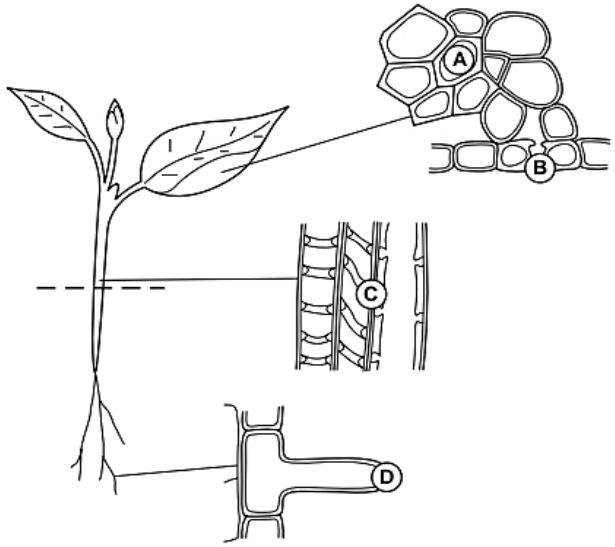
SEMINAR QUESTIONS DISCUSSED ON 08th/07/2023 AT ST. JOHN FISHER – IBANDA SESCONDARY SCHOOL.
ORGANISED BY
ASSOCIATION OF BIOLOGY EDUCATORS (ABE)

THEME 1: CELL BIOLOGY

Histology
QN: 1.1

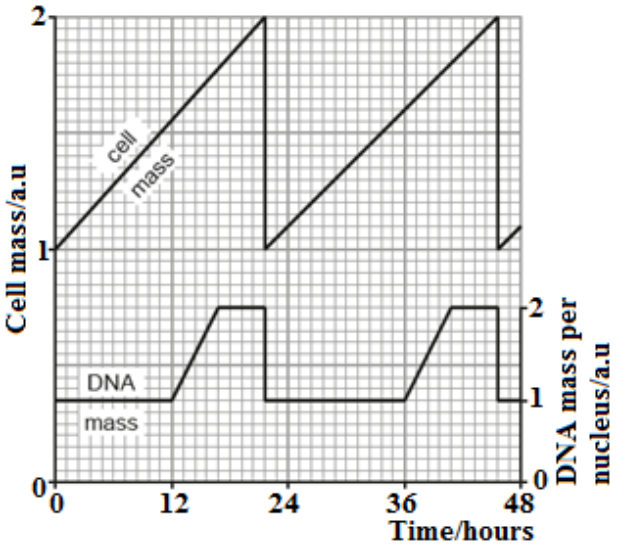
The diagram below shows stages in the passages of water through a plant. The circles are the starting points for arrows to shows the direction in which the water moves.



(a) Describe the structure of;
(i) Conducting elements of tissue C
(ii) Point D and how it relates to water absorption.
(b) How is point C adapted to performing its roles?
(c) Identify the tissue to which cell at point A belongs, and related the structure of the tissue to its functions.
(c) Explain how solute potential of cell A affects the aperture size of point B.
(d) (i) How is sclerenchyma different from parenchyma tissue?
(ii) Describe the different modifications of parenchyma tissues

Cell division
QN: 1.2

Cells can be grown under laboratory conditions and used in the development of drugs to treat cancer. The graph below shows a model of the general changes in cell mass and changes in mass of DNA in two cell cycles.



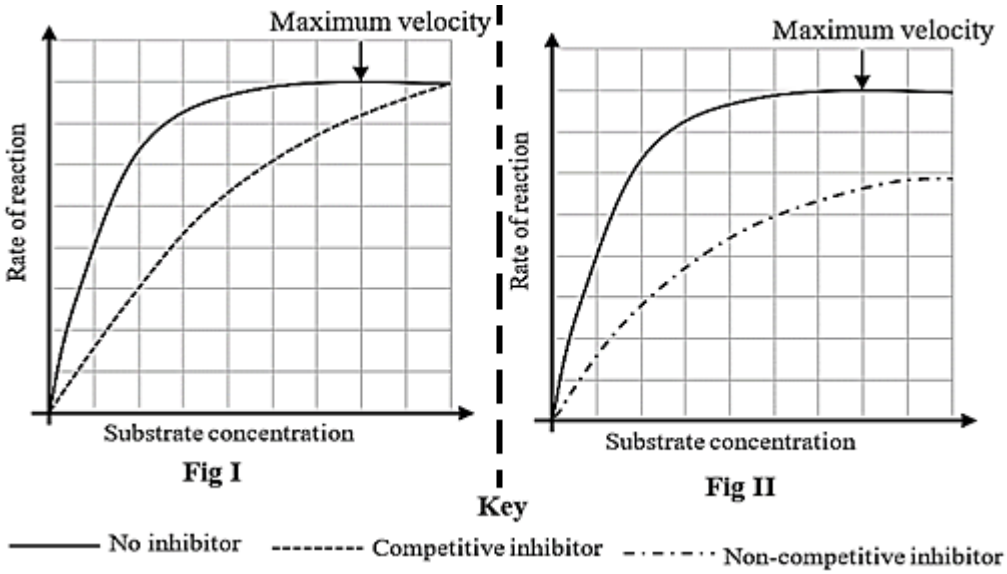
(a) Identify the type of cell division shown above.
(b) In one cell cycle, explain the changes in
(i) Cell mass
(ii) Mass of DNA per nucleus.

Chemicals of life
QN: 1.3.1

(a) Explain how pH affects enzyme-controlled reactions
(b) How does the spatial arrangement of enzyme proteins in membranes help regulate enzyme activity?

QN: 1.3.2

In an experiment to measure the rate of enzyme activity, two types of inhibitors were used to compare their effects on the rate of enzyme-controlled reactions. (***see graph on next page***)
(a) Explain the relationship between the rate of reaction and substrate concentration.
(b) Compare the rate of reaction in the presence of competitive and non-competitive inhibitors.
(c) Explain the difference in the rate of reaction in the presence of competitive and non-competitive inhibitors.
(d) Explain the significance of membrane-bound organelles on the activity of enzymes.
(e) State any six industrial applications and uses of enzymes.



QN: 1.3.3 The graph below shows how the carbon dioxide and oxygen fixing activities of RuBisCO are affected by temperature.

a) Describe the effect of temperature on the carbon dioxide fixing activity of RuBisCO.

b) Account for the above effects in (a) above.

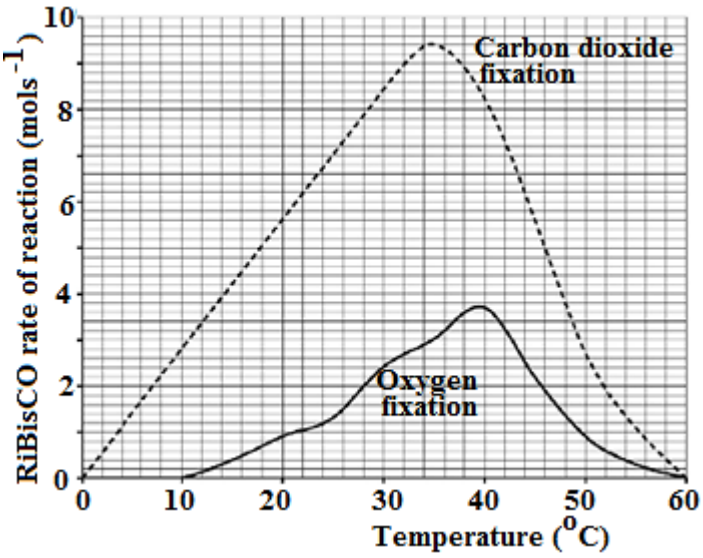
c) Compare the effect of temperature on RuBisCO rate of carbon dioxide fixation and RuBisCO rate of oxygen fixation.

d) From the graph, explain how the following affect the efficiency of RuBisCO for carbon dioxide fixation.

i. Temperatures below 10°C

ii. Temperatures above 35°C

e) Explain what would happen if to carbon dioxide and oxygen fixing activities of RuBisCO when the concentration of carbon dioxide is increased.

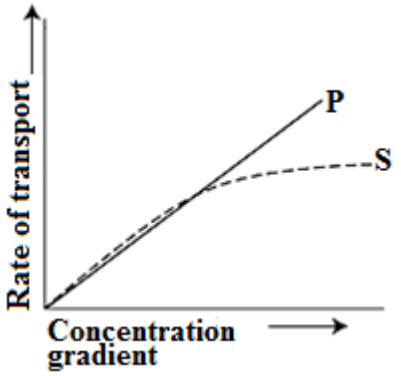


Cell Physiology

QN: 1.4.1 The rate of movement of substances P and S across a plasma membrane is shown in the figure.

(a) Give an example of substance P and explain how it can move across a membrane plasma.

(b) Compare the movements of substances P and S across the membrane plasma.

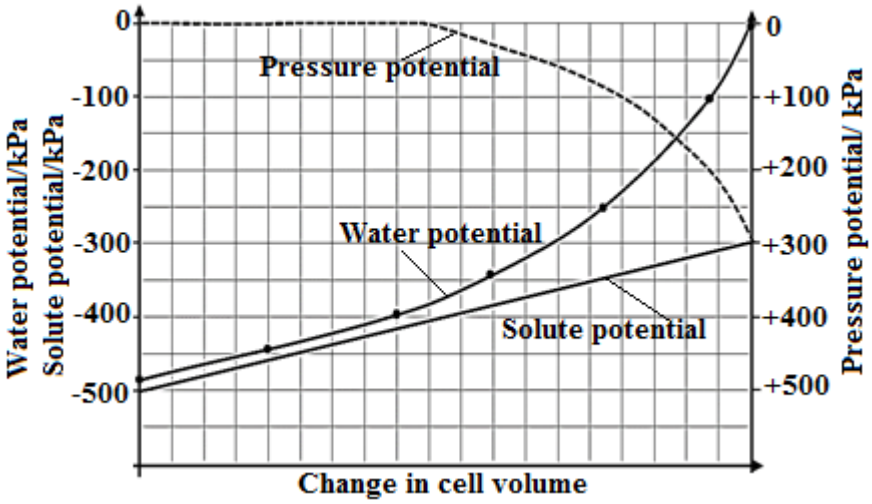


QN: 1.4.2 The figure below shows the changes in the water, solute, and pressure potential of a fully plasmolysed cell when placed in a dilute solution.

(***see figure on next page***)

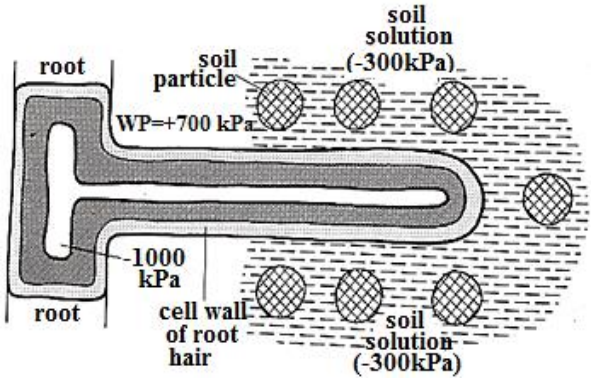
(a) Explain the effect of placing a fully plasmolysed cell in a dilute solution on the;

(i) Water potential of the cell
(ii) Pressure potential of the cell
(b) Compare the changes in the water and pressure potential during the experiment.
(c) Explain what would happen if the red blood cells were used instead of plant cells.
(d) Describe how freshwater amoeba maintains a constant amount of water.



QN: 1.4.3

Figure below shows a root hair cell in a section of a root surrounded by a soil solution of water potential, -300kpa. It rains, diluting the molecules dissolved in the water of the soil solution by three times.

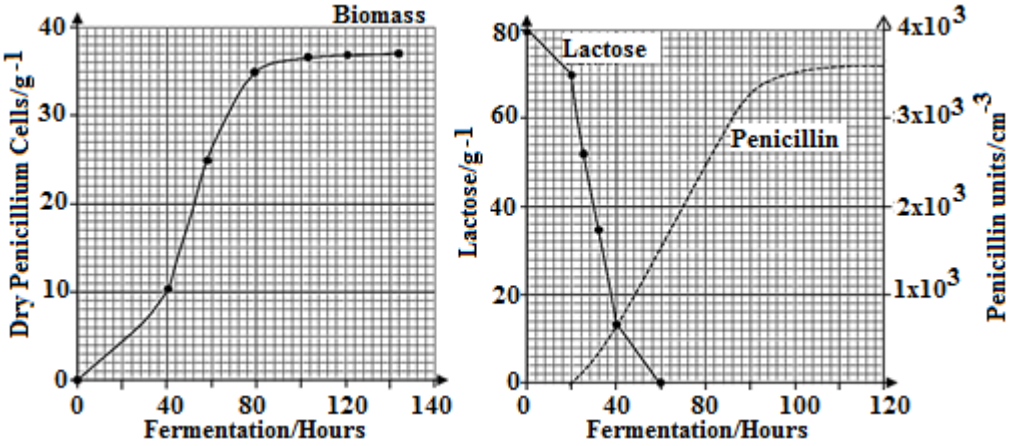


(a) Calculate the;
  (i) Change in the water potential of soil solution after raining.
  (ii) water potential gradient between the soil solution and cell,
  Before raining.
  After raining.
(b) Explain the difference in the effect of water potential gradients at the two conditions in a (ii) on the flow of water molecules between the root hair and soil.
(c) Predict the effect of the change in water potential in a(i) on the pressure potential of root hair cell. Explain your answer.

THEME II: ECOLOGY

QN: 2.1

The graphs below show a fermentation process in which Penicillium chrysogenum is grown using the batch culture method, to produce an antibiotic Penicillin which is used to treat various bacterial infections.

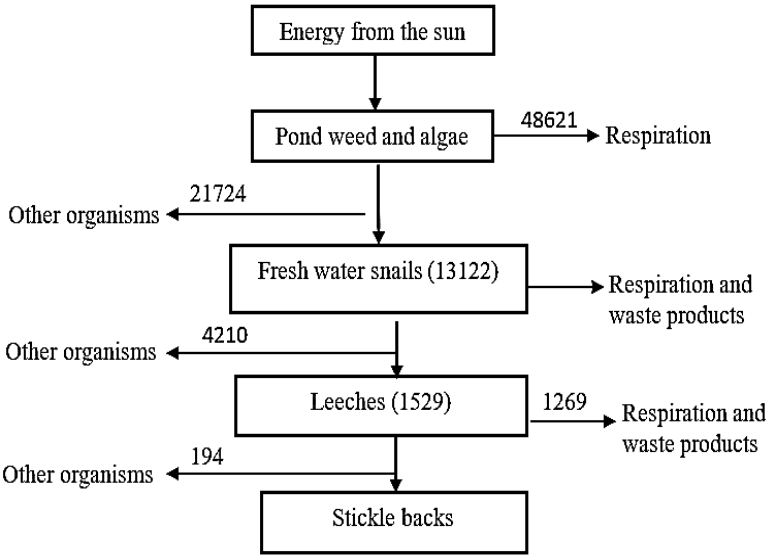


A sugar solution and other ingredients were added. The temperature of the culture solution was maintained at 30^0C. A buffer solution was also included in the culture.
(a) Explain the changes in the biomass of Dry Penicillium during the time of fermentation.
(b) Explain the relationship between lactose and Penicillin.

(c) Why was temperature maintained constant?
(d) Why was the buffer solution included in the culture medium?
(e) The continuous use of antibiotics has caused bacterial resistance and rapid emergency of new strains. Explain the Possible causes for the rapid emergence of resistant strains.
(f) Penicillium chrysogenum commonly grows on dead organic matter. Describe its adaptations to survive in its environment.

QN: 2.2

a) What is meant by gross primary productivity?
b) The diagram below shows the energy flow in $KJm^{-2}year^{-1}$ through a freshwater ecosystem.
i) Calculate the gross primary productivity of the pond weed and algae
ii) How much energy is lost in respiration and waste products by the freshwater snails?
iii) Explain why carnivores would have a higher secondary productivity than herbivores.



THEME III: MAINTENANCE OF LIFE

Nutrition in green plants
QN: 3.1.1

The graph I below shows how the net primary productivity of the marine alga ***Hormosira banksia*** varies with depth and sea temperature. Graph II shows the effect of algal blooms on the productivity of the marine alga ***Hormosira banksia***.
(a) (i) Using the graph, explain the relationship between net primary productivity and depth.
(ii) Explain the effect of algal bloom concentration on the oxygen exchange for the marine alga *Hormosira banksia.*
(b) What is meant by the term net primary productivity?
(c) (i) Explain why oxygen exchange can be taken as an indicator of net primary productivity.
(ii) What concentration of algal is considered dangerous to aquatic life?
(d) (i) Show clearly on each curve the position of the compensation point. Give the reason for your answer.
(ii) Account for the difference in the positions of the compensation points at each temperature.
(iii) Would H. Banksii be able to survive at greater depths in warmer or colder seas? Explain.
(e) State any other four ecological effects of algal blooms.

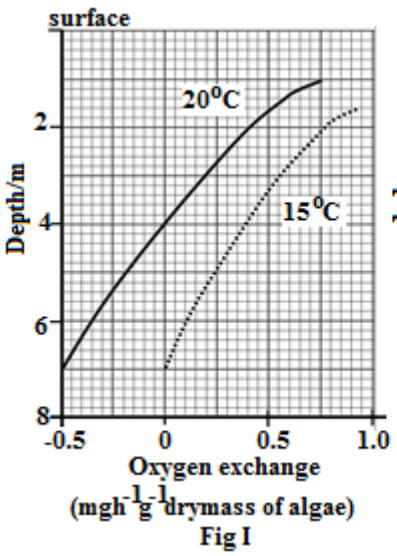


Fig I

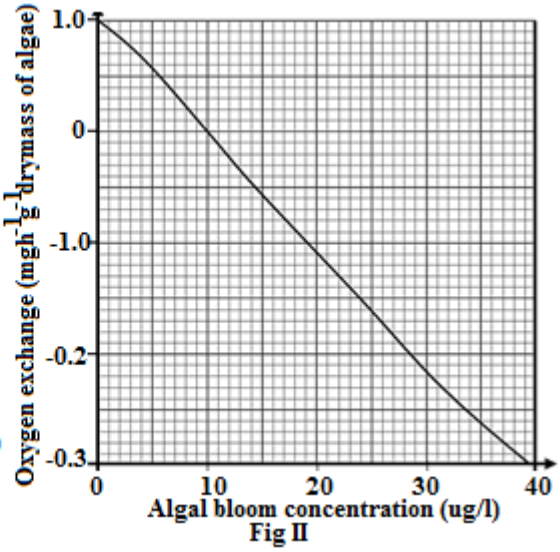


Fig II

QN: 3.1.2

The figure below shows time course of sucrose (photoassimilate) and phosphorus net import (-) into and export (+) from a cucumber leaf during its development.

(a) Describe the relationship between

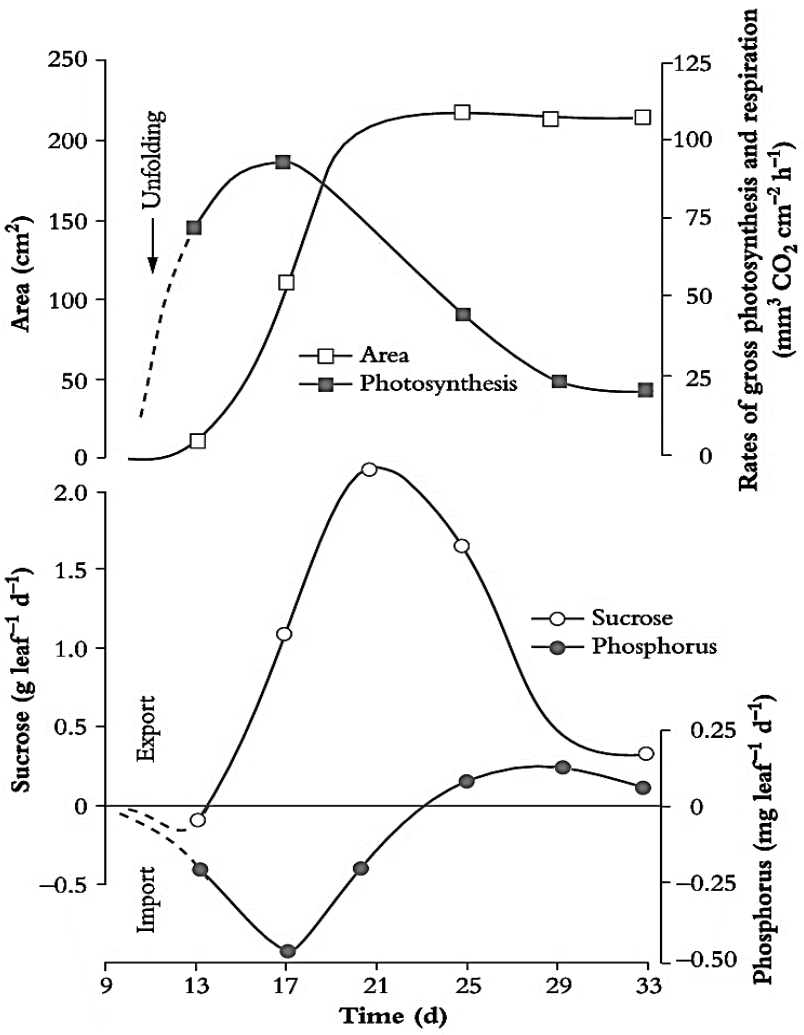
(i) Leaf area and photosynthesis.

(ii) Photosynthesis and sucrose movement in the leaf.

(b) Compare the movement of sucrose and phosphorus in cucumber leaf.

(c) With reference to the graph, explain the movement of sucrose and phosphorus in cucumber leaf.

(d) Outline the mechanism of exporting sucrose from leaves to plant parts that need it.



Transport in plant.

QN: 3.2.1

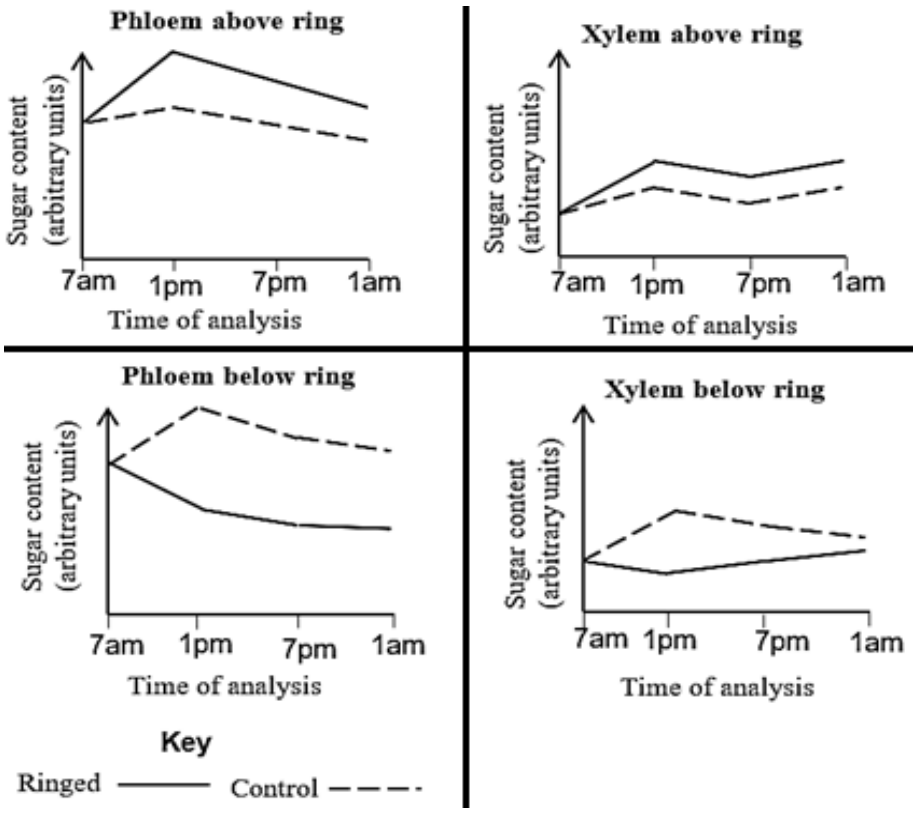
Figure **below** shows the effect of ringing the stem of a cotton plant with time. In the experiment, a ring was cut through the stem and its bark removed and in the control experiment, the ring was cut but the bark not removed. The graphs show the changes in the total sugar content of the phloem and of the xylem over a period of 18 hours.

a) Explain the variation in the sugar content of the phloem and xylem of the plant over the period shown.

i) Above the ring.

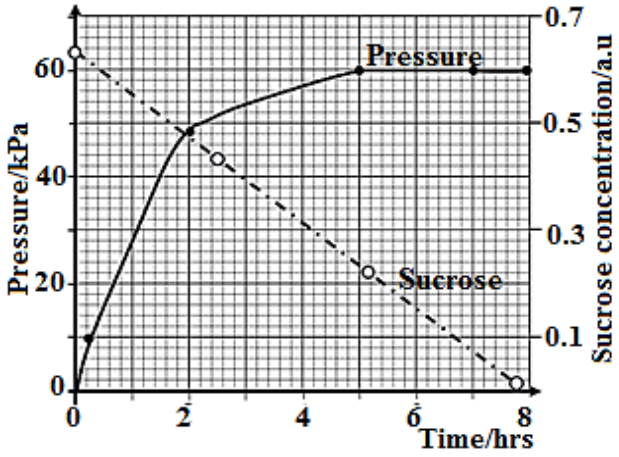
ii) Below the ring

b) What evidence from the graphs supports the hypothesis that sugars can move laterally but not downwards in the stem?



QN: 3.2.2

(a) In an experiment to investigate the movement of water up the plant, the stem of a herbaceous plant was cut, the cut end of the stump continued to exude copious quantities of water, and a suitable mercury manometer was attached to the cut end, to measure the pressure. The experiment was left to stand for some time. The results were tabulated and then plotted in Figure I. At the same time, the amount of sucrose in the cells of the stem was monitored.



(i) Describe the changes in pressure that took place during the period of the experiment.

(ii) Explain the variation in the sucrose concentration.

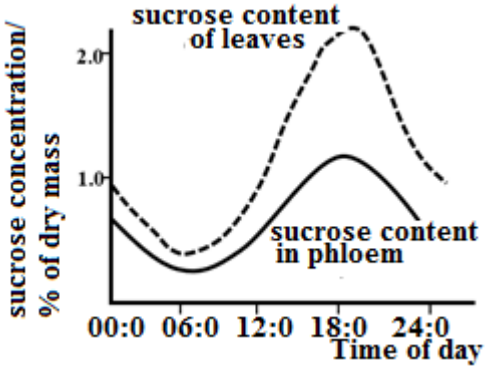
(iii) Explain the effect of variations in sucrose on the pressure.

(iv) Apart from sucrose concentration, state and explain the other three factors that may affect the process being investigated.

(v) How is the process investigated cause the upward movement of water through the xylem vessels?

(vi) State any five adaptations of the xylem for the movement of water up the plant.

(b) Another experiment was carried out to find out the tissues responsible for the movement of manufactured food substances. The plant was supplied with carbon dioxide that had radioactive carbon. Using a Geiger Muller, the concentration and movement of manufactured food (sucrose) were determined. Figure II below shows the Diurnal variation in the sucrose content of leaves and phloem.



(i) Compare the changes that take place between sucrose content in the leaves with that in the phloem.

(ii) Explain the relationship between the sucrose content in the leaves with that in the phloem.

(iii) State any other three pieces of evidence to support the movement of manufactured substances in the phloem

(iv) Apart from the pressure flow hypothesis, describe other two theories to explain the movement of manufactured material.

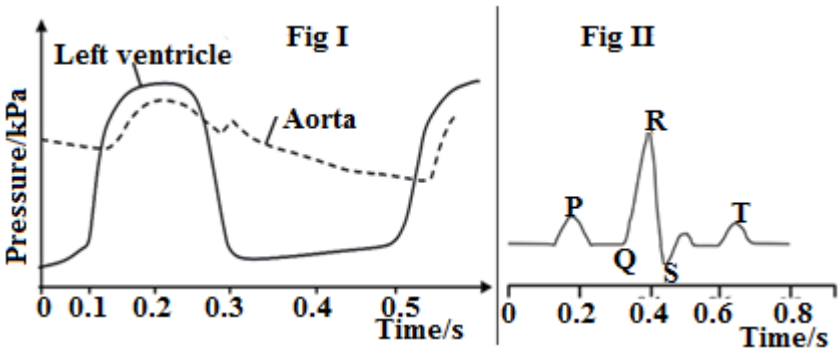
(v) How is the phloem adapted for the process of translocation?

Transport in animals

QN: 3.3.1

Figure I, below shows the changes in pressure in the aorta and the left ventricles of the heart, during the cardiac cycle. Time 0 indicates the start of atrial contraction.

Figure II represents the electrical activity of the heart.



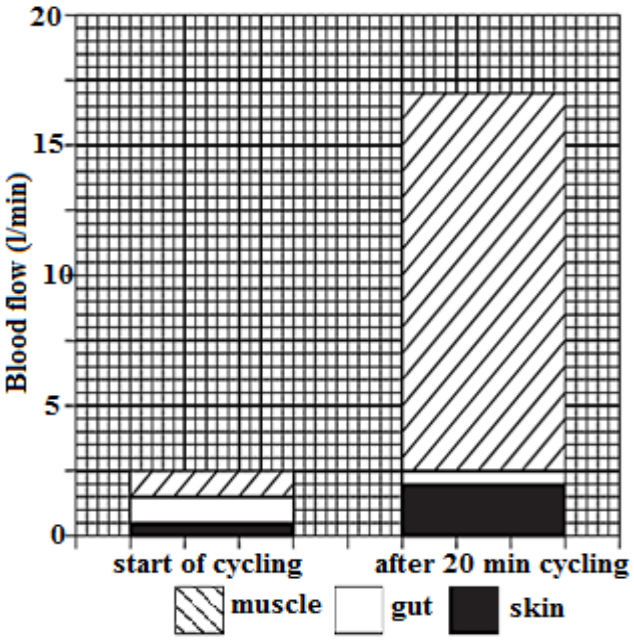
(a) (i) Compare the pressure in the left ventricle with the aortic pressure.

(ii) Explain the differences between the pressures in the left ventricle with that in the aorta.

(iii) Explain the changes in the pressure within the aorta.
(iv) On the graph of changes in pressure in the aorta and left ventricle, show using an arrow when the aortic semilunar valve closes.
(b) State what the points P and QRS represent.
(c) Describe the events that take place at the following points on the electrocardiogram
(i) P
(ii) QRS
(d) State the differences in the events that take place at points P and QRS.

QN: 3.3.2

The graph in the figure below shows changes that occurred in the distribution of blood to some parts of a cyclist's body after he had been cycling for 20 minutes.



(a) Work out the percentage change in the blood flow to his
(i) Muscle
(ii) Skin
(iii) Gut after he had been cycling for 20 minutes.
(b) Account for the observed trends in the blood flow to the body parts shown in the figure.
(c) Suggest ways by which percentage change in blood flow to the muscle in (a) above can be achieved.
(d) Predict the change in the blood flow to the following parts after 20 minutes cycling. Explain your answers.
(i) Brain
(ii) Heart muscle

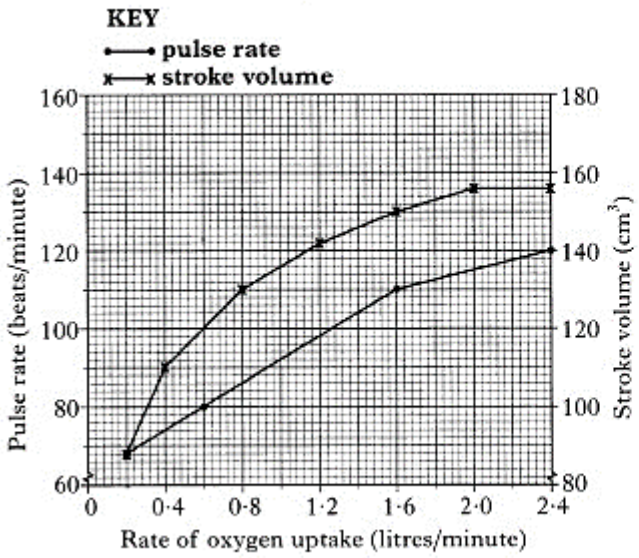
QN: 3.3.3

As the human body exercises, the pulse rate, stroke volume and ventilation rate change. The intensity of exercise is measured as rate of oxygen uptake.
Graph 1 gives information about the heart. It shows how pulse rate and stroke volume change with intensity of exercise in an individual. Stroke volume is the volume of blood pumped from the left ventricle of the heart in one beat.
Graph 2 gives information about the lungs. It shows how the ventilation rate changes with intensity of exercise in the same individual. Ventilation rate is the volume of air inhaled and exhaled in one minute.

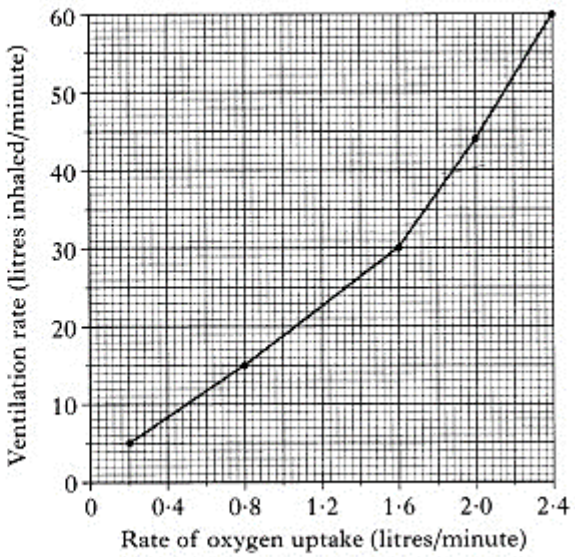
(***see graphs on next page***)

(a) With reference to **both graphs**
(i) Compare the pattern of changes in pulse rate and stroke volume as oxygen uptake increases.
(ii) Describe the observed changes in ventilation rate.
(b) From **both graphs**, explain the relationship between
(i) Stroke volume and exercise intensity.
(ii) Ventilation rate and exercise intensity.
(c) With reference to **Graph 1**, explain the physiological mechanisms that cause the changes in pulse rate and stroke volume during exercise.
(d) Suggest the potential risks and benefits of exercising at different levels of intensity.

Graph 1



Graph 2



QN: 3.3.4

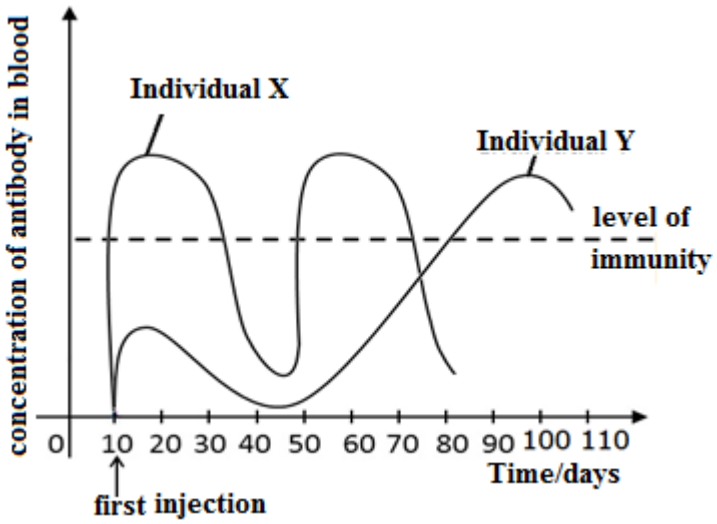
(a) Explain how the rhythmic contraction of heart muscles occurs.
(b) Suggest how to restore the normal feeling of a leg that has become numb after sitting cross-legged for a long time.

Defense against diseases
QN: 3.4.1

Two individuals acquired immunity against chickenpox in different situations. Individual X recovered from chickenpox. Individual Y was injected with a type of suspension and received immunity against chickenpox after a few months.
(a) Explain the immunity acquired by
(i) individual X
(ii) individual Y
(b) Explain how HIV can paralyse the immune system of a person infected by the virus.

QN: 3.4.2

The figure below illustrates the changes in the antibody levels in the blood of individuals X and Y for a specific period of time.
(a) (i) What type of immunity did individuals X and Y acquire?
(ii) State the substance injected in individuals X and Y.
(iii) Explain the differences in the content of the substances you mentioned in (a) (ii).
(b) (i) On the graph, mark with an arrow, the time when the second injection was given.
(ii) Why do individuals X and Y need a second injection?
(iii) Based on the graph curves for individuals X and Y, state two differences in the immunity achieved by individuals X and Y.

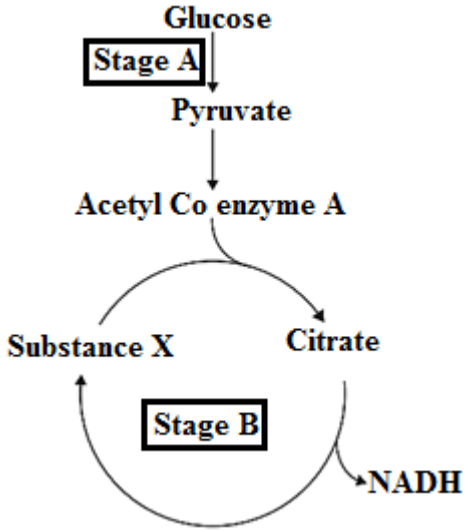


Gaseous exchange
QN: 3.5.1

(a) Compare the human respiratory system and the insect breathing system.
(b) Explain why frogs are more suitable indicators of air pollution level than other vertebrates.

Respiration
QN: 3.6.1

The diagram below shows two stages of respiration.

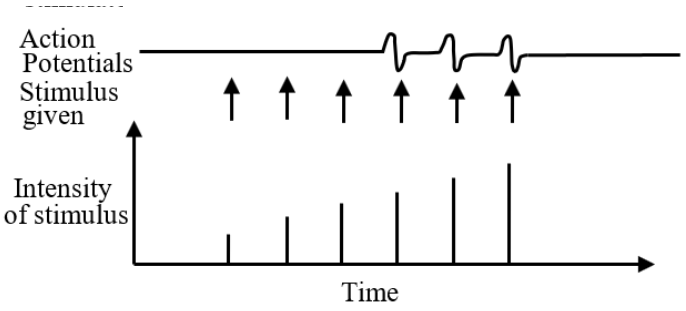


(a) (i) Identify stages **A** and **B.**
(ii) State precisely in a cell where stages **A** and **B** takes place.
(iii) Name substance **X**.
(b) Explain why one of the enzymes involved in the conversion of pyruvate to acetyl coenzyme A is called pyruvate dehydrogenase.
(c) The conversion of citrate to substance **X** in stage **B** involves several reactions.
(i) Name two molecules apart from NADH, which are produced during these reactions.
(ii) NADH is also produced during stage **A**. Explain the role of NADH when cells do not get sufficient oxygen for aerobic respiration.
(d) Phosphofructokinase is an enzyme involved in stage **A**.
(e) The presence of excess citrate inhibits this enzyme. Explain why this is important in the conservation of resources in the cell.

Coordination
QN: 3.7.1

A neurone was suspended in a suitable solution and connected both to an electrical stimulator and an oscilloscope. The intensity of the stimulus could be varied. The oscilloscope produced a visual record of the action potentials in the neurone. The diagrams show the apparatus and a summary of the results of the experiment.

(a) (i) What sort of solution would be suitable to use in this experiment?
(ii) Explain why this solution is used.
(b) Explain why the first three stimuli do not produce action potentials.
(c) (i) Give two similarities between the action potentials and graded potentials.
(ii) Sense organs receive stimuli at different intensities. Explain how the neurons transmit this information.
(d) Explain what happens at a point on a neurone when an action potential is generated and a resting potential is re-established.



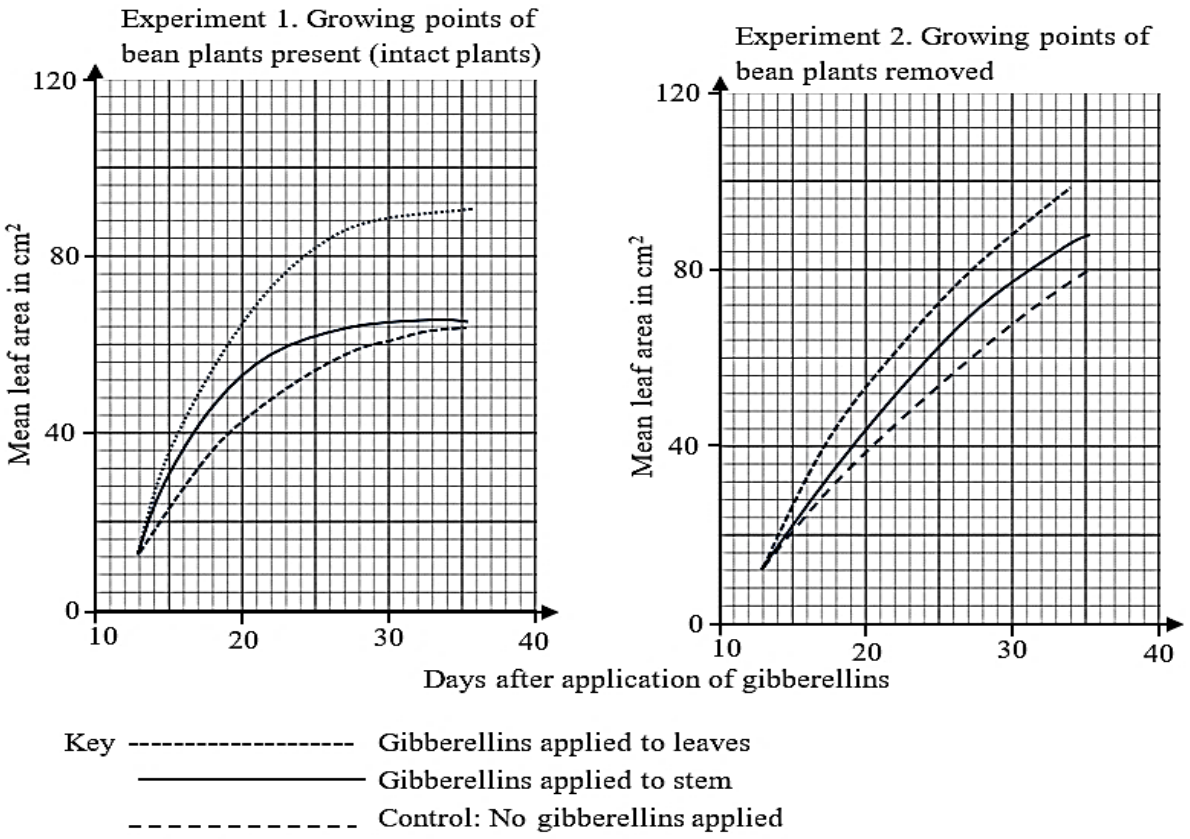
QN: 3.7.2

(a) Describe the roles of proteins in the transmission of nerve impulses along an axon.
(b) Explain the effects of stimulant and sedative drugs on the transmission of impulse through the synapse.

QN: 3.7.3

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 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 gibberellins.

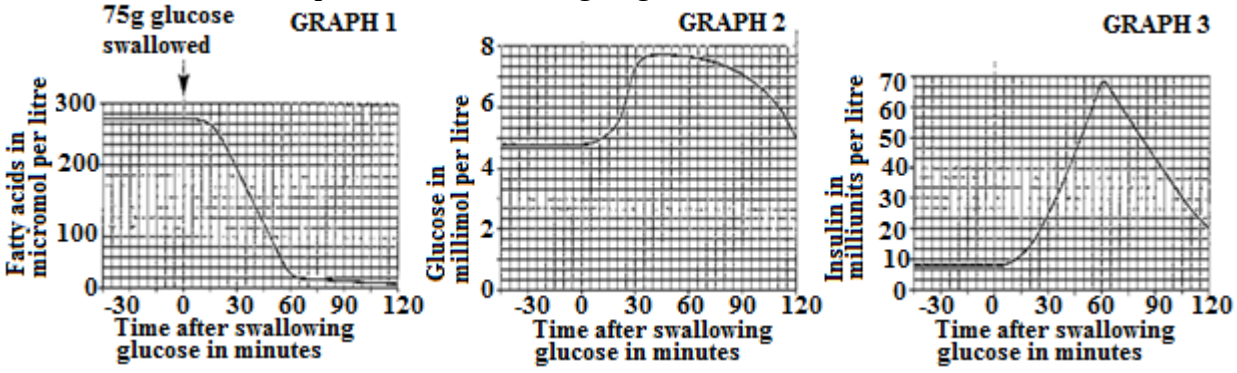
Results are shown in the graphs below.



(a) Compare the effects of applying gibberellin on the stem and the leaves of the intact bean plants.
(b) (i) Describe the effect on leaf growth of removal of the growing points from the bean plants when no gibberellin is applied.
(ii) Suggest one reason why the removal of the growing point has this effect.
(c) How did the removal of the growing points from the bean plans affect the results of gibberellin applications?
(d) Explain how gibberellins exert their effects on plants.

Homeostasis
QN: 3.8.1

Graphs **1, 2** and **3** respectively show the concentrations of fatty acids, glucose and insulin in the blood before and after a person had eaten 75 g of glucose after 24 hours without food.



(a) Give reasons to account for the decrease in blood glucose concentration between 60 and 120 minutes after swallowing 75 g of glucose.
(b) Explain the changes in glucose concentration.
(c) Account for the following:
(i) High concentration of fatty acids in the blood prior to swallowing the glucose.
(ii) Rapid decrease in fatty acid concentration after the glucose was swallowed.
(d) Explain why, following the swallowing of the glucose, the fatty acid concentration took longer to start to change than the glucose concentration.

QN: 3.8.2

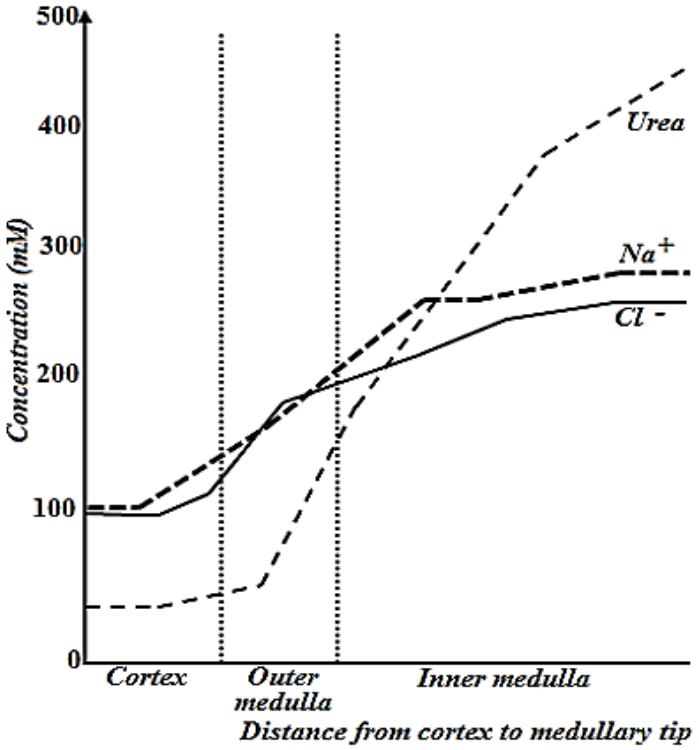
The figure below shows the cortico-medullary concentration gradients of urea, sodium and chloride kidneys of an antidiuretic dog. Study it carefully and answer the questions that follow.

a) Describe the changes in the cortico-medullary concentrations of the solutes with increase in distance from cortex to medullary tip.

b) Explain the changes in the cortico-medullary concentration gradients of the solutes with increase in distance from cortex and medullary tip.

c) How are the above cortico-medullary solute concentration gradients important to the antidiuretic dog?

d) Describe the role of the vasa recta in the efficient functioning of the loop of Henle.

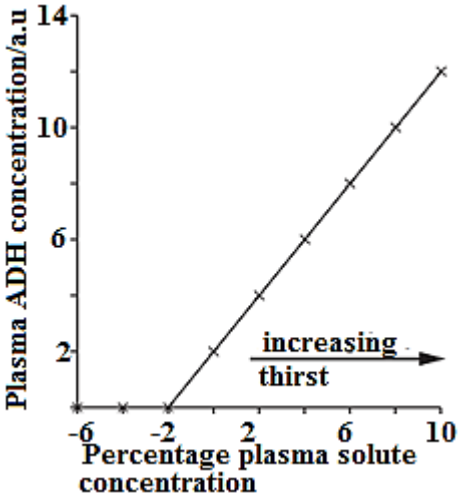


(a) Describe how the following counter current mechanisms occur in living organisms
  (i) Counter current gases exchange in bony fish.
  (ii) Counter current multiplier of the nephron.
  (iii) Counter current heat exchanger in the limbs of dolphins.

(b) (i)Distinguish between positive and negative feedback mechanism in homeostatic systems.
  (ii) Describe any two positive feedback mechanisms in mammals.
  (iii) Why are positive feedback mechanisms not common in physiology of the body of mammals?

QN: 3.8.3

Figure below shows the relationship between the plasma solute concentration and the plasma ADH concentration. A percentage plasma solute concentration of zero represents the mid-point of the normal range.



(a) Describe the relationship between;
  (i) Plasma ADH concentration and plasma solute concentration.
  (ii) Plasma solute concentration and thirst.

(b) Explain the relationship between;
  (i) Plasma ADH concentration and plasma solute concentration.
  (ii) Plasma solute concentration and thirst.

(c) Under what conditions does increased plasma solute concentration arise in humans?

(d) Of what significance is osmoregulation to living organisms?

QN: 3.8.4

(a) Explain how the pituitary gland regulates blood osmotic pressure when a person drinks too little water.

(b) How do saltwater fish survive without experiencing dehydration?

QN: 3.8.5

(a) Describe how the body temperature of a person seated in a cold room for 6 hours is regulated.

(b) Explain the effect on urine excretion of consuming food that contains large quantities of protein.

Patterns of behaviour	(a)	Explain the three types of sign stimuli in evoking behavioral responses in animals.
	(b)	State the roles of hormones in motivation.
QN: 3.9.1	(c)	Explain how displacement activity may have led to evolution of courtship in mammals.
	(d)	State the differences between vacuum and displacement activity.
QN: 3.9.2	(a)	What is a territory
	(b)	State the different ways how organisms mark territories.
	(c)	How can a territory be a threat to the lives of organism that live in it?

THEME IV: CONTINUITY OF LIFE

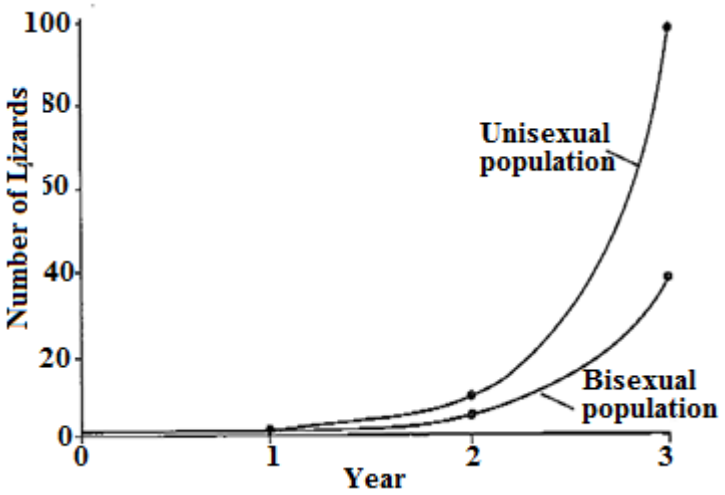
Reproduction

QN: 4.1.1

(a) Describe how changes in different hormone levels in one menstrual cycle prepare a woman for pregnancy.
(b) Explain the effects of taking contraceptive pills on the human menstrual cycle.

QN: 4.1.2

The graph shows the increase in laboratory populations of unisexual and bisexual whiptail lizard species over three years. The unisexual species consists entirely of females, which reproduce parthenogenetically (in total absence of sperm cells). Each population started from a single female animal. For the bisexual species, a mature male was introduced for mating during the first year and then removed.
(a) Compare the observed phenomena in the population of lizards.
(b) Suggest reasons for the differences in population size for the three years.
(c) What are the advantages and disadvantages of unisexual species reproducing parthenogenetically?
(i) Advantages
(ii) Disadvantages



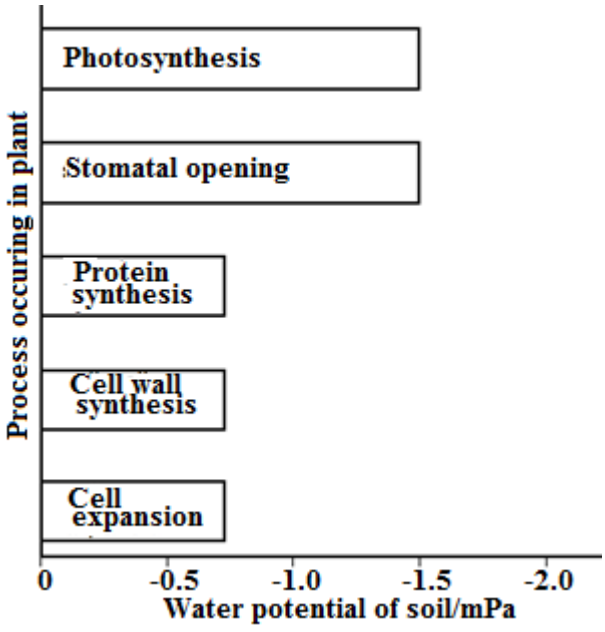
Growth and development

QN: 4.2.1

(a) Describe the events that occur in the gynoecium following pollination.
(b) What changes occur to a human zygote from fertilization up to birth?

QN: 4.2.2

The effect of the water potential of soil water on several plant processes growth was investigated. In the figure below, the bars show whether or not each process was occurring. The plants stopped growing when the water potential of the soil water was below –0.7 mPa. All of the changes in the plants were related to the ability of the roots to take up water from the soil.
(a) Describe the results in the figure.
(b) Explain the relationship between stomatal opening and photosynthesis.
(c) Although photosynthesis is still occurring, plants stop growing when the soil water potential falls below –0.7 mPa. Use information from the figure 3 to suggest two reasons why.
(d) Explain why most of the water uptake in a root takes place in the region just behind the root tip.



Inheritance
QN: 4.3.1

The Alpine region and Tundra are habitats of pine trees. Pine trees in Alpine and Tundra look phenotypically similar but different in phytochemicals thus are different species. The most notable ones are Pinus edulis, Pinus pinaster, & Pinus sylvestris.

A pure tall breeding pine plant with conical canopy when crossed with a pure short breeding pine plant with open canopy, produces F1 generation consisting of trees all tall breeding with conical canopy for all the species. In the F2 generation all had 69 trees, however the phenotypic outcomes vary greatly as follows:

Explain the results of each Pine tree species.

Pinus edulis
Tall breeding with conical canopy=51
Short breeding with open canopy=18

Pinus pinaster
Tall breeding with conical canopy=39
Short breeding with open canopy=26
Tall breeding with open canopy=06
Short breeding with conical canopy=08

Pinus sylvestris
Tall breeding with conical canopy=39
Tall breeding with open canopy=13
Short breeding with conical canopy=13
Short breeding with open canopy=04

QN: 4.3.2

A Manx cat has no tail. A gene controlling tail development in cats has two alleles – Manx (M0) and tailed (M1). Combinations of these alleles can result in either a Manx or tailed kitten being born or the death of the embryo before birth.

The mating of two Manx cats produces both Manx and tailed kittens. The mating of two tailed cats produces only kittens with tails.

(a) Using this information, complete the table below.

Phenotype	Manx	tailed	Embryos which die
Genotype			

(b) In crosses between Manx cats, what would be the expected proportion of zygotes which would have the genotype for tailed cats?

(c) In a series of matings between Manx cats, 60 live kittens were produced. How many embryos would be expected to have died because of the lethal combination of alleles?

In Siamese cats, the expression of a gene for coat colour is strongly influenced by the environment. These cats have dark ears, faces, feet and tails. The dark colour is caused by the presence of pigment, the production of which is controlled by the enzyme tyrosinase.

(d) Siamese kittens are all white at birth with the pigment developing only in the cooler extremities some days later. Suggest an explanation for these observations.

Another gene concerned with coat colour in cats has two alleles – black (c^b) and ginger (c^g). different combinations of these alleles produce female cats of three types – ginger, black and tortoiseshell (a mixture of ginger and black fur) but only two types of male cat – ginger and black. In cats, the female is the homogametic sex.

Two crosses were carried out:

Black female x ginger male = either tortoiseshell females or black males.

Ginger female x black male = either tortoiseshell females or ginger males.

(e) Use genetic diagrams to explain the results of both crosses.

Evolution
QN: 4.4.1

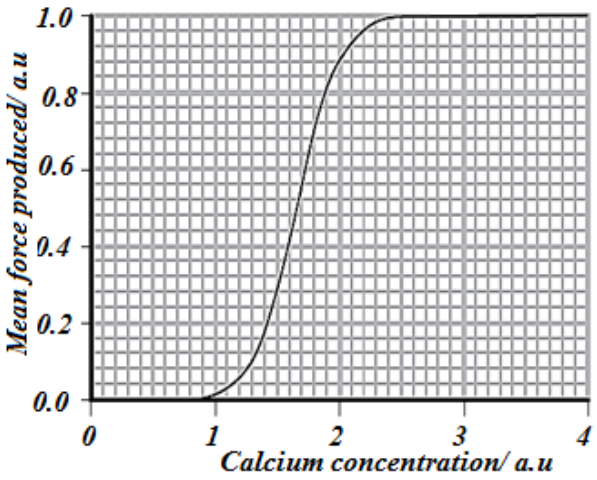
(a) Describe the dangers of inbreeding in organisms.
(b) How can outbreeding lead to evolution.
(c) Describe the different mechanisms how plants reduce the chances of inbreeding.

Locomotion
QN: 4.5.1

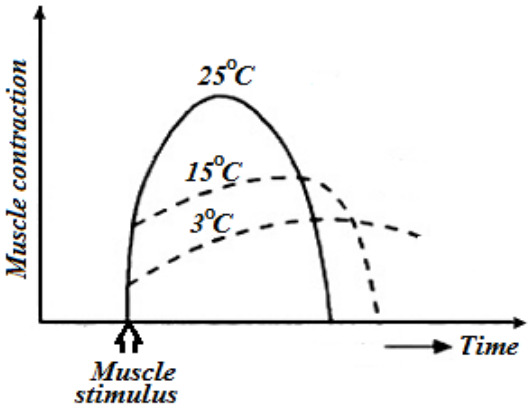
(a) Describe how the following skeletal systems are adapted for locomotion in their respective habitats.
(i) Earthworm
(ii) Fish
(b) Explain the property of muscles involved in human movement.

QN: 4.5.2

(A). An investigation was carried out to study the effect of calcium ion concentration on muscle fibres. Individual fibres, from one sample of muscle, were provided with different calcium ion concentrations. The force produced by each fibre was recorded and a mean force was calculated for each calcium ion concentration. All other variables were kept constant.



(B). Another investigation was carried out to determine the effect of temperature on muscle contraction. The results are shown in the graph below.



(a) Explain the effect of increasing calcium ion concentration on the mean force produced by muscle fibres.
(b) Describe and suggest explanations for the effect of temperature on muscle contraction.
(c) Explain the following observations.
i. Red color of blood is due to the presence of haemoglobin. Certain skeletal muscles appear red in color even when they lack haemoglobin.
ii. Length of A band remains unchanged during muscular contraction
iii. Both shoulder and elbows have joints but their movement is different
iv. Bones of older people turn brittle and break easily
v. Muscle contraction occurs when troponin molecules are removed from the thin filament.
vi. No muscle contraction when the endoplasmic reticulum is removed from muscle cells.

THEME V: DISSECTION

Toad

QN: 5.1.1

You are provided with a freshly killed specimen labeled W. Study it and answer the questions that follow.
(a) (i) Name the peculiar feature that can aid in the identification of its habitat.
ii) Explain briefly the importance of the features named in a)i) above
b) Give three ways in which the covering of the animal's body is adapted for its survival.
c) Dissect the specimen to display;
i) Blood vessels that drain from structures attached to the lower jaw and the anterior upper trunk.
ii) Blood vessels that carry blood to abdominal secretive and excretory organs and those that drain the left hind limb. Draw and label with the heart in a displaced state.

QN: 5.1.2

You are provided with **specimen K** which is freshly killed.
a) Observe the fore and hind limbs. State three observable structural differences between them.
b) Put the specimen ventral side uppermost on a dissecting board and pin with limbs fully stretched. Dissect to pull out the skin from the body wall and upper region of limbs.
c) Dissect the specimen to display blood vessels that;
i) Supply blood to urinary structures and those on the upper jaw
ii) Draining blood from the right hind limb and structures responsible for the chemical digestion of carbohydrates. Draw and label your dissection when the heart is in a ventral state.

Rat **QN: 5.2.1**	You are provided with a freshly killed specimen labeled R i) With reference to the cover of the body, give the importance of each of the structure to the animal. ii) Examine the feet of the animal, and how are they adapted for its survival in the habitat. b) Dissect the specimen on the tray to expose the superficial structures of the ventral side of the neck, and displace the visible neck structures and their accessory structure anteriorly. Draw and label the musculature of the neck, chest region, and thoracic region. c) Open the abdomen to display vessels that carry blood; to structures responsible for chemical digestion from the heart; and from structures responsible for secretion and excretion on the left back to the heart. Draw and label your dissection excluding the heart.
QN: 5.2.2	You are provided with specimen **T** which is fleshly killed. a) Examine the hind limb and state three ways it is adapted for the survival of the specimen in its habitat. b) Examine the head of the specimen and draw and label the ventral view of the anterior part of the head to show the structures for sensitivity. c) Dissect the abdominal region of the specimen to expose the blood vessels. i) Returning blood from the structures for reproduction and secretion. ii) Supplying the structures for absorption of nutrients and excretory organs. Draw and label
Cockroach **QN: 5.3.1**	You are provided with specimen K. Examine it carefully and answer the questions that follow: (a) Place the specimen ventral side uppermost spread out the wing and then examine the anterior wing and posterior wing using a hand lens. (i) Give four structural differences observed between the anterior wing and posterior wing. (ii) Explain one way the structures of the anterior and posterior wing relate to their function. (iii) Cut off the left hind limb and outline the adaptations of the structures anterior to the foot of the hind limb that enables the animal to efficiently locomote. (b) Place the specimen's dorsal side uppermost; open up the abdomen by cutting along the left lateral side. Displace the alimentary canal to the left. Immerse the specimen in the water fully. Draw and label all the buoyant internal structures visible in the specimen. (c) By further dissection, Dissect the specimen by cutting along the right lateral side of the thoracic region to expose only the structures attached to the ventral cuticle. Draw and label the exposed structures with the alimentary canal discarded.
QN: 5.3.2	You are provided with specimen Y, which is freshly killed. (a) Cut off appendages at their proximal ends, and remove all the wings including the tegmina. Describe (b) The structure of the animal's body. (c) Lay the animal dorsal side uppermost, cut off the elytra and the wings close to their bases. Lift the 10^{th} abdominal tergum. Draw and label the visible structures on the ventral cuticle when the tergum is displaced. (d) State the sex of the specimen. Describe the external structures used for determining sex.

DISCLAIMER.

These questions are built in a similar style to that presented within the previous exam board's sample assessment materials. There can be no guarantee of the extent to which these questions will reflect the actual examination questions students will sit. We hope that schools and students find these questions useful in the exam preparations for this year. However, we take no responsibility for the relevance of this document to actual examinations sat.