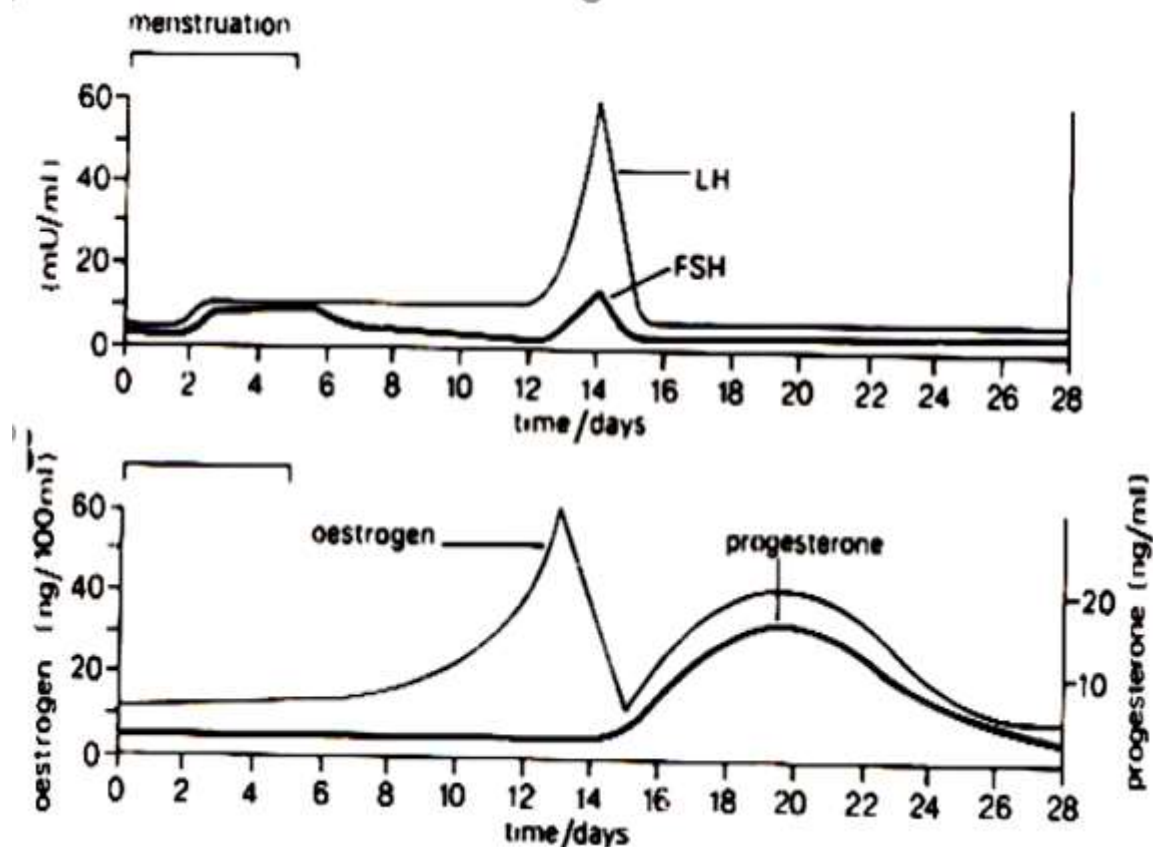


- using the figure above, suggest any pieces of evidence that suggest common ancestry for the four vertebrates.
- state any evidence that suggest divergence for the organisms
- State how each of the limbs has enabled the different organisms possessing them to survive in their respective habitats.

c.) What are the missing links in the fossil record?

BULO PARENTS S.S.

19. The figure below shows the blood levels of hormones; luteinizing hormone (LH), follicle stimulating hormone (FSH), oestrogen and progesterone involved in the control of the human menstrual cycle



- State the general features of animal hormones.
- Use the two graphs in the figure above to explain the changes in the blood levels of hormones with time during the cycle.
- Basing on the effects of each of the hormones on the secretion of others, show how negative feedback operates in the human menstrual cycle.
 - Why should the menstrual cycle be under negative feedback?
- Suggest what would be the effect on the blood level of the hormones if;
 - The ovary of the human was surgically removed
 - Successful fertilization occurred
- Explain how use of each of the following may affect the blood levels of the hormones in the figure above;
 - Contraceptive pills
 - Fertility drugs
- State factors that affect breeding cycles of animals
- Explain how multiple births can arise in human females
- How is courtship of significance in reproduction of organisms? **SEETA H/S GREEN CAMPUS**

20. The Pacinian corpuscle is a type of receptor found in the dermis of the skin. Its activity was investigated by inserting microelectrodes into the axon at different positions, microelectrode X was inserted in the axon at the unmyelinated part in the middle of the corpuscle whereas microelectrode Y inserted in the axon at the myelinated part outside the corpuscle. The stimulus of varying intensity was applied to the corpuscle and the results obtained are shown in the table below.

Stimulus intensity	Maximum potential difference across the membrane (mV) and time taken to attain maximum value (ms)			
	Microelectrode X	Time (ms)	Microelectrode Y	Time (ms)
Light	-47	0.8	-51	1.5
Medium	-40	1.0	-42	1.7
Heavy	-30	1.2	+44	2

- Explain results obtained with light and medium intensity of the stimulus.
- Describe what happened in the unmyelinated region of the axon when the corpuscle was subjected to the stimulus.
- Explain the pattern of recordings from microelectrode Y as the intensity of stimulus applied to the corpuscle was increased.
- Account for the difference in time taken to attain maximum potential difference across the membrane after application of the stimulus.
- Describe the similarities and differences between the structure and function of interneuronal synapses and neuromuscular junctions.
- What is the significance of the following observations
 - Sensory neurons leaving the Pacinian corpuscle are myelinated
 - Stimulation of a single hair at time intervals of about 36 seconds and beyond in Venus fly trap does not trigger closure.

ST. PETER'S S.S. NAALYA

21. Cane toads (*Bufo marinus*) were introduced to Australia in 1935 in a failed attempt to control an insect pest. Since then, the toads have spread across northeastern Australia, with a population of over 200 million today. Cane toads have glands that produce a toxin that is poisonous to snakes and other potential predators. In this exercise, you will interpret data from a two-part experiment conducted to determine whether native Australian predators have developed resistance to the cane toad toxin.

In the first experiment, 12 red-bellied black snakes (*Pseudechis porphyriacus*) were collected from areas where cane toads had existed for 40–60 years and in experiment 2, 12 from areas free of cane toads. They recorded the percentage of snakes from each area that ate either a freshly killed native frog (*Limnodynastes peronii*, a species the snakes commonly eat) or a freshly killed cane toad from which the toxin gland had been removed. In part 2, researchers collected snakes from areas where cane toads had been present for 5–60 years. To assess how cane toad toxin affected the physiological activity of these snakes, they injected small amounts of the toxin into the snakes' stomachs and measured the snakes' swimming speed in a small pool.

Data from the Experiment 1

Type of prey offered	percentage of Snakes from Each Area That Ate Each Type of Prey	
	Area with Cane Toads Present for 40–60 Years	Area with No Cane Toads
Native frog	100	100
Cane toad	0	50

Data from the Experiment 2

Number of Years Cane Toads Had Been Present in the Area	5	10	20	50	60
Percentage reduction in Snake Swimming Speed	52	20	15	10	5

- What is meant by the term predator prey relationship?
 - What do the data from experiment 1 suggest about the effects of cane toads on the predatory behaviour of red-bellied black snakes in areas where the toads are and are not currently found?
 - Explain the relationship between percentage reduction in snake swimming speed and number of years.
 - Suggest an explanation how resistance in the snake species could have arisen.
- Discuss the structural adaptations of prey organisms to increase their survival rates in a natural habitat.

(ii) Explain the significance of the positive-positive interactions between organisms in the environment.

MITYANA MODERN SCHOOL

22. a) Describe how the stratosphere is destroyed.

b) i) What is meant by an indicator species?

ii) Outline the indicators to support the destruction of the stratosphere.

c) How could the effect of stratosphere destruction be mitigated?

MERRYLAND S.S.

23. a. (i) What is the function of the foramen ovale?

ii) It is normal for the foramen ovale to close at birth. If this did not happen what symptoms might be experienced by the baby?

b) (i) Give an account of the role of the placenta as an endocrine organ in mammals.

ii) State the features of placenta that suit it to its function of exchanging materials.

(iii) Explain why fetal haemoglobin is gradually replaced with adult haemoglobin in the child blood after birth.

RINES S.S. NAMUSERA

24. (a) i) What are the main ideas of the cell theory?

ii) Discuss possible exceptions to the cell theory.

(b) Explain how surface area to volume ratio and nucleo-cytoplasmic ratio influence cell size.

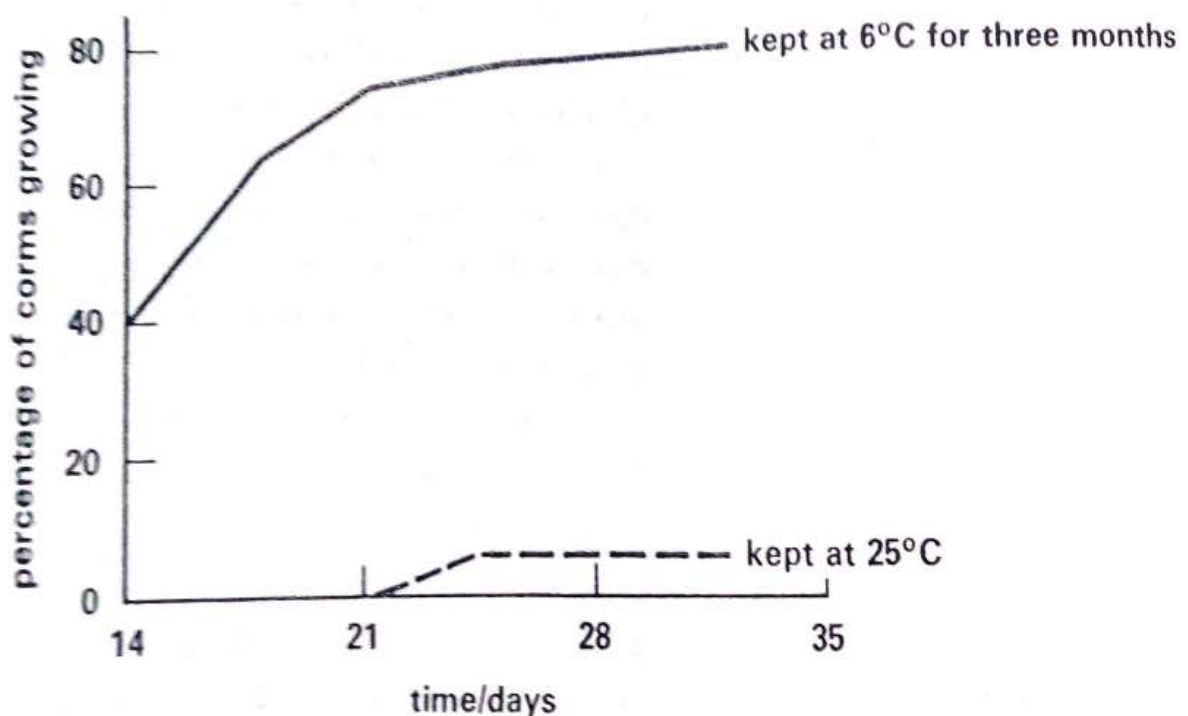
(c) Explain the factors that affect the fluidity of the plasma membrane.

LUGAZI HOMELAND COLLEGE

25. a) Explain the term after-ripening period and state its significance.

b) Describe the physiological changes that occur the pericarp of ripening fruit and state their significance.

b) The figure shows the percentage growth of corns that were previously kept at different temperatures, then sowed at the same time.



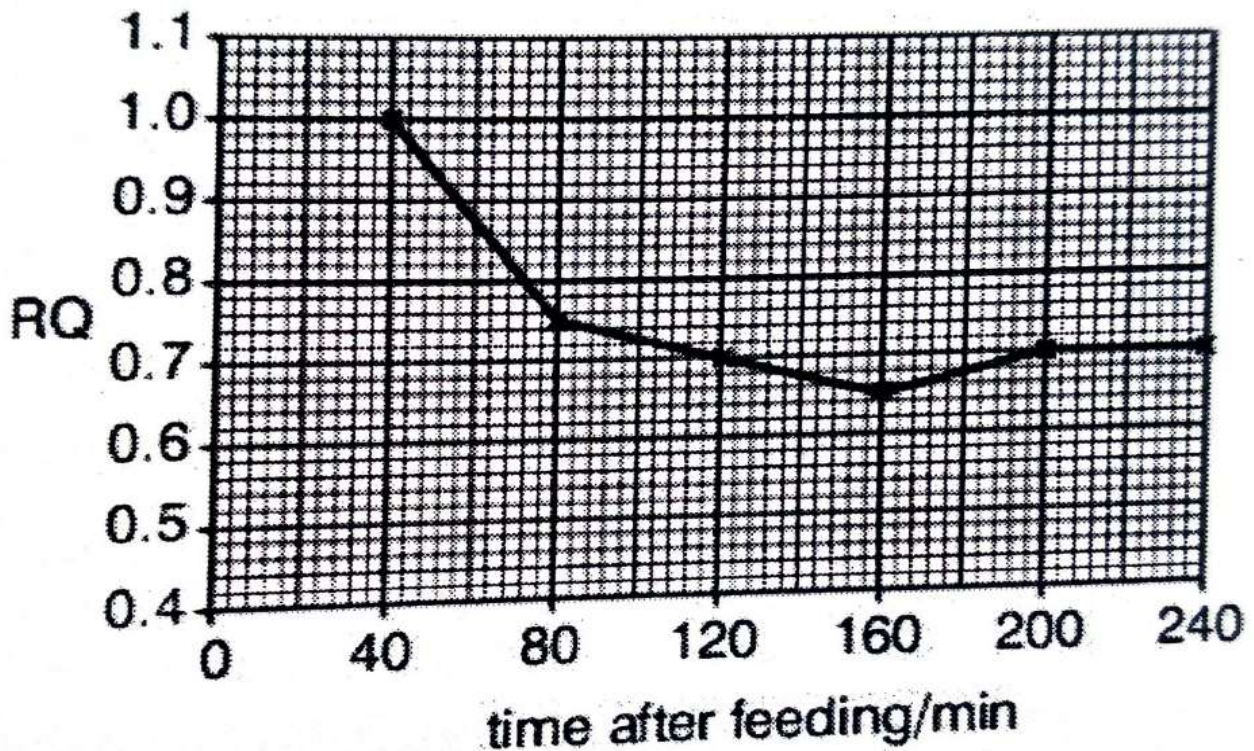
i) What conclusions can be made from the graph.

ii) Account for the differences shown on the graph.

KIBULI S.S.

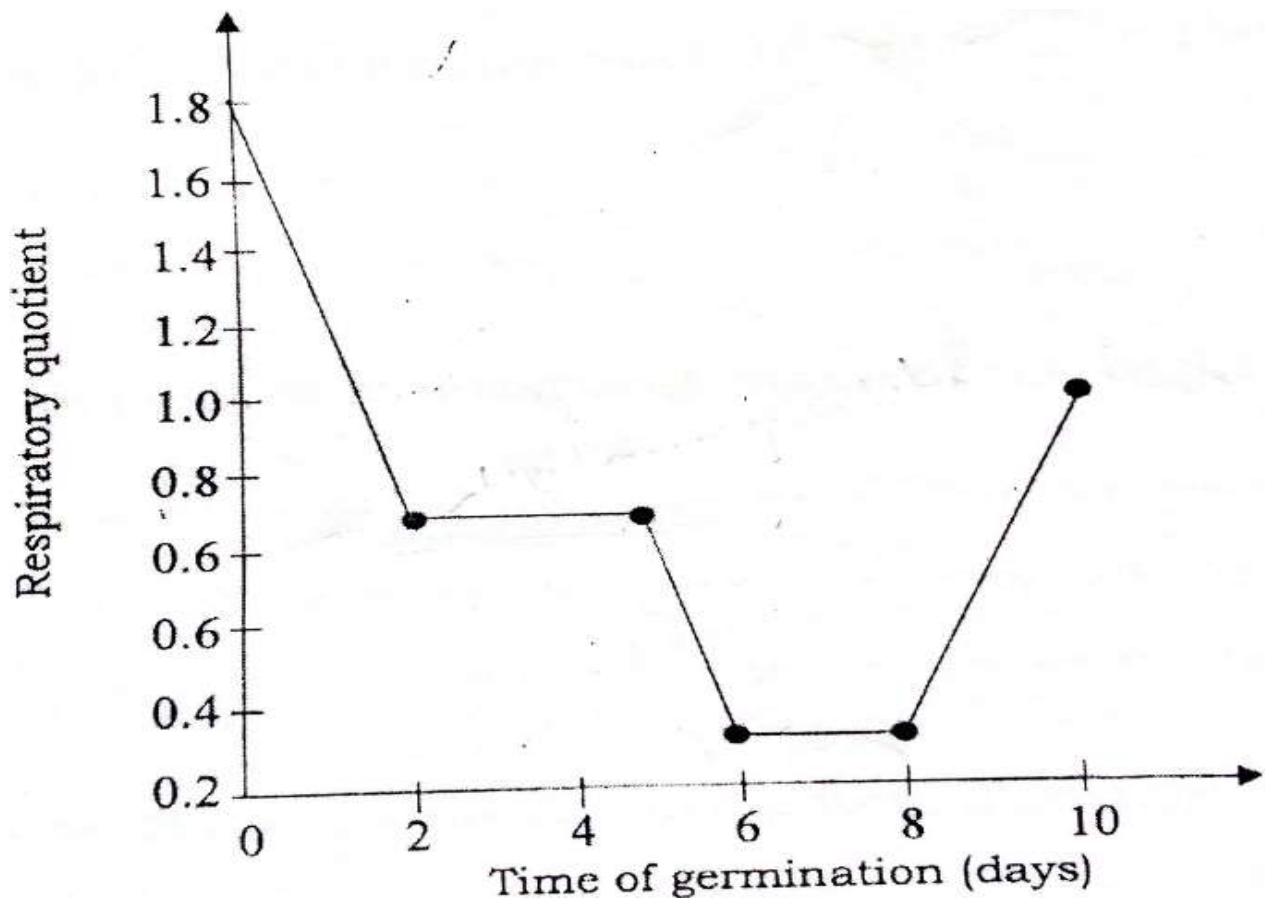
26. a) Discuss the significance of respiration quotient (R.Q.) values.

b) Hummingbirds were allowed to feed freely and then made to fast for four hours in constant conditions. During this time their RQ values were calculated every 40 minutes and the results are shown in the figure below.



Explain the trend of the curve.

c) The graph below shows changes in RQ of a seedling during germination.



Describe and explain the results shown in the figure.

d) Why are theoretical values of respiratory quotient not realistic? **ST. MARY'S COLLEGE KISUBI**

27. a) Outline the changes in cell structure which lead to the formation of mature vascular tissues in higher plants.

b) Give differences between xylem vessels and phloem sieve tubes.

c) Describe the significance of glandular plant tissues.

KYADDONDO S.S.

28. The table shows the mean rate of abdominal pumping of an insect before and during flight.

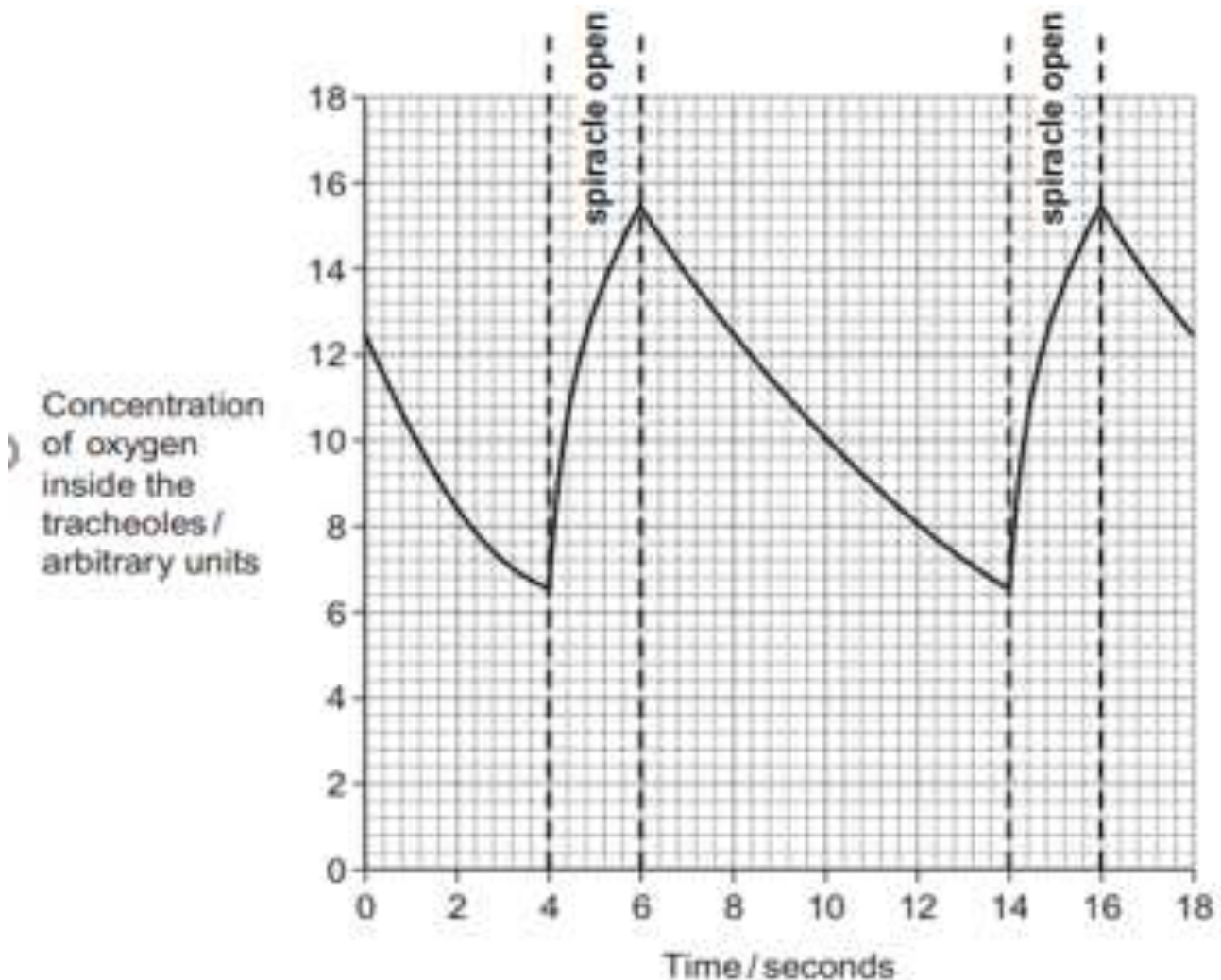
Stage of flight	Mean rate of abdominal pumping (dm^3 of air/kg h)
Before	42
During	186

a) What is meant by abdominal pumping and explain its significance.

b) Calculate the percentage increase in the rate of abdominal pumping during flight.

c) Explain why abdominal pumping is inexistent in small insects.

d) The graph shows the concentration of oxygen inside the tracheoles of an insect when at rest and when the spiracles are open.

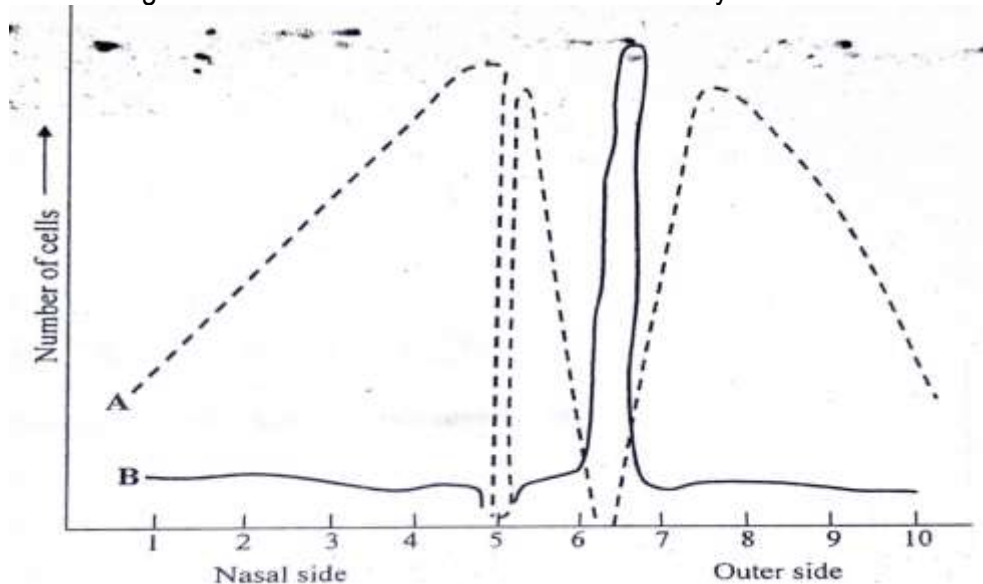


(i) Use the graph to calculate the frequency of spiracle opening. Show your working

(ii) Explain why insects open their spiracles at a lower frequency in very dry conditions.

e) In what ways is osmoregulation achieved in insects? **NAALYA S.S. BWEYOGGERERE**

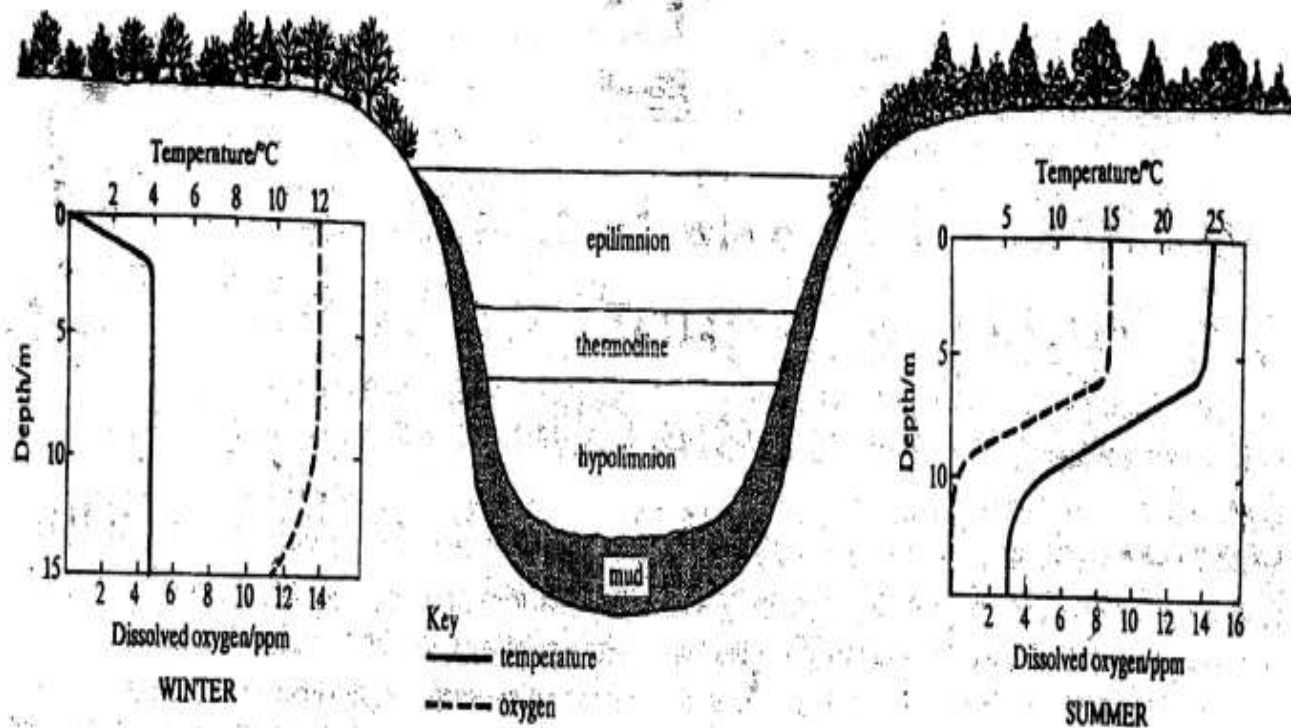
29.) The graph below shows the number of receptor cells of type A and B in arbitrary units in the human retina along a horizontal line from the nasal side of the eye to the outer side.



- a) i) Giving reasons, identify the types of receptor cells represented by A and B.
- ii) Explain why there are no receptor cells at position 5.
- iii) What is the name of the region of the retina at position 6.3. Give reason for your answer.
- b) Explain why;
 - i) the greatest concentration of receptor cells of type B occurs at position 6.3.
 - ii) On entering a dimly-lit room, objects in the room at first are invisible but gradually become visible.
 - iii) in a dimly-lit room, objects are only visible in black and white colour.
 - iv) Some nocturnal animals like cats close their pupils to a vertical slit and squint in bright light.
 - v) When trying to see a faint star in the sky, it's better to look slightly to one side of it rather than directly at it.
 - vi) If both your eyes are open and you press the side of one of your eyeballs, you see double.
 - vii) The position of an object placed in front of the face can be accurately judged.
 - viii) The points of a pair of dividers 1 cm apart placed on the forearm of a blindfolded person will often be experienced as a single point, but when placed on the fingertip will always be felt as two separate points.
 - ix) Food eaten when a person is suffering from a bad cold appears to be less tasty than in normal conditions.
 - x) If a person stares for thirty seconds at a bright red circle, and then shifts the gaze to a white wall, an image of a green circle is seen.
- c) i) From the graph, identify and describe the features of the receptor cells which allow colour vision.
- ii) The flowers of three species of a plant are similar in form and appear to have yellow colours of petals. When photographed in ultraviolet light, each species shows a different pattern of its petals. Using this information, explain how bees are able to distinguish between the flowers of the three species, but not humans.

SEETA H/S MAIN CAMPUS

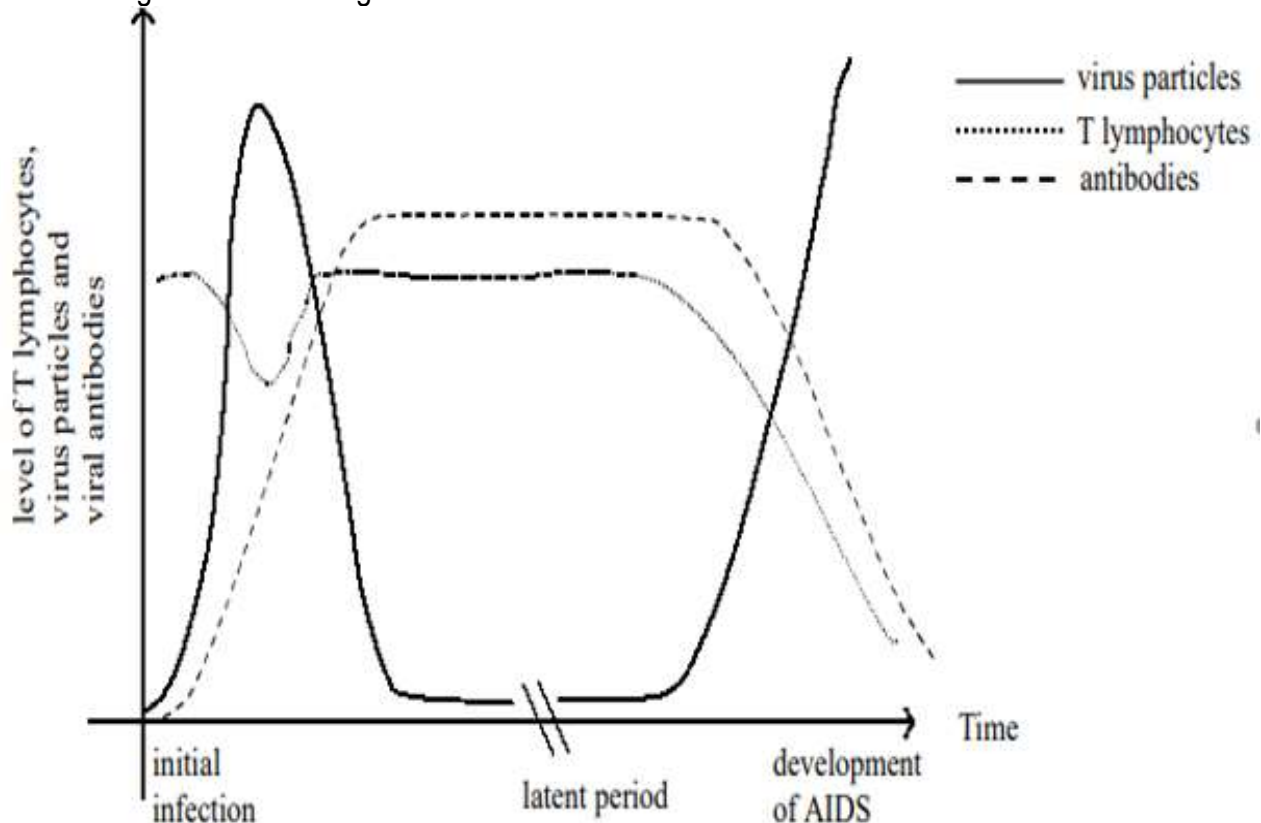
30. The figure below shows the changes in temperature and dissolved oxygen levels of a deep fresh water lake in water and during summer season



- Compare the changes in temperature and dissolved oxygen in the lake between winter and summer.
- Explain the variation in dissolved oxygen during; (i) Winter (ii) Summer
- Outline the probable source of
 - Dissolved oxygen in the lake
 - Temperature variation in the lake
- How does increase in temperature affect the chemical composition of the lake?
- What would happen if untreated sewage and excess fertilisers were dumped in such a lake?

ENTEBBE S.S.

31. The graph shows the changes in the levels of HIV particles, HIV antibodies and T lymphocytes in the blood during the different stages of HIV infection.



- (i) Compare the changes in the number of T4 cells and HIV particles in blood over the time of investigation
- iii) Explain the differences between the number of T cells and number of HIV particles in blood over the period of study.
- (iv) Using the results in the graph above, explain the occurrence of the opportunistic infections in the later years of the infection.
- (v) Briefly explain the features of HIV that makes it a successful pathogen.
- (vi) Explain why are antibiotics ineffective against viral diseases like AIDS?
- (vii) The presence of HIV antibodies in the blood is used to diagnose infection with the virus. An infected person is described as HIV positive. Suggest a basis for the test.
- (viii) With reference to the graph above suggest why, in the final stage of HIV infection, a person may develop tumours and a range of diseases.
- (ix) Describe the role of T cells in the immune response.

BUREMBA S.S.

32. a) What is meant by each of the following?

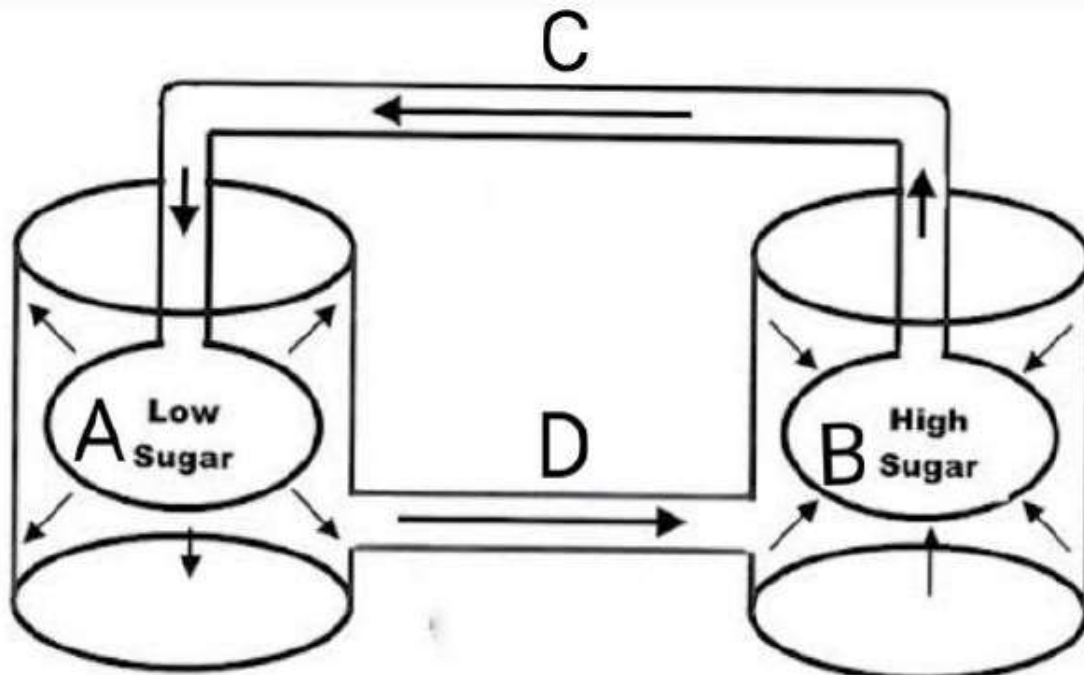
- i) Aerofoil
- ii) Lateral drag
- b) Explain how a lift force is generated in;
 - i) birds.
 - ii) dogfish
 - iii) Teleost fish

c) State the instabilities during swimming in fish and how they are overcome.

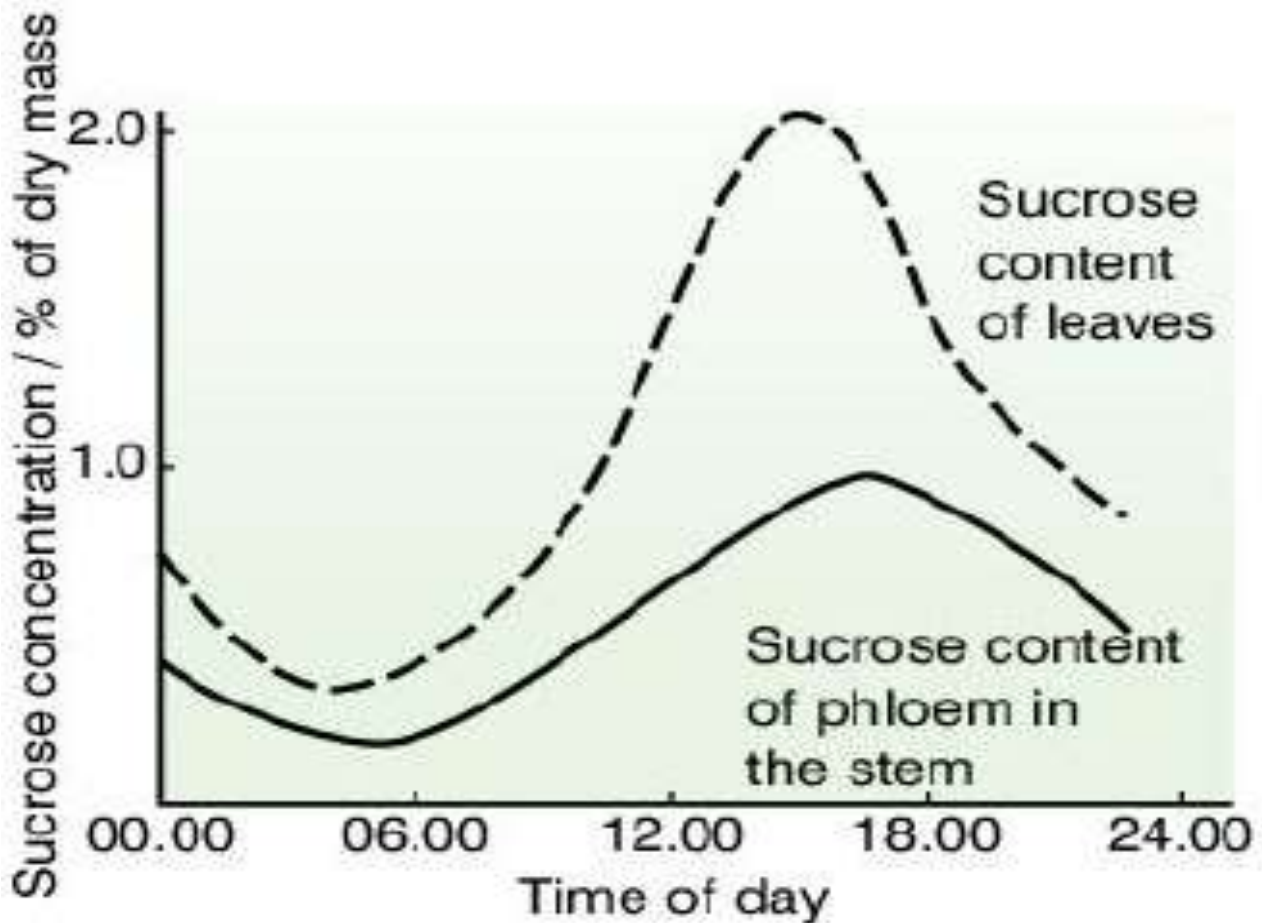
ST. JULIANA HIGH SCHOOL

33. a) What is meant by mass flow and state its conditions.

b) The figure below is a model of how materials are transported in plants. Study it carefully and answer the following questions.



- i) Identify the parts of a flowering plant that are represented by parts A to D.
- ii) Describe how the above figure can be used to explain translocation in plants.
- ii) Explain the limitations of Munch's mass flow hypothesis of translocation.
- c) The figure below shows sucrose concentrations taken from different parts of the same plant over a 24-hour period.



- i) Describe the relationship between sucrose content in phloem and in leaves.
- ii) Account for the trend in sucrose content of phloem in the stem.
- iii) How does the figure above evidence the mass flow hypothesis?

NDEJJE S.S.S

34. a) Explain how signals are used by different animal species in territoriality.
- b) Explain the benefits of each of the following;
 - (i) Habituation
 - (ii) Imprinting
 - (iii) Instinctive behaviour
- c) i) With examples, distinguish between operant conditioning and classical conditioning.
- ii) Describe the factors that could affect the learning of a new situation in trial and error method.
- ii) Describe the characteristics of reflexes.

KAWANDA S.S.

35. Structure and function are closely related. By reference to (a) striated (skeletal) muscle and (b) parenchyma in plants, discuss how far this statement is true.

MT. ST. HENRY'S MUKONO

- 36.a) In some viruses, the genetic material consists of two strands of RNA, bonded together via complementary base pairing. Would these strands form a double helix? Explain why.
- b) Explain how Chargaff's rules relate to the complementary base pairing seen in the secondary structure of DNA. Would you expect these rules to apply to RNA as well? Explain why.
- c). Explain how DNA's secondary structure limits its catalytic abilities compared with that of RNA.
- d). When researchers discovered that a combination of three deletion mutations or three addition mutations would restore the function of a gene, most biologists were convinced that the genetic code was read in triplets. Explain the logic behind this conclusion.
- e). Explain why all point mutations change the genotype, but why only some point mutations change the phenotype.

- f) According to the wobble rules, the correct amino acid can be added to a growing polypeptide chain even if the third base in the mRNA codon is not complementary to the corresponding base in the tRNA anticodon. How do the wobble rules relate to the redundancy of the genetic code?
- g). Describe the sequence of events that occurs during translation as a protein elongates.
- h) Of what significance are ribonucleases in the cytoplasm of the cell?
- i). Why is the synthesis of the new DNA both continuous and discontinuous?

KAKUNGULU MEMORIAL

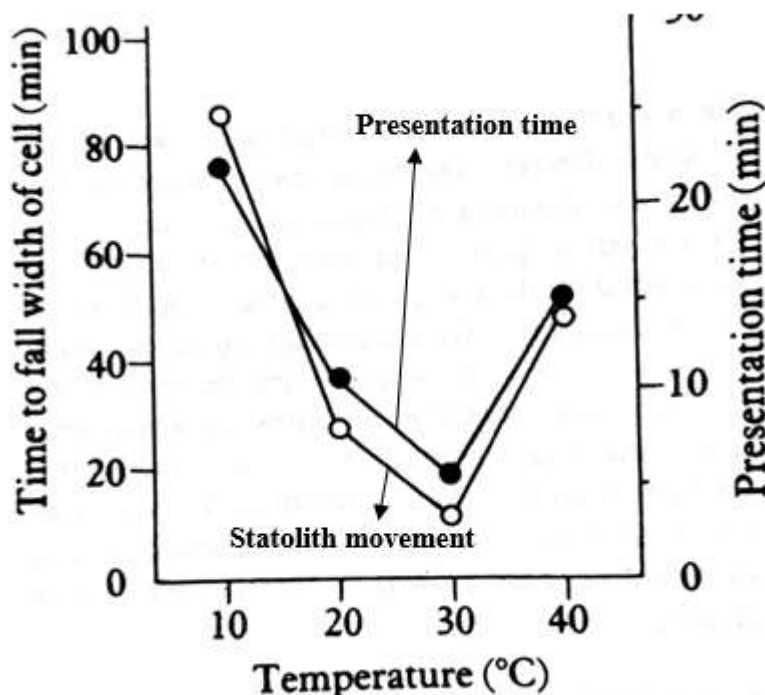
37. a) Describe the events that occur in telophase of mitosis in a plant cell.
- b) Outline the differences between cytokinesis of mitosis in a plant cell and in an animal cell.
- c) Using the knowledge of meiosis, explain Mendel's laws of inheritance.

NABISUNSA GIRLS' SCHOOL

38. (a) Describe the significance of positive feedback in body homeostasis.
- (b) Explain positive feedback mechanism during;
- (i) Parturition
- (ii) hyperglycaemia
- (ii) Propagation of an action potential along the nerve cell
- v) Control of body metabolism after high critical temperature.

MAKERERE COLLEGE SCHOOL

39. The graph below shows the effect of temperature on the time taken for starch statoliths to fall to the bottom of the cells and the presentation time required for the gravity induced bending response in the stem of a pea plant.

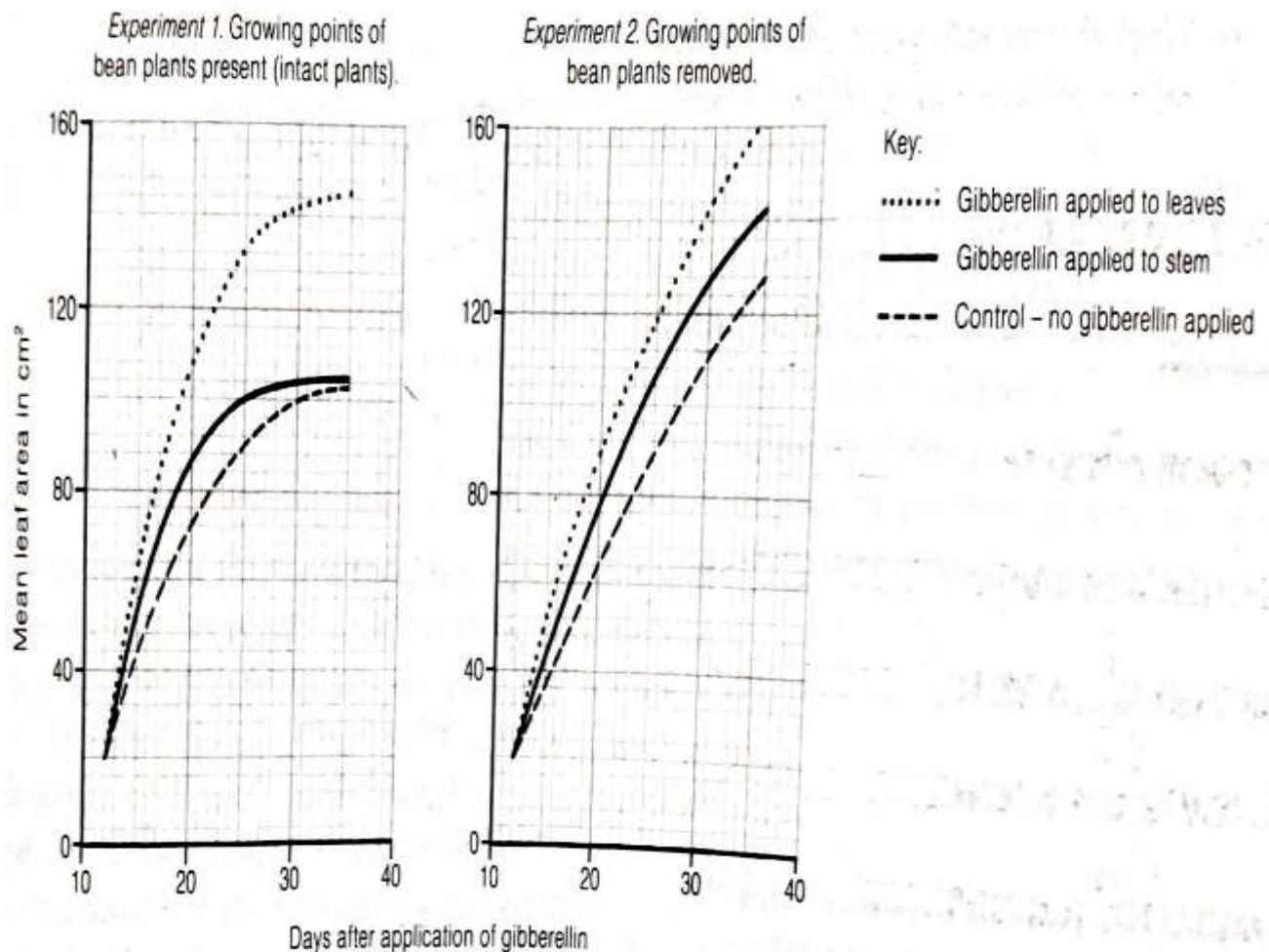


- a) Describe the effect of temperature on presentation time and statoliths movement.
- b) Explain the relationship between;
- i) Temperature and Statolith movement. ii) Temperature and presentation time.
- c) Predict and explain what would happen to the presentation time and plant response to gravity if the temperature was increased beyond 40°C.
- d) Describe the mode of action of auxins and state the applications of auxins.
- e) Distinguish between positively photoblastic and positively phototropic.
- f) What are the advantages of nastic responses to plants.

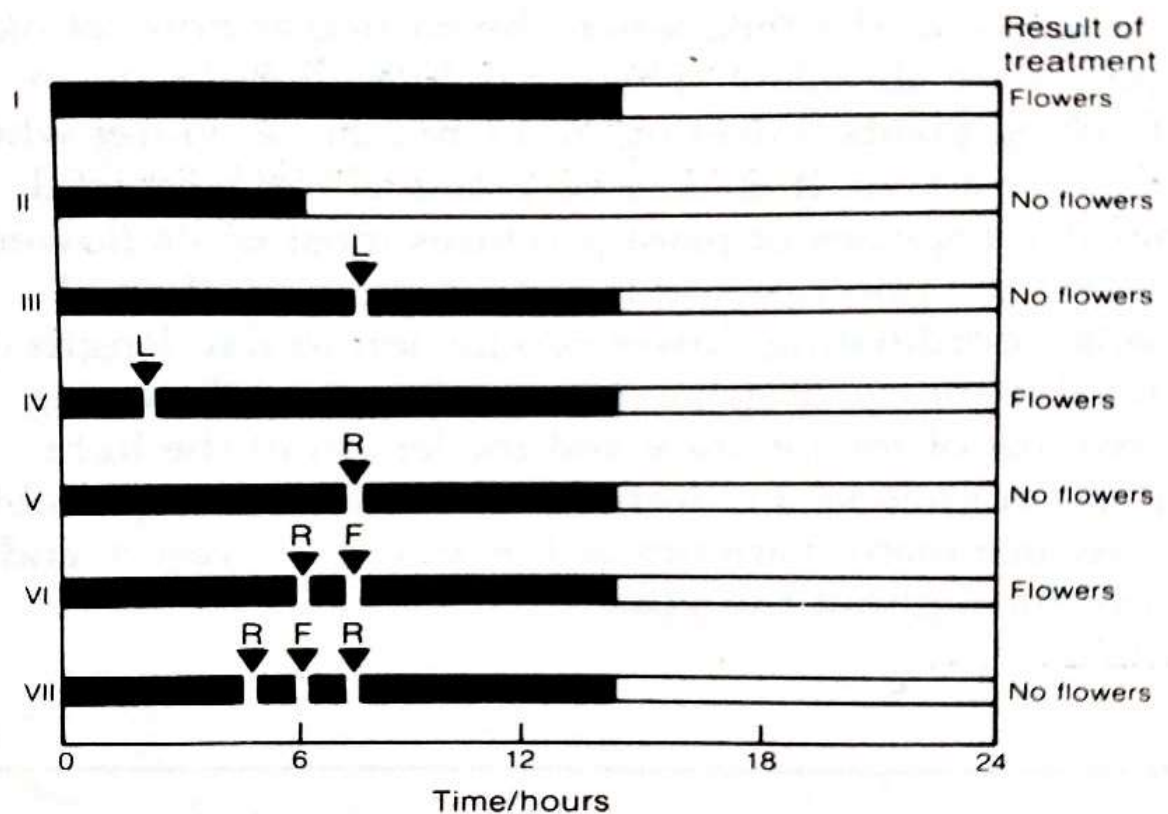
NAMILYANGO COLLEGE

40. An investigation was carried out into the effect of gibberellin on the growth of leaves in dwarf bean plants. Equal amounts of the hormone were applied either to the stem or to the first leaves produced by the plants.

In one experiment the plants were left intact, but in a second experiment the growing point (apex) of each plant was removed when gibberellin was applied. In both experiments a control group of plants received no gibberellin. The results are shown in the graphs below.



- Compare the effects of applying gibberellin to the stem and to the leaves of the intact bean plants.
- Describe the effect on leaf growth of removal of the growing points from the bean plants when no gibberellin is applied.
 - Suggest a reason why removal of the growing point has this effect.
- How did removal of the apices from the bean plants affect the results of gibberellin application?
 - Suggest one hypothesis which could explain this effect.
- Suggest two cellular mechanisms which may lead to an increase in leaf area.
 - Suggest a mechanism by which a hormone such as gibberellin may exert its effect on leaf growth.
- Compare a plant hormone such as gibberellin and a typical animal hormone.
- Samples of plants from unrelated species were subjected to a range of light and dark treatments (I to VII) as shown in the diagram below. Shaded bars indicate darkness, unshaded bars indicate light periods. The letters refer to particular light flashes during the dark period. The effect of each treatment on flowering is also given.



L white light R red light F far-red light

- Using the results from I and II, state the photoperiodic group to which this plant belongs.
- Using the results from I and IV, explain whether the length of the day or the length of the night is the critical element in the light/dark cycle.
- Considering V, VI and VII, deduce the effects of red and far-red light on this species.
- How could these facts be used to produce flowers from this species out of season?

UMSS NAMUGONGO

- Differentiate between selective breeding and natural selection.
 - Describe the harmful effects of inbreeding in agriculture.

CRANE HILL SCHOOL

42. a) What is meant by;

i) metameric segmentation?

ii) Coelom

b) State the functions of each of the following in the life cycle of an organism.

i) Cleidodoc egg

ii) Coelom

iii) Bilateral symmetry

iv) Metameric segmentation

TRINITY COLLEGE NABBINGO

43. a) Distinguish between partial linkage and total linkage.

b) Pure-breeding *Drosophila* with straight wings and grey bodies were crossed with pure-breeding curled-wing, ebony-bodied flies. All the off spring were straight-winged and grey-bodied. Female off spring were then test crossed, giving the following results:

straight wing, grey body 113

straight wing, ebony body 30

curled wing, grey body 29

curled wing, ebony body 115

i) State the ratio of phenotypes expected in a dihybrid test cross such as this.

ii) Explain the discrepancy between the expected result and the results given.

iii) Calculate the hypothetical distance between the two genes.

iv) Is the curled wing locus closer to the ebony locus than is the straight wing locus? Explain your answer.

NAALYA S.S. NAMUGONGO

ALL THE BEST DEAR CANDIDATES