بسم الله الرحمن الرحيم

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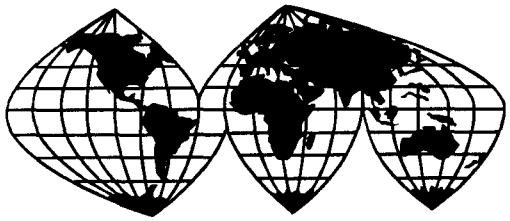

IGCSE

Superior Biology

Answers to Examination Papers

June 1993 - June 2003

WAHID WANIS

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O.L

Biology Answers

Paper 1

June 1994

Paper 1

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November 1994

Paper 1

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June 1995

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November 1995

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June 1996

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November 1996

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June 1997

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November 1997

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November 1998

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June 1999

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November 1999

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June 2000

Paper 1

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November 2000

Paper 1

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June 2001

Paper 1

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8	B	18	C	28	D	38	C
9	D	19	D	29	B	39	B
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November 2001

Paper 1

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June 2002

Paper 1

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November 2002

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June 2003

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O.L

Biology Answers

Paper 3

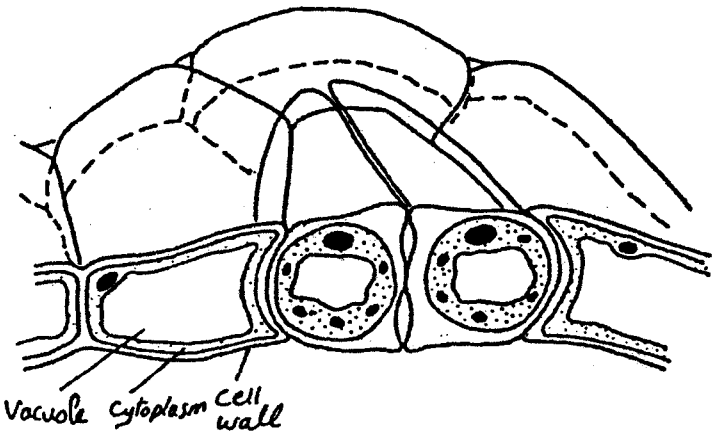
Biology Answers

contents

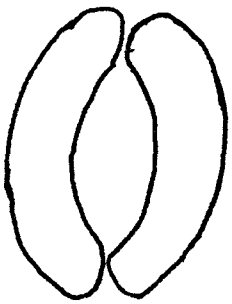
Paper 3
June 1993

1

(a) (i)



(ii)



(b) (i) Carbon dioxide.
(ii) Oxygen.

(c) To reduce the rate of water loss by the process of transpiration by reducing the amount of surface area exposed to air, also it reduces the rate of catabolism by reducing the amount of oxygen

taken by the plant, and therefore, it can maintain its stored food a longer time.

(d) Habitat : desert
Leaves are small covered with thick cuticle to reduce the water loss by transpiration and also in order not to be ruptured by the effect of wind.

Leaves may be covered by hair to absorb moisture or may be rolled with sunken stomata to reduce the effect of the other factors on transpiration.

Stems are short in order not to be broken down by the effect of wind ; and green to help in photosynthesis as the leaves are small.

2

(a) P : spinal cord.
Q : left lung.
R : Heart.

(b) 1- Oesophagus.
2- Trachea.
3- Intercostal muscles.

(c) (i) Lung.
(ii) To increase the rate of gaseous exchange, as a result the rate of respiration increases leading to an increase in the rate of production of energy required for different activities of life.

(d) During inspiration, the intercostal muscles contract pulling the ribs up and outwards also the diaphragm contracts to become nearly flat, as a result the volume of the thorax increases and the pressure inside decreases causing air to rush inside.

3

(a) Bacteria.

(b) (i) 6 .
(ii) 4.1 .

(c) 1- Fluoride in drinking water in U is more than T.
2- The amount of calcium taken by people in town U is more than T.
3- People in town T have the habit of eating a lot of sweets.
4- Medical dental care in town U is more than T.

(d) Because the time taken after changing their milky teeth is not enough to show the effect of different factors on tooth decay.

(e) Breast milk contains the different food materials required for the baby in right proportions while bottle feeding may contain more or less. Breast milk has a suitable temperature while bottle feeding is difficult to be prepared at a temperature similar to the baby's temperature. Breast milk is free from contamination while bottle feeding is liable to be contaminated. Breast milk is cheap and always present while bottle feeding is not.

Section B

4

(a) (i) Solar energy mainly light is trapped by the producers such as green plants which trap light energy converting it to chemical energy to be used and stored in food made by photosynthesis.

(ii) Chemical energy passes along the food chain from one organism to another in the form of food when primary

consumers feed on producers or when secondary or 3rd consumers feed on the other consumers, organisms use part of this energy which is released during breaking down of food by the process of respiration in the different activities of life and keep the other parts in the cells of their bodies.

(iii) Energy leaves the organisms in different ways. Amount of energy is lost in the form of heat to the surrounding medium by conduction, radiation or with expired air and excretory products such as warm urine and faeces in higher animals, other amounts of energy leave the organisms in the form of kinetic energy during movement. After death, energy leaves the organisms by the effect of decomposers which break them down using parts of them as food and leaving the rest in the form of simple substances in the environment to be reused by the producers.

(b) Short food chains reduce the loss in energy and in biomass because as the number of producers increases more energy is lost to the surrounding by each of them and also more biomass is lost by their excretion or respiration.

(c) The advantage of feeding crop plants to animals is to provide enough animal proteins and to maintain species of these animals while the disadvantage is that it leads to loss in energy and biomass where the animals lose energy during their different activities of life and lose biomass due to processes of respiration and excretion as a result when humans feed on such animals they gain less energy and less biomass than that which can be obtained from feeding crop plants.

5

(a) They can get a strain of a plant which has fruits with good flavour and other strain with attractive colour.

The stamens of one strain have to be removed before maturing from their flowers to avoid self pollination, then the flowers have to be covered with a plastic bag to avoid cross pollination.

When the stamens of the other strains become mature, pollen grains are collected and then dusted on the stigma of the flowers of the strains which are covered.

The produced seeds are then cultivated, and the plants that produce the desired fruits are then allowed to be self pollinated (by covering their flowers with a plastic bag before maturity of their reproductive organs to allow self pollination and to avoid cross pollination).

The above process has to be repeated to obtain pure breeding strain of the desired characteristics.

(b) Artificial selection can be of economic importance to a farmer in production of varieties of animals and plants with increased economic importance, and this can be done by cross breeding strains with desirable characteristics or by producing new strains of good plants by vegetative propagation e.g. by grafting plants. For example farmers in Egypt, by cross breeding of Egyptian cattles with Friesians can produce strains that can live in Egyptian conditions and are able to give high milk and meat production.

(c) Using antibiotics such as penicillin kills bacteria, but due to variations in the bacterial strains, some of these bacteria become able to resist this antibiotic.

These bacteria can live longer and produce more offsprings. These offsprings inherit the variation that helps their parents to resist this antibiotic.

By time, this particular variety will outnumber and finally replace the original varieties.

Therefore, It is important to discover and use different types of antibiotics to avoid the development of antibiotic resistance bacteria, and to kill by the different antibiotics those bacteria which are resistant to a specific antibiotic.

Paper 3
November 1993

1

(a) (i) The days 1, 2, 3, 4 and 5.
(ii) 14.

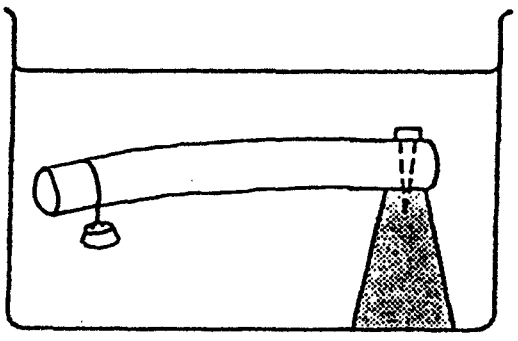
(b) Because there is no ovum in the oviduct to be fertilized during these days.

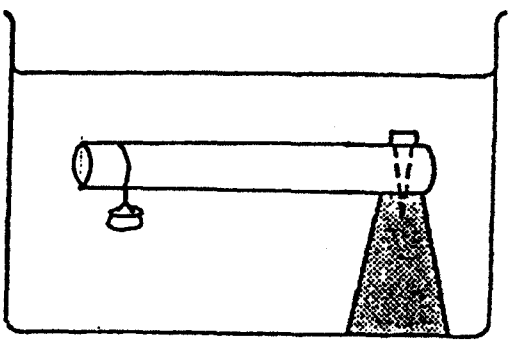
(c) By the effect of the hormone progesterone the lining of the uterus is maintained allowing implantation of the embryo providing it with its requirements and after three months it forms a disc shaped structure called placenta which is connected to the embryo by the umbilical cord through which wastes pass from the embryo to the maternal blood. Food and oxygen pass from the maternal blood to the embryo.

(d) (i) It stimulates the ovaries to secrete ova to be fertilized.
(ii) 1- May lead to multibirth which has economic difficulties.
2- The produced babies may be under-weight due to their abnormal number.

2

(a) (i)





(ii) 2B. The potato cells gained water by osmosis and therefore, increased in length, due to their turgidity.

3B. The potato cells lost water by osmosis and therefore, the cells shrinked and so decreased in length.

(iii) Osmosis.

(b) (i) The plant cells are surrounded by cell wall which can withstand high pressure, while high pressure in animal cell causes it to burst.

(ii) It causes the cells turgid and this is necessary for support especially when there is no supporting tissues are formed yet.

(c) Uptake of water takes place by osmosis while uptake of minerals takes place by active uptake which is a biological process needs energy from the living cells.

3

(a) To maintain the internal environment of the organism constant.

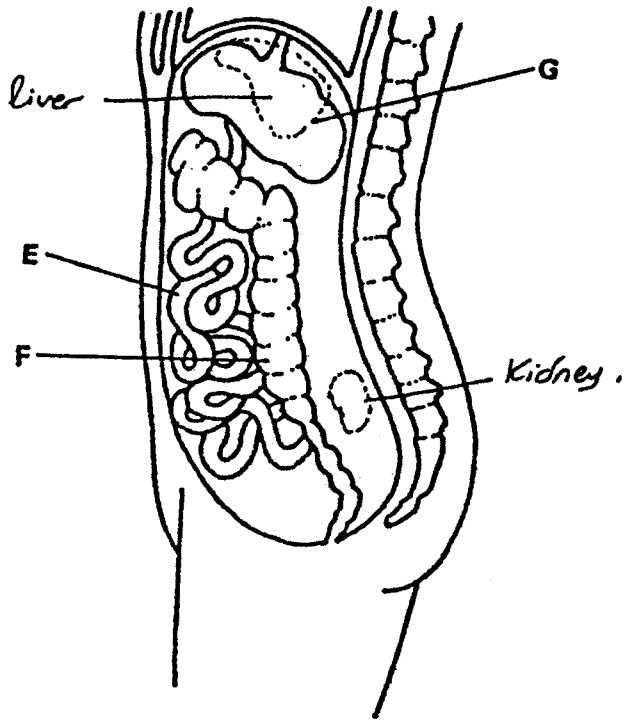
(b) (i) 20 minutes.

(ii) Due to heat loss to the water of the bath which has a temperature lower than that of the body.

(iii) 1- Liver converts part of the stored glycogen to glucose to be used in production of more energy.

2- The blood vessels in the skin constrict to reduce the rate of heat loss from the body.

(c) (i)



(ii)

part	name	function	structural feature
E	....ileum.... "Part of small intestine"	..Absorption of..... ..digested..food....	Contains..villi..to..increase the..surface..area.....
F	.....Colon..... "..Large..intestine."	....Absorption..of..H_2O from..indigested..food	Lined..with..fine..capillaries to..absorb..water.....

(iii) Proteins.

(iv) The final product of this digestion is amino acids, in the liver excess amino acids are deaminated i.e. the amino group NH_2 is removed from one amino acids leaving an organic acid which is then converted to fats or carbohydrates while the NH_2 is converted to NH_3 which combines with CO_2 forming urea.

Section B

4

(a) A reflex action is an automatic, rapid, unlearned response to a stimulus which helps the animal survive, it is a reaction to sensory information of an urgent nature e.g. withdrawing hand from flame.

(b) Reflex action is rapid while the voluntary action is usually slower, also the reflex action is involuntary while the voluntary action is under the man's will.
Reflex action in region of the head is controlled by the mid-brain, and that at the region below neck is controlled by the spinal cord while the voluntary action is controlled by the cerebrum.

(c) Nervous and hormonal control resemble each other in many ways such as both are affected by certain stimulus to produce the proper response, also both cause a response in an effector, and both of them lead to the body coordination.

Nervous control and hormonal control differ in many aspects for example the speed of message in nervous control is usually fast such as withdrawing hand away from a hot object while the hormonal control is usually slow like the control of growth by hormones.

The precision of effect is also different, in case of nervous control it affects a very precise area, for example feel of pain at the tip of finger while the hormonal effect has more general effect, for example the effect of hormone adrenaline results in heart beats, blood pressure, constriction of iris and constriction of certain blood vessels.

In case of nervous control the reaction required is immediate like blinking of eye while in case of endocrine control the reaction is long term like the reaction of growth hormone in the body.

5

(a) Deforestation is one of the activities shown, it causes many harmful effects, it reduces the amount of produced oxygen from plants and causes an increase in the concentration of carbon dioxide in the atmosphere and this has its harmful effects on the respiration of different organisms while excessive increase in the concentration of carbon dioxide may lead to green-house effect which means an increase in the temperature of the planet earth.

Deforestation also causes rapid soil erosion as the presence of trees is required to reduce the effect of air currents and water currents on the soil and also the roots of trees help to bind the particles of soil together.

Deforestation affects the life of the animal, living in this region where the plants provide shelter and food for them.

Deforestation also affects the humidity of the surrounding atmosphere as the presence of the trees is used as a source of water vapour due to the process of transpiration, also from the same point of view deforestation will reduce the amount of rain.

Saw mills, pulp factory and means of transportation of paper products all produce waste gases such as sulpher dioxide and nitrogen oxides which can dissolve in rain water leading to acid rain which has harmful effects on buildings made of lime stone and also on metals found in buildings or machines also it affects marine life as it changes the pH value of the water streams. Acidic gasses also have harmful effects on respiratory systems of people live in town.

Sewage outflow and factory wastes when poured in water streams they cause harmful effects, for example they make water unfit for drinking and encourage the growth of water plants such as algae which may form a layer that blocks out light from the submerged plants which are used as a source of oxygen by the

process of photosynthesis, also the decay of dead algae encourages the growth of microorganisms which spread diseases and consume the oxygen dissolved in water leading to death of marine animals.

(b) The harmful effects of deforestation can be reduced by making a balance between planting and cutting down of trees.

The harmful effects of the produced gases can be reduced by using filters or catalytic converters, while the effect of sewage outflow and wastes of factories can be reduced by treating this water before being poured in water streams.

Paper 3
June 1994

1

(a) (i) Mineral ions such as nitrates form making proteins and magnesium for making chlorophyll.

(ii) Uptake of minerals takes place by active uptake which needs energy while the uptake of water takes place by osmosis which does not need energy, as it is a physical process.

(b) To provide the plant roots by oxygen to respire producing the energy necessary for active uptake.

(c) 1- Light intensity.
2- Carbon dioxide.
3- Suitable temperature.

(d) (i) Because there is no soil to fix itself in it by its roots.
(ii) The white to reflect the heat from the surrounding and the black to absorb the excessive heat from inside the apparatus.

(e) As it is a non-biodegradable material, it will not be decomposed by microorganisms, therefore, if it is thrown it causes accumulation, for example in water canals it resists movement of water and blocks light from submerged plants, and if thrown in soil it will resist the growth of plant roots.

2

(a) P Oxygenated - high pressure.
Q Deoxygenated - low pressure.
R Deoxygenated - High pressure.
S Oxygenated - High pressure.

(b) (i) 1- Animal fats, as they precipitate on inner walls of vessels.
2- Salts, as they increase blood pressure.

(ii) 1- Stress.
2- Smoking.

(c) (i) Because if it is sewn in the wrong direction the semi-lunar valves in it will prevent the flow of blood.

(ii) Advantage is that, in this method no tissue rejection takes place while using a vessel from other person causes tissue rejection.

Disadvantage is that the walls of the vein are thin, therefore, it may be unable to withstand the high blood pressure in the artery.

3

(a) (i) Respiration.

(iii) Carbon dioxide.

(iii) Due to the absorption of the produced carbon dioxide.

(b) Alcohol (ethanol) due to anaerobic respiration.

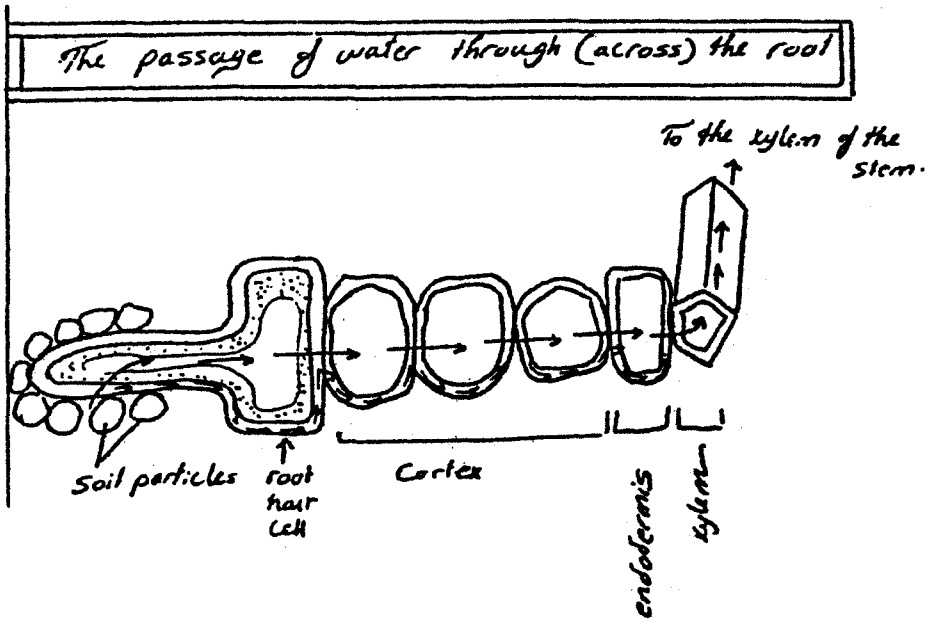
(c) Temperature affects the rate of respiration of yeast, at low temperature (at refrigerator) the rate of respiration is very low but refrigeration do not kill yeast, at high temperature the rate of respiration is also low but at room temperature, the rate of respiration is high.

(d) As it absorbs carbon dioxide from the atmospheric air where the high temperature activates the rate of this absorption.

Section B

4

(a)



The uptake of water from the soil takes place mainly by osmosis where the water potential in the soil is higher than the concentration of water in the vacuole of the root hair cells, and the cell membrane is a partially permeable membrane, therefore, water enters the root hair from the soil by osmosis.

Also water can be imbibed (soaked) by the viscous substance secreted by the root hair cell, and so it is also soaked by the cell wall, as a result an amount of water passes throughout the cytoplasm from the epidermal cells to the cells of cortex because the concentration of water in the epidermal cells becomes higher than that in the cortex due to absorption of water and this process also helps movement of water from the cortex to the endodermis and then to the xylem vessels of the root to ascend to the stem.

(b) When systemic pesticides are sprayed onto the leaves of plants they can pass (diffuse) through stomata, and rarely through cuticle to the inside the plant cells. Systemic pesticides are translocated through phloem to the different parts of the plant, as a result when an insect feeds on shoots of this plant they are killed as they receive a dose of this insecticide.

After a period of time the pesticide becomes destroyed spontaneously inside the plant into harmless substances, therefore, we should not obtain food from the plants directly after being sprayed because in this case a dose of an effective pesticide can pass through this food to our bodies, but we have to obtain food from the plants after period of time (according to the type of the pesticide) enough for the pesticide to become destroyed.

(c) The plant roots are adapted for absorption by having fine projections in the cortical cells of the root known as root hair cells to increase the surface area for absorption of food, also the lining of intestine has similar fine projections called villi to increase the surface area for absorption.

The root hair cells and also the villi have thin walls and this is effective as it facilitates absorption. In both root hair cells and villi there are a lot of mitochondria to produce enough energy for the absorption by the process of active uptake.

5

(a) Excretion is the process of removal of toxic materials, waste products of metabolism, and substances in excess of requirement of the organism.

(b) (i) Lungs excrete carbon dioxide and water vapour which are produced in the different body cells as a result of the process of respiration, water is carried to the lungs through the blood plasma, while carbon dioxide is also carried by the blood plasma but in the form of bicarbonate.

Carbon dioxide and water reach the lung through the pulmonary artery where the air sacs of lungs excret such materials from the blood capillaries which are the fine branches of the pulmonary artery.

(ii) Kidneys excrete the components of urine from blood that reaches the kidney through a branch of aorta known as renal artery, from the fine capillaries of this artery the kidney excretes urea, modified hormones and excess salts with amounts of water by means the following steps :

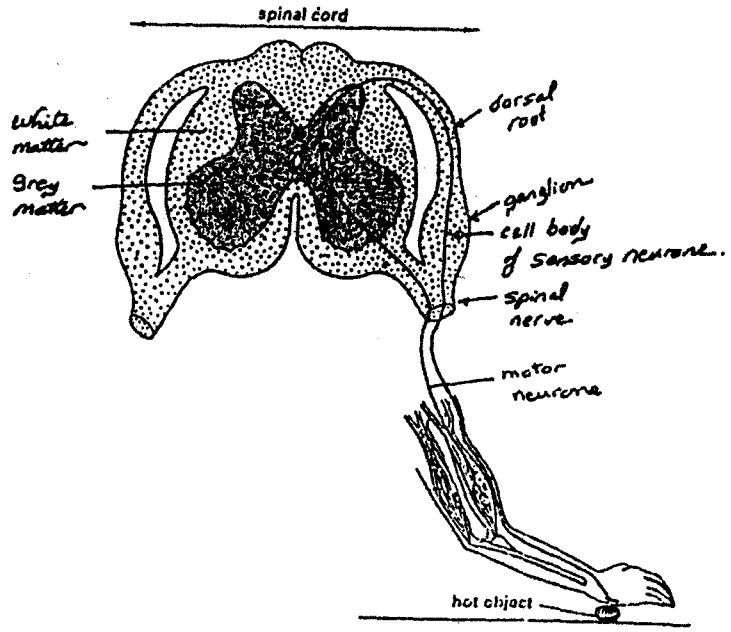
* Ultra filtration :
  - Blood flows through the renal artery into the glomerulus .
  - Some components of blood filtrates through the blood capillaries in the glamerulus due to the high pressure in the vessels.
  - The main filtrates are :
    Water, soluble salts, glucose, urea, modified hormones.

* Selective re-absorption :
  - Some components which are required by the body such as glucose and water are re-absorbed.
  - The other components pass through the collecting ducts to the pelvis to the urinary bladder.
  - When the sphincter muscle of the urinary bladder relaxes, urine flows outside.

(c) See 4 (c) in paper 3 June 1991.

6

(a)

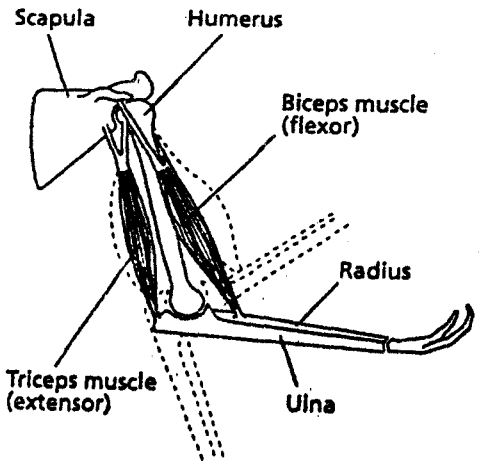


(b) Deliberately raising the arm differs from raising the arm as a result a reflex action in many ways one of the ways is that deliberately raising the arm is controlled by the brain while the raising of arm as a result of a reflex action is controlled by the spinal cord while the brain detects this response after being occurred. Reflex action is involuntary while deliberately raising the hand is a voluntary action happens with mans will.

Raising arm as a reflex action is rapid while deliberately raising arm is slower.

(c) Muscles in the arm are found as antagonistic pairs to allow the movement of the arm as the muscles of antagonistic pair when one of them contracts the other relaxes leading to this movement towards the contracted muscle.

In the arm the one of the antagonistic muscles is known as biceps while the other is known as triceps muscle.



When the biceps contracts it causes the arm to bend, therefore, it is called flexor, and when the triceps contracts the arm extend, therefore, this muscle is known as extensor muscle.

7

(a) Complete dominance means that when a characteristic is controlled by a pain of alleles of a gene, one allele only can show its effect in the phenotype in case of heterozygous individuals this allele is called dominant while the other allele can not show its effect in phenotype of heterozygous individuals, therefore, it is called recessive.

As an example, if a plant with red flowers is crossed with other one that has white flowers and all the offsprings, produced have red flowers in this case the allele for red colour is called dominant and the other allele is called recessive.

Codominance means that, a characteristic is controlled by a gene that has two alleles, both alleles are able to show their effect in the produced phenotype and neither of them is able to be a dominant over the other one (to mask the effect of the other one). As a result an intermediate characteristic is produced in the individual that carries the both alleles.

An example, if an animal with a black fur is crossed with other one that has white fur, the produced individuals are 100 % grey.

(b) If a man with heterozygous blood group A (his genotype is I^AI^0) married a female with heterozygous blood group B (her genotype is I^BI^0) one of their children may have a blood group O and this can be shown in the following diagram :

Parental phenotype	A	B
Parental genotype	I^AI^O	I^BI^O
Gametes	(I^A) (I^O)	(I^B) (I^O)
F_1 genotype	I^AI^B I^AI^O	I^BI^O I^OI^O
F_1 phenotype	AB A	B O

(c) From the results it is concluded that the allele for hairy skin is dominant while the allele for smooth stem is recessive, therefore, the allele for hairy stem can be represented by (H) and the allele for smooth stem can be represented by (*ħ*).

To produce offsprings with hairy stem and smooth stem in a ratio 1 : 1 , one parent must be heterozygous dominant while the other one must be homozygous recessive as follows :

Parental phenotype	Hairy stem	×	Smooth stem
Parental genotype	Hh		hh
gametes	(H) (h)		(h) (h)
F_1 genotype	Hh Hh		hh hh
F_1 phenotype	hairy hairy		smooth smooth
Phenotype ratio	1 hairy	:	1 smooth

Paper 3
November 1994

1

(a) A- Inferior vena cava.
B- Renal vein.
C- Ureter.

(b) Right atrium.

(c) Kidney excretes the components of urine, it extracts urea from blood (therefore, the conc. of urea in blood is 0.03 while its conc. in ureter is 2.00). Kidney also excretes excess salts (therefore, the conc. of salts in blood is 0.72 % while its conc. in ureter is 1.50 %), it does not excrete glucose, amino acids or proteins as they are required for the body.

(d) (i) After eating meat the conc. of urea in (C) will increase because digestion of proteins of meat leads to the formation of amino acids. Excess amino acids are deaminated in lives leading to the production of urea which is excreted from blood by the kidney to be poured in the ureter (C).

(ii) Glucose becomes found in the ureter (C) because insulin stimulates the liver cells and muscles to store excess glucose into glycogen and also it stimulates the body to use glucose, in addition it stimulates the process of glucose reabsorption in kidney, therefore lack of insulin causes glucose to flow out with urine.

2

(a) (i) Ventilator is used to get rid of excess heat if the temperature inside the green house exceeds the optimum.

(ii) The heater is used to attain the optimum temperature if the climate is very cool, and the solar heat that reach the green house is not enough.

(iii) The blind is used to reduce light intensity if it is too high to be beard by certain types of plants which can be harmed by high light intensity.

(iv) The lamp is used to provide light to increase the duration of exposure to light if the day length is short and the reflector is used to avoid dispersion of light keeping it fall on the plant only.

(b) Carbon dioxide.

(c) To increase the level of humidity inside the green house to reduce the rate of transpiration of the seedlings that may lead to their wilting as they are not protected by enough cuticle.

(d) (i) Magnesium.

(ii) Necessary for synthesis of chlorophyll which is used in making food by photosynthesis.

3

(a) (i) P 15 °C.
Q 65 °C.
R 35 °C.

(ii) P- At temperature 15 °C the activity of the enzymes in the washing powder is low, therefore, they are unable to remove the stain properly.

Q- At temperature 65 °C the enzymes in the washing powder are denatured, therefore, they are unable to act on the stain.

R- At temperature 35 °C the temperature is suitable for the enzymes in the washing powder to be highly active, therefore, they can act on the stain properly.

(b) 1- Increase the amount of washing powder.

2- Increase the time at which the washing powder is left to act on the stain.

(c) 1- Lipase (to act on fat stains).

2- Protease (to act on the proteins of blood stains).

You can not write pepsin or trypsin because the question asking what type not what name of the enzyme.

4

(a) A - Stigma B - filament C - Anther.

In this flower pollination is most likely to be carried out by wind because the reproductive parts of the flower are projected outside the flower to be exposed to wind, also the stigma is feathery to trap the pollen grains carried by wind.

Both stigma and anthers provide a large surface area for being exposed to wind.

Cross pollination is most likely to be carried out in this flower because the anthers are not found directly above the carpel but the figure shows that they are usually found spaced.

(b) (i) Asexual reproduction is considered as an advantage to organisms for many reasons, one of the reasons is that it is a rapid process and this provides a chance for the organism to keep its race, one other advantage is that the produced organisms are similar to the parent organism, therefore, the good characteristics can pass to the produced offsprings.

As this method of reproduction does not need a partner, therefore, only one arrival needed to colonize a new area and this helps the organism to be widely spread.

There are many commercial advantages of asexual reproduction for example by asexual reproduction we are sure that the good strains produce also good strains which is not applied in case of sexual reproduction.

As the process of asexual reproduction is a rapid process it is good commercially especially if it is used in food production such as single cell proteins, and the different organisms which are used in food production.

5

(a) (i) Recycling paper is important to avoid pollution by accumulation of paper which the different ways used to get rid of it are also cause pollution, for example, burning paper leads to the production of ash particles, carbon monoxide and carbon dioxate which have their effects on the atmosphere and on the different organisms, also if thrown in soil they may resist the growth of the plant roots and if thrown in water they may resist the movement of water in the small streams and block out light from the different submerged organisms.

Recycling paper also is important in reducing the rate of cutting down of trees which are used in manufacture of paper, this cutting down which may cause many harms such as reducing the conc. of oxygen in air and increasing the conc. of CO_2.

(b) (i) Using pesticides has limited advantages such as protection of crops against pests and this affects food production, also the advantage of using pesticide is that it is a rapid process leading to quick results while the other methods such as biological control are slower.

(ii) Using pesticides has many disadvantages as it may lead to death of both useful and harmful organisms, it may kill microorganisms in soil such as nitrogen fixing bacteria which produce nitrogenous compounds from atmospheric nitrogen to be absorbed and used in making proteins, also it may lead to death of insects such as worms that live in soil and helps in soil aeration.

Other disadvantage is that if the pesticide is a presistant type does of it may remain in the plant and accumulate in different organisms along the food chain causing harms to the higher consumers such as humans.

Excessive use of pesticides may cause them to be washed out in water streams and this makes water unfit for drinking, and also accumulate in the bodies of the aquatic organisms leading to a great harm or death of the higher consumers such as humans who receive high doses of this pesticide.

As they remain in water without being decomposed their effect remains and transfers to the humans through eating aquatic animals even after stopping the use of such pesticides.

6 and 7 are repeated in previous questions (paper 3 section B).

Paper 3
June 1995

1

(a) A : Amniotic sac.
B : Umbilical cord.
C : Placenta.

(b) Surrounds the foetus to prevent the adhesion of its organs.

(c) Muscles.

(d) (i) w : Umbilical artery.
x : Umbilical vein.

(ii) Nutrition
In the end branches of the w (capillaries) food materials such as sugar and amino acids diffuse from the maternal blood to be carried by x to the foetus.

Excretion
Waste products such as urea are carried from the foetus by the blood vessel w through the umbilical cord where they diffuse out of the walls of its branches (capillaries) to the maternal blood.

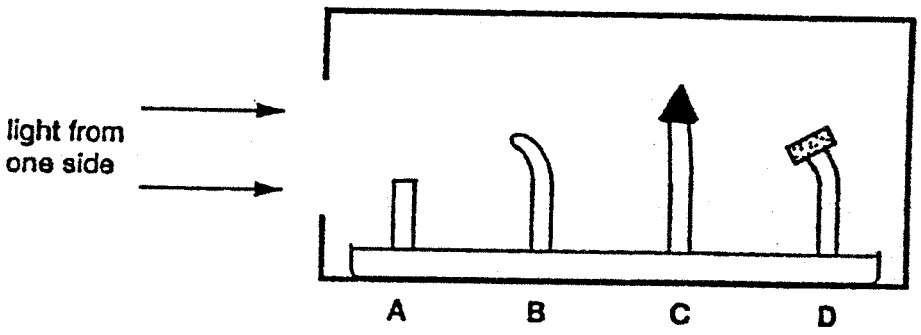
Gaseous exchange
Carbon dioxide is carried by the umbilical artery (w) where it diffuses through the capillaries to the maternal blood while the oxygen diffuses from the maternal blood to the foetal blood to be carried by x to the foetus.

2

(a) (i) Positive phototropic response.

(ii) Light caused the plant hormones (auxins) to be produced more in the side away from light, the auxins diffuse stimulating the growth in this side more than the other side, as a result the shoot grows towards light.

(b)



(c) (i) Taxic response.
(ii) In damp invertebrates can avoid excessive loss in water that may lead to dehydration, also in damp places usually food is abundant. While they prefer darkness to hide from their enemies.

3

(a) A and B : intercostal muscles.
C and D : Diaphragm.

(b) 1- B
2- C

(c) P : Vertebral column.
Q : a rib.
R : intercostal muscles.
S : Trachea.

(d) 1- The diaphragm is dom-shaped while the piston is not.

2- The ribs move up and outwards while the walls of the apparatus are not.

3- The diaphragm contract and relax while fixed at its ends but the piston moves up and downwards.

(c) (i) In air sacs (alveoli)
(ii) 1- Moist.
2- Provide a large surface area.
3- Permeable to gases.

Section B

4

(a) Through the cells (A) which are xylem vessels water reach the leaf where it flows from the xylem through the fine pits found in the walls of the lignified xylem to reach the surrounding cells such as (B) which is a spongy cell.

Water enters the cell (B) by the effect of osmotic pressure where the concentration of water outside cell (B) is higher than its concentration inside it, amount of water also is imbibed and flows in the cellulose cell wall.

From the cell (B) and the cells surrounding the air chamber amounts of water flow outside by the effect of turgur pressure or soaking the cell walls forming a film of water (C) which begins to evaporate by the effect of heat or carried by the effect of air current or due to difference of humidity.

Water is then flows from the air chamber (D) through the stoma (E) to be transpired.

(b)Water loss is reduced in this leaf by the effect of many structures, one of these structures is the thick layer of cuticle which is impermeable to water.

The long hairs found in the leaf reduce the effect of air currents on the evaporation of water, also hairs trap humidity from the surrounding atmosphere and this makes humidity surrounding the stomata high reducing water loss.

The leaf is rolled around itself with its stomata sunken in the inner surface this reduces the surface are exposed to the different factors that increase the rate of water loss such as wind and heat.

No stomata are found on the surface which is directly exposed to the surrounding medium as a result water loss from this surface is restricted to the rare water that can escape from the cuticle.

The inner surface has many foldings with no stomata in the tip of the foldings the presence of such foldings reduce the effect of factors that increase transpiration.

(c) One of the factors that increase the water loss is high temperature. High temperature increases the rate of evaporation of water as the water molecules gain the heat energy which increases their kinetic energy and so they can escape in the form of vapour from the plant.

Other factor is air currents. Air currents carry the water molecules from plants and also carry the atmospheric water vapour surrounding the plant and this reduces the humidity around the plant as a result transpiration increases.

5

(a) (i) Water transpired from the forests affect the water cycle as they increase the rate of rain fall which is used by agricultural lands.

Presence of the large trees of forests reduce the effect of wind on the plants of agricultural land this wind which may carry sand particles or destroys the plant leaves and mainly increases the rate of transpiration of such plant that may cause wilting of plants.

Trees of forests in this slope reduces the speed of water currents in case of heavy rain, this water current that may destroy the plants and cause soil erosion.

(ii) Presence of trees of forests affect the nitrogen cycle, as the water transpired from trees of forests can dissolve the nitrogen oxides in air and then fall as rain on the agricultural land, the moderate conc. of such nitrogenous oxides can increase the nitrogenous compounds in soil such as nitrates which are absorbed by the plant roots to be used in formation of proteins.

Remains of such trees such as dead parts may decompose in the soil of forests increasing the nitrogenous content of this soil, particles of this soil may be carried by wind or rain water or even river water to the agricultural land increasing its fertility.

(b) Chopping down forests affect farmers as it makes their agricultural land exposed to wind as the trees of forests act as wind breakers. Wind may damage the young seedlings or carry sand particles, or increases the rate of water loss by the process of transpiration, wind also can cause soil erosion.

Chopping down forests also makes the agricultural land exposed to harms of water currents caused by heavy rains, this water current that may destroy their crops or increases the rate of soil erosion.

Chopping down of forests may also decrease the fertility of soil where the decayed particles of such forests affect the fertility of the agricultural land when carried from forests by wind or water currents.

(c) The warnings are that chopping down trees will affect the conc. of oxygen in air, this decrease will affect the people living on this planet also it will increase the conc. of carbon dioxide this increase may lead to different harms as it (besides the decrease in conc. of oxygen) can cause respiratory problems which can affect not only human growth and activity, this will reflect a problem in food supplies.

Chopping down trees will reduce the amount of humidity in air and the amount of rain fall, this affects the agricultural lands. Not only this but it will make the agricultural lands exposed to the effect of wind and water current which damages them.

An advice is that cutting down of trees should be balanced with planting new trees to maintain this natural resource.

6

(a) Active transport is an energy consuming process by which molecules of a substance can move against concentration gradient "means from regions of their lower conc. to regions of their higher conc."

This process is very important for the plants as it enables them to obtain their mineral requirements from the soil even if their conc. in soil is low.

(b) Diffusion means movement of molecules of a substance from regions of their higher conc. to regions of their lower conc. down a concentration gradient.

This process is important for plants as it helps the plants to absorb different ions from the soil of that conc. in soil is higher than that inside the plant, also it helps the flow of different materials from one cell to another inside the plant.

(c) Osmosis means movement of water molecules from regions of their higher conc. to regions of their lower conc. through a partially permeable membrane.

This process is important to the plant because by this process plants absorb water from the soil by the root hair cells, as the conc. of water in the cell vacuole of these cells is lower than its conc. in the soil after irrigation, also by the effect of osmosis water flows inside the plant from one cell to another.

(d) Transpiration means evaporation of water from plants mainly through stomata, as a result the water pressure in the surrounding cells decreases causing the water to be pulled inside xylem from the lower parts of the plant where the water pressure is high.

The transpiration pull is very important for the plant as it enables water to ascend through the long trees to supply the upper parts of the plant by its water requirements.

7

(a) Tissue is a group of similar cells grouped together to perform a specific function.

An example of such a tissue is the epithelial tissue in animals.

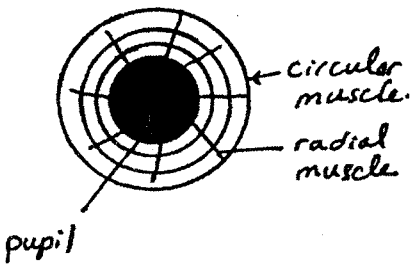
Organ is a group of different tissues connected together in a certain way to perform a specific function or functions.

An example is the heart.

Organ system is a group of organs connected together to perform a specific function or functions.

An example is the digestive system.

(b) If the light receptors in the retina become exposed to bright light higher that their capacity they may be affected or completely damaged , therefore, the iris protects the eye against this danger by controlling the amount of light that enters the eye.



When the sensitive cells of the eye receive the impulse of bright light they send sensory impulses through sensory neurons to the mid-brain which in turn sends motor impulses to the circular muscles found in the iris to contract, therefore, the radial muscles relax causing the eye pupil to become narrower allowing only suitable amount of light to enter the eye.

Paper 3
November 1995

1

(a) (i) Plant A monocotyledonous plant.
Plant B dicotyledonous plant.

(ii) Insects.

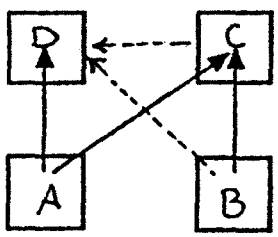
(iii) A. 1- Narrow leaves.
2- Parallel vein.

B. 1- Broad leaves.
2- Network of veins.

C. 1- Have three pairs of jointed legs.
2- Body divided into three regions, head, thorax, and abdomen.

(b) Bacteria.

(c)



(d) Mineral ion 1 : Nitrogen.
Function : Absorbed by the plant to be used in protein synthesis.

Mineral ion 2 : Magnesium.
Function : Absorbed by the plant to be used in formation of chlorophyll.

2

(a) (i)

Experiment	Region			
	W	X	Y	Z
1	2	0	4	14
2	5	0	7	8
3	2	1	4	13
4	0	3	3	14
5	1	1	2	16
average number	2	1	4	13

(ii) For accuracy as taking the average reduces the effect of odd behavior on the results.

(iii) To provide enough time for the insects to be affected and respond to the stimulus as many of them may be slow.

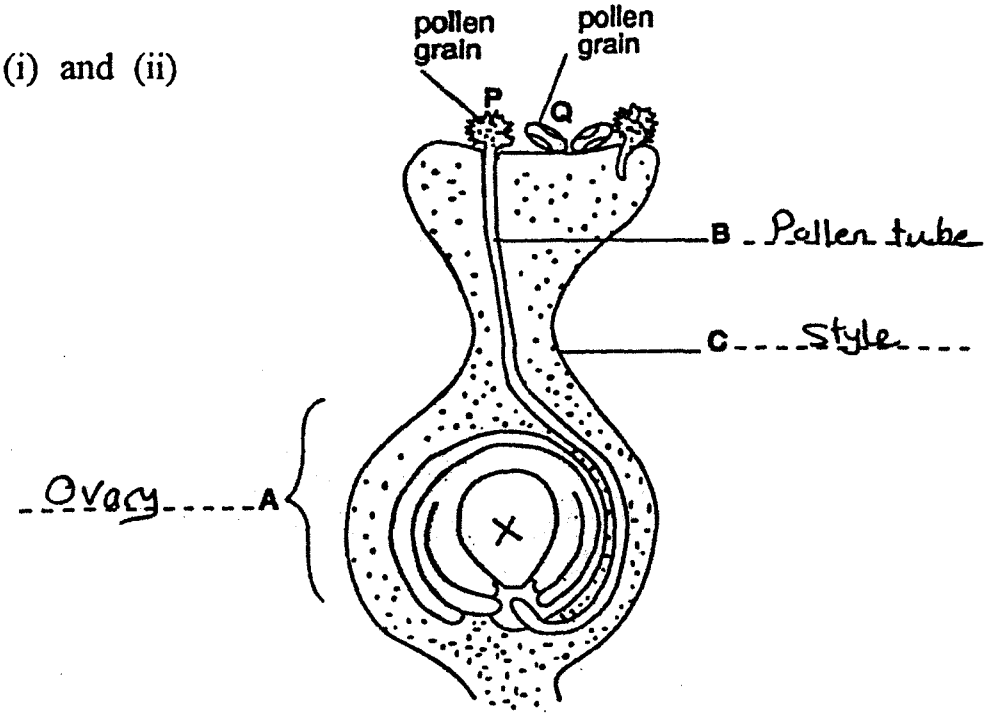
(b) Response to light and humidity.

(c) (i) Darkness and humidity.
(ii) Light and dryness.

(d) Tunnels in agricultural land.

3

(a) (i) and (ii)



(iii) It is the pollen tube where the nucleus of the male gamete moves to reach the female gametes.

(b) (i) Insects carry the pollen grains from the anther to the stigma this is clear as the stigma is not feathery to receive the pollen grains carried by wind, also the pollen grains have many projections to be held to the body of the insect.

(ii) Perhaps these pollen grains of a type different than that of the plant shown in fig.

(c) (i) 29 mm
(ii) 28 mm

(d) During the first two days of growth, the rate of growth is not affected by light where the increase in length is equal in that grown in light and that grown in darkness, but after that the increase in length in darkness is more than light i.e. light inhibits growth.

(e) 1- Conc. of carbon dioxide.
2- Humidity.
3- Temperature.

(f) It grows rapidly in an attempt to reach light, but the stem becomes weak, no increase in size of leaves which become yellow and pale, and eventually dies due to the consumption of the stored food in growth, at the same time it is not able to make new food by photosynthesis due to absence of light.

Section B

4

(a) (i) Discontinous variation.

(ii) Continous variation.
This type of variation is brought about in different ways one way is meiosis, during meiosis a half of the chromosomes go into one gamete and a half into the other gametes, each set of these chromosomes carries alleles with particular characteristics and this causes variation.

Fertilization is another way leads to variation as this process is a random process where one sperm from millions of sperms fuses with one ovum leading to the production of certain characteristics which may be varied if another sperm fuses with that ovum.

A third way leads to variation is mutation. Mutation is a sudden change in gene or genes, chromosome or chromosomes.

(b)

Parent phenotype	A		B	
" genotype	I^A	I^0	I^B	I^0
gametes	I^A	I^0	I^B	I^0
F_1 genotype	I^AI^B	I^AI^0	I^BI^0	I^0I^0
	AB	A	B	0

(c) Due to chromosomal mutation, it may be by the effect of chemicals or radiation, one ovum become of extra chromosome, this is due to the production of extra replica for the chromosome number 21, therefore, the number of its chromosomes is 24 instead of 23.

When this ovum fuses with a sperm, a zygote of 47 chromosomes is produced, leading to the formation of an individual each of its cells contains 47 chromosomes this individual has Down's syndrome

5

(a) (i) Smoking contains carcinogenic substances such as tar, the most common cancer caused by smoking is lung cancer. Tar can cause cancer by damaging the DNA in cells.

Smoking cigarettes also causes heart diseases as it contains nicotine which increases the rate of heart beats, and blood pressure, and this leads to atheroma formation.

(ii) Eating unbalanced diets may lead to cancer and heart diseases for example eating much fats and carbohydrates cause overweight (obesity) which makes the individual more liable to cancer. Fats may precipitate in the blood vessels and this causes an increase in the blood pressure or formation of clot in the coronary artery.

(b) Smoking is regarded as a socially unaccepted habit as it causes different problems, one of these problems is that it may lead to diseases such as heart diseases and cancer and this affects the productivity of the people of the society and also nicotine found in cigarettes is an addictive drug this means that people who regularly smoke can not easily give up smoking and so a part of the family income will be lost.

(c) Depending on a drug such as heroen can lead to infection with the AIDS virus as sharing needles in injecting this drug may be a way through which HIV can be transmitted from an infected person to a healthy one. Also people depending on this drug usually have sexual act with different prostitutes through them HIV can be transmitted.

6

(a) Homeostasis is the maintainance of a constant internal environment of an organism, for example if the blood pressure in a human being rises above the normal the body tries in different ways to maintain its normal level.

(b) (i) The blood glucose level of a healthy person is expected to rise after eating a meal of a lot of carbohydrates or in cases such as fight and fright where the adrenaline hormone is secreted from the adrenal gland stimulating the liver cells to convert some of the stored glycogen into glucose.

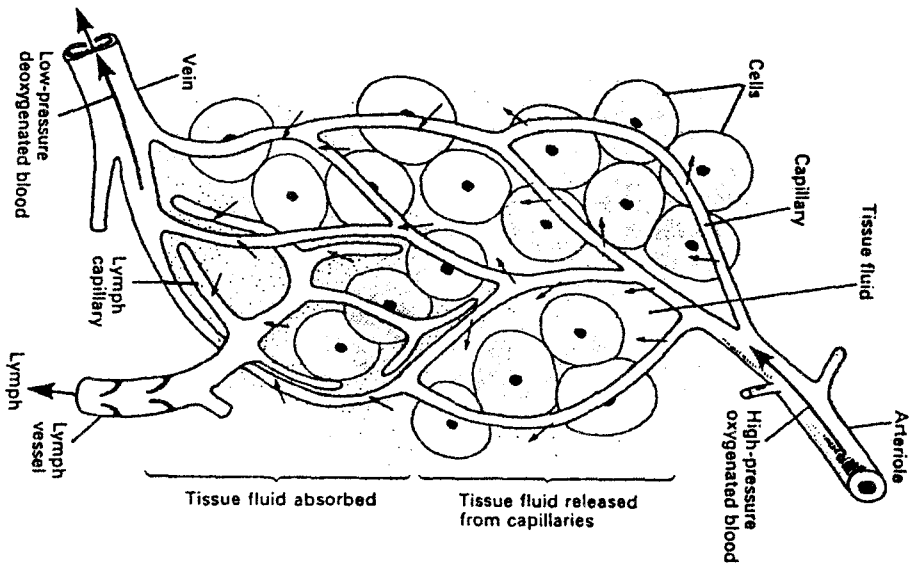
(ii) The blood glucose level falls in different situations for example after vigorous exercise or being fasten for a period of time.

(c) When the blood glucose level increases, pancreas secretes the hormone insulin which circulates in the blood, it stimulates liver cells and muscle cells to convert glucose into glycogen to be stored in an insoluble forms, also it stimulates the different body cells to utilize carbohydrates. Insulin also stimulates conversion of excess glucose into fats to be stored, and inhibits the conversion of excess amino acids into carbohydrates after being

deaminated in liver. All above processes help to lower the glucose level until the body maintains its normal blood glucose level. When the blood glucose level decreases the hormone adrenaline is secreted by the adrenal glands to circulate in blood stimulating the liver to convert amounts of stored glycogen into glucose until the body attains its normal glucose level.

7

(a) (i) Essential substances such as glucose, amino acids, fatty acids, glycerol, minerals, vitamins and water can filter out the blood capillaries because they are small molecules as a result they form with many components of the blood plasma a fluid known as tissue fluid that submerges the body cells.



By means of simple diffusion and the process of active uptake the different nutrient molecules in the tissue fluid can enter the body cells diffusing in its cytoplasm, but water enter the cell mainly by the effect of osmotic pressure.

(ii) Amino acids are obtained by the body cells to be used in synthesis of cytoplasm, cell membranes, and cell organelles.

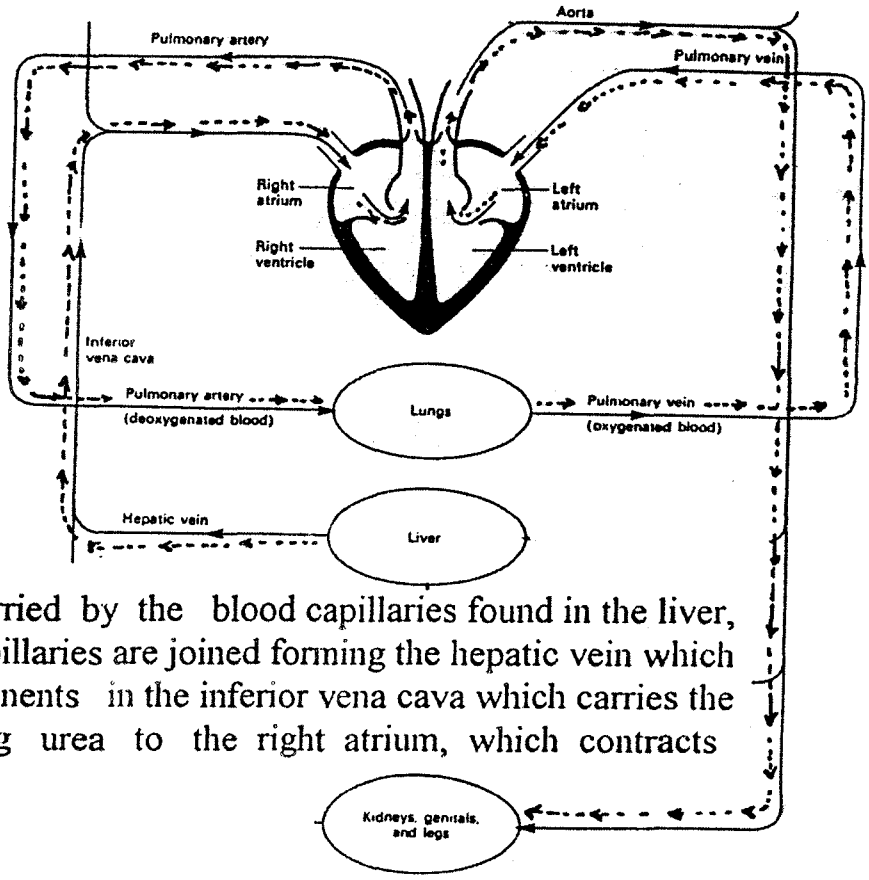
Carbohydrates are used by the cells in the process of respiration or to be stored in the form of glycogen.

Fatty acids and glycerol are used in formation of cell membranes or in secretions of certain cells such as cells of sebaceous glands, fatty components, also used in the production of energy.

Minerals are also of many uses, calcium and phosphorus are necessary for formation of bony cells, and teeth. While iron is used by the cells of bone marrow in the production of red blood cells.

Water is used by the cells in different ways as it forms a part of the cytoplasm, cell membrane and cell organelles, it takes part in secretions of cells such as enzymes and hormones.

(b) An example of the waste products is urea which is made in the liver due to the process of deamination of excess amino acids.



Urea is carried by the blood capillaries found in the liver, these blood capillaries are joined forming the hepatic vein which pours its components in the inferior vena cava which carries the blood containing urea to the right atrium, which contracts

pushing blood to the right ventricle, then the tricuspid valve is closed and the ventricle contracts forcing the blood in the pulmonary artery to reach the lungs and then to return back to the left atrium of heart through the four pulmonary veins. The left atrium contracts to pump the blood to the left ventricle and the bicuspid valve becomes closed, the left ventricle contracts forcing the blood through the aorta.

A branch from aorta known as renal artery carries blood carrying urea to the kidney which excretes this waste substance as one of the major components of urine.

paper (3)
June 1996

Section A

1- (a) i - P ileum
Q hepaic portal vein .
R liver

ii- a vein (its name is hepatic vein)

(b) The concentration of amino acids in Q increases as a result of absorption of products of digestion of proteins .
The concentration of monosaccharides such as glucose in Q increases as a result of absorption of products of digestion of carbohydrates .

(c) i - Concentration of glucose in blood vessel S becomes higher than that in vessel Q also concentration of oxygen in blood vessel S is lower than that in Q .

ii - The adrenal glands secrete the hormone adrenaline which stimulates the liver cells to break down amounts of the stored glycogen into glucose , that leaves the liver through the blood vessel S . This metabolism in liver consumes oxygen therefore its conc. In S decreases

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2- (a) 1- light
2- The same pH value.

Other answer: The same volume of water or the same length of time .
Avoid writing oxygen or carbon dioxide because beakers are shown exposed to open air.

(b) To act as a control experiment .

(c) Asexual reproduction .

(d) By simple diffusion and active uptake from the surrounding medium.

(e) X- normal rate of growth as the water contains the normal level of nutrients required for growth and reproduction .
Y- High death rate as the water is polluted by the industrial wastes either those discharged in water or those produced as gases and then dissolved in water .
Z- High rate of reproduction due to the presence of high concentrations of nutrients dissolved in water as a result of the washed out fertilizers .

3- (a) i - AIDS : virus
Gonorrhoea : bacteria
Syphilis : bacteria

the above question is asking for the type not the name of the microorganism therefore you cannot write HIV for AIDS or gonococcus for gonorrhoea .

ii- AIDS.

(b) i - M

ii- As person M has glucose in his urine this indicates that he has insufficient insulin to help in storing , using , and increasing glucose reabsorption in nephrons .

(C) i - L

ii- Because his urine contains protein and healthy kidney does not allow protein molecules to filter out as they are large molecules , but in presence of a disease such large molecules can diffuse without being reabsorbed .

(D)

	disease	constituent	food
Fig. 3A	scurvy	vitamin C	citrus fruits such as orange
Fig. 3B	rickets	vitamin D	butter and egg yolk

Other answer : for fig. 3B calcium can be used instead of vitamin D, but in this case the food can be milk products or you can mention any other sources of calcium.

Section B

4- (A) i - Sycamore , the seed is found inside the pericarp , the pericarp is found in the form of wing -like structures to increase the surface area to be carried by wind for a distance in order not to fall beside its tree.

ii- There are many advantages of dispersal of seeds and fruits , one of such advantages is that it prevents overcrowding which leads for shortage of nutrients in soil and competition for space, water and minerals in roots . Other advantage of dispersal is that it helps the plant species to colonize different areas and this helps to conserve species , for example if there is a change in an environment such as lack of water that leads to death of plants in such environment the species will not perish .
There are also many disadvantages of dispersal for example a dispersed seed or fruit may fall on land which is not suitable for germination , also weak or undesirable plants can be dispersed to grow between plants of other fields such as parasitic plants that harm the crops .

(b) The most important external environmental conditions are water (humidity) , oxygen and suitable temperature .
Water is important for germination as it activates the enzymes found in the seed to act on the stored food to be converted from as insoluble form to a soluble form to be absorbed and used by the embryo in germination . Also water is used to expand the vacuoles of the newly formed cells to grow the radicle and the plumule , water also is used in the transport of sugar and the other food materials stored in the cotyledons to the growing regions .
Other environmental condition is oxygen which is necessary for aerobic respiration of the embryo to produce the energy required for different metabolic activities that take place during germination .
Suitable temperature is a third environmental factor needed for germination as germination is controlled by enzymes such as the enzymes that act on the stored insoluble food in the seed to be converted into small soluble form to be absorbed and used by the embryo ,therefore suitable temperature is needed to keep high activity of such enzymes .

5- (a) Ovary is the organ responsible for production of the female gametes in both plants and animals , in case of animals it is also responsible for production of the female hormones oestrogen and progesterone .
Ovule is a part in ovary that contains the female gamete in flowering plants .
Ovary in plants may contain one or more than one ovule. After fertilisation in plants the ovary becomes fruit while the ovule becomes a seed.

(b) Ureter in the duct that conducts urine from the kidney to the urinary bladder .
Urethra is the duct through which urine travels from urinary bladder to the exterior . In case of male animals urethra also is used as a duct through which semen is ejaculated .

(c) Testa is the outer protective coat of the seed , it encloses the embryo and the cotyledons .
Testis is the organ responsible for production and storing of the male gametes in animals , also it produces the male sex hormone testosterone .

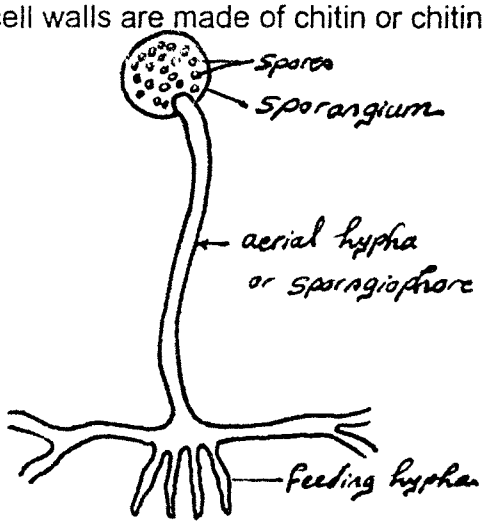
(d) Fertilization is the fusion of male and female gametes forming a diploid cell called zygote.It takes place in all living organisms that reproduce sexually whether plants or animals.
Pollination is the transfer of pollen from anther to stigma. It takes place in flowering plants only. Successful pollination is followed by fertilization.

6- (a) A- suspensory ligaments .
B- lens
C- cornea
D- ciliary muscle
E- fovea (yellow spot)
F- optic nerve

Light rays from the words of the book are converged by the cornea , ciliary muscles contract , as a result suspensory ligaments slacken and therefore the eye lens becomes thicker to focus the image on the fovea,(this image is small and inverted) where the light receptors receive light energy converging it into nerve impulses which are then carried by the optic nerve to the centre of vision in brain where the image is detected , upright with its real size .

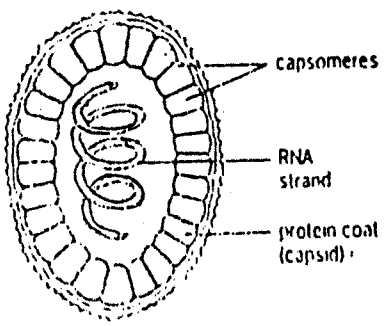
(b) Having two eyes enables the living organism to see three dimensional image , also to have a wider field of vision .
Having two eyes has a value if one of the eyes becomes weak or damaged, the other eye enables the organism to see.
Binocular vision (vision by means of two eyes) overcome the problems associated with the blind spot.

7- (a) - i- A fungus like bread mould consists of thread- like structures called hyphae (singular :hypha) , the hyphae which form the structure of a fungus are called mycelium . The cell walls are made of chitin or chitin and cellulose.



one of the main characteristics of this fungus is that it contains no chlorophyll ,therefore it is heterotrophic . The type of heterotrophic nutrition of this fungus is saprophytic. It secretes enzymes to digest the surrounding insoluble food into a soluble form, then absorbs it by simple diffusion and active uptake . Other characteristic is the way of reproduction as this fungus reproduces by Formation of spores which spread by the effect of wind or water , and when a spore falls in a suitable medium it begins to germinate producing hyphae of a new fungus .

ii- A virus



A virus like human immune virus (HIV) that causes AIDS consists of an outer coat made of protein and is called *capsid* , this coat consists of small units called *capsomers* .
Inside this coat there is a strand of genetic material in the form of a loop of a nucleic acid called DNA.
It has characteristics like living organisms as it has a core of DNA , proteins also it can reproduce.
A virus has characteristics like non- living organisms as it has no nucleus ,cytoplasm ,or cell organelles and it does not carry out any function of life except reproduction inside living cells.

(b) - This question is answered in many exams before .

PAPER (3)
NOV. 1996

1- a- R secondary consumer Q- Primary consumer.

b-i- 1- To maintain the body temperature.
2- For movement
3- For production and transmission of nerve impulses.

ii- L- Exhalation or sweating M- Excretion, defaecation or decomposition.

c- I- Chemical energy in food molecules.
ii- Light energy is trapped by chlorophyll found in most producers and is converted to chemical energy to be stored in the food molecules made by the producers to be transferred to the other trophic levels during the process of nutrition.

2- a- Position 4.

b- The radial muscles of the iris contract while its circular muscles relax making pupil wider to allow enough light to enter the eye for clear vision.

c- I- Reflex action (it is named pupil reflex or light reflex of the eye.)
ii- In bright light it reduces the diameter of the pupil to protect the light receptors against being damaged by high light intensity . In dim light it makes pupil wider to allow enough light to enter the eye for clear vision.

3- a- I- Insect pollination.
ii- 1- The flower is large in size .
2- Petals have nectar guide lines .
Other answers also are acceptes such as stigma is surrounded by petals and not exposed to wind also stigma is not feathery

b- Because it contains no stamens to produce the pollen grains needed for self pollination.

c- I- Animal dispersal.
ii-

	Feature	*Role*
1	Coloured and fleshy fruit wall	Coloured to be attractive and fleshy to be easily eaten by animals
2	Large in size	to be easily seen by animals.

d- I- 20.5 – 20.9 cm.
ii- Continuous variation.

e- I- 1- Light intensity which enables the plant to form more nutrients to be stored in the fruit.

2- Fertility of soil which provides the plant with the materials required for the growth of the fruit.

3- Conc. of carbon dioxide needed for photosynthesis.

ii- genetic factors coded in DNA.

4- a- I- Root nodules.

ii- Bacteria known as nodular bacteria.

b- Carbon dioxide

Its conc. above the soil is lower because it is absorbed to be used in the process of photosynthesis, while its conc. in soil is higher because it is produced due to respiration of roots and the other organisms in soil.

Oxygen

Its conc. above the soil is higher because it is produced during the process of photosynthesis, while its conc. in soil is lower because it is absorbed due to respiration of roots and the other organisms in soil.

c- Protein.

5- a- I- During strenuous exercise adrenaline hormone is produced stimulating increase in heart beats and rate of breathing, as a result of this more glucose and oxygen can reach the muscles to be used in the production of the energy needed for muscular contraction by the process of respiration, an amount of this energy is liberated as heat causing the body temperature to rise.

ii- When exercise is over , the body temperature returns to the normal in many ways . One of the ways is the production of sweat , evaporation of sweat requires energy , an amount of this energy is gained from the body decreasing its temperature.

Other way in reducing body temperature is vasodilatation which is the increase in diameter of the blood vessels found near the surface of the body . This dilatation causes more blood to reach the skin carrying heat energy , an amount of this energy is lost to the surrounding leading to a decrease in body temperature.

When exercise is over, rate of respiration decreases decreasing the libration of heat energy and this also other way used in reducing body temperature.

b- I- During exercise breathing rate increases to enable the body to obtain enough oxygen which is needed for the production of energy by the process of aerobic respiration, this energy which is required for the muscular contraction during exercise .

Breathing rate increases also to enable the body to remove the produced carbon dioxide efficiently to avoid its accumulation in the body.

After exercise rate and depth of breathing remains high for a period of time for recovery of the built oxygen debt i.e. to obtain the oxygen needed to oxidise the

lactic acid formed during anaerobic respiration.

ii- Pulse is the ripple of pressure on the walls of arteries causing an increase in the lumen due to heart beats.
Pulse rate increases during exercise because of the increase in rate of heart beats as a result of production of the hormone adrenaline and control of the brain.

6- a- I- Both carbohydrates and fats are formed of three elements only, which are carbon, hydrogen and oxygen. Carbohydrates and fats have other similarity in structure as both contain a lot of chemical bonds which enable both to be used in the production of energy.

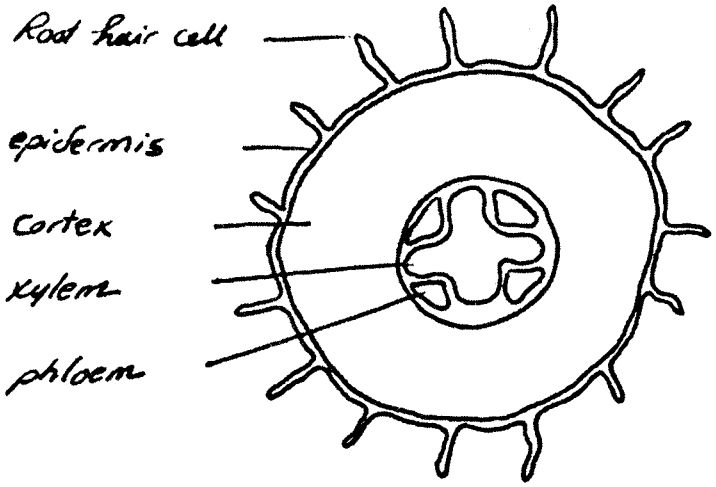
ii- Although both carbohydrates and fats are formed of carbon, hydrogen and oxygen only, carbohydrates contain higher proportion of oxygen than fats . Carbohydrates and fats also differ in their building units. The building units of carbohydrates are monosaccharides while building units of fats are fatty acids and glycerol.

b- I- Many types of seeds store protein, such as bean seeds that contain a high proportion of proteins in their cotyledons.
One of the uses of the stored proteins is to be used as enzymes which catalise the break down of stored food to be easily absorbed and used by the embryo. During germination stored proteins are used by the embryo to grow and so the radicle increases in size forming a root and the plumule increases in size forming a shoot.

ii- Proteins are digested in stomach and small intestine producing amino acids which are absorbed by means of villi in ileum to be carried to the liver through the hepatic portal vein.
In the liver excess amino acids are deaminated forming urea, this deamination takes place by the break down of amino acids into amino group and an organic acid. Amino group reacts with carbon dioxide forming urea while the organic acid is then converted into carbohydrates or fats.

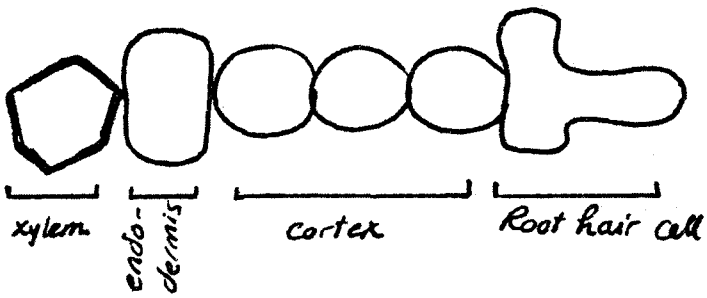
7- a- I- water is absorbed by the plant roots by means of two processes, one process is osmosis while the other is known as soaking.
Osmosis takes place by the root hair cells as the water potential in soil is higher than that in the cells so water can pass through the partially permeable cell membrane.
Soaking takes place by the cellulose cell wall.

In the plant root,water moves from the root hair cells to the cells of cortex , endodermis , pericycle and then reaches the xylem of the root. This movement also takes place by osmosis and through the cell walls from one cell to another by means of soaking.

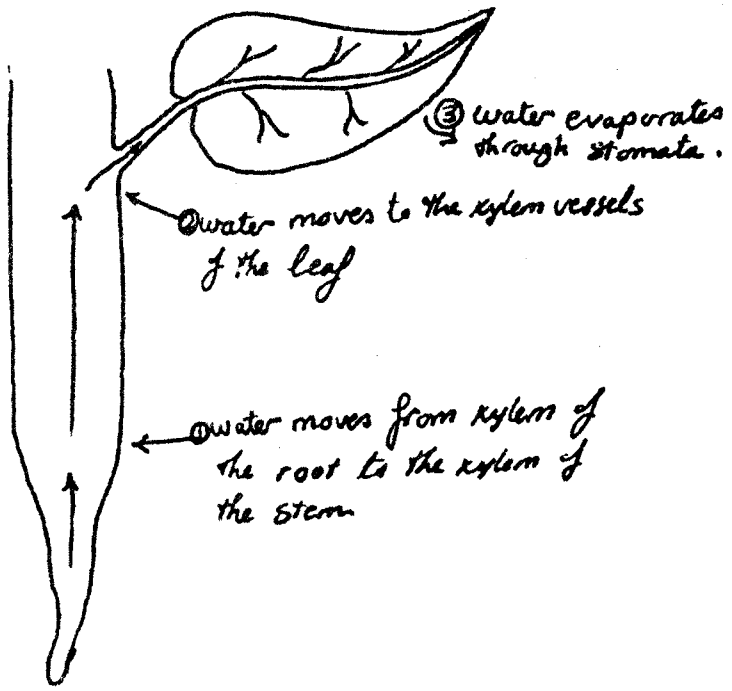


T.S across a dicot. root.

Passage of water across the root



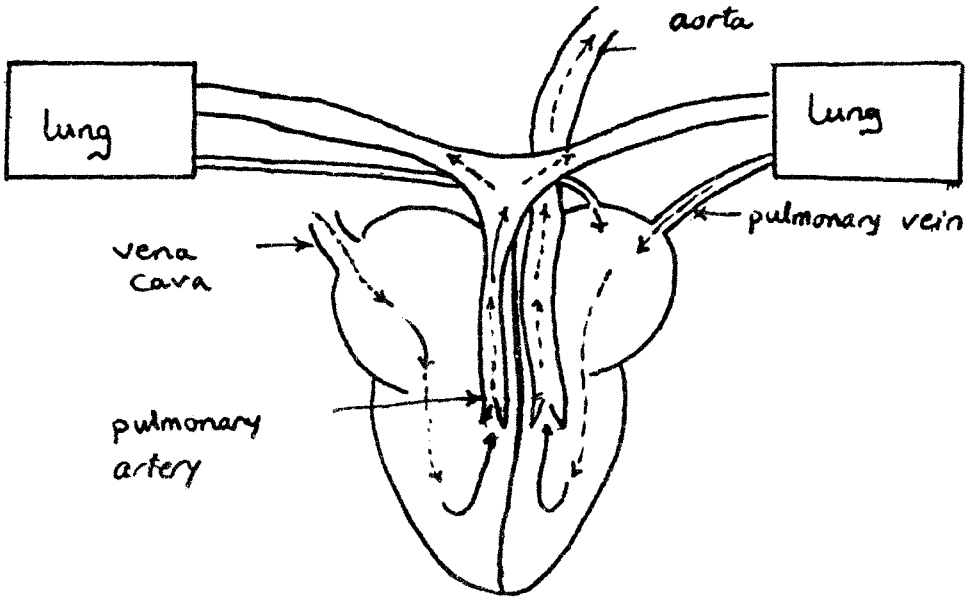
ii- From xylem of the root water ascends through xylem of the stem as xylem of the root is continuous with the xylem of the stem.
The process of ascending in the xylem of the stem takes place mainly by transpiration force which creates a negative water pressure at the top of the plant. Root pressure and capillary action are other two forces which help the process of ascending of water in the xylem of the stem.



iii- Water from xylem of the stem passes to the xylem of the leaf which passes through the stalk , midrib and veins.
Water moves from xylem of the leaf veins to the surrounding mesophyll cells where water enters the mesophyll cells by osmosis and soaking but an amount of water moves between the cells where it evaporates and diffuses through stomata to the outside of the leaf, this evaporation is known as transpiration.
Transpiration is controlled by many factors such as air currents, temperature, light and humidity.

b- Water has many functions in plant cells , one of such functions is to keep the plant cells turgid and this turgidity is necessary for supporting the plant.
An amount of water is used as raw material in the process of photosynthesis, and as a component of cytoplasm and many organelles such as cell vacuole.
An amount of water is lost from the plant by the process of transpiration, this process is necessary for cooling down the plant during hot days and to create negative pressure for ascending of water and minerals through xylem.

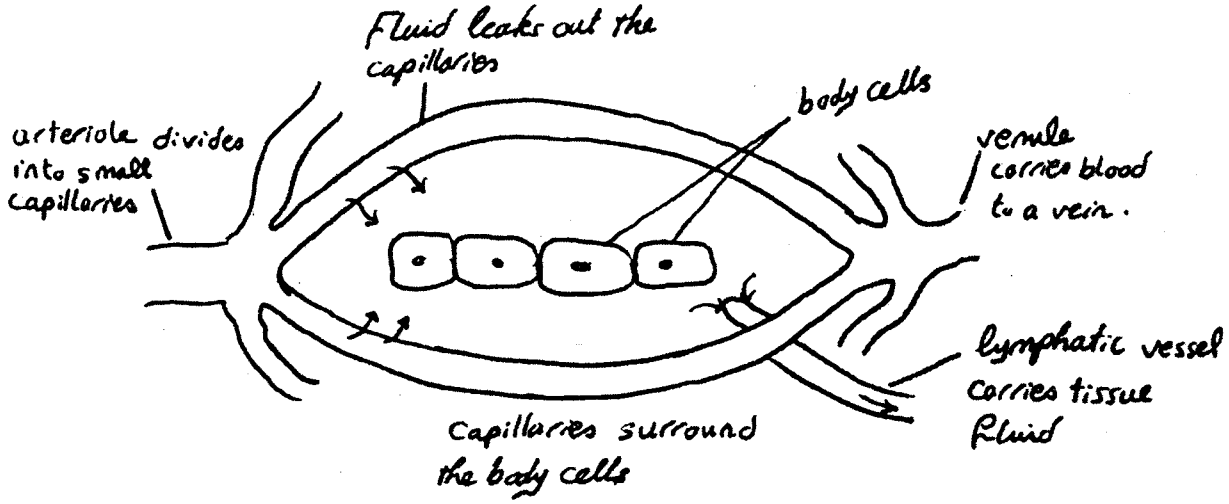
8- a- When right atrium relaxes deoxygenated blood reaches the blood vessel P (vena cava) from the different body tissues to be carried to the right atrium. Due to contraction of the right atrium blood is forced to the right ventricle but can not be forced back through the vena cava because of the semi-lunar valves.



When blood reaches the right ventricle the tricuspid valve closes, then this ventricle contracts to force blood to the lungs through the pulmonary artery, at the same time blood do not flow back to the atrium because of the tendons that prevent flaps of the tricuspid valve to open upwards .
In the lungs pulmonary artery ends with fine capillaries that carry blood around alveoli where exchange of gases takes place, and then capillaries pour blood in the four pulmonary veins that carry oxygenated blood to the left atrium.

The left atrium contracts to force blood to the left ventricle and then the bicuspid (mitral) valve closes.
The left ventricle contracts forcing blood through the blood vessel Q (aorta) to be carried to all parts of the body.

b-



Tissue fluid is the components of the blood that can filter out of the blood capillaries because the pressure inside the blood capillaries is higher than that of the surrounding tissues, this filtration takes place sue to the presence of fine gaps in walls of the fine blood capillaties.
Tissue fluid is composed of blood plasma lacking large molecules of plasma proteins. The function of tissue fluid is to provide the body cells by the different substances which are carried by blood such as glucose, amino acids and hormones, also it carries the waste products produced by the body cells due to their metabolic reactions.
Tissue fluid is then carried by lymph vessels to be poured once more in the blood stream.

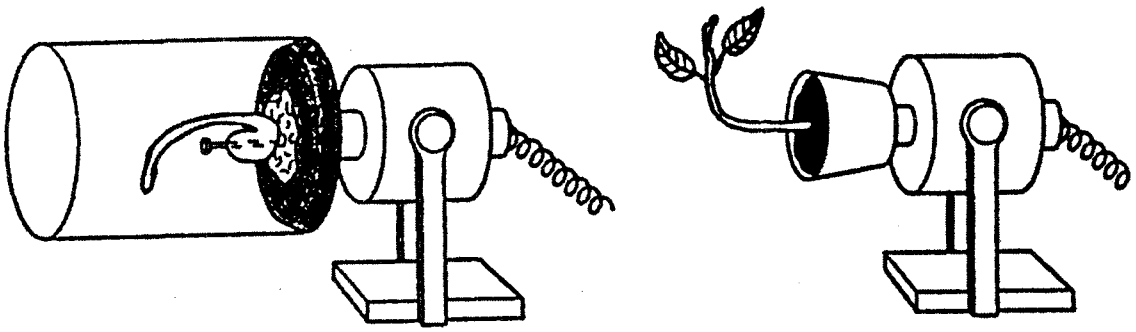
PAPER 3
JUNE 1997

Section A

1- (a) 1- Oxygen .
2- Suitable temperature .
3- water.

(b) To reduce the effect of air current which may evaporate the water in the moist cotton which is necessary for growth of the germinating seeds .

(c) -I-



ii- **Root response** : +ve geotropic .
Auxins accumulate in the side of gravity ,fthis accumulation inhibits growth of this side , so the other side grows faster causing growth towards gravity .

Shoot response : - ve geotropic .
Accumulation of auxins in the side of gravity causes an increase in the rate of growth of this side , so it grows opposite to gravity .

iii- Because rotation of the apparatus leads to an equal distribution of auxins which in turn leads to equal rate of growth in the sides of the plant ,as a result both root and shoot grow straight .

2- (a) Photosynthesis .

(b) Consumers : Y
Explanation : the population size of consumers must be be smaller than that of the producers otherwise producers disapppear (extinct) .

(c) Developed methods of farming such as using fertilizers causes an increase in the population of producers in the lake when excess fertilizers are washed into the lake with rain water . Increase in the size

of producers cause an increase in population of consumers as they can find enough food .

(d) Fertilizers increase growth of floating water plants and algae that form a layer reduces dissolving of atmospheric oxygen and blocks out light as a result oxygen produced by photosynthesis of submerged plants is reduced also death of algae encourages growth of bacteria which use oxygen decreasing its concentration leading to death of many producers and consumers .

3- (a) P ovary - Q cervix - R vagina .

(b) **Feature** : Oviducts are blocked
Explanation : sperms can not reach the ova released in oviducts as a result fertilization is impossible .

(c) -I- (on any point on the lining of uterus)
ii- 1- To make sure that it is not dead and so it is growing
2- To provide enough time for growing as transferring and implantation of a relatively large embryo is easier than dealing with the microscopic fertilized egg .

(d) **Time of implantation** : day 21
Explanation : At this period of time level of progesterone is high enough to keep a thick spongy lining of the uterus

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4- (a) Seeds which germinated = 28 +28 = 56 seeds
% of germinated seeds = 56/ 70 x 100 = 80 %

(b) I- Continuous variation

- Because there are intermediate phenotypes between extremes in the same group .
- Variation within this type of plant (not within each group) is discontinuous as plants lie in two major categories with no intermediate phenotypes (long plants and short plants)

ii- 1- genetic factors .
2- Light intenity
(as some of the grown seedlings may receive less light due to the shadow of the other plants)
3- Length of the developing roots .

(c)

Notice that the produced ratio is 3:1 indicates that both parent plants re heterozygous

SECTION B

5- (a)Similrities : both have cell membrane , nucleus , cytoplasm.

Differences :

Palisade cell	Livercell
Has a cell wall made of cellulose.	has no cell wall
Has a large permanent sap vacuole.	has no or temporary small vacuole
Contains chloroplasts	no chloroplasts.
Usually contains stored starch.	usually contains stored glycogen.
Long with lateral nucleus	nucleus is central .

(b) Cell wall is made of cellulose therefore it is rigid enough to protect the cell and to give its shape , and because it is fully permeable it allows different molecules to move freely , also rigidity of the cell wall allows the cell to become turgid without being burst and this turgidity is necessary for support .

Cell membrane is partially permeable therefore it controls the movement of the different molecules in and out of the cell , also it encloses the cell components .

Nucleus contain DNA which carries the genetic information and so the nucleus controls all the functions of the cell including cell division .

Chloroplasts contain chlorophyll which absorbs light energy to be converted into chemical energy which is used in formation of food by photosynthesis , also in chloroplasts starch granules can be stored as a food reserve .

Sap vacuole contains stored food materials and water , it is necessary for regulating the process of absorption of water by osmosis ,also it has a role in cell turgidity .

6-(a) The main waste products of metabolism are carbon dioxide , water, urea , bile pigments , modified hormones and modified drugs .

Carbon dioxide is removed from blood by lungs , water is removed from blood by means of kidneys (water in urine) , by means of lungs in the form of water vapour and by sweat glands in skin in the form of sweat .

Urea is made in liver due to the process of deamination and is carried by blood to be excreted by kidneys where it forms one of the components of urine .

Bile pigments are made in liver due to the process of destruction of dead red blood cells , and then excreted by liver also to be carried by urine and undigested food .

Hormones , after carrying out their function, are modified in liver otherwise their effect continue along life , the modified hormones are carried by blood to be excreted by kidneys with urine .

Drugs also (being toxic) are modified in live by the process of detoxification , and then carried by blood from liver to kidneys to be excreted with urine .

(b) See paper 3 June 1991 question 4 c .

(c) Because faeces is not a waste product of metabolism , it does not even enter or pass a cell membrane

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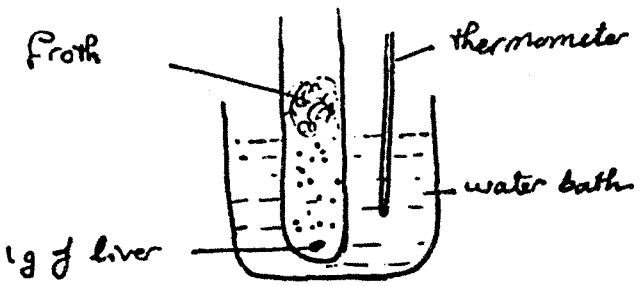
7- (a) Prepare 7 clean dry test tubes , put in 6 of them one gram of liver *(liver cells contain an enzyme which breaks down hydrogen peroxide into water and oxygen , this enzyme is catalase enzyme)*but in the 7th put boiled liver (to denature the enzyme and so this tube can be used as a control .

Put each test tube in a water bath of a different temperature for example 10 , 20 , 30, 40 , 45 and 50 °C , leave the tube number seven at room temperature .

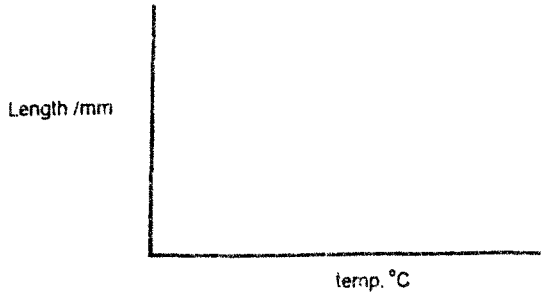
Leave them for about 10 min. so that the enzyme gains the temperature of the water bath . In each tube add $2cm^3$ of hydrogen peroxide and determine the amount of froth formed using a ruler .



Record the results in a table

temp .°C	length of froth /mm
10	
20	
30	
40	
45	
50	

plot the results in a graph.



(b) Because salivary amylase enzyme can act on starch in a neutral or a slightly alkaline medium and this is available in mouth where saliva contains hydrogen carbonate which provides the suitable pH ,but in the stomach Hcl is produced providing a low pH (about 2) and this reduces the activity of amylase and so digestion of starch ceases.

(c) this to provide a larger surface area (of food) for the enzymes to act ,and to facilitate swallowing , it also provides time for salivary amylase to act on starch.

8- a-

The main differences between
monocotyledonous and dicotyledonous plants

Monocotyledonous	Dicotyledonous
Have narrow leaves with parallel veins	have broad leaves with network of branched veins
The seed contains one cotyledon	the seed contains two cotyledons
Have fibrous roots	have main tap root with lateral roots
The number of stomata is equally distributed in the upper and lower surfaces of the leaves	stomata are usually found in the lower surface
Floral parts are three ,five or their multiples	floral parts are two,four or their multiples.

b- Potato is plant with a storage organ , it stores food mainly starch in its tuberous stem which grows in the soil.

The plant forms glucose in the leaves of its shoot by means of photosynthesis, an amount of this glucose is converted into sucrose which is carried by active transport to the phloem found in the vascular bundle of the leaf.

Phloem carries sucrose from the leaf to the phloem of the aerial stem which in turn carries it to the tuberous stem where it is stored in the form of starch.

c- Plants contain different components that form important parts in the healthy diet.
Cellulose which form the cell wall of plant cells is used as stimulant for the peristaltic movement and so it helps the body to avoid constipation. Cellulose also being a roughage it forms bulks that absorb amounts of food additives and other toxic materials and so it helps the body to avoid cancer of colon.

Carbohydrates which are found in many plant foods such as starch which is found in potatoes and glucose which is found in grapes form a part of the diet as they are used in production of energy by the process of respiration also they can be stored in the form of glycogen in liver and muscles.

Proteins are important component of diet , they are found in many plant foods especially leguminous plants such as beans and peas. Proteins are used for growth, tissue repair, formation of enzymes and hormones.

Lipids also are important components of diet, they are found in many plant foods in the form of oil, for example oil is fond in maize, olive and many vegetables. Lipids are used as a source of energy and in formation of cell membranes, in addition they are used in supporting organs such as kidneys.

PAPER (3)
November 1997

1- a- I- Blood capillary.

ii- Have thin walls (one cell thick) with fine pores between cells to facilitate exchange of materials between blood and tissue fluid.

b- B, D, C, A.

c- Because walls of left ventricle that force blood in aorta are stronger than those of the right ventricle that forces blood in pulmonary artery.

e- Animal fats and cholesterol can build up deposits on the inner walls of arteries making them narrower, stiff and less elastic , therefore resistance to blood flow increases and this increases blood pressure.

2- a- A- root B- Cotyledons C- remains of testa.

b- Germination.

c- I- The seed absorbs water.
ii- An amount of starch is hydrolysed into sugar to be used in the production of the energy needed for different metabolic activities.
iii- There is an increase as leaves are developed and used in formation of new food by photosynthesis.

d- 1- Sugar is used in respiration.
2- Sugar is stored in the form of starch.

3- a-

Raw material	From where absorbed
Water	From soil by the root
Carbon dioxide	From air by diffusion through stomata

b- P and S : control experiments.
R and U : To detect the presence of enzymes as enzymes denature by the effect of high temperature.

c- Chemical : amino acids.
Explanation : Amino acids produced due digestion of proteins of meat by the protease enzymes found in the solution of pitcher.

d- Mineral ion : nitrogen ion.
Explanation : The plant can not form its amino acids due to deficiency of nitrogen ions therefore it obtains its amino acids by digesting insects

4- a- I- mouse 2 : X and Y (it is a male)
mouse 3 : X and X (it is a female)

ii- 50%

b- I- 2
ii- 3

c- (Mouse 5 is heterozygous as it is produced due to the breeding of black female and a white male . Mouse 3 is also heterozygous because when it is bred with a white one it produces many mice of white coat and other with black coat)

Symbols used :
Allele for black : B Allele for white :b

Phenotype	black	x	black				
Genotype	Bb		Bb				
Gametes	(B)	(b)	(B)	(b)			
F1 genotype	BB	Bb	Bb	bb			
Phenotype	black	black	black	white			

d- I- length of tail
ii- (the phenotype ratio of this family according to length of tails is 50%, indicating that one of the parents is heterozygous dominant while the other is homozygous recessive. Also the diagram shows that the allele for long tail is dominant because when mouse 2 that has long tail is bred with mouse 3 which has a short tail all the produced individuals have long tails.)

Symbols used ;
Allele for long tail : T Allele for short tail : t

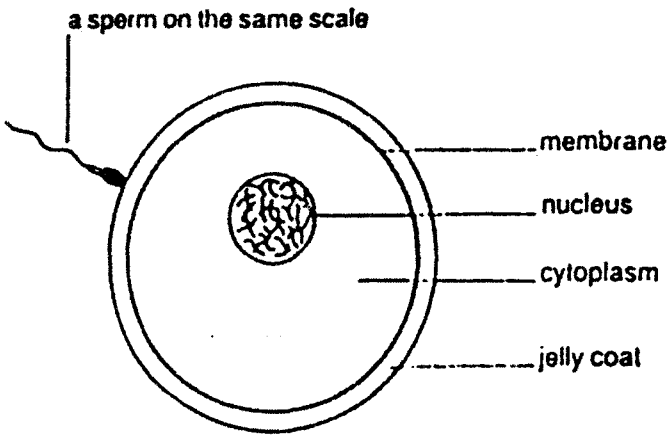
Phenotype	Short tail		x	Long tail			
Genotype	tt			Tt			
Gametes	(t)	(t)		(t)	(T)		
F1 Genotype	Tt	Tt		tt	tt		
Phenotype	Long	long		short	short		

Section B

5- a- Male gametes differ in many aspects than the female gametes. One of the differences is that , the male gamete is much smaller than the female gamete. Other difference is that the male gamete moves towards the female gamete for example sperm has tail for swimming and the male gamete in pollen grain is carried by wind or insects towards the female part where it goes in a formed pollen tube towards the female gamete. A third and important difference in types of chromosomes for example the human sperm carries 44 chromosomes in addition to the

chromosome X and the chromosome Y While the ovum carries 44 chromosomes in addition to two X chromosomes.

b- The semen is deposited at the top of vagina below the cervix. Sperms swim using their tails through the cervix and the film of moisture lining the uterus.
Sperms are attracted towards the ovum due to the chemicals it produces. Many sperms reach the egg , each sperm produces enzyme from its head to digest a way into the egg.
The first sperm that reach the ovum leaves its tail outside, then the nucleus of the sperm and that of the ovum fuse together forming a zygote.
Once one sperm has succeeded in penetrating the egg, a ***fertilization membrane*** is formed quickly to prevent any more sperms to enter the ovum .



The zygote begins to divide by mitosis forming a ball of cells and during this it is forced along the oviduct to reach the uterus. In the uterus the embryo (the ball of cells) produces enzymes to digest its way into the lining of uterus. The embryo uses the broken- down cells and the substances used by the uterus as food to grow and to become firmly embedded in the uterus. And this is known as implantation.

c- Cigarette smoke contains many harmful substances such as nicotine and c arbon monoxide. Both nicotine and carbon monoxide can cross the placenta and reach the blood of the fetus.

CO of smoking can reduce the oxygen supply as it combines with haemoglobin forming stable carboxy-haemoglobin and this affects the development of the fetus and may be born under-weight or prematurely.

Nicotine makes the foetal heart beats more quickly also it causes constriction of the blood vessels in placenta and this reduces exchange of materials between maternal and foetal blood.

Tar is other harmful substance found in cigarette smoke, it contains carcenogens (may lead to cancer).

Notice that foetus may be written in this way or as fetus without o

---

6- a- A man who does regular, hard, physical work needs quantities of different food stuffs in his diet. He needs large amounts of proteins which are found in many foods such as beans, peas, meat, milk and eggs. Proteins are required for developing strong muscles and for tissue repair of such muscles.
Proteins are also needed for formation of the different enzymes such as respiratory enzymes to improve the process of releasing energy.

This man needs amounts of carbohydrates which are found in many foods such as fruits, potatoes and bread. Carbohydrates are required for production of the energy needed for the hard work.

Lipids are also needed as they can be used as a source of energy.

Vitamins and minerals are needed in his diet to avoid the defeciency diseases and also many vitamins and minerals are needed for the enzymes to act properly and this helps in providing abilities for performing hard work.

b- Starvation means massive lack of food which leads to a decrease in body weight due to consumption of the stored fat followed by breakdown of parts of muscles to be used in the production of the energy needed for metabolism.

Malnutrition means taking an unbalanced diet i.e. taking more or less than the body's requirements or taking food lacking one or more of the classes of food.

c- Famine may be due to on or more of the following reasons
The rapid rate of population increase. (theoretically and practically it is impossible to match the food production and the increase in population).

Long term climatic changes may cause agriculture impossible in some parts.

Soil erosion and desertification (desertification means the change of agricultural land to deserts).

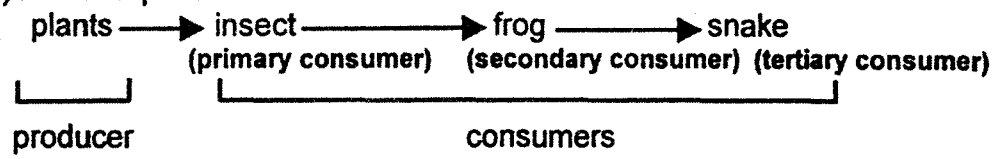
Desertification may be due to strong wind, deforestation, floods which wash away the top fertile soil.

Economic pressure also is one of the causes of famine (for example a country may have adequate food supply but people are too poor to buy it. Some third world countries cultivate cash crops to be exported such as cafee and tea to earn foreign currency. and so on enogh food can be provided for people.

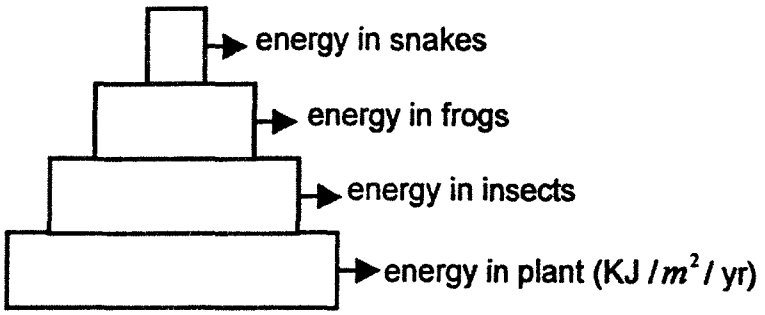
Unequal distribution on food also leads to famine in certain countries for example the world countries together have more than enough to feed every one including the 80 millions which are added every year but food supplies are not shared equally. (Americans for example represent only 6 % of the world's population but consume 35 % of the world's food).

Effect of pests such as locust which damage crops, leading also to famine
Drought (means lack of rain water which makes agriculture impossible).

7- a- (i) An example of food chains



(ii)



b- (i) Solar energy is trapped by the producer (e.g light energy is trapped by the plants to be converted into chemical energy during the process of photosynthesis).

The energy is stored in the chemical bonds found in food molecules formed in plants such as carbohydrates, fats and proteins, an amount of this energy is transferred from the producer to the primary consumer in the form of food, this transfer of energy continues from a consumer to another, but an amount of energy is lost during this flow from one traphic level to another.

(ii) In the producer an amount of the energy it gains is lost to the surrounding environment in the form of heat due to difference in temperature between the producer and the surrounding environment, also an amount of energy is lost during the process of transpiration, as evaporation of water requires heat energy, an amount of this energy is gained from the plant leading to a decrease in its temperature.

In the producer, an amount of energy is also lost due to certain metabolic reactions such as absorption of minerals by active uptake.

In consumers amounts of energy are also lost due to respiration as the body loses warm heat during expiration, also during excretion an amount of energy is lost in the form of heat with urine or evaporation of sweat.

Also in consumers an amount of energy is lost in the form of kinetic energy used for movement of the different organs such as heart and intestines or the movement of the organism itself.

In both consumers and producers energy passes to the consumers where amounts are lost during decay.

c- Feeding crop plants to animals leads to loss of both of energy and biomass.

Loss of energy increases by increasing traphic levels for example feeding plants directly to humans enable this human to obtain larger amount of energy and biomass, but feeding it to animals causes this animal to lose amount of energy and biomass during its life therefore when humans feed on such animal they obtain less energy and biomass (many kilograms eaten by animals lead to the building of only smaller number of kilograms of meat in the body of the animal).

8- The intercostal muscles (B) and (A) which is the diaphragm are used in inspiring air as the external intercostal muscles contract pulling ribcage upwards and outwards, diaphragm also contracts and flaten and this increases the volume of the thorax, as a result of this, pressure in thorax decreases to become lower than the atmospheric pressure so air rushes from the surrounding atmosphere into the lungs.

When air enters the nose it passes through the phorynx to reach the structure (c) which is trachea.

Trachea is lined with ciliated epithelium that contains goblet cells. Goblet cells produce mucus to trap dust and pathogens while cilia are used to force this mucus to the oesophagus out of the trachea for purification of air.

From trachea air passes through bronchi and bronchioles to reach alveoli. The fluid (D) which lines alveoli is used to facilitate diffusion of gases between alveoli and the surrounding network of capillaries.

The epithelial cells of alveoli (E) are thin and permeable to gases to allow exchange of gases also epithelial cells that form the alveoli provide large surface area to increase rate of gaseous exchange.

The cells of walls of blood capillaries (F) are also thin and permeable to gases while (G) which is the red blood cell is used to transport oxygen in the form of oxyhaemoglobin from lungs to the different body tissurs.

PAPER (3)
June 1998

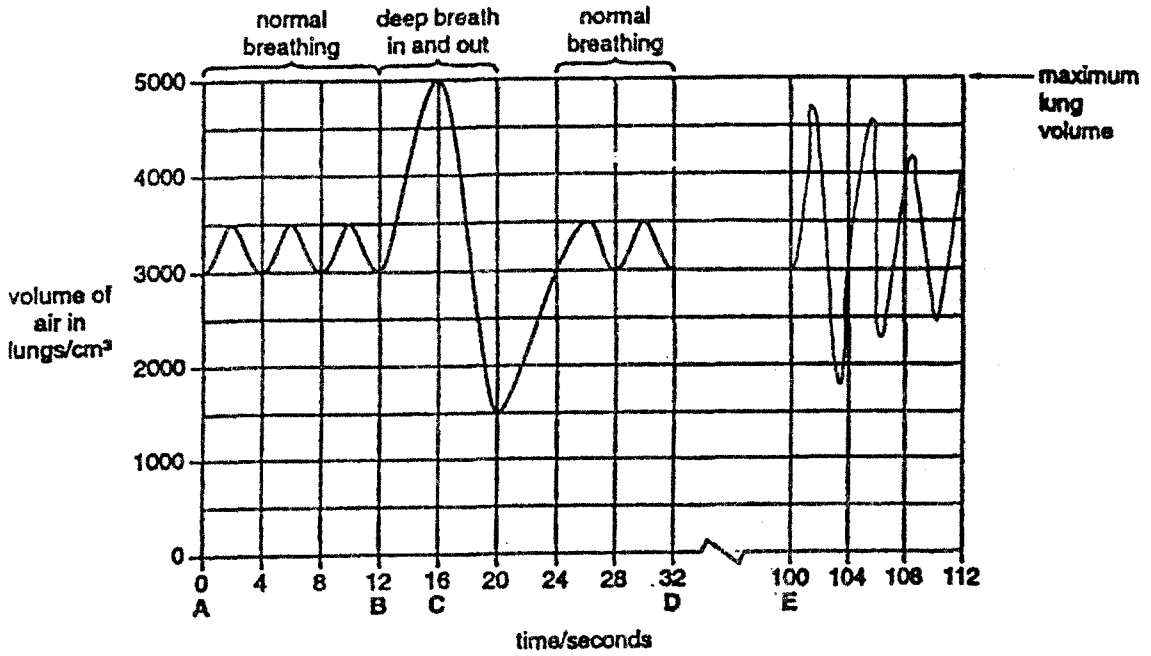
(Section A)

1- a- (i) 3 breaths in 12 seconds.
/ in 60 seconds.
15 breaths per minute.

(ii) 1500 cm^3

(iii) It is the time of inhalation during this the external intercostal muscles contract to pull the ribcage upwards and outwards to increase volume, decreasing pressure so air rushes into lungs.

b- (i)



(ii) Rate and depth of breathing remains high and begins to decrease gradually until it reaches the normal level, this to obtain enough oxygen to oxidize the lactic acid formed due to anaerobic respiration.

2- a- 1. Absorption of water.
2. Absorption of mineral.
3. Fixation of the plant in the soil.

b- (i) Gas Q water vapour process transpiration.
Gas R oxygen process photosynthesis.
(ii) Gas S Oxygen process respiration.

c- -ve geotropism.

d- Because it cannot obtain enough oxygen for production of the energy needed for this process by aerabic respiration as the soil spaces are filled with water, not air.

3- a- (i) Bacteria.

(ii) 1. Has DNA not enclosed in nuclear envelope.
2. Has a slime capsule.
3. Has a flagellum.

b- Asexual reproduction.

c- It is resistant to this antibiotic, this resistance may be developed due to mutation therefore it can live and reproduce.

d- Because this provides the chance for living bacteria to develope resistance against the used antibiotic and symptoms of the disease may reappear and the antibiotic can not affect such bacteria.

4- a- T mouth (you cannot write pharynx because pharynx must be connected also to the respiratory tract).
U stomach
V Large intestine.

b- 1. Nutrition.
2. Excretion.

c- A Ingestion.
B Digestion.
C Absorption.

d- Villi have large surface area to increase rate of absorption, also formed of thin walls to facilitate the process of absorption. Villi contain specific enzymes to complete digestion of food before being absorbed.

(Section B)

5- a- Smoking is a great risk as tobacco contains tar, nicotine and produce carbon monoxide which have the following harms

1.Tar

* It is a carcenogenic substance (leads to cancer).
* Irritates the lining of the trachea causing the production of more mucus and the cilia stop beating therefore:-
  - Coughing takes place to expel mucus.
  - Coughing damages the lining of the bronchioles, and allow it to be attacked by viruses and bacteria causing **chronic bronchitis.**
* Excessive coughing can breakdown the thin walls of alveoli decreasing the surface area of gaseous exchange and this is called **emphysema**.

2. Nicotine

* It is a **stimulant** (makes you more alert and active).
* It is **addictive**, means that once your body has got used to it, it is very hard to do without it.

* Affects the **nervous and the circulatory system** in general it acts as a stimulant by increasing the release of adrenaline hormone, this increases the rate of heart beat and increases blood pressure by causing constriction of many blood vessels.

* It also increases the tendency for fatty deposits to form inside blood vessels causing blood vessels to lose their elasticity and to become narrow (this is called **atherosclerosis**).

3. Carbon monoxide

* Combines with haemoglobin forming carboxy-haemoglobin which reduces the oxygen carried by blood.

* Babies born to mothers who smoke tend to be smaller as result of lack of oxygen.

The female smoke while pregnant and this may lead to miscarriage or producing premature baby.

The young girl may be affected by the smoke (passive smoker) and has a risk not less then that of the parents.

The male is overweight (obesity) which has different harms such as
Eating too much fats .... causes many harms such as ....

b- Fresh salad provides them with vitamins such as vitamin C and D which are necessary for .... and minerals such as calcium and iron .... and roughages .... eating vegetables and reduce fats and cholesterol to ....

6- a- Potatoes reproduces asexually and therefore they have the following advantages.

Advantages
* Often rapid because there is no need to find a mating partner. * Produces identical strains, therefore it is useful if parents are of good strains. * Can withstand unfavorable condition using stored foot. * Maintains a good strain exactly with no variation.

b- Testes are held outside to be in a lower temperature as high temp. may affect the ability of testis to produce sperms.

Testis produce a huge number of sperms each day to ensure fertilization during sexual intercourse as many sperms may be last or die during their way to reach the ovum.

The produced sperm has a tail for movement and a lot of mitochondria to produce the energy needed for this mivement.

Around kstis a coiled tubule called epididymis which is used to store sperm and necessary for ejaculation as the muscular walls are used in this process.

Penis contains erectile tissues in which blood flows when male is stimulated causing it to be longer and stronger ready for copulation.

c-

Produce primary sexual characteristics such as:
- Development of sex organs.
- Erection in case of stimulation.
- Production of sperms.

Produce secondary sexual characteristics:
- Rough voice (deep).
- growth of facial and pubic hair.
- Muscle development.
- Broad shoulders.

7- a,b- It the sequence by which energy in the form of food flows from one organism to another.

Example:

Grass → insect → frog → snake

(producer) (primary consumer) (secondary consumer) (tertiary consumer)

c- To reduce loss of energy and loss in biomass and this helps to feed greater number of humans.

8- a- dental decay is the dissolving of a hole in enamel and dentine by the effect of the acids produced by certain bacteria that feed on the food remains in mouth especially sugars.

Infection may reach pulp where nerves are found, and this is very painful.

Infection can spread rapidly through the pulp, and may form an abscess at the root of the tooth.

The ways for preventing dental decay can be summerised as follows:
Do not eat much sugar (because bacteria feed on sugar producing acids which dissolve the enamel).

Use a fluoride tooth paste because:
- fluoride make your teeth more resistant to decay.
- fluoride helps in healing by formation of new enamel.
- regular brushing helps to remove plaque.

Make regular visits to a dentist.

Your food should contain enough calcium, phosphorus and vitamin D which are necessary for formation of enamel.

Take enough vitamin C which makes the cement substance healthy.

b- In mouth mechanical digestion takes place by teeth during the process of chewing which divides large food particles into smaller particles to increase surface area for the enzymes to act and to facilitate the process of swallowing.

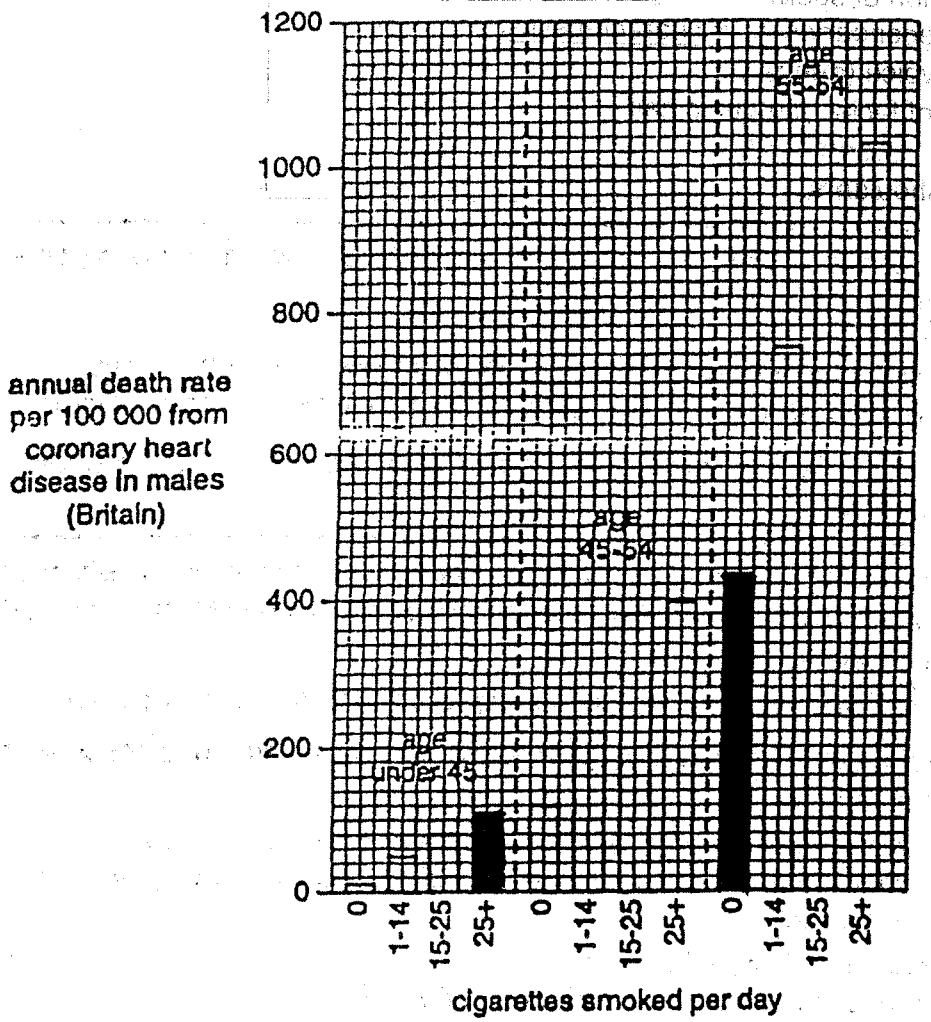
In stomach mechanical digestion takes place by churning movement using stomach muscles to mix food with the gastric juice.

In mouth chemical digestion takes place by the effect of salivary amylase which acts on starch to be digested into maltose while in stomach .... (pages 59 – 60).

PAPER (3)
November 1998

(Section A)

1- a-



b- (i) Increase in age increases the liablity for death by coronary heart disease especially above 54 years old.

(ii) Increasing number of cigarettes smoked per day increases liability for death by coronary heart disease.

c- Yes, because rate of death from coronary heart disease is higher among heavy smokers , than non smokers of the same age.

d- 1. Avoid eating too much fats and salts.
2. Regular exercise.

e- (i) 1. Tar.
2. Nicotine.

(ii) Tar is a carcenogenic substance, also it is inhibits beating of cilia in trachea leading to production of more mucus which in turn leads to chromic bronchitis and emphysema.
Nicotine affects nervous and circulatary system and may lead to atherosclerosis.

2- a- initial mass = 150 g.

mass after = weeks = 450 g.

$$\% \text{ increase} = \frac{450 \times 100}{150} = 300\ \%$$

b- Overcrowding leads to shortage in light therefore many leaves become unable to carry out photosynthesis, so death and decay took place.
No overcrowding, so they can receive light and continue to carry out photosynthesis.

c- Container A

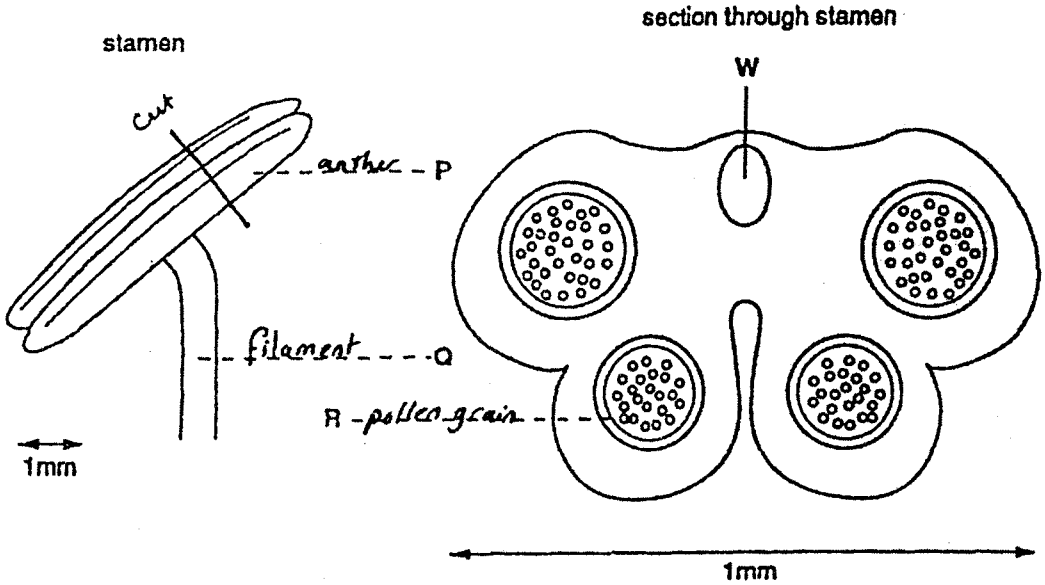
Explanation: Death of plants encourages growth of bacteria which begin to decompose them consuming the dissolved oxygen.

* In container C the mass of dead plant is less than that of container A, also long period of time in C allows oxygen to dissolve in water.
* As they are floating plants the produced oxygen due to photosynthesis escape in air not dissolve water.

d- Colour of light: green.

Explanation: Plant C can not carry out photosynthesis, die and decrease in mass.

3- a- (i,ii)



b- (i) Reduced to half.

(ii) When male and female gamctes fuse together the normal (diploid) number of chromosomes is restored without duplication.

(iii) Random assortment of alleles during meiosis leads to variation.

c- It provides the stamen with the food needed for growth and production of the energy for its metabolism.

4- a- Starch.

b- (i) Because iodine solution being of small molecules can diffuse through the visking bag to change colour of starch.

(ii) Because starch being of large molecules, it can not diffuse out the visking bag.

c- (i) To provide suitable temperature for the enzyme to ast.
(ii) Because starch is digested by the effect of the enzyme, therefore iodine solution can not change colour.

d- (i) Increase in volume.
(ii) Starch is digested into sugar, so water potential inside the bag becomes low so water enters by osmosis.

(Section B)

5- a- - The body is divided into head, thorax and abdomen.
- Have three pairs of jointed legs.
- Have one pair of antenna.
- Have compound eyes (few types have simple eyes).
- Most of them have wings.

b-

Insect. pollinated flowers e.g. apple:
* Usually large. * Appear in warm times (the times when are active). * Scented to attract insects. * Have nectary glands to secrete nectar
* Reproductive organs are enclosed within the flower * Pollen grains are: a- Sticky to cling to insects. b- Small in number. c- Larger then those carried by wind. * Stigma is not Feathery.

c- **Importance of their use:**
1. Reduces crop loss.
2. Controls spread of diseases e.g. malaria.

Harms of their over use:
1. Persistent pesticides such as DDT (pesticides which do not break down but remain in the environment). Pass along food chain, and become more and more concentrated until it reaches humans food as pesticide residues, causing harm.
2. Non persistent pesticides (which – break down into harmless materials after time).
   Therefore there must be enough time between spraying pesticide and harvest the plant, if not people could be poisoned.
3. Insects – and weeds may develop resistance to pesticides therefore pesticides have to be changed from time to time.
4. Insecticides may kill harmful and useful organisms together.

6- a- It is repeated.

b- (i) double circulation means that blood flows through the heart twice during complete journy in the body.

(ii) Blood in foot is collected by means of capillories which join together forming veinules the pour blood in the inferior vena cava that carries blood to the right atrium. Right atrium contracts forces blood into the right ventricles where the tricuspid valve close to prevent backflow of blood to the atrium.

The right ventricle contracts forcing blood into the pulmonary artery that divides into two branches each enters a lung where it divides into arterioles and blood capillaries.

7- a- Not involved in the new syllabus.

b- **Methods of transmission**

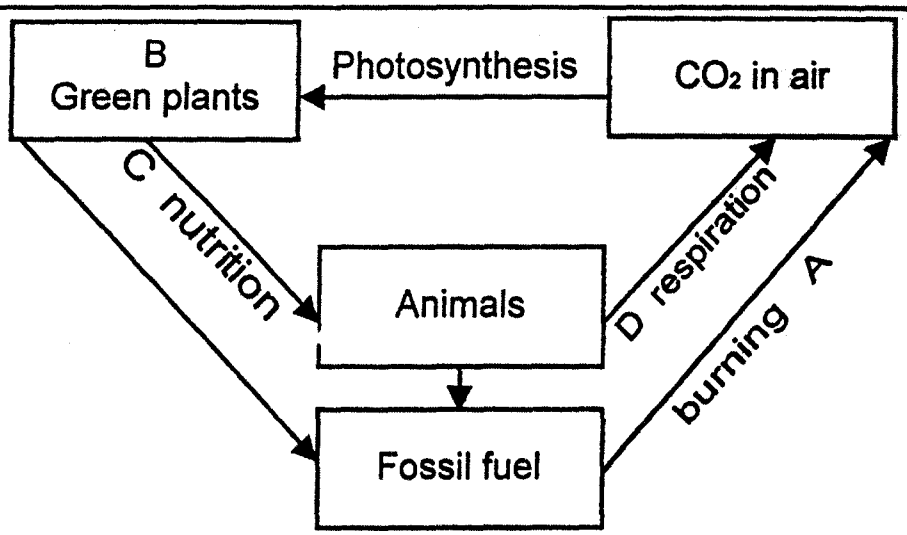
- Intercourse
- Blood transfusion form an infected person.
- Organ transplant form an infected person.
- Sharing needles with infected people.

How to avoid it ?

- Avoid intercourse with many partners or prostitutes.
- Use a condom.
- Never inject drugs.
- Never share razors or tooth brushes.

c- Because AIDS is caused by the virus HIV therefore it can not be treated by antibiotics like syphillis which is caused by bacteria.

8- a-



b- green plants being producers absorb light energy by means chlorophyll and covert it to light energy which is stored in the form of bonds in carbohydrates, protein and fat.

Animals being primary consumers obtain the energy when eat plants, but an amount of energy is lost therefore animals obtain less energy then that trapped by green plants may be due to loss of energy in the form of heat to the surrounding or active uptake, respiration and transpiration.

When animals excrete or both plants and animals energy is transferred to the decomposers, such as bacteria and fungi.

When plants and animals die they may be exposed to agents of fossilization and so converted into fossil fuels where energy is stored.

PAPER (3)
June 1999

(Section A)

1- a- (i) Plants.

(ii) 1. Contain no chlorophyll and do not carry out photosynthesis.
2. Their cell walls contain chitin.

b- (i) % of arthropods = 56.3 + 4.5 + 2.4 + 1.2 = 64.4 %

$$\% \text{ of insects} = \frac{56.3}{64.4} = 87.4\ \%$$

(ii) Feature: Small in size.
Explanation: Therefore they can hide from enemies and so have chance to grow and reproduce.

c- (i) Have feathers.

(ii) Tail.

d- The number for plant species known = $\frac{1.7 \times 1000000 \times 14.3}{100}$ = 243100

2- a- Growth means increase in size and mass due to the formation of new protoplasm but development means differentiation or cells or increase in its complexity.

b- Cells grow, its nuclear material is then replicate and then the nucleus divides by mitosis into two nuclei, then the cell divides into two cells by formation of separating cell wall.

c- (i) Osmosis.

(ii) The water potential in the cell must be lower than the surrounding medium.

(iii) Presence of cell wall.

(iv) The cells become turgid and supported to penetrate a way in the soil, the water taken is used in cell metabolism.

d- (i) A group of similar cells work together to perform a particular function.

(ii)

name of tissue	function
xylem	conduction of water and minerals
phloem	transport of sugars
root epidermis	Absorption of water from the soil

3- a- Planktons ⟶ small fish ⟶ large fish ⟶ fishermen.

b- (i) Level of mercury in fishermen.
Level of mercury in Plankton.

(ii) Because mercury being non-biodegradable it accumulates along the food chain therefore its concentration in fishermen reaches poisonous level.

c- Brain.

d- (i) Means are not decomposed by the effect of decomposers such as bacteria.

(ii) 1. Their accumulation.
2. When burnt they produce toxic gases.

(Section B)

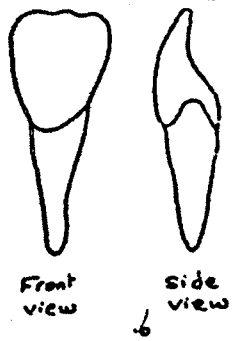
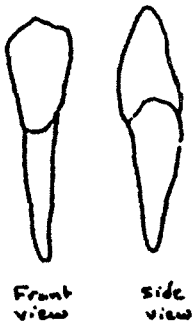
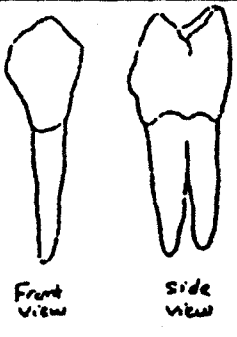
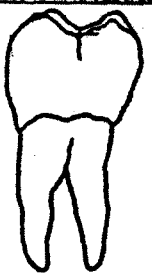
4- a- Pollination is the transfer of pollen grains from anther to stigma, it may take place by wind or insects.

b- One of the insect pollinated flowers is apple or wall flower. The wall flower is formed of receptacle that carries the four whorls of the flower, its calyx composed of green leaves called sepals which are usually small and green and their function is to protect the flower while it is closed (complete as above for petals, stamens ... etc.).

c- Cross pollination is the transfer of pollen grains from an anther of a flower to the stigma of another flower on another plant of the same species, it leads to variation as each plant may carry different alleles for the different characteristics then the other, as a result of this combinations of different alleles leads to formation of new combinations of characteristics in their offspring.

5- a- mechanical digestion that leads to breakdown of food particles into smaller particles without affecting their molecular structure such as action of teeth and churning movement of the stomach, but chemical digestion is that affect food molecules to be broken down into smaller molecules such as breakdown of starch into maltose by the help of amylase.

b-

incisors	canines	premolars	molars
			
- Have sharp edges for cutting and biting of food. - Found in the front of the mouth. - Are four in each jaw.	- Are more pointed to tear food. - Are two in every jaw.	- Are four in each jaw, two in each side. - Each has one or two cusps. - Broad for grinding and crushing food.	- Larger and broader than premolars. - Each has four of more cusps. - Used for crushing and grinding.

c- Eating too much sugars and leaving their remains in mouth encourages presence of bacteria which feed on such sugar producing acids that dissolve the enamel causing decay.

If diet includes raughages this helps in reducing teeth decay as roughages (brush) teeth and helps in removal of remains.

Diet must contain vitamin D and calcium as vitamin D is necessary for absorption of calcium but calcium is necessary for bulding enamel.

6- a- Modern technology increased food production by its role in developing agriculture in different ways, examples of such ways are using modern machines for ploughing and for irrigation can increase the rate of production, and to save time and effort.

By increasing, rate of mutation, crops of high yield can be developed.

Modern technology produced new sources of food such as single cell protein.

Modern technology also can improve the property of soil.

Modern technology is used in land reclamation to increase the cultivated area.

Modern technology developed new types of fertilizers to increase rate of production.

b- Less magnesium ⟶ less chlorophyll ⟶ less photosynthesis ⟶ shortage of food ⟶ reduced growth ⟶ death.

c- Dead animals are decomposed by the effect of decomposers such as bacteria of decay and certain types of fungi, as a result of this decay the materials of dead bodies are broken down into simpler molecules while their mineral content is released in soil to be used once more by plants.

7- a- b- see enzymes as this question is answers before.

PAPER (3)
November 1999

(Section A)

1- a- At the surface the temperature is about half that of the surrounding atmosphere, this applied to about one third of the depth, then it decreases sharply to its half, this applied to the second third of the depth, and then it decreases gradually to reach its minimum at the bottom.

b- To be fixed to the soil if they have roots, or to avoid the effect of water currents, also near edges dissolved minerals are more abundant.

c- Anaerobic respiration as the concentration of oxygen as shown in fig. 1 reaches its minimum at the bottom.

d- (i) Its level will increase, as sludge contains a lot of organic matter because it is produced as a result of discharge of wastes of organisms.

(ii) Will decrease as the suspended particles of sludge act as barriers for light, also it encourages growth of algae and the other floating plants that form a layer on the surface that also acts as barrier for light.

(iii) Will decrease because sewage encourages growth of algae which accumulate forming thick layer that prevents penetration of light to the other algae below, and this causing them to die and so bacteria increases, consuming the oxygen dissolved in water.

2- a- 1. Segmented body.
2. Jointed legs.

b- Tissue: phloem.
Processes: Simple diffusion and active uptake.

c- (i) **Sap vacuole**
Would shrink and decrease in volume due to loss of water by osmosis, but concentration of its contents would increase.

Cytoplasm
Would shrink also, pulling the cell surface membrane away from the cell wall and so plasmolysis occurs.

Cell wall
Cell wall being made of rigid cellulose, on considerable change would take place in the cell wall Except for being slightly pulled inwards.

(ii) The cytoplasm loses water by osmosis as the water potential inside the cell is higher than that of the surrounding medium, therefore cytoplasm shrinks, the cell becomes flaccid and may be plasmolysed.

d- Systemic pesticides go through stomata and they are translocated in the plant to reach different plant tissues through phloem, Aphids feeding on sap absorb the sap from phloem and die due to its toxic effect.

3- a- (i) In surface view, it is seen as disc-shaped cell while in lateral view it is seen biconcave in shape.

(ii) The abnormal cell is seen distorted  as haemoglobin becomes fibrous or crystalline.

(iii) Can not transport enough oxygen due to decrase in surface area,

Also it cannot be squeezed through fine capillaries as it becomes less elastic.

b- (i) H^AH^A

(ii) H^AH^S

(iii) H^SH^S

c- (i) H^AH^S (or H^SH^S if he has the chance to live).

(ii) H^SH^S

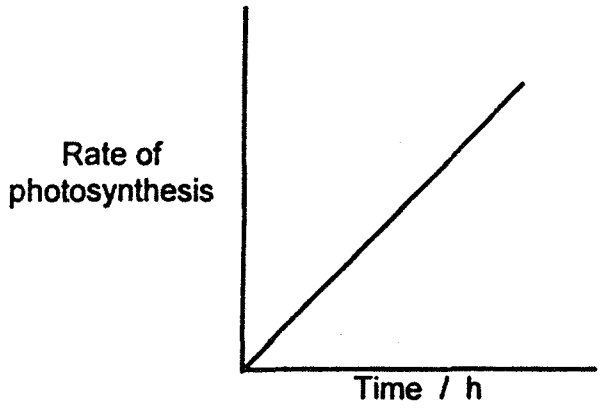
d-

parent phenotype	sickle cell sufferer		het. sickle cell	
genotype	H^SH^S		H^AH^S	
gametes	H^S	H^S	H^A	H^S
F1 genotype	H^AH^S	H^SH^S	H^AH^S	H^SH^S
Phenotype	het.	sickle cell sufferer	het.	sickle cell sufferer
percentage 50 %				

(Section B)

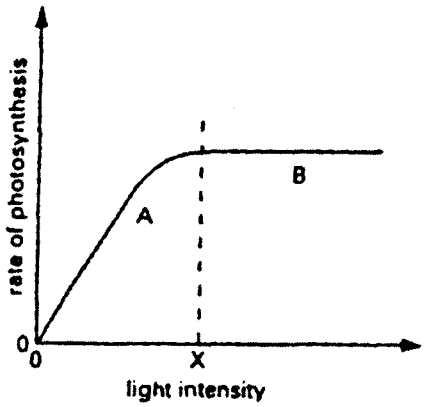
4- a- (i) Limiting factor is a condition whose supply limits the rate of a reaction.
Example:
In shortage of light the rate of photosynthesis slows down. In this case light is considered as a limiting factor.

(ii) 1.

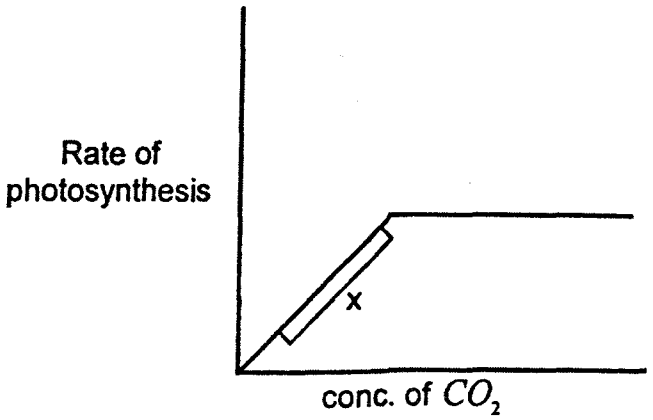


2. – During stage (A) light is the limiting factor, therefore increase in light intensity causes an increase in rate of photosynthesis.

- During stage (B) light is not the limiting factor because the increase in light intensity dose not affect the rate of photosynthesis.



(ii) A factor like conc. of carbon dioxide can limit the rate of photosynthesis if the other external and internal factors are available but the concentration of carbon dioxide is not enough to cop with the expected rate, therefore the rate of photosynthesis can not exeed certain limit like in the graph below:



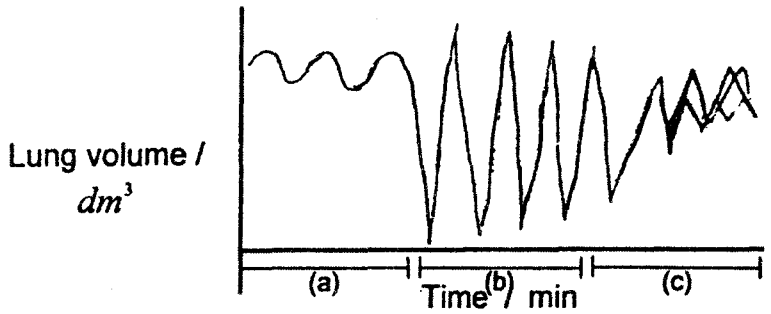
At stage x, CO_2 acts as a limiting factor therefore its increases the rate of photosynthesis as carbon and oxygen needed for formation of glucose by photosynthesis are obtained from carbon dioxide.

b- The conditions inside the green house can be controlled to produce the optimum production for example: Green house can be enriched with optimum carbon dioxide by connection it to a place in which animals live or by a factory where the waste carbon dioxide is produced.

Green house can also be provided with optimum light intensity if the light intensity is insufficient, artificial light can be added and if the light intensity is more than the optimum, a blind is used to reduce the light intensity that may harm the plants.

Green house can be provided with optimum temperature, if the temperature become above the optimum, certain windows are opened to get rid of the excess heat and if the temperature is lower than the optimum a heater is used to attain the optimum temperature.

5- a- The rate and depth of her breathing will increase to obtain enough oxygen to be used in production of the energy needed for this race by aerobic respiration and also to remove the produced carbon dioxide to avoid its accumulation in the body.



(a) Rate before the race.
(b) Rate during race.
(c) Rate after the race.

Although rate and depth of breathing is high, the muscles needs to produce more energy therefore it begins to respire anaerabically and this leads to accumulation of lactic acid providing what is known as oxygen debt. for this reason when she finished the race, rate and depth of breathing remains high to obtain the oxygen needed to oxidise the lactic acid formed, and then depth and rate of breathing becomes normal after recovery of the oxygen debt.

b- As a result of the race the adrenal glands found above the kidneys (one adrenal gland above each kidney) secrete the hormone adrenaline which is transported by blood to reach the heart muscle, liver, the blood vessels, respiratory, and digestive system.

In the heart, it increases the rate of heart beats and the volume of blood it forces at each beat to provide the brain and the working muscles with enough food and oxygen to be used in the production of the required energy.
In the liver, it stimulates the conversion of amounts of the stored glycogen into glucose to be carried to the working muscles.

In the digestive system and skin it causes vasoconstriction to reduce the flow of blood for digestive system and skin, as a result of this more blood can reach the muscles.

In the blood vessels reaching muscles it causes them to dilate for providing them with food and oxygen.

c- By vasodilatation, means to keep the blood vessels in the skin wider. This helps in getting rid of the excessive heat from the warm blood to the surrounding.

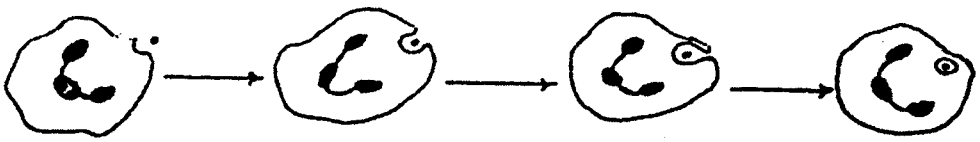
By lowering of hair this helps in getting rid of the excessive heat by reducing the amount of trapped air which acts as an insulator.

By production of sweat, as evaporation of sweat requires heat energy, an amount of this energy is gained from the body, leading to a decrease in body temperature until it reaches the normal.

6- a- (i) The body responds in many ways, three of such way are phagocytosis, antibody production and tissue refection.

Antibody production, in presence of an antigen, such as bacteria the type of lymphocytes responsible for attacking this antigens enlarges, divided repeatedly to produce new lymphocytes, they begin to produce antibodies, the antibodies remain fixed to the surface of the lymphocytes, the lymphocytes migrate to the site of injury where they attack the bacteria by releasing their antibodies.

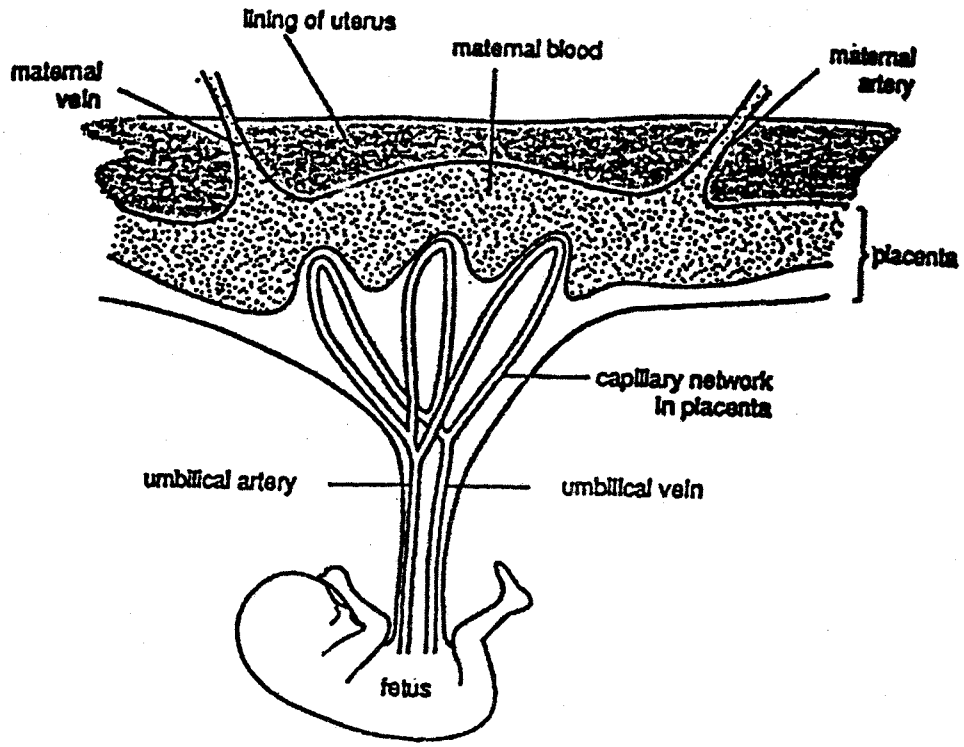
Some antibodies cause bacteria to burst, while others make them stick together to prevent their spread in the body and to be easily engulfed by the phagocytes. Phagocytosis, when bacteria enter the body inflammation takes place causing vasodilatation in this area, the permeability of the blood vessels increases, more blood flows in this area, and more phagocytes penetrate the blood vessels to engulf microbes and digest them as shown in figure.



(ii) When blood is exposed to air or rough surface platelets produce a chemical known as thrombokinase or thromboplastin. Thrombokinase changes inactive substance in plasma known as prothrombin into active form known as thrombin.

Throbin changes a soluble protein in blood known as fibrinogen into an insoluble form known as fibrin. Fibrin is a sticky, thread-like protein that accumulate in the wound trapping blood cells and platelets forming a temporary plug, that prevents loss of blood from the cut.

b-



A material like ghncose is absorbed by the villi found in ileum of the mother to reach the heart where it is carried with blood in aorta to reach the uterine ortery of the mother to reach placenta.

In the placenta glucose is taken from the maternal blood to the fetal capillaries in placenta. Capillaries regoin together forming umbilical vein to reach the fetus.

7- a-

Diffusion	Active transport
1- In diffusion molecules move down their concentration gradient (from regions of their higher concentration to regions of their lower concentration). 2- Diffusion is a passive process, dose not need energy. 3- It takes place in livings and non livings. 4- No carrier molecules are needed.	- In active transport molecules move against their concentration gradient (from regions of their lower concentration to regions of their higher concentration). - It is an active process, needs energy. - Takes place in living cells only as it needs energy. - Carrier molecules are needed to carry ions or molecules against their concentration gradient.

Examples of active uptake: uptake of minerals by the root hair cells and uptake of glucose by the epithelial cells of villi.

Examples of diffusion is the diffusion of gases during respiration and photosynthesis.

b-

Nervous control	Hormonal control
- The message is electro-chemical. - The impulse is transmitted in nerves. - Localised (means that the impulse is sent directly to target organ). - Short term effect. - Example control of walking or balance.	- The message is chemical. - Hormones are transmitted via blood. - Widespread (means that hormones are dispersed through out the body). - Long term effect. - Example control of heart beats by adrenaline.

Voluntary actions	Involuntary actions
• The action which you can decide whether or not you carry out the action. • It starts in the cerebrum. • Example: picking up a book.	• Actions which happen automatically, you can not decide whether or not you carry out the action. • It starts in medulla oblongata, or spinal cord in case of reflex action. • Example: peristalsis.

PAPER (3)
June 2000

1- (a) (i) 1. Two simple eyes.
2. Four limbs.

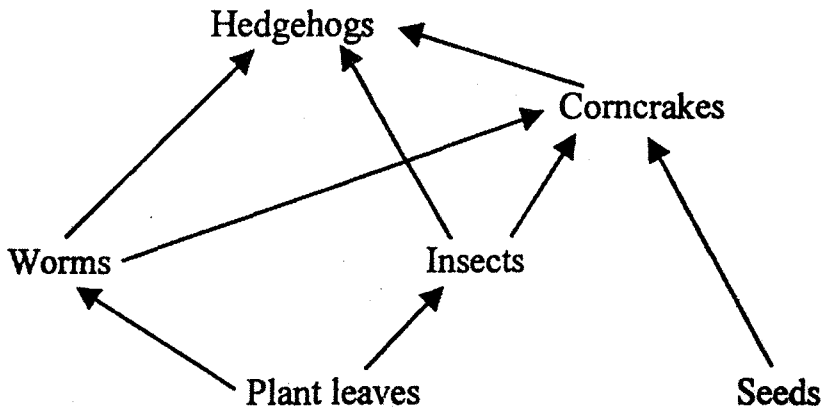
(ii) 1. Birds covered with feathers while mammals are coverd with hairy skin.
2. Birds have beaks while mammals have no beak.

(b) Because birds can fly to reach such islands while mammals can not.

(c) 1. There are few predators.
2. Plenty of hay fields where they can nest.
3. There is enough food (insects, worms and seeds).

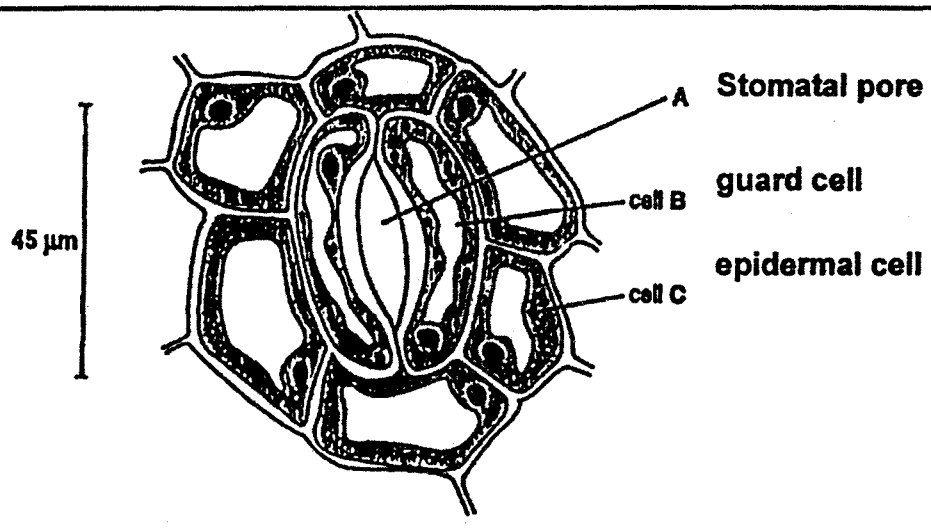
(d) Because Hedgehogs feed on eggs of corncrakes reducing their abilities to reproduce, also they share food of corncrakes.

(e)



(f) 1. Reducing Hedgehogs by increasing number of their predators or providing viral or bacterial infection.
2. By providing natural preserved area for then where hunting, is prevented and natural food is supplied.

2- (a)



(b) Cassia fistula has stomata in the upper surface only while Bauhinia monandro has stomata in the lower surface only.

(c) (i) During the day transpiration takes place through stomata therefore, colour of cobalt chloride paper changed in the pieces attached to the lower surface of cassia fistula and upper surface Bauhinia monandra.

(ii) During night stomatal pores are chased to reduce rate water loss.

(d) Due to transpiration water potential at the top of xylem decreases (negative pressure) and becomes lower than the xylem in the root therefore water ascends in xylem. Root pressure and capillary action help this process.

(e) (i) It reduces rate of transpiration because humid air has a higher water potential than the air inside air spaces of leaves.

(ii) It increases rate of transpiration as evaporation of water increases because heat energy provides kinetic energy for the water molecules.

3- (a) (i) Ff.
(ii) ff.

(b)

Porent phenotype		normal		x	carrier	
	genotype	FF			Ff	
	ganetes	(F)	(F)		(F)	(f)
F1	genotype	FF	Ff		FF	Ff
	Phenotype	normal	carrier		normal	carrier

It is not possible for then to produce a baby with cystic fibrosis.

(c) It resists flow of air causing respiratory problems, also mucus may act as a suitable medium for growth of bacteria and other microorganisms that may cause harm.

(Section B)

4- a- (i) The right atrium relaxes to receive deoxygenated blood through the superior and the inferior vena cava then it contracts to force deoxygenated blood through the tricuspid valve to the right ventricle.

(ii) When the right ventricle relaxes, it receives deoxygenated blood from the right atrium then it contracts, so the tricuspid valve closes while the semi-lunar valve of the pulmonary artery opens causing blood to be forced through the pulmonary artery to the lungs.

(iii) The tricuspid valve opens during contraction of the right atrium and relaxation of the right ventricle allowing deoxygenated blood to flow to the right ventricle but during contraction of the ventricle it becomes closed to prevent the back flow of blood to the right atrium.

b- There are many factors that lead to heart attack, from these factors eating too much animal fats which precipitate on the inner walls of arteries leading to reduction in their lumen and elasticity and this is known as atherosclerosis which reduces the ability of arteries to transport blood and makes them more subjected to blockage by thrombus.

Too much salts which increase the blood pressure (Hypertension) increasing the chance of damage of arterial walls and formation of thrombus.

Smoking which helps in precipitation of fats, on the inner walls of coronary artery and this also causes the heart muscle to be starved leading to attack.

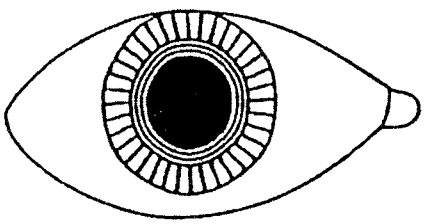
Stress which causes increase in blood pressure, leads in turn to atherosclerosis.

There are many preventive measures which can be taken to maintain a healthy heart, from these measures is to avoid smoking and to carry out regular exercise (to consume fats), to avoid stress and eating diets that do not contain too much animals fats and salts.

5- a- (i) Reflex action is a rapid involuntary response to a stimulus such as withdrawal of a hand when touches a hot object.

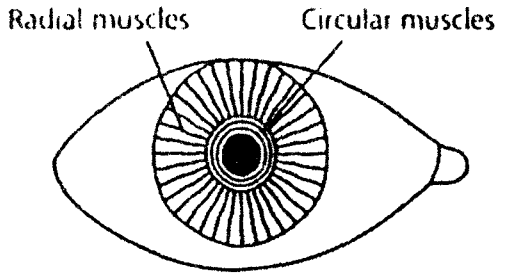
(ii) Pupil reflex or light reflex is the action taken by the iris to control the amount of light, it takes place as follows:-

in dim light



- Radial muscles of the iris contract.
- Circular muscles relax.
- Pupil becomes larger.

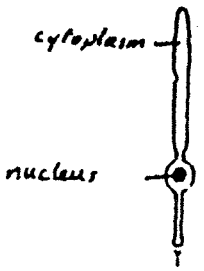
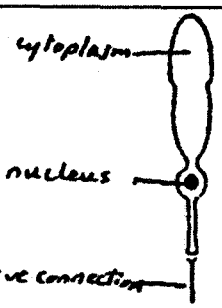
in bright light



- Radial muscles of the iris relax.
- Circular muscles contract.
- Pupil becomes smaller.

Pupil reflex is an advantage in both bright and dim light, in bright light it reduces the amount of light that enters the eye so it protects the light receptors against bright light that may harm them. In dim light it allows enough light to enter eye for clear vision.

b-

Rods	Cones
	
• Larger in number. • Spread in all retina but much less in fovea and absent in blind spot. • Sensitive to low light intensity. • Can not detect colours. • Each group share one nerve connection therefore it is less accurate in vision.	• Smaller in number. • Concentrated in fovea. • Sensitive to bright light. • Detect colours. • Each has its own nerve connection therefore it is more accurate.

Notice
Do not use a table except if the question asks you to do it in the form of a table.

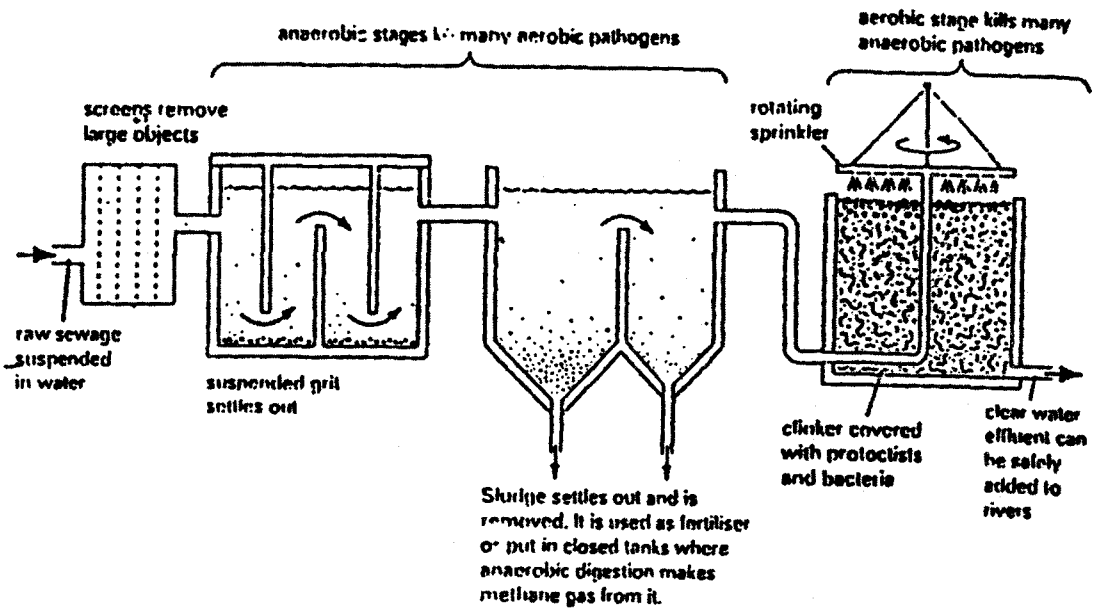
c- Damage of cornea may lead to loss of its transparency so light cannot fall on retina and so no image can be detected.

Damage of retina or retinal detatchment causes loss of vision (blindness) as the image can not be onverted into nerve impulses by the light receptor to reach the centre of vision in brain.

Damage of eye lens caused the image not to be focused sharply on fovea leading to impaired vision or this damage may cause the lens to be opaque and so light cannot reach the retina.

6- a- When untreated sewage reaches water stream, it encourages growth of algae and the other water plants that form a thick layer that blocks out light so plants below die as they cannot form their own food by photosynthesis. The death of such plants reduces conc. of oxygen in two different ways, one way is that they (during life) are used as a source of oxygen and the other way is that, their death encourages the presence of saprotrophic bacteria which are used to decompose such dead plants, bacteria use the oxygen dissolved in water, as a result of this water animals and many other organisms live in water die and this is known as eutrophication.

b-



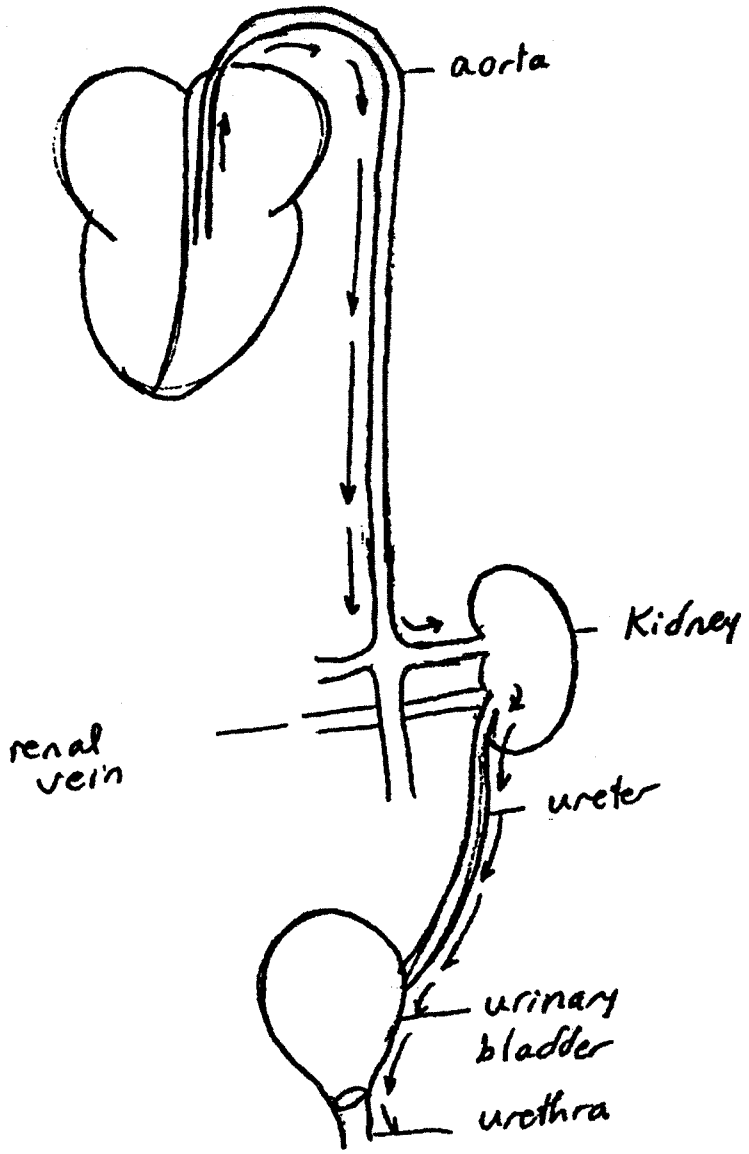
c- A plant like cactus can live in dry habitat can be adapted to its surrounding environment by conserving water in different ways.

Its root is long and branched to increase surface area for absorption of more water and its stem is juicy to store water, it is covered with thick cuticle to reduce water loss.

Its leaves are modified into spines covered with cuticle to reduce loss of water.

7- a- Excretion is the removal of toxic materials, waste products of metabolism and substances in excess of the requirements of the organism while egestion is getting rid of the undigested food.

b- Water passes through aorta until it reaches the renal artery that passes through kidney. Renal artery branches into a network of capillories, excess water leaves blood capillaries to reach the pelvis of kidney to be carried by ureter to the urinary bladder to be stored. When urinary bladder become filled, in a voluntary way, the sphincter muscle of urinary bladder relaxes and water in urine flows through urethra.



c- Liver excretes bile pigments which are produced due to the process of destruction of haemoglobin of dead red blood cells, also liver excretes excess cholesterol. Liver has a role of excretion as urea is made in liver by the process of deamination of excess amino acids, this urea is then is carried to the kidneys to be excreted. Liver also has a role of excretion as it prepares materials to be excreted by the kidney, examples of such materials are modified hormones and drugs.

PAPER (3)
November 2000

(Section A)

1- a- (i) The percentage of saturated fats in diet must be reduced from 16 % to 10 % and the percentage of unsaturated fats must be reduced also from 26 % to 20 %.

(ii) Because the increase in percentage of fats leads to heart disease as they precipitate on the inner walls of arteries and lead to atherosclerosis also lead to obesity that cause many problems.

b- (i) plant tissue : Starch.
animal tissue : glycogen.

c- Because excess glucose may be converted into fats to be stored under the skin causing obesity which makes the person liable to cancer and to be diabetic.

d- It increases blood pressure which may lead to atheroma which in turn may lead to heart attack.

e- 1. Breast milk contains antibodies while the formula milk dose not contain antibodies
2. Breast milk provides emotional relationship.
3. Breast milk has suitable temp. while formula milk may be of higher or lower temp.

There are many other advantages such as that, breast milk is not contaminated, and contains the right proportions of food stuffs according to the baby's requirements.

2- a- (i) Sigmoid or S-shaped curve.

(ii) A Primitive stage.
B transitional stage.
C Stage of stabilisation.

b- (i) Due to anaerobic respiration of yeast.

(ii) 1. Shortage of glucose as food.
2. Ethanol provides unsuitable condition.

c- (i) Put a sample in a test tube, add to it Benedict's solution and heat.

(ii) 1. Red – orange colour or ppt.
2. The blue colour of Benedict's solution is maintained.

d- glucose $\xrightarrow{\text{yeast}}$ ethanol + carbon dioxide.

e- due to death of yeast.

3- a-

part	name	function
A	placenta	Exchange of gases between maternal and fetal blood.
B	Amniotic fluid	Facilitates the movement of the fetus.
C	Amniotic sac	Secretes amniotic fluid.

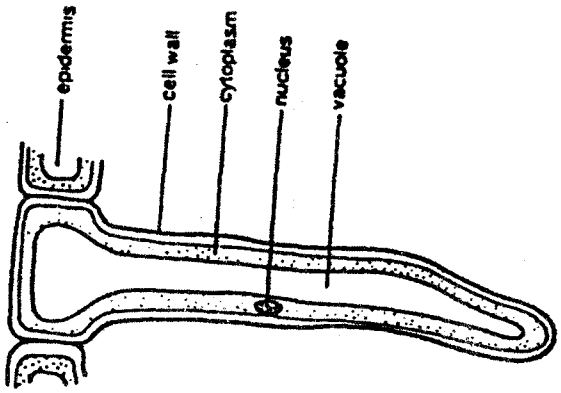
b- (i) Each cell has 47 chromosomes instead of 46.
(ii) Replication of the chromosome number 21.

c- If the nucleus of the cell contains autosomes and two xx chromosome the fetus is a female but if it contains xy the fetus is a male (x is longer than y).

d- To know if she has normal or higher level of salt, diabetic or not, level of hormones which are excreted with urine.

(Section B)

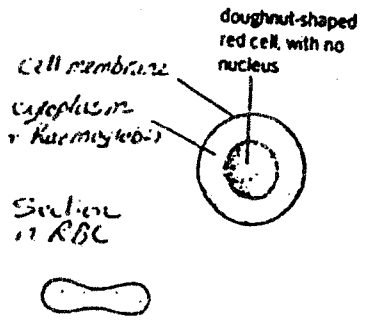
4- a- A root hair cell is a cell modified for absorption of water and minerals.



It is adapted to its function in many ways such as being large in number and protruded to increase the surface area of absorption also it contains a lot of mitochondria for production of the energy required for absorption of minerals by a process known as active uptake and it contains a large concentrated sap vacuole for absorption of water by osmosis.

The next question its answer must be as a prose not points. Try to do it.

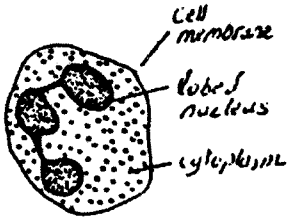
b- Red blood cells or (red corpuscles):
- Are also called RBC's
- Function: Transport of O_2
- Structure:



White blood cells or (white corpuscles)

- Are also called WBC's
- Function: Defense (immunity)
- Structure: There are two main types:

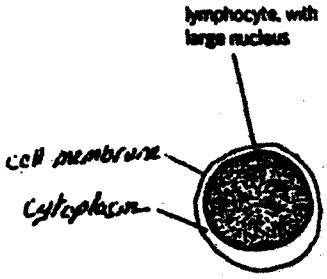
1. Phagocytes.



2. Lymphocytes

Function of lymphocytes:
Produce antibodies (proteins) that attack microbes.
Effect of antibodies:

- Make germs burst.
- Make germs clump to be easily engulfed.
- Stick to germs to be easily engulfed.



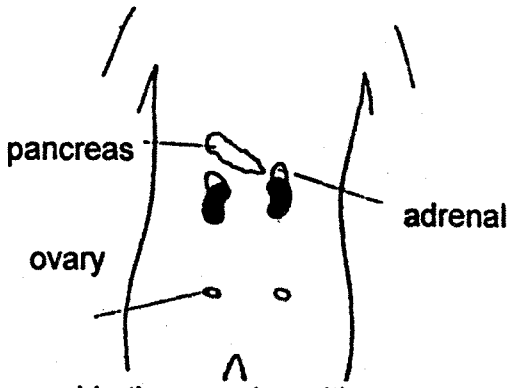
Platelets:
Function: - Necessary for blood clotting.
Structure:

5- a- Hormones, are chemical messangers (e.g protein)secreted in small amounts by endocrine glands into the blood stream directly to reach and affect certain organs.

Hormones, do not remain permanently in blood but are changed by the liver into inactive components to be excreted by the kidneys.

Function of hormones is to speed up, to slow down or alter the action of their target organs.

b- Adrenaline is a hormone secreted by the adrenal glands (supra – renal glands) which are found above the kidneys.



It is known as fight, fright and flight hormone as it prepares the body for action in many ways as it increases the rate of heart beats, increases the blood pressure, increases the rate of breathing, causes constriction of the blood vessels in skin and digestive system, stimulates conversion of glycogen stored in liver to glucose, and fats to fatty acids. The above actions to provide the muscles with enough food and oxygen, to produce the energy required for rapid and efficient response.

c- (i) When artificial plant hormones <u>(auxins for example Indole Acitic Acid IAA)</u> are sprayed onto cereal crops, it is taken by the weeds which have broad leaves but not by the crop, therefore the auxins cause excessive growth in the weeds consuming their stored food leading to their etiolation and then to death.

(ii) Pesticides are chemicals used to kill pests (pests are the organisms such as bacteria and fungi that harm plants). There are many types of pesticides such

as contact and systemic pesticides. Contact pesticides are the pesticides which have to be sprayed directly onto the pest. One of its disadvatages is that many insects and other pests may not be affected as they may be found under the lower surface of leaves. Systemic pesticides are the pesticides which are absorbed by plants when sprayed. Systemic pesticides and other applied chemicals are transported to all parts of the plant through phloem. Any pest feeds on the plant will be killed, also after time systemic pesticides become broken down into harmless substances by the plant. Therefore fruits and leaves have to be left for enough time after being sprayed by pesticides before being used by humans.

6- a-

Notice:
When you answer this question, write it in the form of prose (as paragraphs) except if the question is asking you to use a table.

(i)

Viruses	Bacteria
- Smaller than bacteria	- Larger than virus.
- A virus has a protein coat (capsid) consists of units called capsomers.	- Has a cell wall made of proteins, lipids and sugars.
- Has no cell membrane.	- Has a cell membrane.
- Contains no cytoplasm.	- Contains cytopasm.
- Contains no cell organelle.	- Contains few cell organelles such as ribosomes.
- Can not carry out any function of life except reproduction.	- Can carry out all the functions of living organisms.
- Can not be found except as a parasite in living cells.	- Can live free or as a parasite.

(ii)

Bacteria	Fungi
- Have a unicellular form.	- Formed of thread – like structures each is known as hypha and collectively are called mycelium (but yeast is a unicellular fungus)
- Have a cell wall made of proteins, lipids and sugars.	- The cell wall made of chitin or chitin and cellulose.
- Have no real nucleus (nuclear material without a nuclear envelope)	- Hypha contain many unclei in the cytoplasm.
- There are types of bacteria contain bacteriochlorophyll and can carry out photosynthesis.	- Contain no chlorophyll and so cannot carry out photosynthesis.
- Reproduce by simple binary fission.	- Reproduce by spore formation (but yeast reproduces by budding)

(iii)

Monocotyledons	Dicotyledons
1- Have narrow leaves with parallel veins.	have broad leaves with network of branched veins
2- The seed contains one cotyledon.	the seed contains two cotyledons.
3- Have fibrous roots.	Have main tap root with lateral roots
4- The number of stomata is equally distributed in the upper and lower surfaces of the leaves.	Stomata are usually found in the lower surface.
5- Floral parts are three, five or their multiples.	Floral parts are two, four or their multiples.

b- The binomial system of naming species

Means giving each organism a name of two parts:

The first represents genus, it begins with a capital letter, the second represents species, it begins with a small letter, the name is written **LATIN** in italics, or underlined.

Example : the scientific name of humans is Homo sapiens

Homo represents genus

sapiens represents species

7- a- Nutrition is the obtaining of organic substances, and mineral ions for growth, tissue repair and materials for energy.

Nutrition of different consumers e.g different animals leads to digestion and absorption of this digested food, but food which is not absorbed is egested by animals, such egested substances, with dead bodies of animals and plants may decompose in soil. providing minerals and nitrogenous compounds in soil.

Other way for providing nitrogenous compounds in soil is the effect of the nitrogen fixing bacteria which live free in soil absorbing nitrogen gas of air found in air spaces in soil to convert it into nitrogenous compounds such as nitrates.

In leguminous plants certain bacteria known as nodulare bacteria live in nodules in roots. Nodular bacteria obtain carbohydrates from the plant and provide it with nitrogenous compounds which they synthesize using nitrogen gas.

Nitrifying bacteria which also live in soil can convert ammonia (which is produced due to decay of wastes) to nitrates.

Plants can absorb the produced nitrogenous compounds to obtain nitrogen ions to be used in formation of amino acids (by adding such nitrogen ions to the carbohydrates made by photosynthesis to form the amino acids.

Amino acids are used in protein synthesis in plants.

b- (i) Amino acids are absorbed by the small intestine to be carried in blood plasma to reach the different parts of the body.

In muscles amino acids may be assimilated into muscles tissues as muscle tissues are mainly made of protein, such proteins are used in the growth of the muscle tissues or for their repair.

In muscle tissues amino acids are also used for synthesis of the enzymes needed for the metabolic reactions in muscles.

In case of starvation such amino acids may be used as a source of energy to maintain life.

(ii) In animals proteins are used in many ways such as growth and tissue repair as they are used for formation of the different components of cells such as cell membranes, cytoplasm and chromosomes.
Proteins are used for synthesis of the enzymes, and many hormones needed for different metabolic reactions.
Proteins are used in many animals to form nails, hair or fur.
In case of starvation proteins are used as a source of energy.

Biology O.L Answers

June 2001

Paper 3

Section A

1- (a) 1. Respiration.
2. Movement.
3. Reproduction.

(b)

feature	animal cell	plant cell	bacterial cell
chloroplast	×	✓	×
cytoplasm	✓	✓	✓
membrane	✓	✓	✓
nucleus	✓	✓	×

(c) For osmoregulation as increasing water potential inside Euglena may cause it to burst or disturb the different metabolic reactions, or disturb its stream-lined shape, increasing water resitance.

(d) (i) It may move closer to it, to carry out photosynthesis but if the light intensity is high to the extent that it may harm the organism, it moves away.

(ii) To obtain the optimum light intensity for carrying out photosynthesis without its eye spot being harmed by very high light intensity.

2- (a) (i) Being of short supply it limits the rate of growth of water plants, and so any increase in its conc. can lead to increase in rate of growth.

(ii) No effect will take place as it is found in exess, and the plant growth is already limited by phosphate concentration.

(b) 1. Conc. of carbon dioxide.
2. Temperature.

(c) Take identical samples of a water plant (e.g 5 samples) put them in identical containers containing fresh water and leave than in the suitable conditions of light and temperature, leave one as control and add different conc. of phosphates in the other containers, after about one week calculate the rate of growth in the samples by using dry mass , if rate of growth increased by increasing phosphate conc., phosphate is considered as a limiting factor.

(d) (i) phosphate levels increase from 10.0 μg per dm^3 to 58 $\mu g / dm^3$ by increasing distance downriver.

(ii) Waste products of fish, dead fish and the added nutrients for fish increase this conc.

(iii) Increasing phosphate conc. leads to an increase in algal growth that can form a thick layer on the surface of water, this blocks out light so algae and the other plants below die to be decomposed by bacteria that consume the oxygen dissolved in water leading to death of different organisms.

3- (a)

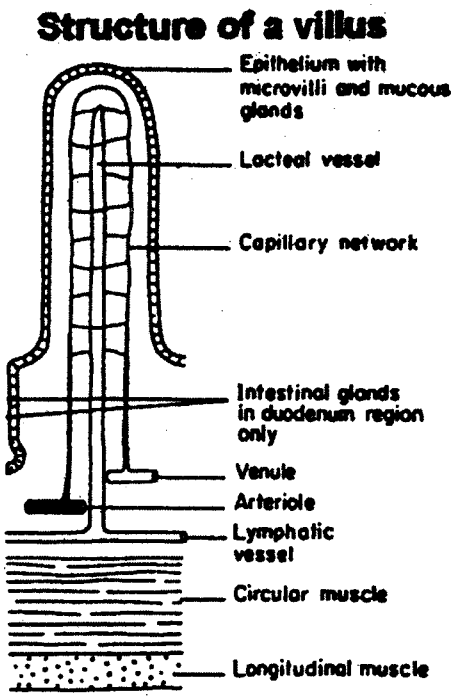
test	response time (seconds)	
	before drinking	after drinking
1	0.25	0.40
2	0.20	0.40
3	0.15	0.35
4	0.10	0.35
5	0.05	0.30
6	0.05	0.30
7	0.05	0.35
8	0.05	0.35
9	0.10	0.30
10	0.10	0.30
mean	**0.11**	**0.34**

(b) Effect : increases the time taken for response.
Explanation : Affects the nervous system and so delays the transmission of impulses.

(c) In a short term it may cause double vision and delays response leading to accidents. In long term it damages liver and weaken the heart muscle, it may lead to abortion for pregnant women also causes many social problems.

Section B

4- (a) In the small intestine there are large number of villi



Glucose is absorbed by epithelial cells of villi partially by diffusion and partially by active transport to reach the blood capillaries of villi.

The blood capillaries carry glucose to a vein known as hepatic portal vein which joins small intestine and liver. In the liver excess glucose is stored in the form of glycogen, this takes place also in muscles. If conc. of glucose is higher than the storage capacity of liver and muscles, it is stored in the form of fat.

(b) If glucose level rises above the normal pancreas secretes the hormone insulin which stimulates liver and muscles to store excess glucose in the form of glycogen. Insulin also stimulates the conversion of excess glucose to fat and stimulates the different body cells to use glucose.

If glucose level falls below normal pancreas secretes a hormone known as glucagon which stimaltes conversion of stored glycogen to glucose, also stimulates conversion of stored fats into carbohydrates.

(c) During strenuous exercise and when there is a shortage in oxygen supply to muscles, muscle cells produce energy by anaerobic resporation to produce the energy needed for exercise as a result of this lactic acid is produced.

5- (a) Sulphur dioxide is one of the most effective pollutants to the environment. There are many sources for production of sulphur dioxide such as roasting of sulphide ores, sulphuric acid industries, tyres industries, burning of fossil fuels and volcanic eruptions.

Sulphur dioxide as a pollutant it causes many effects on the environment as it dissolves in rain water leading to acid rain.

Acid rain has harmful effects on plant life as it damages leaves and fine roots, also it changes the pH value in soil making it unfit for agriculture or leads to soil erosion.

Acid rain has harmful effects on the buildings made of metals or lime stone. For aquatic environment changing pH of water may damage producers and affects life of consumers.

There are different ways to control the effect of sulphur dioxide, for example, removal of proportions of sulphur compounds from coal and petroleum, this also can take place removal of proportions of sulphur dioxide from the exhaust gases of factories before being discharged into the atmosphere or using catalytic converters.

(b) Deforestation has different undesirable effect on different aspects of life, one of such effects, its effect on the atmosphere as it increases conc. of carbon dioxide that may lead to global warming, also it decreases the conc. of oxygen cauring respiratory problems, and also decreases the amount of water vapour in air that reduces rain.

Deforestation also affects the soil as it decreases fertility of soil, then soil erosion as presence of trees protects the soil against the effect of wind and water currents. Soil erosion may be followed by desertification.

Deforestation affects animal life, as it damages their shelters and their source of food.

(e) Non-biodegredable plastics are not decomposed by bacteria therefore their accumulation may harm the environment in many ways, for example, if thrown in sewage pipes they remain causing blockaye until it is removed by man and if thrown in water streams they may form a layer that blocks out light harming plant life in water and if thrown in soil it may resist growth of plant roots.

November 2001

Paper 3

Section A

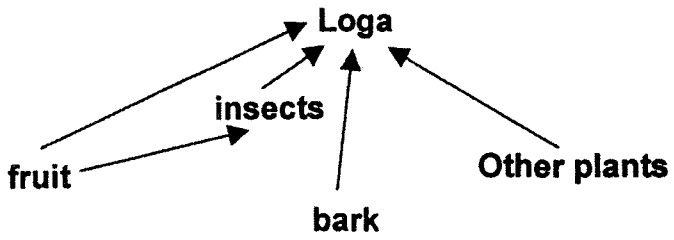
1- (a) (i) Loga : widest ronge from height 11 to 15 m and 31 + m but rarely near the ground.
Sirit : most frequently at height 1 – 5 m above the ground, % decreases with height, never found above height 25 m.
Soksak : mainly live on the ground, never live above 5 m.

(ii) Because more predators are found on the ground.

(b) (i) insects and other plants.

(ii) - May eat different species of insects or plants.
- Presence of plenty of food.
- May have other sources of food.

(c) (i)



(ii) insects : primary consumer. (herbivore)
Fruit : producer.
Loga : secondary consumer. (carnivore)

2- (a) (i) To act on the protein found in the blood it freeds to be digested into smaller soluble molecules to be easily absorbed and transported to the cells of the insect.

(ii) Amino acids or peptides.

(iii) For growth, tissue repair, formation of enzymes and hormones.

(b) Because insecticides may harm the other useful organisms while chlorella do not harm others. Insecticides also may accumulate along food chains and harm humans, also insects may develop resistance to insecticides.

(c) 1. Diseases or pollution by wastes.
2. Predators or overcrowding.

(d) (i) Organic compounds secreted by endocrine glards into the blood stream directly to reach and affect target organs or cells.

(ii) (you can mention any of the following hormones oestrogen - progesterone – L 11 – FSH or testosterone).

3- (a) A - vein.
B - artery.
C - Capillary.

(b) (i) Thin walls.
permeable to gases.
well ventilated.

(ii) It is carried by haemoglobin of the red blood cells in the form of oxyhaemoglobin.

(c) less haemoglobin is synthesized for formation of the red blood cells, as a result of this less oxygen is carried to the body cells to be used in production of energy by aerobic respiration and this leads to anaemia.

Section B

4- (a)

Virus	Bacteria	Fungi
- Smaller than bacteria.	- Larger than virus.	- May be formed of long hyphae.
- Has a protein coat.	- Has a cell wall made of protein, sugar and lipid.	- Has a cell wall made of chitin or chitin and cellulose.
- Has no cell membrane	- Has a cell membrane.	- Has a cell membrane.
- Contains no cytoplasm.	- Contains cytoplasm.	- Contains cytoplasm.
- Can not carry out any function of life except for reproduction.	- Can carry out all the functions of life.	- Can carry out all the functions of life.
- Contains no organelle.	- Contain organelles.	- Contains organelles.
- Not considered as a cell.	- Unicellular.	- May be unicellular such as yeast or multicellular.

(b) See onsuer of question 7 June 1996 also question 6 Nov. 1994.

5- (a) Malnutrition is a condition caused by eating an unbalanced diet such as eating food lacking one or more types of food or an increase in the quantities of one or more type of food.

The link between malnutrition and coronary heart disease is due to eating too much fats which are rich in saturated fatty acids and cholesterol which precipitate on the inner walls of arteries leading to reduction in then lumen and elasticity and this is known as ***atherosclerosis*** which reduces the ability of arteries to transport blood and makes them more subjected to blockage by ***thrombus***.

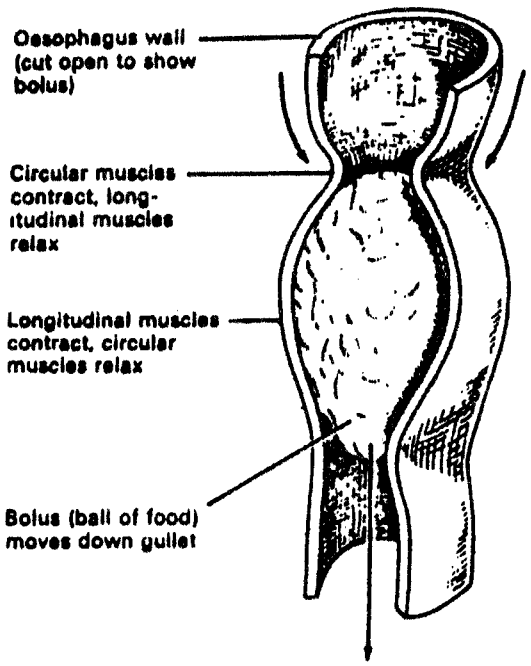
If this occurs in the coronary artery, shortage in supply of food and oxygen that reach the cardiac muscle occurs causing part of the cardiac muscle to die and this is called heart attack

(b) From mouth food is forced towards the pharynx by the tongue during swallowing, this food passes in the form of moist balls each is known as bolus.

From the pharynx food passes to the oesophagus, but can not pass to the nasal cavity as the soft palate closes the opening of the nasal cavity, also can not pall to the trachea as the epiglottis closes trachea, as a result food passes only to the oesophagus.

In the oesophagus food is forced by peristalsis. Peristalsis is the rhythmic contractions of the muscles in the walls of tubes such as the alimentary canal to squeeze the contents along.

Peristalsis in the oesophagus is due to the action of circular and longitudinal muscles found in its walls.



Above the piece of food the circular muscles contract while the longitudinal muscles relax. The opposite takes place around the bolus. As a result the food is pushed along the alimentary canal.

(c) Carbon dioxide levels in air during the day may be lower than at night because during day time photosynthesis occurs due to the presence of light as a result of this, carbon dioxide is absorbed while the rate of production of CO_2 during daytime is low compared with rate of its absorption so net decrease in conc. of CO_2 occurs but at night there is no light and so no photosynthesis, as a result of this the net production of CO_2 due to respiration is high.

6- (a) Because 100 % of the first generation appear tall we can conclude that the allele for tall is dominant while the allele for dwarf is recessive.

Allele for tall T

Allele for short t

parent phenotype		Tall		x		dwarf
	genotype	T T		x		t t
	gametes	(T)	(T)		(t)	(t)
F_1	genotype	T t	T t	T t	T t	
	phenotype	tall	tall	tall	tall	
	phenotype ratio	100 % tall				

<u>The second generation</u>

Parent phenotype		Tall		x		tall
	genotype	T t		x		T t
	gametes	(T)	(t)		(T)	(t)
F_1	genotype	T T	T t		T t	t t
	phenotype	tall	tall		tall	dwarf
	phenotype ratio	75 % tall		:	25 % dwarf	

(b) Leguminous crops such as pea plants contain nodules in which a type of nitrogen fixing bacteria known as nodular bacteria live, this type of bacteria can provide the plant with its requirements of nitrogen containing compounds, therefore adding too much fertilizers is considered as a waste of money and effort, in other way such festitizers make soil loose and therefore erosion occurs easily. Other harmful effect is that excessive fertitzers when washed out into the water streams encourging the growth of algae and the other floating plants that form a layer on the surface of water, this layer blocks out light, therefore plants and algae below the water surface die and this increases the number of saprotrophic bacteria which consume the oxygen dissolved in water leading to death of different organisms in water stream, and this is known as eutrophication.

7- It is a repeated question.

June 2002

Paper 3

Section A

1- (a) 1. Snails use elodea as food.
2. Elodea provide oxygen for snails to respire
OR
- Elodea provide shelter for snails.
- Elodea provide camouflage for snails.
- Snails lay eggs on elodea.

(b) (i) Tube 1. Elodea carried out photosynthesis at higher rate than respiration therefore conc. of CO_2 decreased.
2. Pond snail produced CO_2 due to respiratrn.
3. The CO_2 absorbed by elodea for photosynthesis is replaced by CO_2 produced by respiration of snail.
4. The CO_2 produced by pond snails due to respiration is more than that absorbed by elodea for photosynthesis.
5. Elodea can only respire producing CO_2.

(ii) To be used as a control experiment that enables use to be sure that the change in the colour of the indicator is due to vital processes in argonisms.

2- (a) A - nucleus.
B - cytoplasm.
C - cell membrane or plasma membrane.

(b) (i) Haploid.
(ii) A molecule of DNA and protein found in nuclei of cells, it is made up of many genes.

(c)

Parent phenotype	male		x	female		
	X Y			X X		
genotype	(X)	(Y)	x	(X)	(X)	
F_1 genotype	XX	XX		X Y	X Y	
Phenotype	female	female		male	male	

F_1 phenotype ratio 50 % females : 50 % males.

3- (a)

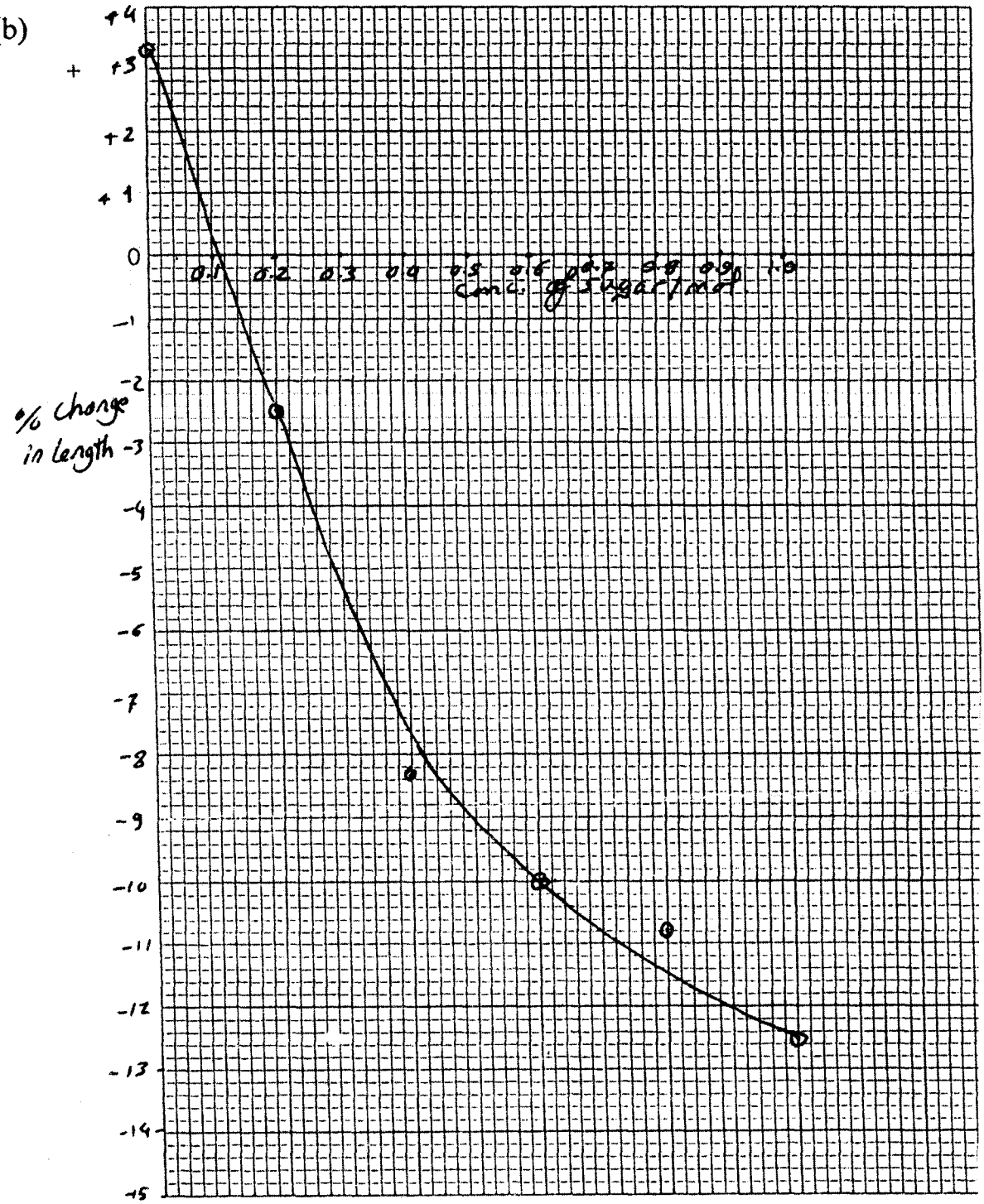
concentration of sugar solution (mol)	length of potato at start (mm)	length of potato after 24 hours (mm)		mean length (mm)	mean change in length (mm)	% change in length
		piece 1	piece 2			
0	60	60	64	62.0	+ 2.0	+ 3.3
0.2	60	58	59	58.5	- 1.5	- 2.5
0.4	60	55	55	55.0	- 5.0	- 8.3
0.6	60	54	54	54.0	- 6.0	- 10.0
0.8	60	53	54	53.5	- 6.5	- 10.8
1.0	60	52	53	52.5	- 7.5	- 12.5

Space for rough work

$$\text{mean} = \frac{60+53+54}{3} = 53.5 \text{ mm} \qquad \% \text{ change} = \frac{-6.5}{60} \times 100$$

$$\text{mean} = 60 - 53.5 = 6.5 \text{ mm}$$

(b)



Notice :

* Points which are not exactly fitted to the curve must be left.

(c) (i) 0.11 mol.

(ii) Because there is no net movement of water by osmosis as the water potential inside the cells is equal to that of the surrounding solution.

(d) (i) Piece 1 at 0 mol. After 24 hours.

(ii) % change in length is lower than it should have been.

(e) 1. Absorption of water by the root hair cells.
2. Prevents welting of the plant and provides support by turgidity.

Section B

4- (a) (i) Transpiration is the evaporation of water from plants mainly it takes place through stomatal pores of leaves.

(ii) We have to prepare two similar potted plants, labeled A and B. The weight of each is determined, the pot must be sealed to avoid evaporation of water from the soil.

One of the potted plants must be kept in cool conditions e.g. in a refrigerator, the other must be placed in an incubator at a hot condition e.g. 40°C.

After about 5 hours the two plants must be reweighed, and the decrease in weight is determined, this decrease in weight roughly determines the weight of water lost by transpiration.

It is expected that rate of transpiration in hot conditions is higher than that in cold conditions as heat increases rate of evaporation of water.

(b) Wilting means that cells of plant become flaccid not turgid and may be plasmoysed. Wilting occurs due to rapid loss of water from the plant at a rate higher than the rate of gaining water.

The rapid loss of water may be due to shortage of water in soil, or inability of the plant to absorb enough water because soil is salty, also it may be due to rapid loss of water due to air currents, low humidity or high temperature.

5- (a) (i) Nitrogen in air can not be absorbed by plants as gas but must be taken only in the form of nitrogenous compounds such as nitrates. The process by which nitrogen gas is converted to nitrogenous compounds is known as nitrogen fixation.

Nitrogen fixation occurs in may ways for example lightning caused the formation of nitrogen oxides from nitrogen gas and

oxygen gas in air. In industry Haber process is used to form nitrogen compounds.

The main agent in the process of nitrogen fixation is a type of bacteria known as nitrogen fixing bacteria which live free in soil and fix nitrogen gas found between soil particles into nitrogenous compounds. Other type of nitrogen fixing bacteria is the nodular bacteria which live in nodules in roots of leguminous plants.

The nitrogen-compounds formed due to the process of nitrogen fixation are absorbed by plants to be used as a source of nitrogen ions needed for protein synthesis in plants.

When a herbivorous animal feeds on such plants it can obtain protein which is then digested into amino acids by the effect of protease enzymes. Amino acids are then absorbed and transported in the blood stream of the mammal to reach the body muscles where the amino acids are used in the process of protein synthesis in muscles once more.

(ii) Proteins are used in mammals in many ways other than building of muscles such as formation of enzymes which act as catalysts in metabolic activities or used in formation of certain hormones such as insulin which is needed for regulating the blood sugar level. Proteins are also used in formation of haemoglobin of the red blood cells for transport of oxygen.

Proteins take part in building cell membranes and chromosomes, hair and nails, antibodies and plasma proteins such as fibrinogen.

(b) Magnesium ions are needed for formation of chlorophyll in plants therefore deficiency of magnesium leads to shortage in chlorophyll formation as a result of this plant leaves become yellowish and unable to carry out photosynthesis in a proper way because chlorophyll is the substance which traps light energy and convert it to chemical energy for formation of food by photosynthesis. Shortage in formation of food cause plant to become weak and gradually die.

6- (a) (i) One of the natural methods is rhythen method or safe period. In this method intercourse is avoided during the period of ovulation. The period of ovulation can be recognized by having slight rise in temperature and the mucus in vagina becomes more viscous.

The advantage of this method is that, it is acceptable to all religions and cultures, also it has no side effects.

From its disadvantages is that, the signs of this period may not be clear or the menstrual cycle may be irregular, as a result of this the time of ovulation can not be determined.

(ii) One of the chemical methods is the spermicide which is a creamy substance that kills sperms, it is put into the vagina before intercourse. It is easy to be used but some sperms may pass during sexual intercourse without being killed, therefore it must be used beside condom.

(iii) One of the mechanical methods is a sheath of rubber known as condom placed over the erect male organ during intercourse to prevent sperms to reach vagina.

This method can be used as a way of protection against sexually transmitted diseases but any defect in its manufacture may lead to the release of sperms into the vagina during intercourse.

(iv) One of the surgical methods of birth control is the tubal ligation which means to tie and cut the oviducts to close the way through which sperms reach ova.

This method is 100 % effective and does not affect the female secondary sexual characteristics as such characteristics are controlled by the hormone oestrogen which is transported through blood stream not the oviducts but the disadvantage of this method is that it is irreversible.

(b) The process of asexual reproduction in bacteria is known as binary fission

(a) Bacterial cell **(b) Chromosome replieates** **(c) Cell divides**

During this process the nuclear material replicates. The nuclear material becomes constricted in the middle and divides into two. The cytoplasm also become constricted. A cell wall is formed separating it into two cells. The new cells may remain together and divide repeatedly forming a ***colony***.

7- (a)

Arteries	Veins
- Artery is a blood vessel that carries blood from the heart.	- Vein is a blood vessel carries blood to the heart.
- Arteries have thick walls to withstand the high blood pressure.	- Veins have thin walls as the blood pressure in vein is low.
- Arteries have no semi-lunar valves as the high blood pressure in arteries, makes blood not liable to flow back.	- Veins have semi-lunar valves to prevent the back flow of blood.
- Carry oxygenated blood except for pulmonary artery and umbilical artery.	- Carry deoxygenated blood except for pulmonary veins and umbilical vein.

(b) Blood capillaries allow different nutrients to pass to the tissue fluids such as glucose, amino acids, and mineral ions.
Blood capillaries are suited for this transfer as they have very this walls (one cell-thick) and their walls are permeable to such materials.
Blood capillaries form a dense network therefore they provides large surface area for this transfer.
The walls of blood capillaries have fine pores and relatively high blood pressure and this helps such molecules to transfer from blood stream to the tissue fluid.

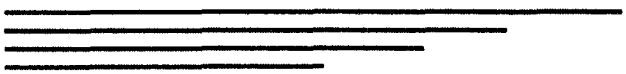
(c) (i) Our circulatory system is known as double circulatory system as blood flows through heart twice during one complete journey around the body.

When the two atria relax, the right atrium receives deoxygenated blood through vena cava but the left ventricle receives oxygenated blood through pulmonary veins.

When the two atria contract the ventricles relax, during this period the right ventricles receives deoxygenated blood from the right atrium through the tricuspid valve, but the left ventricle receives oxygenated blood from the left atrium through the bicuspid or the mitral valve.

When the two ventricles contract the bicuspid and tricuspid valves close to prevent the backflow to blood to the atria. Blood from the right ventricle is forced through pulmonary artery to reach the lungs but oxygenated blood is forced from the left ventricle through aorta to reach the different parts of the body.

(ii) The advantages of the double circulatory system is that it maintains blood pressure at a suitable level for its flow through the lung's network of blood vessels.
Other advantage is that it keeps oxygenated and deoxygenated blood separatex; in addition pulmonary circulation allow exchange of gases in lungs while the systemic circulation provides the different parts of the body with oxygen and carries away the waste products.



November 2002

Paper 3

Section A

1- (a) (i) A group of living organisms and their surrounding environment, such organisms interact with each other and with their environment.

(ii) A network of food relationships between organisms in a certain ecosystem. It consists of many food chains.

(b) (i) Locust and impala.

(ii) Because it occupies more than one trophic level, in a food chain which contains impala it acts as a secondary consumer, in the other food chains it acts as a 4^{th} consumer.

(c) (i) The number of impala might decrease due to lack of grass which is used by locusts.

(ii) The number might increase, as they can find enough locusts which are used as food for scorpions.

(d) (i) Locusts plague led to a decrease in number of impala therefore leopard feed mainly on baboon leading to a decrease in its number.

(ii) May be spread of a disease or presence of a predator which is not shown in this web.

OR

* Migration to escape from predators.
* Death due to pollution.
* Natural disaster.

(e) 1. To conserve leopard in order to avoid their extinct which may disturb balance of the environment.

2. To maintain biodiversity.

OR

Their decrease may cause baboon and impala numbers to be out of control.

2- (a) (i) Motor nerve cell or motor neurone.

(ii) 1. Its cell body is terminal.
2. Has long axon.
OR
- It has motor end plates.
- It has many dendrons and dendrites.

(iii) Its cell body is located in the central nervous system (brain or spinal cord).

(b) Cytoplasm : The site of metabolic reactions needed for impulses.
Myelin sheath : Act as insulating and protecting layer and increases speed of transmission of impulses.

(c) (i) Stimulus ⟶ receptor ⟶ coordinator ⟶ effector ⟶ response.

(ii)

part of sequence	part in pupil reflex
coordinator	brain
effector	**muscles of iris**
receptor	**light receptors in retina**
response	**change size of pupil**
stimulus	**light intensity**

3- (a) (i) Capillary : For absorption of sugar, amino acids, water soluble vitamins and minerals.
Lacteal : absorption and transport of fatty acids, glycerol and fat soluble vitamins.

(ii) To increase surface area for increasing rate of absorption.

(b) (i) Diffusion.

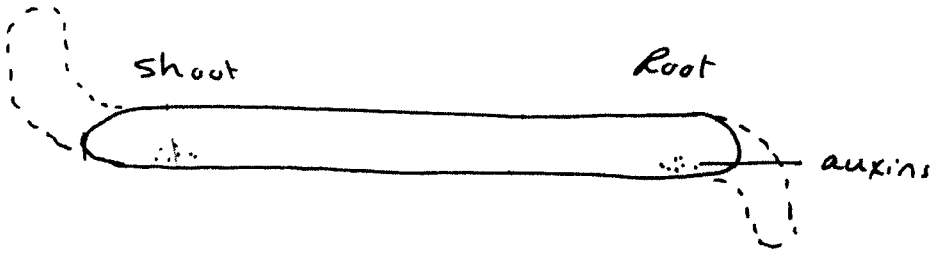
(ii) Capillaries have thin walls (one cell – thick) with fine gaps between cells to facititate diffusion, also they forma large network for providing large surface area for diffusion.

(c) (i) Because conc. of a substance in ileum is lower than its conc. in blood, also active uptake is faster.

(ii) Because active uptake requires energy which is produced by respiration.

(d) 1. Transport of fatty acids, glycerol, fat soluble vitamins and tissue fluid.
2. Immunity as lymphocytes mature in lymphatic system.

4- (a) Auxins which are produced by the tip of the shoot and the tip of the root are attracted towards gravity.



Auxins at the shoot stimulate growth at this side causing the shoot to grow against gravity.
Auxis at the root in hibit growth due to their accumulation as a result of this the region facing gravity grow at a slower rate, so the root grows towards gravity.

(b) (i) Oestrogen is produced by the ovary into the blood stream directly, exactly during menstrual cycle oestrogen is produced by graafion follicle.

Increase in level of oestrogen stimulates building the lining of uterus in the first half of the menstrual cycle, also it has a role in maintaining the lining of uterus during the second half of the cycle.

Oestraogen inhibits the production of FSH by its negative feedback effect on the pituitary gland.

In the menstrual cycle progesterone is produced by the ovary, exactly it is produced by corpus luteum.

Progesterone has a role in developing and maintaining. The lining of uterus, and increases mucus production invagina.

Drop in level of progesterone leads to breakdown of the lining of uterus (menstruation).

(ii) During pregnancy both oestrogen and progesterone are produced by the developed placenta, this occurs after 12 weeks of pregnancy.
During this period they are produced to maintain the lining of uterus, as the breakdown of lining leads to abortion or micarriage.

The high level of such hormones are necessary for growth of milk-producing tissues and to prevent further ovulation during pregnancy.

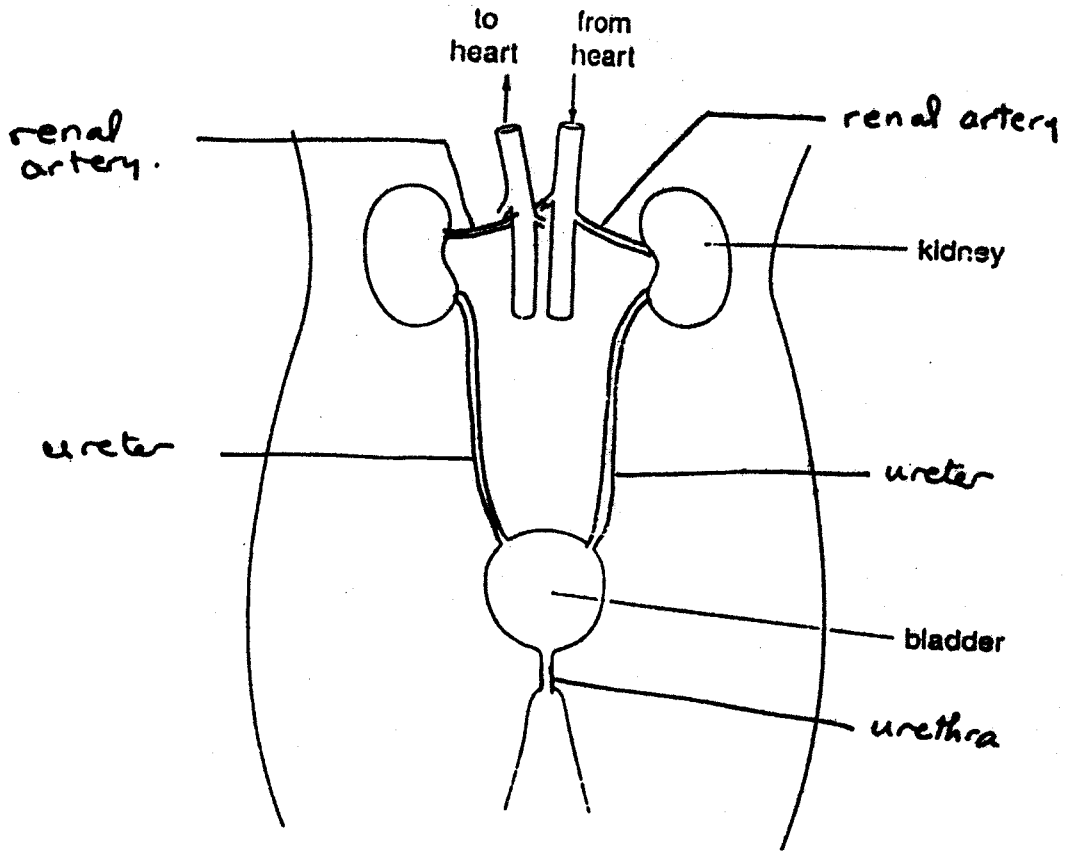
5- (a) It is a repeated question (see ....)

(b) Self pollination is more likely to occur as one plant is required while in cross pollination two plants at least are required.
Self pollination leads to production of offspring with no voriation, this is good if the parent plant survive properly in its environment. But if the parent plant has any genetic disorders or defects it will transfer to the offspring.
Having identical offspring has a disadvantage especially if there is a change in the environment and the plants become unable to live in such environment.

June 2003

Paper 3

1- (a)



(b) 1- Water.
2- Urea.
3- Modified hormones and drugs.
OR uric acid.

(c) Blood from the patient is forced through dialysis tube which is partially permeable, this allows excess water, excess salts and urea to diffuse out by the required water, salts, glucose and amino acids are maintained in blood as their conc. in blood is equal to that of the surrounding dialysis solution.

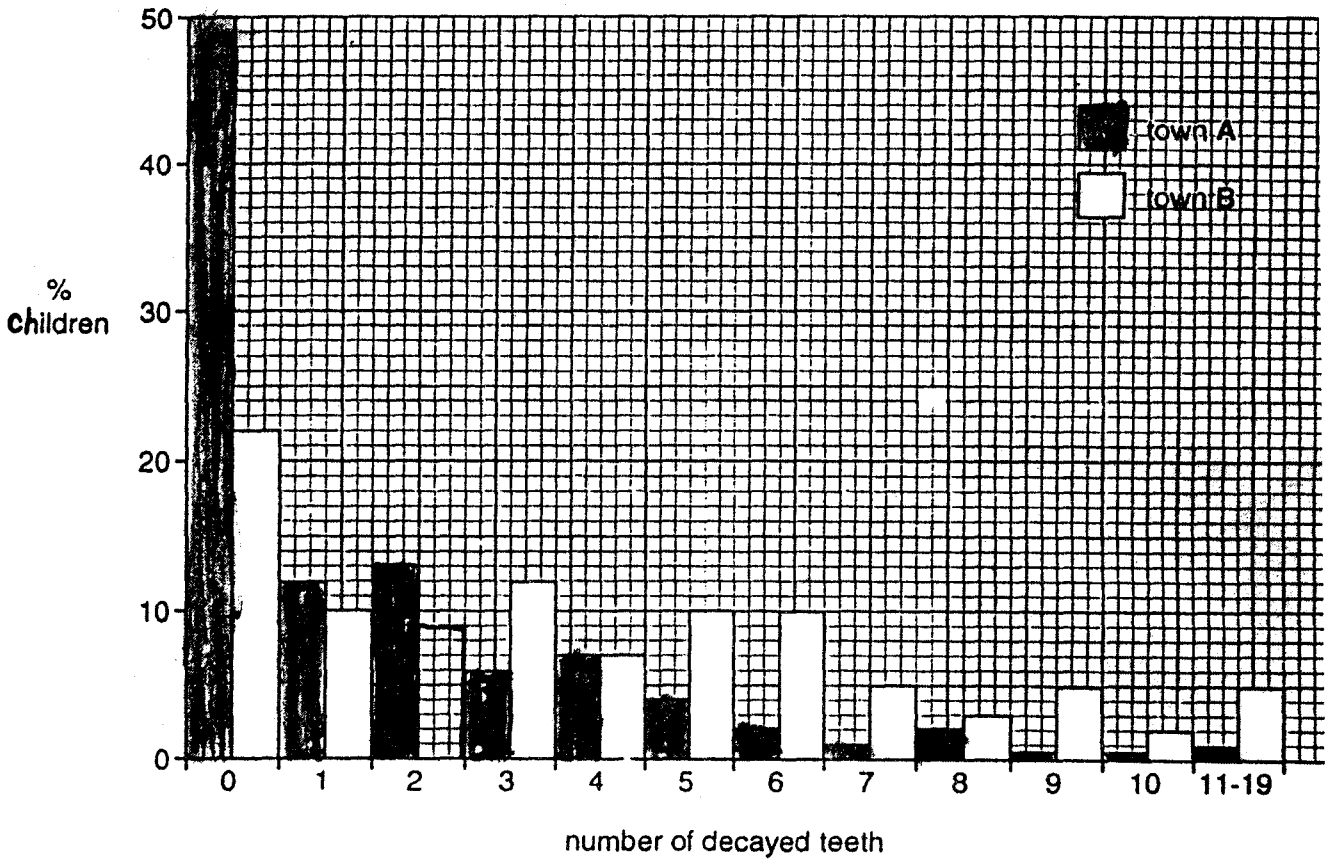
(d) (i) To maintain the internal environment of the body constant such as maintaining constant blood pressure, blood glucose level and body temperature.

(ii) It acts as osmoregulator that maintains osmotic potential by removal of excess salts and water, it excretes excess urea, modified hormones and drugs.

(iii) Liver

Its role is to regulate blood glucose level, if it increases, liver stores the excess in the form of glycogen by the help of insulin hormone, if it decreases liver converts stored glylogen into glucose by the effect of adrenaline or glucagon hormone.

2- (a)



(b) (i) 12 %

(ii) 1 teeth 12 %
2 teeth 13 %
3 teeth 6 %
4 teeth 7 %
Total 12 + 13 + 6 + 7 = 38 %

(c) (i) Water containing fluoride at a conc. of 2 parts per million reduces the incidence of tooth decay in children.

(ii) Adding fluoride with conc. 2 parts per million to drinking water to reduce the incidence of tooth decay.

(iii) Because the metabolism of fluoride is still unknown, also many are against interferring in natural water.

3- (a) Binomial system means giving each type of organisms a name of two wards, the first represents its genus, starts with capital letter while the second represents species starts with a small letter, both are written either etalic or underlined.

(b) (i) Rapied rate of their consumption as they are edible to herbivores, also due to competition for resources with caulerpa taxifolia.

(ii) Are the living organism that feed on plants only.

(iii) Because of the shortage in their food (local weeds), and presence of inedible weeds caulerpa taxifolia.

(c) It may kill other useful organisms disturbing the balance of the environment.

(d) (i) To conserve species and to maintain the balance of the environment.

(ii) Because caulerpa is part of their natural diet, the number caulerpa may decrease giving chance for local weeds to increase one more.

(iii) If there are no natural predators for them, they may increase rapidly without being controlled, disturbing the balance of the environment especially of they feed on other organisms in sea water.

O.L

Biology Answers

Paper 6

Biology Answers

contents

Paper 6
June 1993

1

(a) (i) 1- Cell A is smaller than cell B.
2- Cell A has no nucleus while cell B has a nucleus.
3- Cell A is biconcave while cell B is not "this is shown from the region found in its middle that has a lighter colour".

(ii) Blood platelets.

(b) Draw it , "you can draw twice the size of the photograph".

(c) Diameter of D in photograph is 1.5 cm.

This diameter may differ from one copy to another because the examination papers that you have is not original and the photocopier may increase or decrease the size.

Diameter of D in drawing is 3 cm.

Its magnification relative to photograph is $\frac{3}{1.5} = 2$
Its magnification relative to the actual is $2 \times 1000 = 2000$
i.e. its magnification is $\times 2000$.

You can also use this procedure :

1.5 cm is magnified by 1000
3 cm is magnified by ?

$$\text{magnification} = \frac{3 \times 1000}{1.5} = 2000$$

Paper 6
November 93

1

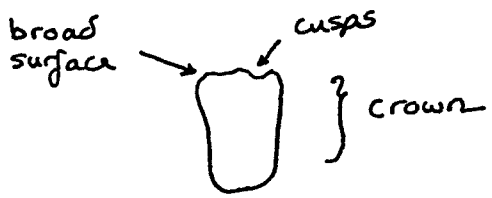
(a)

	Fig. 1	Fig. 2 A.
1-	Has canines.	No canines.
2-	No diastema.	There is diastema.
3-	Smaller number of incisors.	Greater number of incisors.

(b) Fig. 1- Incisors have sharp edges for cutting food, canines are pointed for tearing food, while molars and premolars are broad with cusps for grinding and crushing food.

Fig. 2- A. Incisors are long and chisel shaped, and are directed outwards for taking and tearing herbs, the toothless gap (diastema) is used for manipulating grass in the mouth, the molars and premolars have broad ridged surface to fit in the grooves of the other jaw for grinding food.

(c)



measurement : 2 cm.

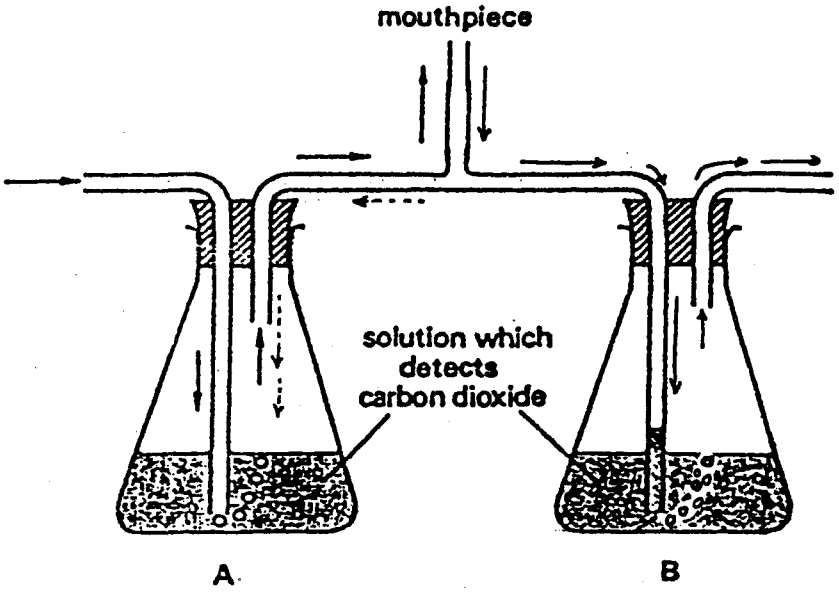
Calculation : magnification relative to the photograph

$$= \frac{\text{Length of drawing}}{\text{Length in photograph}} = \frac{2}{1} = 2$$

Magnification relative to the actual = 2 × 1.5 = 3
Magnification is × 3

2

(a) (i)



(ii) Because if you breathe out strongly the pressure on the surface of solution in A will increase causing the solution to be pushed outside the apparatus.

(iii) Lime water.

(iv) To investigate the difference is conc. of carbon dioxide in inspired and expired air.

(v) Flask A- The indicator remains clear (but changes after longer period if the experiment continues).

Flask B- The indicator turns milky before A.

(vi) Concentration of carbon dioxide in expired air is more than that of the inspired air.

(b) Due to the expansion of the air found in the air chambers of the leaf, which causes it to escape from the stomatal openings found is the lower surface to be replaced by water.

3

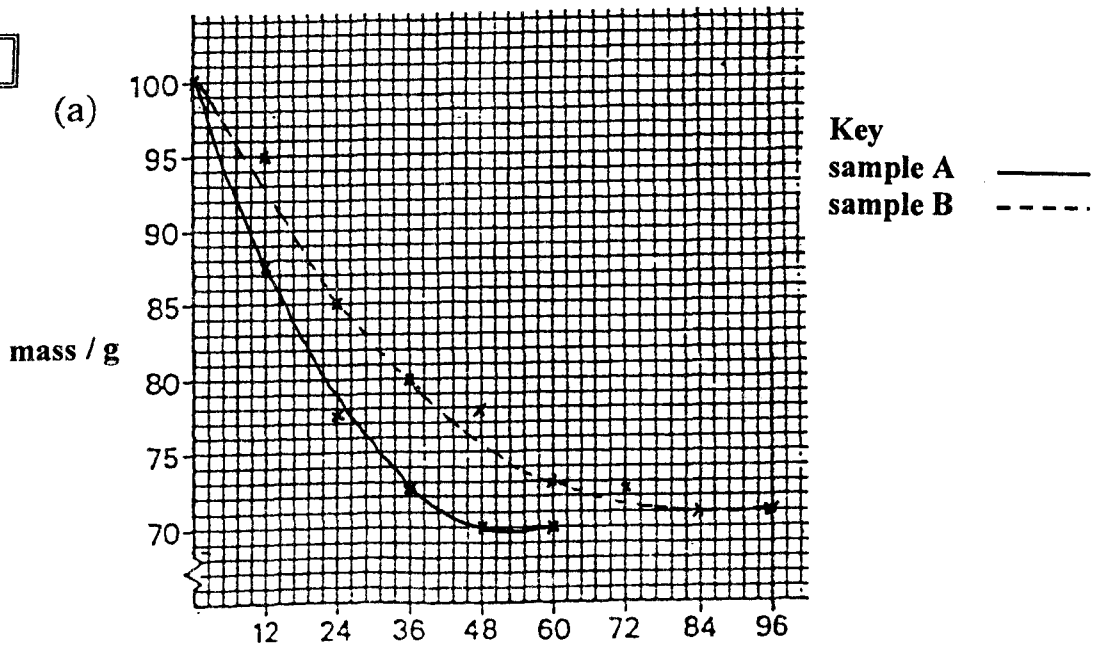
(a) (i) Put an amount of the food in a test tube with a small amount of water and shake to dissolve then add an equal volume of Benedict's solution and heat, if there is a reducing sugar the solution becomes orange red but if there is no reducing sugar the solution remains blue.

(ii) Put the food in a test tube and add small amount of water and shake to dissolve, add some potassium hydroxide solution, then two drops of copper sulphate solution, shake gently, if the colour become purple it contains proteins, if remains blue it contains no proteins.

	conclusions from			
powder	test with Benedict's solution	test with biuret reagents	test with red litmus paper	composition of powder
A	Contains glucose	No protein	No bicarbonate	glucose + Sucrose
B	Contains glucose	Contains proteins	No bicarbonate	glucose + protein
C	Contains glucose	No protein	Contains bicarbonate	glucose + bicarbonate
D	No glucose	No protein	Contains bicarbonate	bicarbonate + Sucrose

4

(a)



Notice :
The points which are not exactly fitted to the smooth curve must be left.

(b) (i) 1- in sample A .....
2- in sample B .....

(ii) Due to the change in atmospheric conditions such as air currents, temperature and humidity which cause a decrease in water loss at this period.

(iii) Because it has lost all its water content, therefore, its mass will remain constant.

(c) (i) Between 40°C and 60°C.

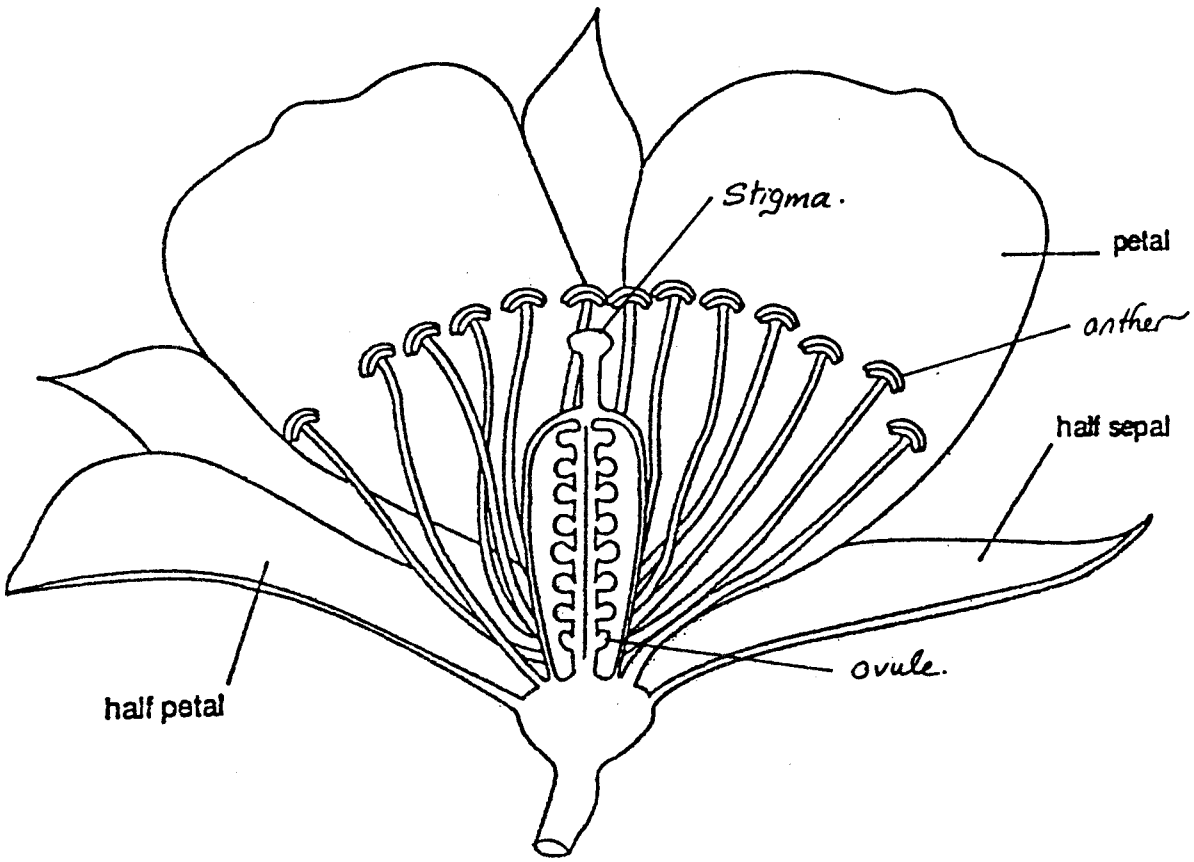
(ii) Because this temperature is enough to increase rate of water content of the sample without burning the organic matter in the sample.

(d) 29 % .

Paper 6
June 94

1

(a) (i)

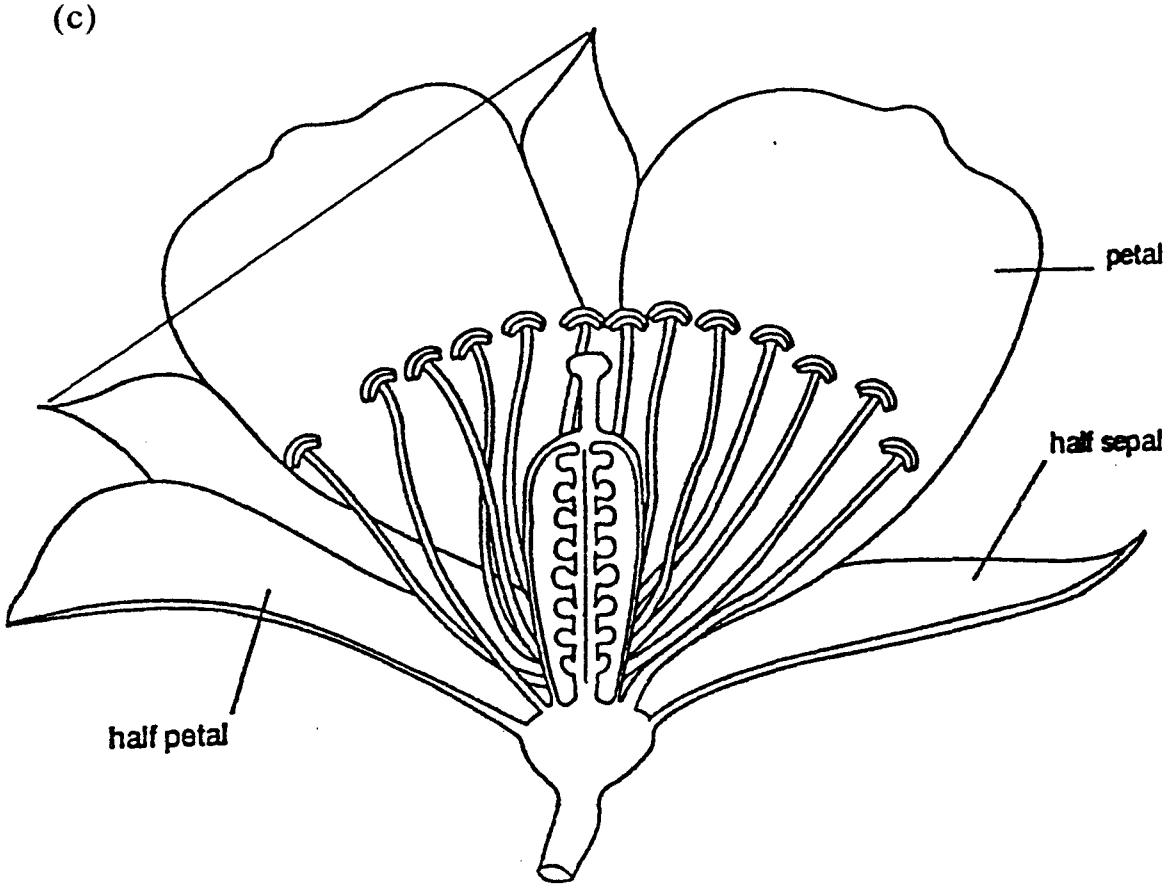


(ii) 5 .

(b) (i) Stigma is feathery to trap the pollen grains carried by wind, and the anthers are projected outside the flower to be exposed to wind.

(ii) Suggested pollen type for jute : B
Explanation : has fine projections to be easily held to the body of the insects, also it is larger than A.

(c)

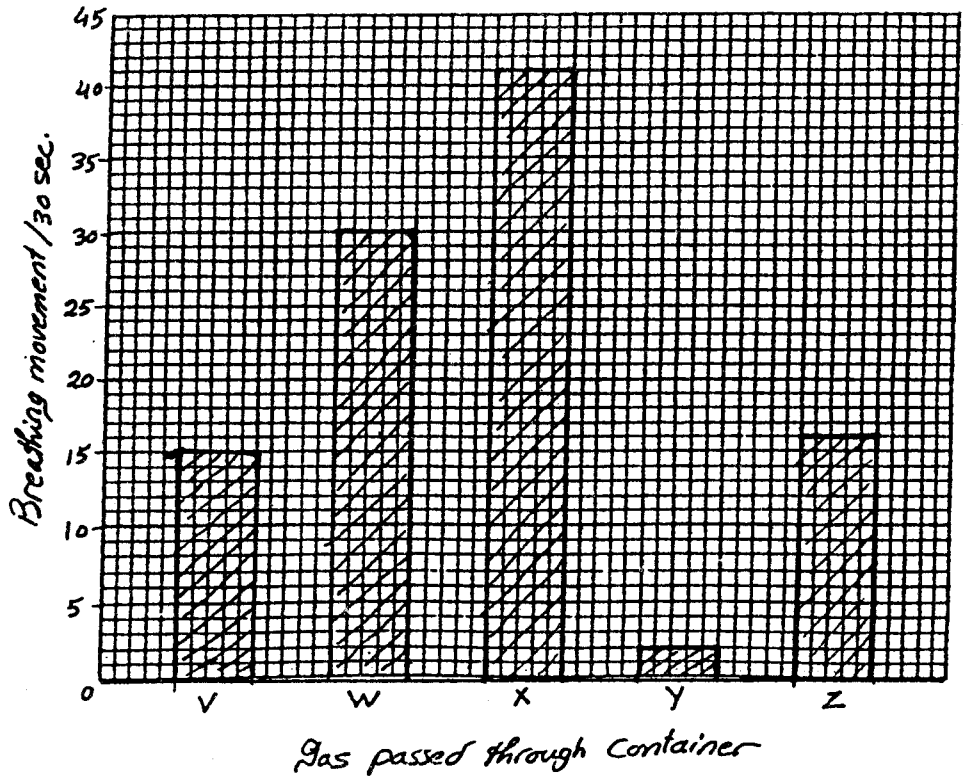


(i) 9 cm.

(ii) Actual length = $\frac{\text{length in photograph}}{\text{magnification}} = \frac{9}{20} = 0.45$ cm

Measurement in actual flower : 0.45 cm.

2



(b) In the lower number of breathing movements, the insect can obtain its requirement of oxygen due to its high concentration.

(c) (i) Increase in range to about 40° C can lead to increase in rate of breathing due to increase in activity of enzymes.

(ii) Water vapour content.

(d) So that, the number of breaths of the insect become the normal once again, to be able to repeat the experiment.
Also, to check that locust is not affected or damaged by the procedure.

(e) The experiment has to be repeated several times, using different locusts, to obtain further sets of data.

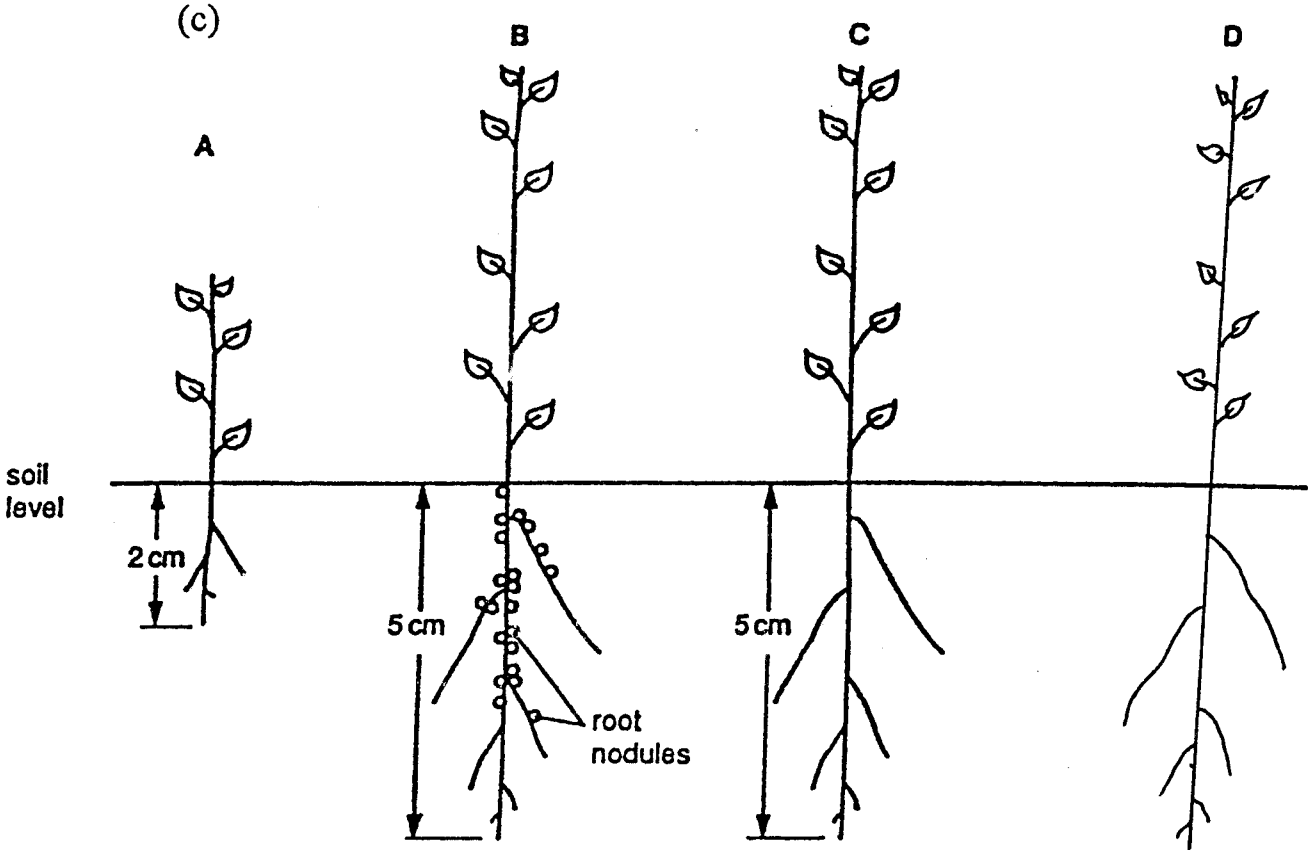
3

(a)

	A	B	C
Length of root/cm	10	25	25
Length of stem/ cm	15	28	28
Number of leaves	5	8	8

(b) 1- Soil sterilized.
2- Nitrates added.

(c)



soil sterilised	soil not sterilised	soil not sterilised	1 Soil sterilized
no nitrates added	no nitrates added	nitrates added	2 Nitrates added

4

(a) (i) It is partially permeable that allows small molecules to pass through it but prevents the large ones.

(ii) Epithelial cells of villi or ileum.

Also you can write glunerulus of nephrons in kidney.

(b) Put about 2 cm^3 of the liquid in a test tube, then add to it equal volume of Benedict's solution (blue in colour), hold the tube with a holder and heat, such that the opening of the tube is directed away from your face to avoid any splashes, if it contains reducing sugar, the colour becomes red orange.

(c) (i) To provide a suitable temperature for the enzyme amylase in saliva to act.

(ii) Because saliva contains other components than amylase. also unhygienic and unpleasant procedure.

(d)

	starch	*reducing sugar*
contents of tubing	Present	absent
contents of beaker	absent	absent

The enzyme amylase has been denatured by boiling, therefore, it cannot act on starch to be digested into smaller molecules.

Paper 6
November 1994

1

(a) (i) 1- Iodine solution.
2- Potassium hydroxide solution + drops of copper sulphate (biuret reagents).
3- Benedict's solution.

(ii)

solution tested	conclusions from results of tests for:		
	1. starch	2. protein	3. reducing sugar
A	absent	Present	absent
B	Present	absent	absent

(b) (i) Starch is disappeared (digested or broken down gradually). until it disappeared after 7 minutes.

(ii) After 1 minute no reducing sugar is formed but after that reducing sugar starts to appear, and its concentration increases gradually, this is due to the digestion of starch.

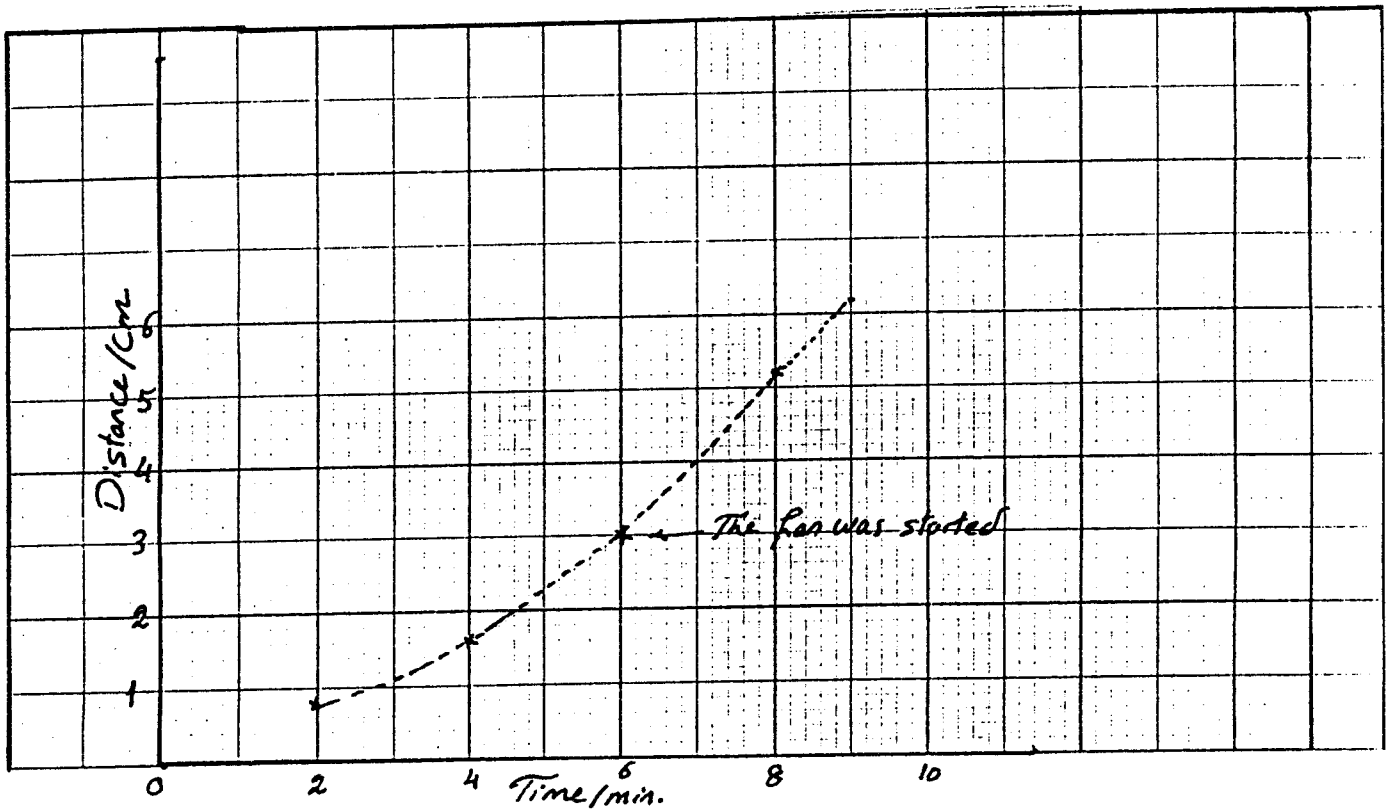
(c) (i) enzyme - Amylase.

(ii) 1- 100°C.
2- 35°C.

(d) In seeds during germination.

2

(a) (i) and (ii)



(b) 6.2 cm.

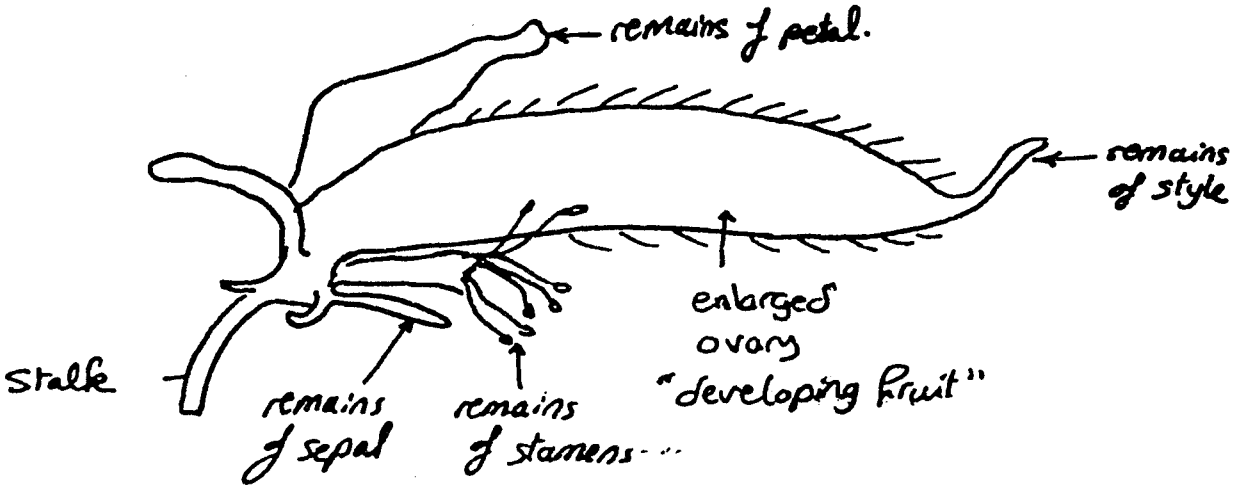
(c) Increases the rate of water uptake by the leafy shoot because air currents increase the rate of transpiration due to its effect on evaporation of water from the shoot.

(d) Transpiration from the leaves causes a pull force from above leading to ascent of water from the apparatus into the xylem, and so the water in the narrow tube moves along the scale.

(e) Open the tap of the reservoir, so water flows inside the narrow tube to reach the zero of the scale, then close the tap.

3

(a)



(b) measurement of drawing : 12.5 cm
measurement of photograph : 10 cm

magnification in drawing related to the photograph

$$= \frac{\text{Length in drawing}}{\text{Length in photograph}} = \frac{12.5}{10} = \times 1.25$$

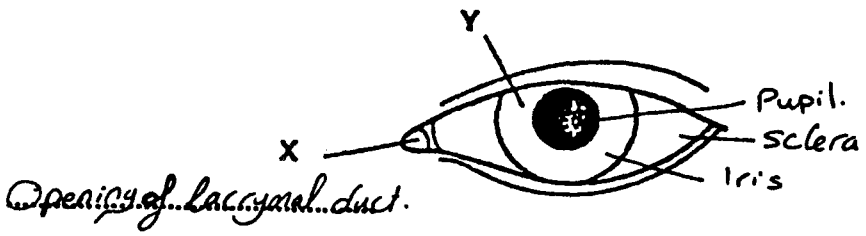
Magnification in drawing related to the actual $= 1.25 \times 3 = 3.75$

$\therefore$ Magnification $= \times 3.75$

(c) 1 - Remain of stigma and style dry off and fall down.
2 - Remains of petals dry off and fall down.
3 - The fruit enlarges and sepals may fall down.

4

(a) (i) and (ii)



or tear sac

(b) (i) Left.

(ii) Increase in light intensity.

(c) In (Y) which is the iris there are circular and radial muscles in this case the circular muscels contract and the radial muscles relax to make the pupil narrower.

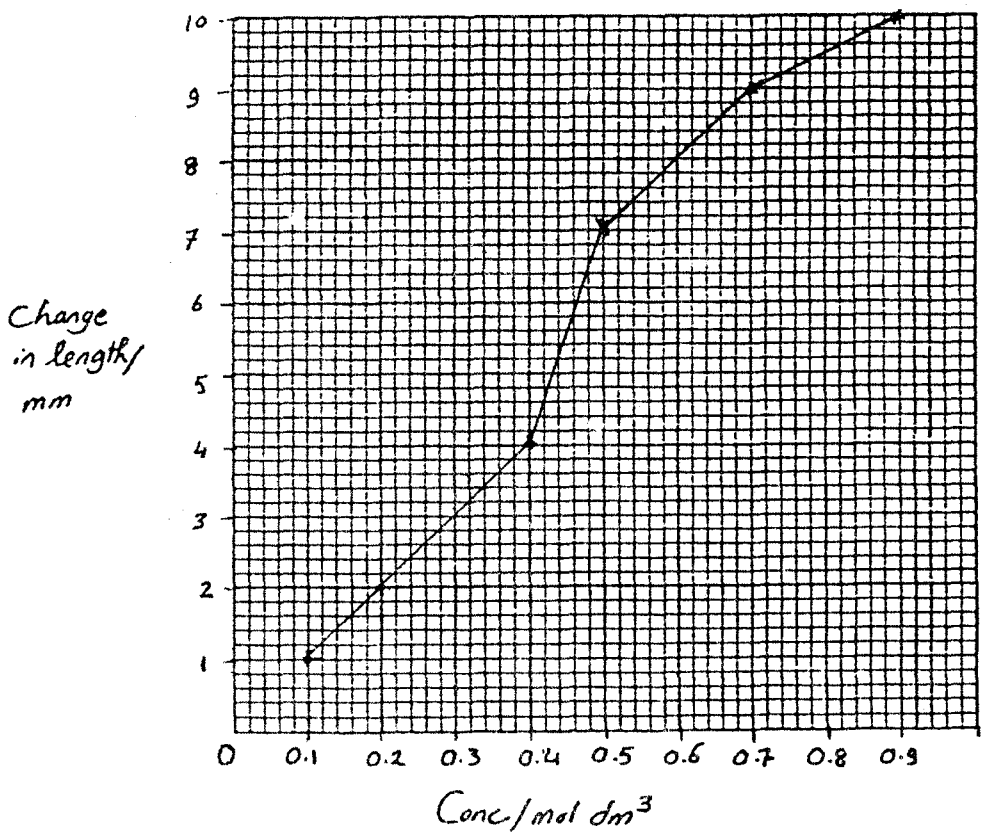
Paper 6
June 95

1

(a)

Conc. / mol per dm^3	original length / mm	length after an hour / mm	Change in length / mm
0.1	100	99	- 1
0.2	100	98	- 2
0.4	100	96	- 4
0.5	100	93	- 7
0.7	100	91	- 9
0.9	100	90	- 10

(b)



(c) Its length decreased as the strip lost water by osmosis because the conc. of water inside the potato is higher than that of the solution.

2

(a) You can draw it.

(b) (i) Number of pale grains 23.
Number of dark grains 8.

(ii) Suggested ration : 3 pale : 1 dark.

(iii) Count the total number of the pale grains and then count the total number of dark grains, find the ratio.

(c) (i) allele for pale grain A.
allele for dark grain a.

(ii) Aa × Aa

3

(a) (i) Amounts of the starch had been digested by the effect of the enzymes found in seeds.

(ii) Areas around the seeds gained the yellowish colour of iodine solution after testing for starch.

(b) 1- At 35°C the enzymes are more active therefore, more starch disappeared.

2- At 35°C the rate of diffusion of enzymes in the dish is higher than that at 25°C. (heat increases the rate of diffusion).

(c) Before adding iodine :

Observation : growth of colonies of microorganisms.

Explanation : Because the medium is not sterilized, and there is plenty of food and suitable temperature.

After adding iodine :

Observation : More yellowish areas are formed.

Explanation : Micro-organisms secrete enzymes that act on starch to be digested.

(d) For accuracy, because one may be spoiled causing misleading results such that found in fig. 6 at 15° C, one half seed did not show any effect.

4

(a) (i) To provide enough time for humidity to spread around the moist paper.

(ii) To put each in a condition different than the other, to observe their response.

(b) (i) To provide a condition different than that found in the other half. OR for fair comparison.

(ii) Advantage : To maintain the dry condition in this region by absorption of the moisture that diffused from the moist paper.

Disadvantage : May cause misleading results as this agent may affect the response of the beetles.

(c) Temperature as the lamp produces heat with light that causes an increase in temperature in the illuminated part.

(d) - Repeat the same experiment without the black cover to investigate the effect of humidity and dryness.

- Then repeat the same experiment with the black paper but without the moist and dry paper to investigate the effect of light and darkness.

Paper 6
November 95

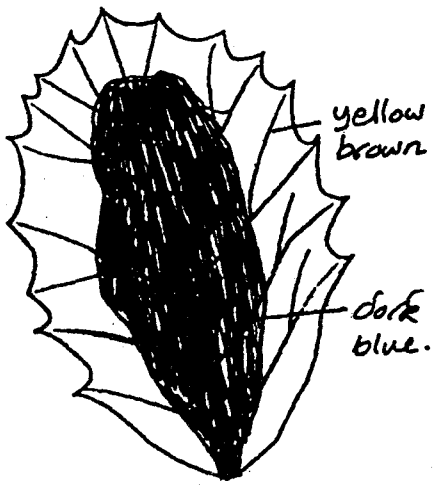
1

(a) Draw it.

(b) It is placed in boiling water to destroy the cell walls, then heated in ethanol using a water bath to get rid of its green colour and then placed once more in hot water to soften it.

(c) (i) By placing the leaf in a petri dish and covering it with iodine solution (yellow brown in colour).

(ii)



(iii) The green parts become blue black because they contain starch as they can carry out photosynthesis forming sugar which is stored as starch while the other parts gain the colour of iodine as they contain no starch because they can not carry out photosynthesis therefore, chlorophyll is necessary for photosynthesis.

2

(a) (i) To activate the enzymes in seeds to act on the stored food to be used by the embryos of seeds, and to increase rate of respiration.

(ii) Place the seeds in the test tube, then fill the test tube with oil, cover it with a piece of glass, then invert it with the cover in the basin of oil, then remove the cover under the surface of oil.

(iii) Because carbon dioxide is highly soluble in water therefore, the produced gas can not be detected, also oil contains no dissolved oxygen allowing anaerobic respiration.

(b) Respiration.

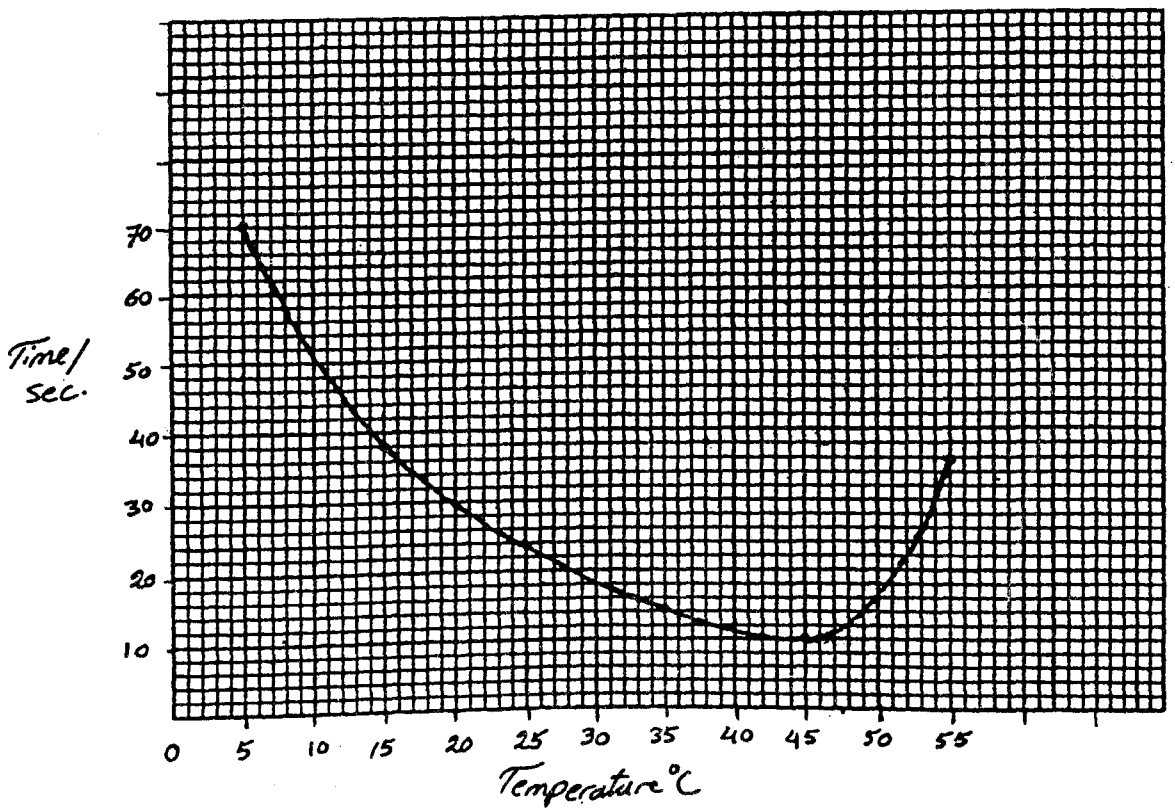
(c) (i) It produces the energy required for the process of active uptake of the surrounding food by the embryo.

(ii) Product formed during exercise : lactic acid.
Product of brewing : Alcohol (ethanol).

(d) Set up similar apparatus without seeds or using glass beads.

3

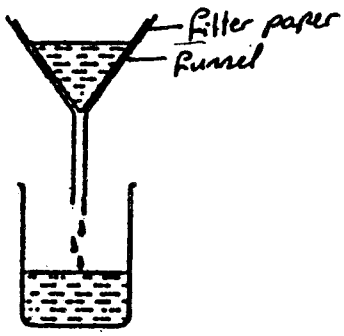
(a)



(b) (i) 1- Sand : To help in breaking down the cells so that their components can be easily released.

2- Water : To dissolve the components of the cell so they can be easily diffused out cells.

(ii)



(iii) This is a high temperature that denature the enzymes that can be obtained in the extract of cells.

(c) (i) Because the extract of cells containing the enzyme (dehydrogenase) that acts on the hydrogen peroxide to be decomposed into water and oxygen which evolves pushing the filter paper to the surface.

(ii) Put a filter paper soaked in the extract of seeds and then dried in high temp. in tube of hydrogen peroxide it will not rise.

Other answer : bring a glowing splint to the evolved gas, it relights.

(d) At 55°C the enzyme began to denature therefore, the rate of decomposition of hydrogen peroxide decreased and so less oxygen is produced to push the filter paper.

(e) By using the value $\frac{1}{time}$ as a measurement of activity of enzyme.

4

(a) (i) 1. To trap and kill the collected small animals and avoid their escape.

2. To preserve the animals and prevent them feeding on one another.

(ii) Alcohol.

(b) To allow small animals not the leaves to pass.

(c) 1. light that stimulates negative photo taxis of the small animals.

2. Temperature which cause small animals to escape to avoid dtying.

Paper (6)
June 1996

1- a- I-

leaf letter	A	B	C	D	E	F	G	H	I	J
number of prickles	17	7	17	8	14	7	17	18	8	15

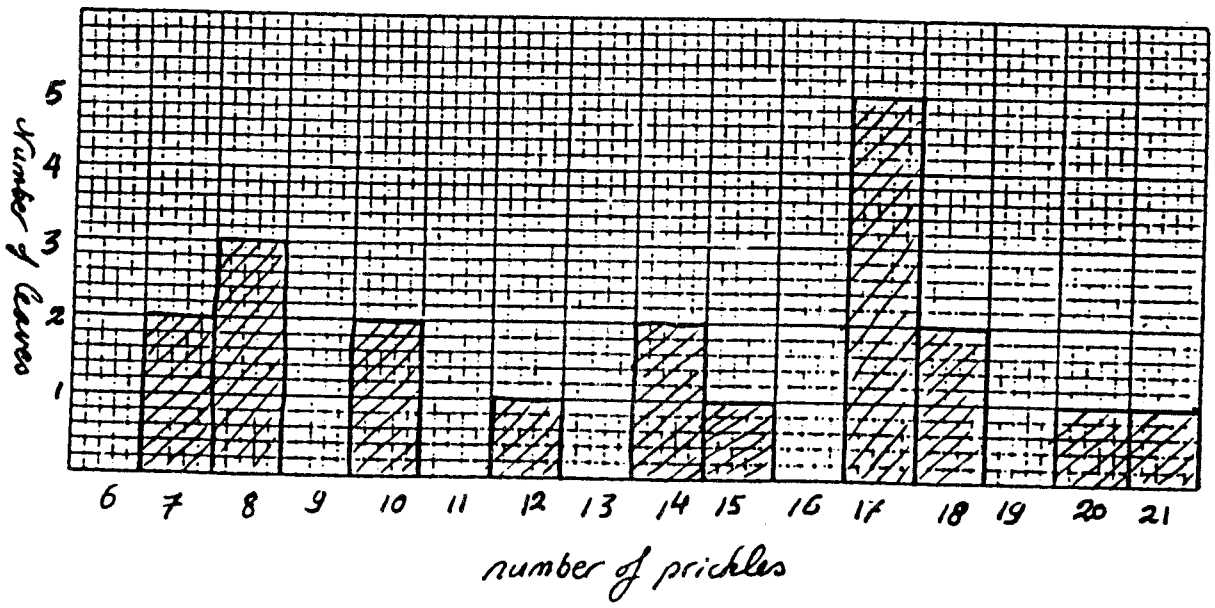
leaf letter	K	L	M	N	O	P	Q	R	S	T
number of prickles	21	12	10	17	18	10	20	8	14	17

ii -

number of prickles	6	7	8	9	10	11	12	13
number of leaves	0	2	3	0	2	0	1	0

number of prickles	14	15	16	17	18	19	20	21
number of leaves	2	1	0	5	2	0	1	1

b-



2- a- Prepare a clean dry test tube containing 1cm^3 of the sample under investigation , add 1 cm^3 of ***Benedict's*** solution and ***heat*** using a water bath , if the sample contains a reducing sugar the colour will change from ***blue*** to ***red orange*** .

b- I- After 8 minutes the starch was broken down into a reducing sugar by the effect of enzyme amylase as a catalyst , therefore test for starch was negative while test for reducing sugar was positive .

ii- Because after one minute the time was not enough for amylase to act on the starch to be digested into sugar this took place after 8 minutes.

iii- Because only an amount of starch was broken down into a reducing sugar by the effect of amylase therefore both starch and reducing sugar can be detected .

(c)- I- The dropper or the pipette should be washed and dried after being used to remove each sample .

should be dried in order not to affect the concentration of the solution , it is going to be used to remove it .

ii- Two similar tubes C and D each contains 20 cm^3 of starch and one cm^3 of denatured amylase , one is kept in a water bath at 20°c and the other at 30°c .

(d) -I- At 60°c the enzyme amylase was denatured so it could not act on starch to be broken down into a reducing sugar .

ii- Because further experiments should be conducted between 40°C and 60°C to find the optimum temperature, since 10°C intervals are too widly spaced to give the optimum temperature.

3- (a) -I- to be used as a control experiment that enables the student to determine the real length moved by the coloured marker liquid due to respiration of seeds by comparing the results of Q with that of P .

ii- As the glass beads do not consume or produce any gases and the amount of carbon dioxide absorbed by the chemical found in wire mesh is too small to cause a movement in the coloured marker.

(b)-i- This may be due to an increase in the surrounding temperature leading to the expansion of the air inside the tube causing the marker to move .

ii- By adding the distance moved in tube Q (3mm) to the distance moved in tube B (10mm) as the marker moved to the right 3mm

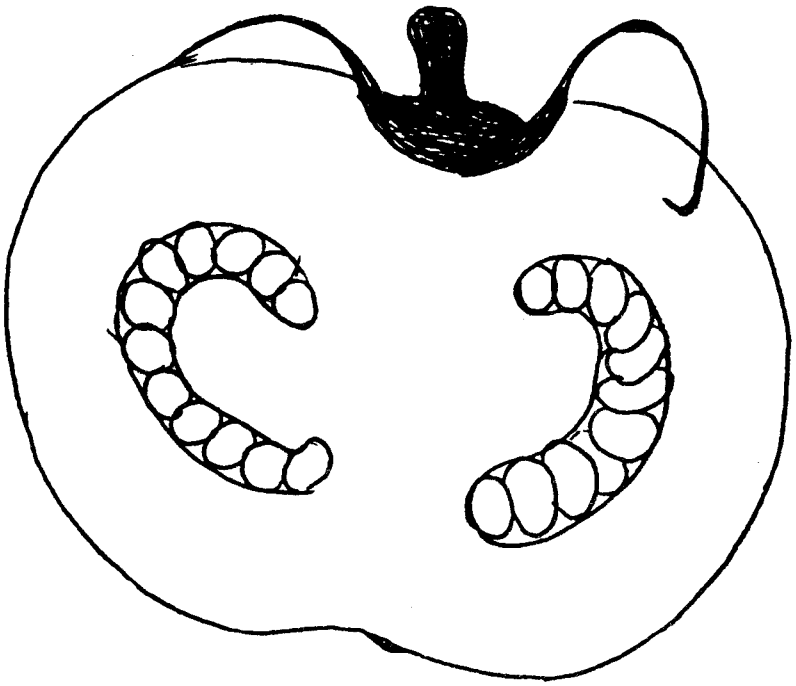
first and then it begins to move to the left due to absorption of oxygen . **Along (13 mm).**

(c) I- As the seedlings carry out photosynthesis producing oxygen which may compensate the oxygen absorbed by the seedlings during respiration .

ii - By placing the apparatus in a dark place so photosynthesis stops and respiration only takes place like the seeds .

4- (a)

Remember that only outlines are needed.



fruit **A**	*fruit* **B**
1- rounded in shape	elongated
2- seeds are found in rows	seeds are found in one row only .
3- seeds are smaller in size ,	seeds are larger
4- large pericarp or fruit wall	smaller pericarp .

(c) I- 6 cm

ii- actual length = $\frac{\text{length in photograph}}{\text{magnification}}$

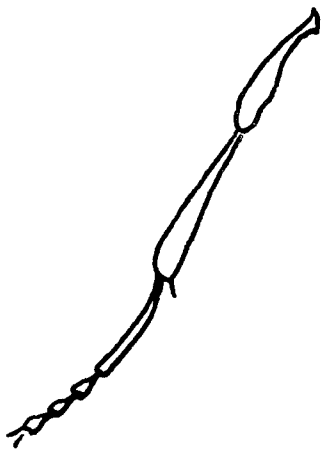
$$= \frac{6}{0.5} = 12 \quad cm$$

iii- average seed length $= \frac{\text{length of seeds}}{\text{number of seeds}}$

$$= \frac{12}{5} = 2.4 \text{ cm}$$

PAPER (6)
NOV. 1996

1- a-



b- 1- Body is divided into three regions which are head, thorax and abdomen.
2- Each has three pairs of jointed legs.
3- Each has one pair of antennae.

ii- Visible differences between insect Y and insect Z

Insect Y	Insect Z
1- Spine is found in the second segment of the back legs.	No spine in the back leg.
2- Leg is not hairy.	Leg is hairy.
3- Abdomen is elongated.	Abdomen is rounded.

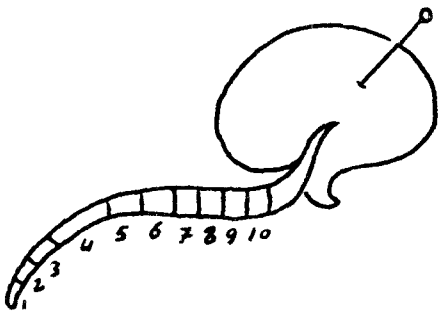
c- Length of line on photograph 55 mm.
Length of the drawing 66 mm.

Magnification of the drawing = 66/55 X 10 = 12
i.e. the magnification is X12.

2- a- I and ii It is easy to be done.

b- I- No growth in region one , while the trend in growth in regions two to four shows consecutive increase in growth, reaching the maximum in region four.

ii- The fifth region showed greater growth than the sixth , and this indicates that there is a decrease in growth . No growth is recorded in regions seventh to tenth.



ii- Auxins accumulate at the lower side of the root inhibiting growth at this side than the other side as a result of this the root grows towards gravity and this is known as geotropism.

3-

basis for conclusions		test-tube A	test-tube B	test-tube C	test-tube D
results of biuret test		blue colour	Lilac or mauve	lilac or mauve	blue colour
results of Benedict's test		orange red colour	orange red colour	blue colour of Benedict's with no change	orange red colour.
results of litmus tests	red litmus	red	red	red	blue
	blue litmus	blue	blue	red	blue

b- A- Glucose only.
b- Glucose and a protein.
c- Protein and an acid.
d- Glucose and an alkali.

c- I- Stomach.
ii- Small intestine.

PAPER 6
JUNE 1997

1- (a)

Number	Height in mm	
	container A	container B
1-	17	35
2-	36	46
3-	43	0
4-	20	32
5-	34	47

(b) - I

Container A	Container B
Working: Total =17+36+ 43 + 20 +34= 150 mm Mean height =150/ 5= 30 mm	Working: Total = 35+46+ 0+ 32+ 47= 160 mm Mean height = 160/5 = 12 mm

ii- Temperature as the lamp produces both heat and light .

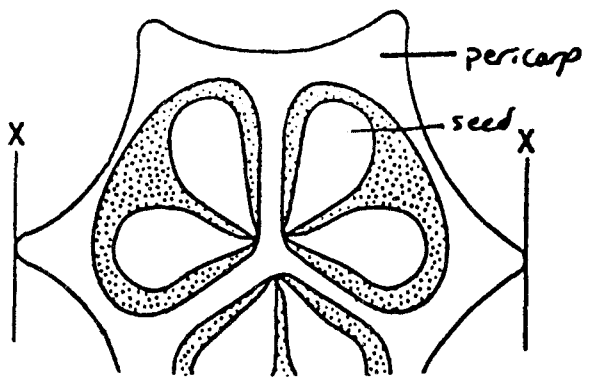
(c) 1- One grain may be spoiled causing misleading results such as the grain number 3 in container B .

2- To take the average and this is for more accuracy as the growth of seedlings vary and this is shown in both containers although all the seeds were placed in the same container .

(d) To avoid side growth due to phototropism ,as the lamps above the seedlings lead to equal distribution of auxins at all sides and so the seedling grows straight , and this facilitates the measurement of length .

2- (a) You can do it.

(b) I-



ii- magnification = $\frac{\text{length in diagram}}{\text{actual length}}$

$= \frac{72}{8} = 9$

magnification x 9

3- (a) You can do the graph.

(b) To avoid the effect of heat on the rate of photosynthesis as the investigation is set up to detect the effect of light intensity on the rate of photosynthesis while the lamp produces both heat and light .

(c) To provide enough time for the bond plant to respond to the (new) light intensity .

(d) This is because light intensity at this point did not act as a limiting factor therefore any increase in light intensity did not lead to increase in rate of photosynthesis , perhaps there are other limiting factors at this point such as carbon dioxide concentration .

(e) This because the rate of photosynthesis at 0.5 units was equal to the rate of respiration (compensation point) therefore the rate of production of oxygen was equal to that of absorption by the plant during respiration.

(f)Repeat the same experiment at the same conditions but without using a pond plant .

Placing similar apparatus in a dark place as a control experiment may lead to misleading results as bubbles of carbon dioxide which is produced during respiration may be seen (although carbon dioxide is soluble in water)

PAPER (6)
November 1997

1-a-

	test			
	1	2	3	4
reagent	Iodine solution	Benedict's solution	ethanol	
nutrient in sample of food	Starch	Reducing sugar	Lipid	Protein

b- test 1 yellowish brown.
test 2 blue.
test 4 blue.

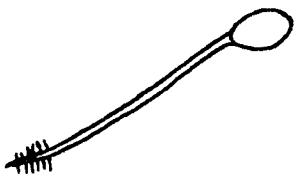
c- (i) Butter and meat.

(ii) Eggs and milk.

2- a- 1. Oxygen. 2. Suitable temperature.

b- (i) in dish A ; All seeds germinated except for only one, but the rate of germination differs from one to another.
In dish B; six out of sixteen seeds did not germinate and the rate of germination is very low.

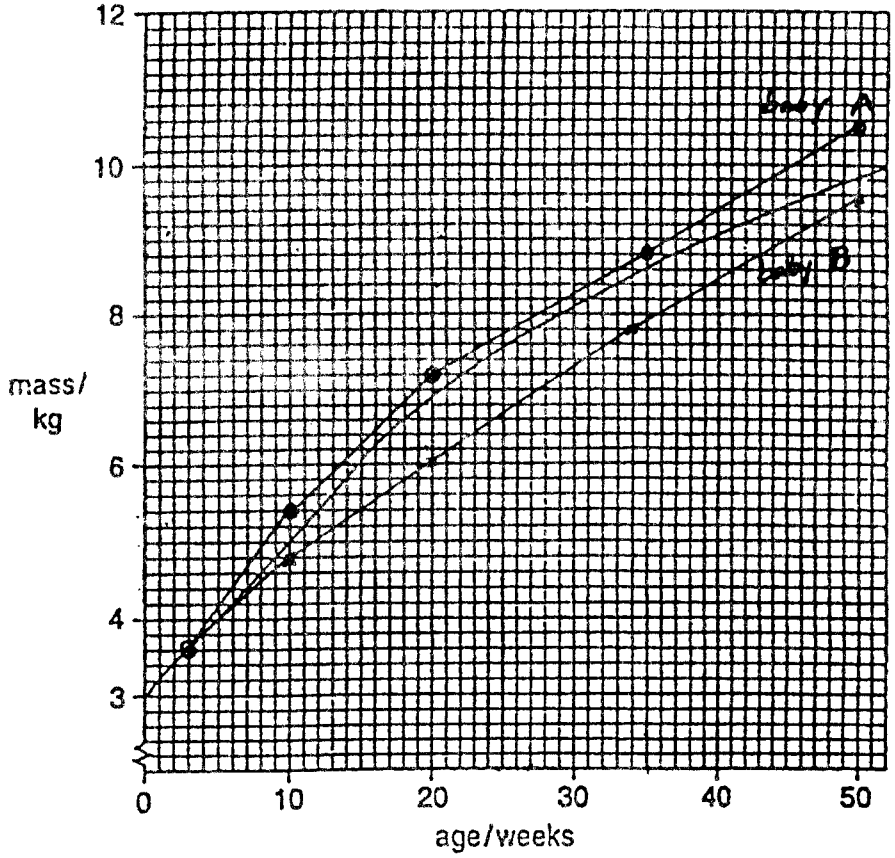
(ii)



c- (i) In dish A most seeds germinated due to presence of suitable conditions while in B seeds cannot absorb enough water due to the presence of a lower water potential in tomato juice.

(ii) Repeat the same experiment using different types of seeds such that, the other surrounding conditions such as temperature remain constant.

3- a- (i),(ii)



b- (i) 7.9 Kg.
(ii) 27

c- 1. Malnutrition, for example no enough breast milk is produced by mother which leads to decrease in growth.

2. The baby may be infected by a disease which decreases rate of growth.

Other answer:
It may be due to inherited factors e.g shortage in production of growth hormone.

4- a- you can draw it.

b- Advantage: it enables the plant to be hanged to a support.

Disadvantage: decrease in ability to form food by photosynthesis.

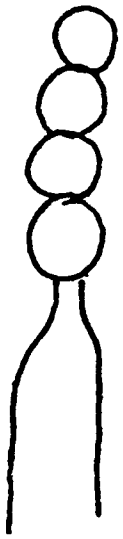
c- (i) 1. Presence of veins and midrib.
2. Broad surface.

(ii) 1. Leaflets in (Y) are identical in shape while in B leaflets are different.
2. In (Z) leaflets at the top modified into tendrils while in Y no tendrils are found.

Tendrils are leaflets modified to hang the plant to a support.

PAPER (6)
June 1998

1- a-



b- (i) Width 15 mm.

(ii) Width 10 mm.

(iii) magnification $= \frac{\text{Width in drawing}}{\text{Width in photograph}}$

$= \frac{15}{10} = 1.5$

Magnification X 1.5

2- a- (i) Tube A purple.
Tube B red.
Tube C yellow.

(ii) Tube A Leaf carry out photosynthesis consuming carbon dioxide decreasing its concentration.

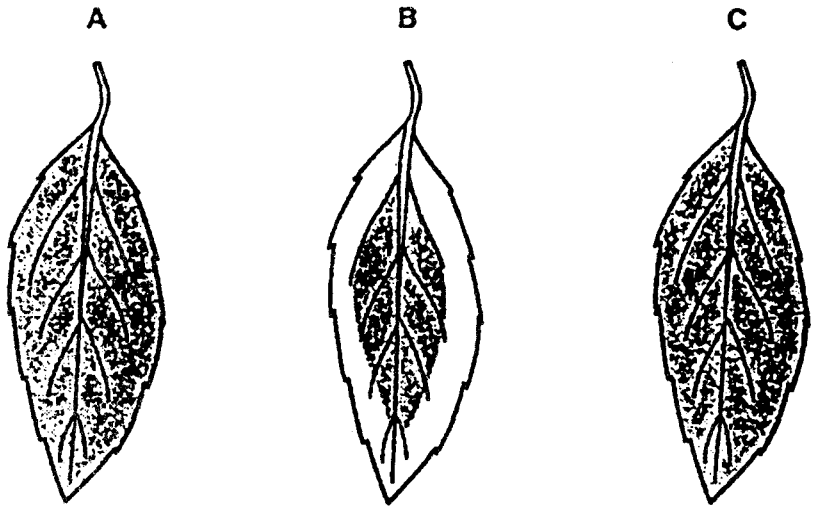
Tube B The carbon dioxide absorbed by the green part during photosynthesis is replaced by that produced due to respiration of non green part.

Tube C Due to absence of light only respiration takes place leading to increase in conc. of carbon dioxide.

b- (i) It is placed in boiling water to destroy its cells then placed in hot alcohol to dissolve its chlorophyll to be able to observe the change in colour after adding iodine solution clearly (water bath is used as alcohol is flamable).

The leaf is then placed in hot water to soften it, then iodine solution is added.

(ii)



all only the dark region no shade

3- a- Before maturation, the stamens of the red flowered plant are removed and covered by plastic bag to avoid self pollination. After maturation, pollen grains are taken from the white-flowered plant and dusted on the stigma of the red one then covered by plastic bag.

b- Because the allele for red is dominant, and the red flowered plant is homozygous.

c- Before maturation of the flowers, he has to cover it with a plastic bag to avoid cross pollination (should not be air tight to allow respiration).

d- (i)

Color	Number of flwers
Red	28
White	8

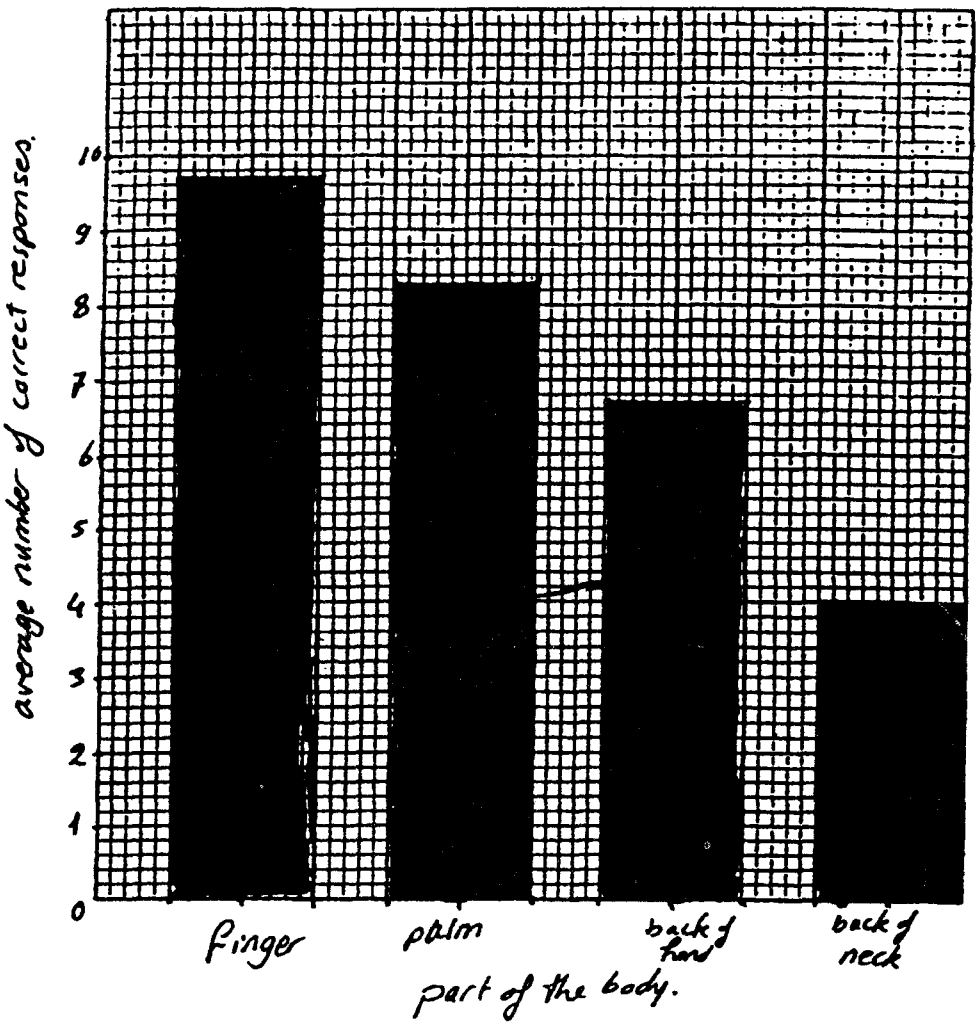
(ii) $\frac{28}{8} = 3.5$ Ratio: 3.5 red : 1 white.

(iii) 3 red : 1 white.

(iv) Because the red-flowered plants heterozygous while the white one is homozygous.

4- a- (i)

student	number of correct responses			
	finger	palm of hand	back of hand	back of neck
A	10	9	8	5
B	9	9	7	4
C	10	7	5	3
Total	29	25	20	12
Average	9.7	8.3	6.7	4



(iii) 1. Finger.
2. back of neck.

(iv) The number of nerve endings in finger more than those in the back of neck, also the distance between nerve endings and surface of skin in back of neck are larger.

b- By covering his eyes.

PAPER (6)
November 1998

1- a- 4 min.

b- (i) 1. Normal pulse rate of A is higher than B.
2. During exercise pulse rate of A reaches higher level than B.
3. B reaches the normal level after exercise before A.

(ii) 1. Student A may be a fatty over weight.
2. Student B used to perform regular exarcise.

c- 1. During exercise: so more blood can reach the muscles providing food and oxygen for production of energy.
2. During exercise: so more blood can be used to carry out the waste products of metabolism.
3. After exercise: to supply enough oxygen to oxidise the lactic acid formed due to anaerabic respiration.

d- (i) Running with increasing speed gradually (for abut 4 min.).
(ii) By putting the finger on the radial artery (one or two cm before wrist) and count the number of dilation of the artery per minute.

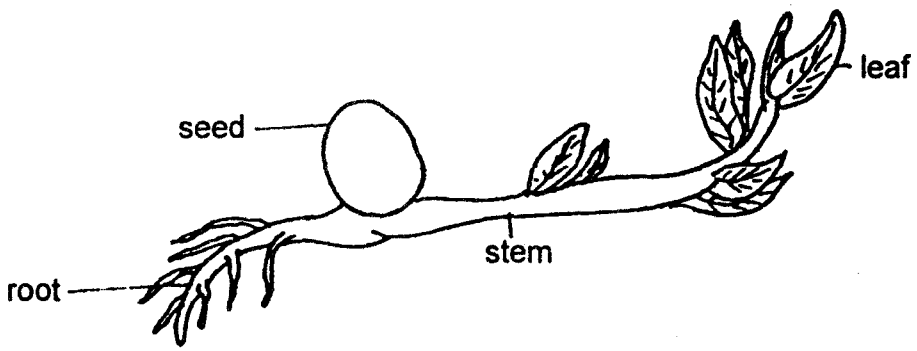
2- a- (i) 1. Equal number of leaves.
2. Equal length of root.

(ii)

A	B
1. Leaves smaller than B.	Leaves larger than A.
2. Stem is longer and thinner than B.	Stem is shorter and thicker than A.
3. Stem is curved at the top	Stem is not curved at the top.

b- (i) Light (A is exposed to enough light, B is not).

(ii)



(iii) Auxins.

(iv) Seedling A placed in dark therefore more auxins are produced and caused rapid rate of growth and because there is no photosynthesis the plant becomes weak, with smaller leaves (efiolation) but B placed in light so suitable auxins are produced for suitable growth.

c- In a dish put seeds on a piece of wet cotton and leave it in suitable temperature. and good supply oxygen.

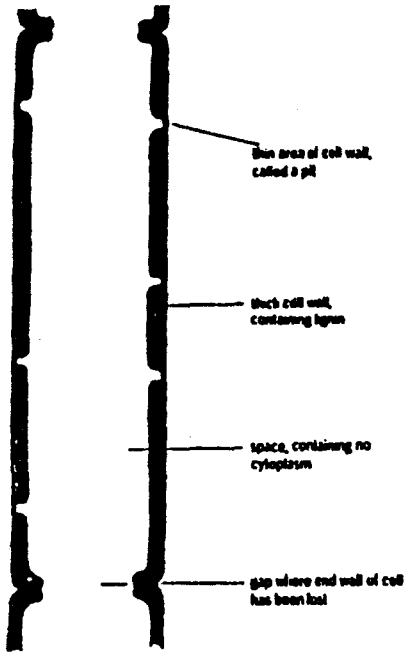
3- a- (i) Sapratrophic organisms produce enzymes to digest parts of the dead leaf to use it as food , larvae or insects may have role in formation of the holes.

(ii) Being thick with lignified xylem it is difficult to be digested or eaten by insects.

b- Dicot. The leaf is broad with network of veins.

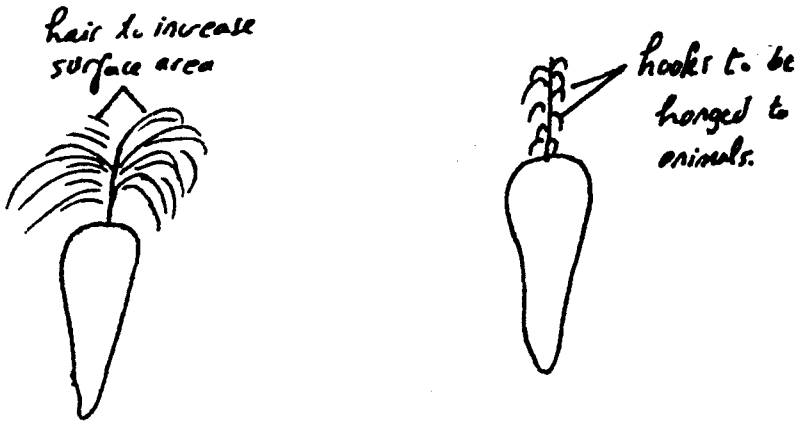
c- (i) Cut a flowering shoot whose flowers are pale in colour or a white and quickly immerse it is a beaker containing coloured water, you observe that the veins in the petal become coloured indicating the presence of water conducting tissue.

(ii)



4- a- (i,ii) You can do it, also you can calculate its magnification as mentioned in many answers before.

b-



Dispersal agent: Wind Animal.

PAPER (6)
June 1999

1- a- (i) 1. Segmented body.
2. Four pairs of jointed legs.
3. Body divided into cephalothorax and abdomen.
4. Simple eyes, legs and with claws.

(ii) Length: 44 mm.

$$\text{Magnification} = \frac{\text{length in diagram}}{\text{actual length}} = \frac{44}{0.4}$$

Magnification X 110

b- (i) you can do it.

(ii) From the graph.

c- Number of species E decreased due to the following: shortage of food which is D which is decreased as it is eaten by E. also due to overcrowding and pollution by wastes.

2- a- A Respiration.
B Transpiration.
C Photosynthesis.

b- (i) Carbon dioxide.

(ii) Repeat the same experiment using glass beads instead of seeds.

c- Increasing temperature, leads to an increase in rate of transpiration as it provides kinetic energy for water molecules.

d- (i) Oxygen.

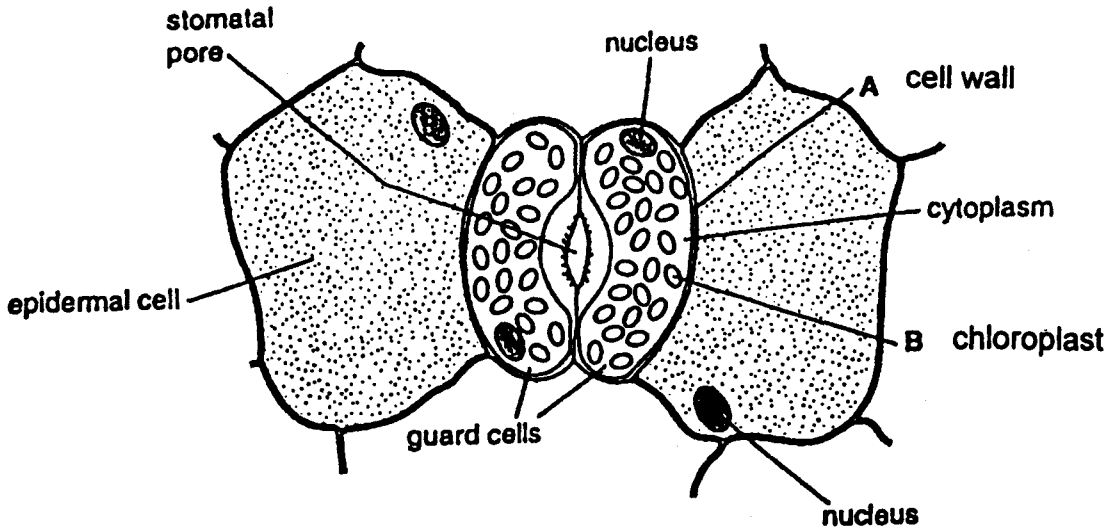
(ii) Temperature by using a heat filter.

3- a- (i) Lower epidermis.

(ii) Larger number of cells but smaller in size.

(iii) Using a cutter remove the upper layer of the leaf until a thin layer remain, put it on a microscope slide, add a drop of water then put a cover in away that no air bubbles trapped.

b- (i)



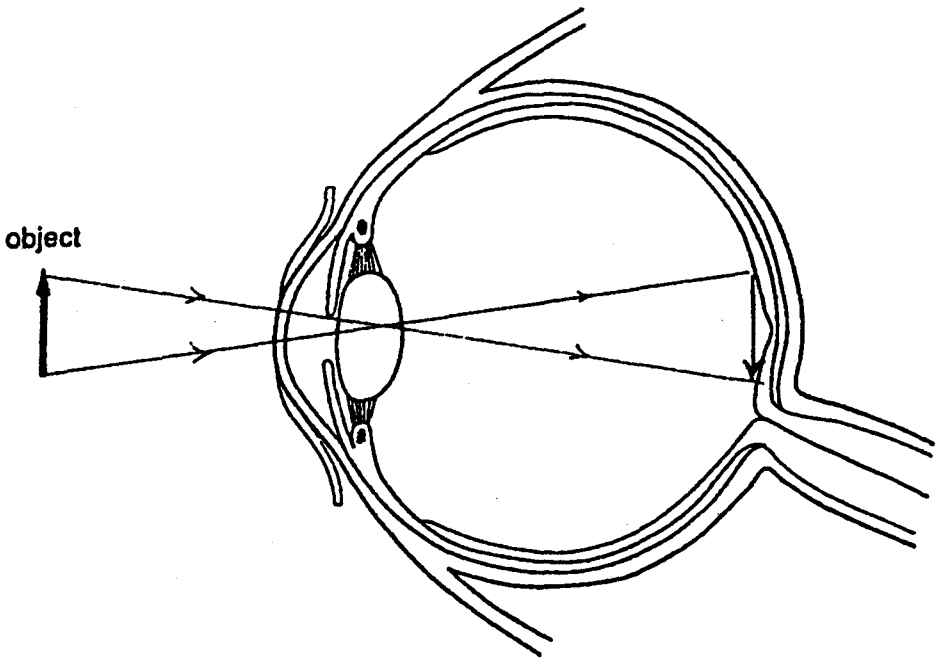
(ii) 1. The guard cell contains chloroplasts while the epidermal cell contains no chloroplast.

2. The cell wall of the guard cell is thicker at the region facing stomatal pore.

4- a- (i) Can not be seen.

(ii) It falls on the blind spot where no light receptors are found.

b-



PAPER (6)
November 1999

1- a- (i) Test: Crush a piece of biscuit and put it in a test tube, add alcohol, then add few drops of water.
Observation: Milky or turbid solution is obtained.
(ii) Get two equal samples and crush them, put each in a test tube, repeat the above test and compare the degree of turbidity, the more turbid, the more fat, it contains.

b- fat + water $\xrightarrow[\text{(enzyme)}]{\text{Lipase}}$ fatty acids + glycerol.

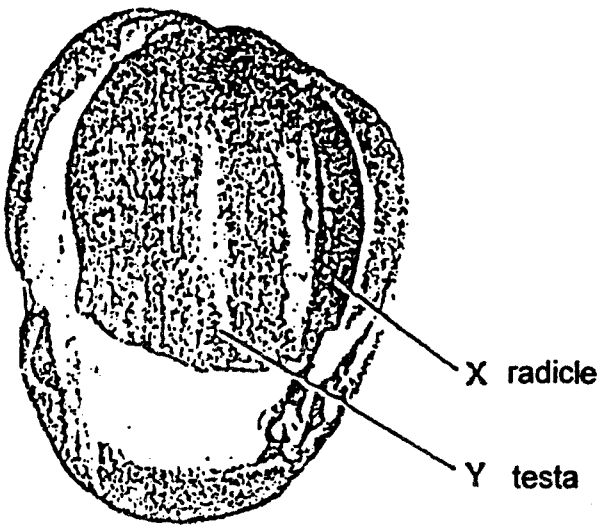
2- a- Draw it.

b- (i) Ratio 1 : 2 : 1.
(ii) As the surface area to volume ratio increases rate of heat loss also increases or leading to more cooling.

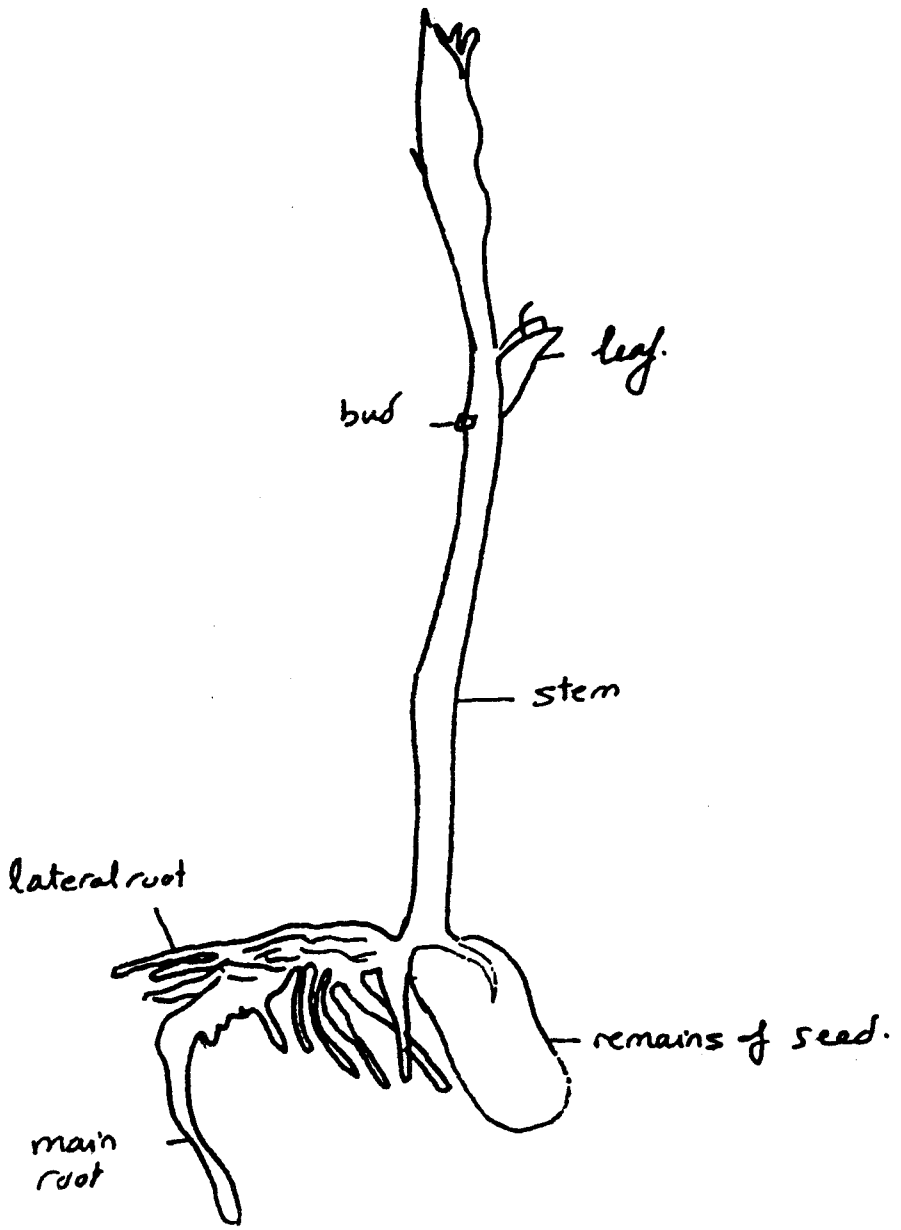
c- This may be due air current in the lab. (for example a door or window is opened).

d- By vasoconstriction in skin reducing heat loss and erection of hair to trap air as insulator.

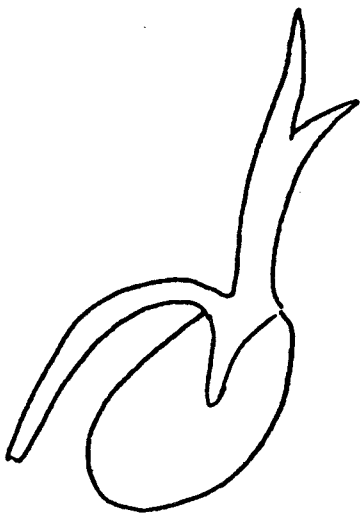
3- a-



b- (i)



(ii)



c-

broad bean	mung bean
1. Cotyledons remain below the soil.	cotyledons are carried above the soil.
2. Many leaves developed	the two cotyledons become the first leaves.
3. The stem is erect	stem is not erect

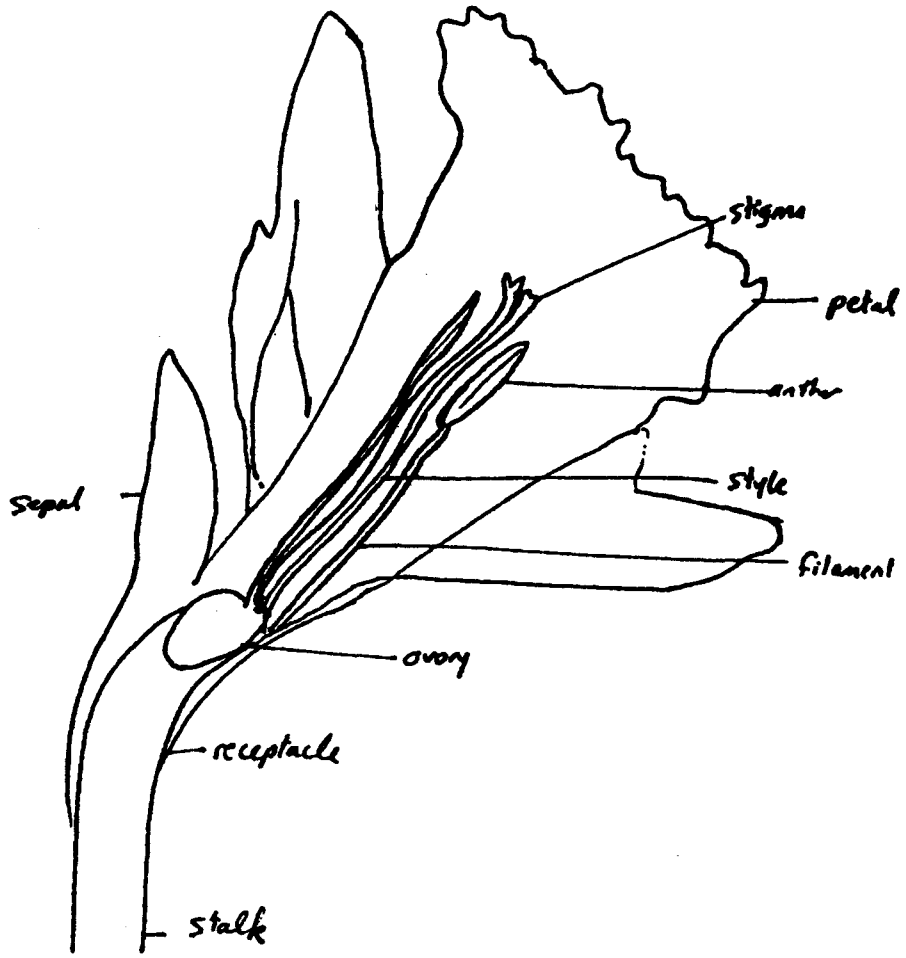
4- a- (i) Primary consumers (herbivores) 5 and 13 and 6
(ii) Secondary consumers (carnivores) 14 and 11.

b- 3 (phytoplanktons) 16 ⟶ 9 ⟶ 7 ⟶ 1 ⟶

c- Take a sample of water from this pond, use a narrow mesh to separate the large organisms leave organisms to reproduce.

PAPER (6)
June 2000

1- a-

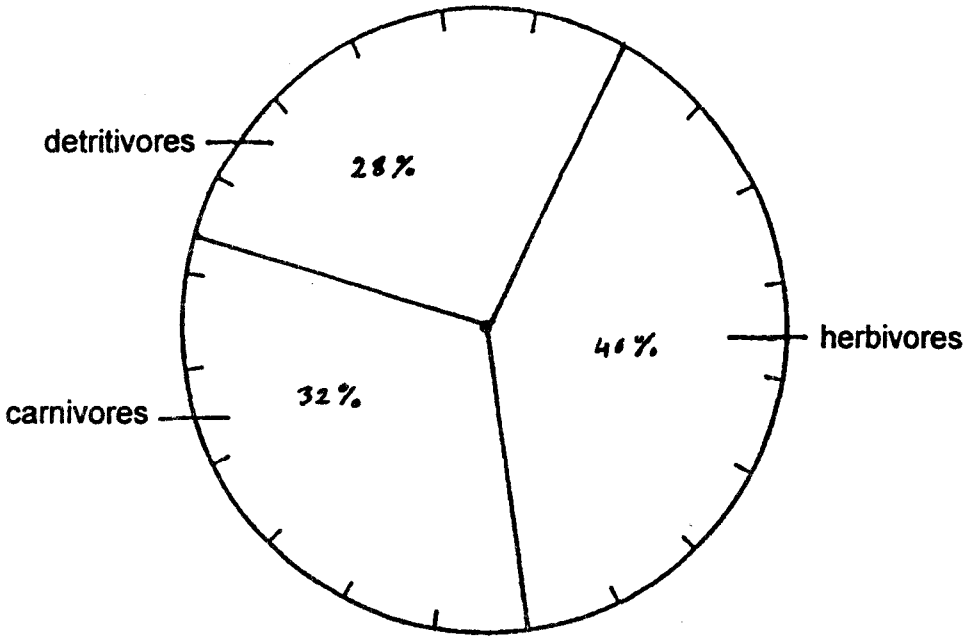


b- It is difficult as the two photographs are not clear but in the original copy of the exam you can find the differences with no effort.

2- a- (i)

Feeding category	number of animals found on the underside of the logs	Percentage %
herbivores	20	40
carnivores	16	32
detritivores	14	28
total	50	100

(ii)



b- 1. To hide from their predators which can see them easier if were found on the surface.

2. To reduce rate of water loss as being on the surface keep them exposed to sun.

c- Collect two random samples one of each woodland habitat such that the two samples are equal in mass. Put each sample in a funnel containing wire gause found above a beaker of alcohol, expose the sample to light. Identify the animals, sort them into groups, count them and compare the results.

3- a- (i)

	number of bubbles released in one minute	
	25 °C	35 °C
1	11	17
2	12	19
3	14	20
4	13	16
5	10	18
total	60	90
Mean (average)	12	18

(ii) Respiration.

(iii) - Raising temp. between 25 % to 35 % increases activity of yeast.
- Increasing temp. to such degree increases activity of the enzymes responsible for respiration.

b- (i) Carbon dioxide.

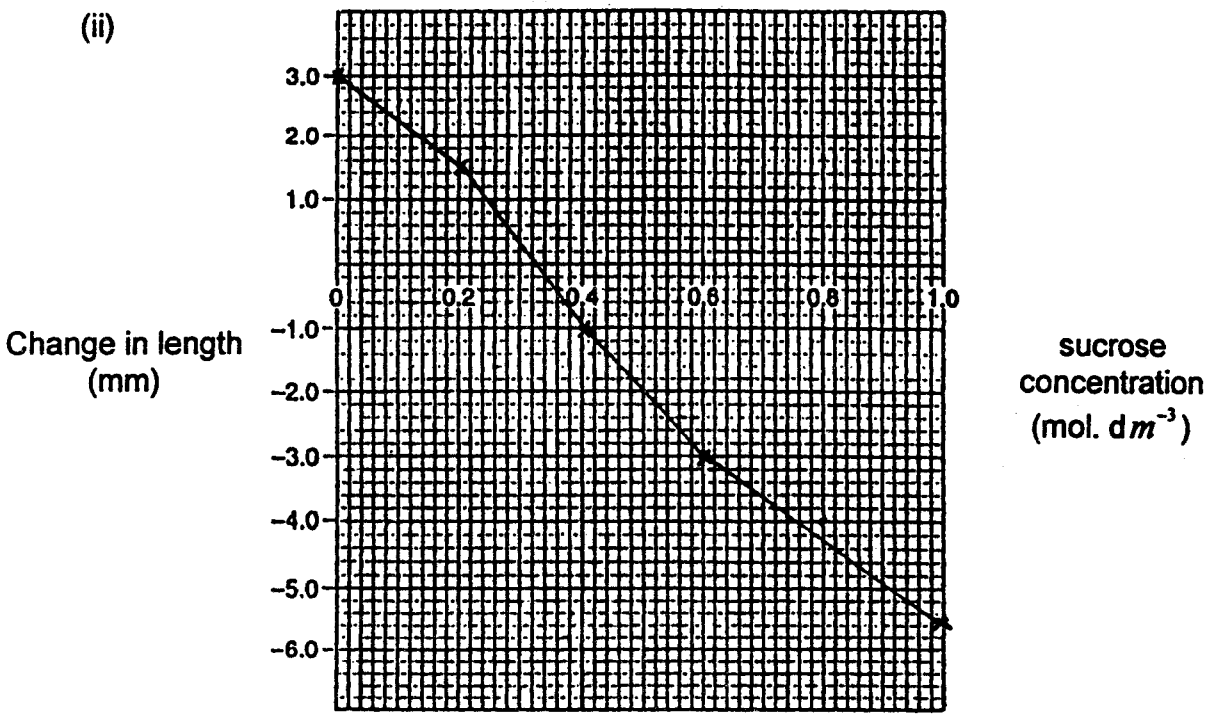
(ii) By passing it through lime water, it makes it turbid or milky.

c- To provide enough time for the yeast to be adapted to the new temperature and to avoid the effect of the previous one.

4- a- (i)

Concentration of sucrose solution (mol. dm^{-3})	initial length (mm)	final length (mm)	Change in length (mm)
0	70	73.0	+ 3.0
0.2	70	71.5	+ 1.5
0.4	70	69.0	- 1
0.6	70	67.0	- 3
0.8	70	66.0	- 4
1.0	70	64.5	- 5.5

(ii)



b- (i) Concentration of sucrose below 0.32 leads to an increase in length as it is of higher water potential than that of potato cell, so water enters the potato by osmosis, the opposite occurs at conc. higher than 0.32. no change at conc. 0.32 indication that its water potential is like that of the potato cells.

(ii) Osmosis.

c- 1. To use more than one potato strip in each concentration and then find the average.

2. To use more than one tube for each concentration and then find the average.

Other answer :

- To use intermediate dilutions of sucrose solution.
- To use longer potato strips so the changes can be easily identified.

PAPER (6)
November 2000

1- a- The number of squares that contain more than half are 31
Surface area of feather 31 cm^2

b- you can do it.

c- (i) Trap air between them, air acts as insulator keeping they warm by reducing loss of heat.
(ii) Get two beakers of water of the same temp. let one uncovered and the other covered with the feathers, measure the decrease in temp.

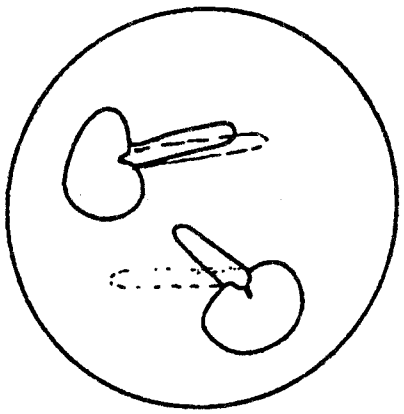
2- a- 1. Plant A is shorter than plant B.
2. Number of seeds in cob of plant A is larger than B.
3. Number of leaves of plant A is less than B.

b- By self pollination of the plant with good yield several times and collect the produced seeds to be planted and the process is repeated until homozygous plants are produced to use their seeds.

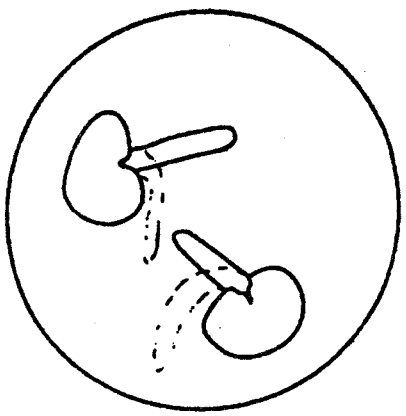
c- (i) Number of pale grains 10
Number of dark grains 9
(ii) 1 : 1
(iii) Count the total number of pale grains and the dark grains and find the ratio.

d- allele for **pale** grain B allele for **dark** grain b.
Genotype Bb x bb

3- a- (i)



(ii)



(iii) Due to gravity auxins accumulate at the lower side inhibiting growth at this side as a result of this it bends towards gravity.

b- (i) Humidity.
(ii) Put it on wet piece of cotton.

c- Cover the seedlings with a light proof cover.

4- a- you can do it.

b- Increasing pH between 2 and 6 increases the activity of catalase (6 is an optimum pH). Increasing pH above 6 leads to a decrease in the activity of the enzyme catalase.

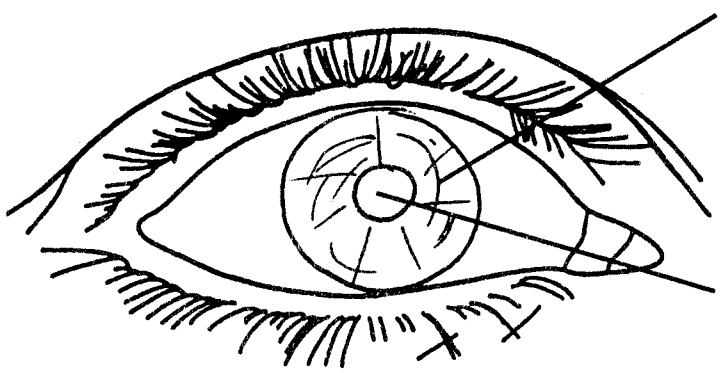
c- 1. Repeat the experiment several times and take the average.
2. Two students count the bubbles at the same time for more accuracy.

Biology O.L Answers

June 2001

Paper 6

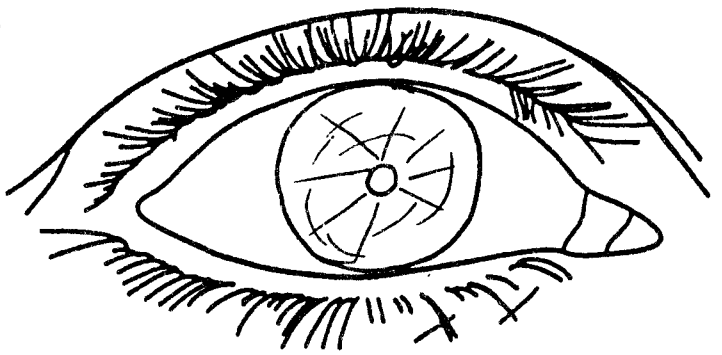
1- (a) (i)



Iris
Differin colour may be green, brown, ... etc.

Pupil
" black due to the darkness of the inside of the eye"

(ii)



(b) In dim light pupil becomes wider to allow enough light for vision to enter the eye. In bright light pupil becomes narrow to protect the light receptors against being harmed by high light intensity, the changes occur due to effect of circular and radial muscles of iris.

2- a and b you can do it.

3- (a) test for starch : Add iodine solution to the sample under test, if starch is present the colour changes from yellow brown to blue black.

test for protein : Add potassium hydroxide to the sample under test then add drops of copper sulphate, if protein is present the colour changes from blue to purple.

Test for reducing sugar : Add Benedict's solution to the sample under test and heat, if a reducing sugar is present the colour changes from blue to orange red.

(b) (i)

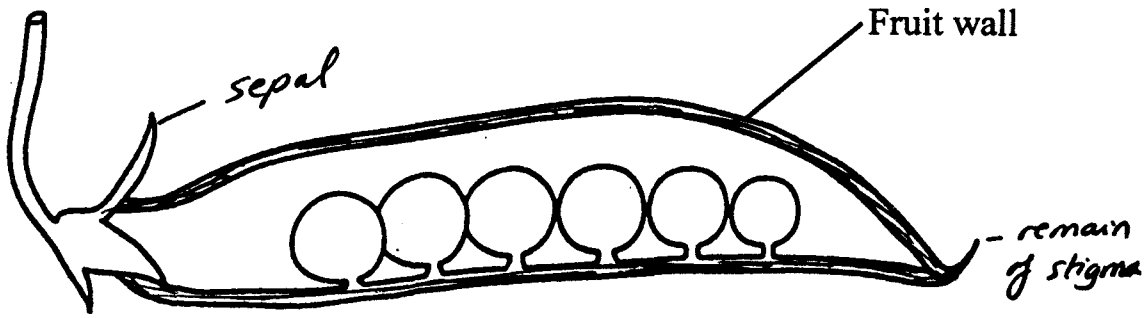
test	sample tested immediately	sample tested after one hour
starch	✓	×
protein	✓	✓
reducing sugar	×	✓

(ii) To provide suitable temperature for amylase to act.

(iii) For distribution of heat, enzymes and substrate.

(c) The results of the sample takes immediately and that tested after one hour are the same as boiling caused amylase to denature and so can not act on starch to be digested producing reducing sugar.

4- (a) (i) (ii)



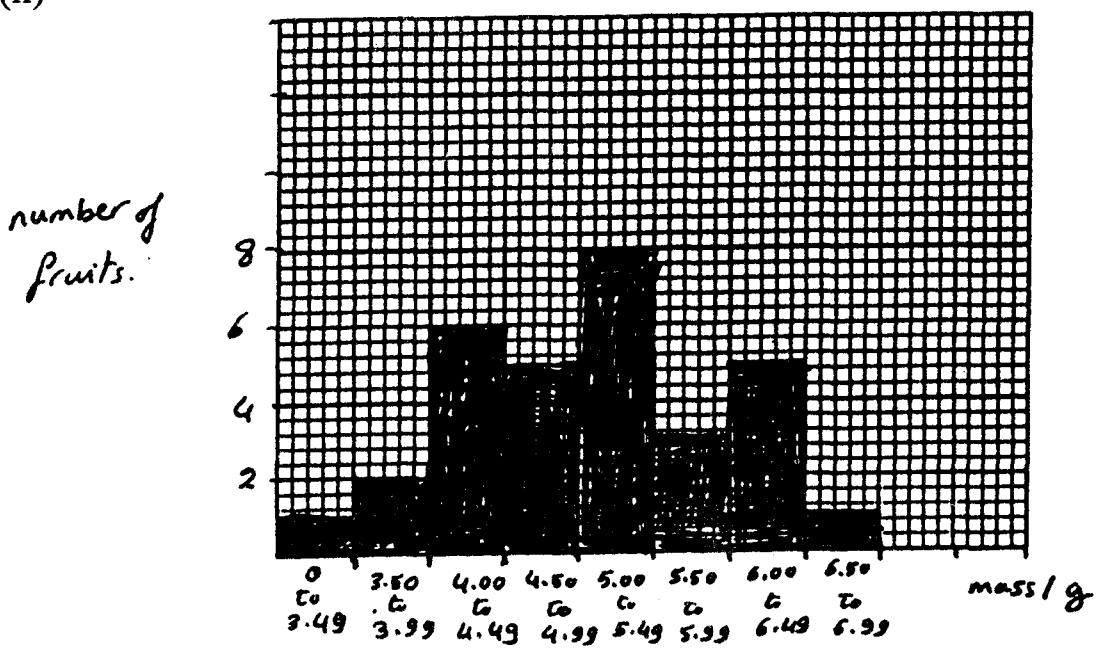
(b)

	A	B
1	Rounded shape	elongated shape
2	Seeds are arranged in more than row	seeds are arranged in only one row
3	Remain of stigma not present	remain of stigma is present

(c) (i)

group by mass (g)	number of fruits
0–3.49	I
3.50–3.99	II
4.00–4.49	IIII I
4.50–4.99	IIII
5.00–5.49	IIII III
5.50–5.99	III
6.00–6.49	IIII
6.50–6.99	I

(ii)

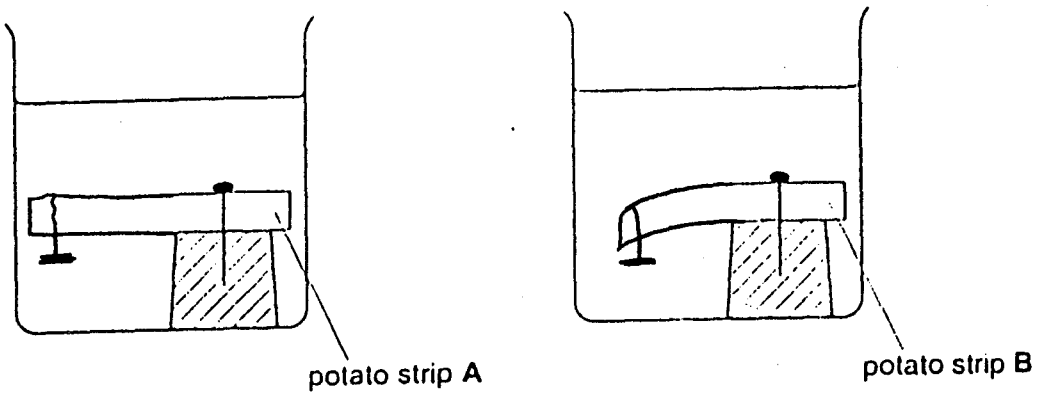


(iii) continous variation.

November 2001

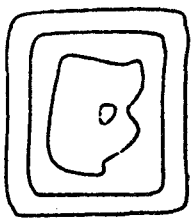
Paper 6

1- (a) (i)



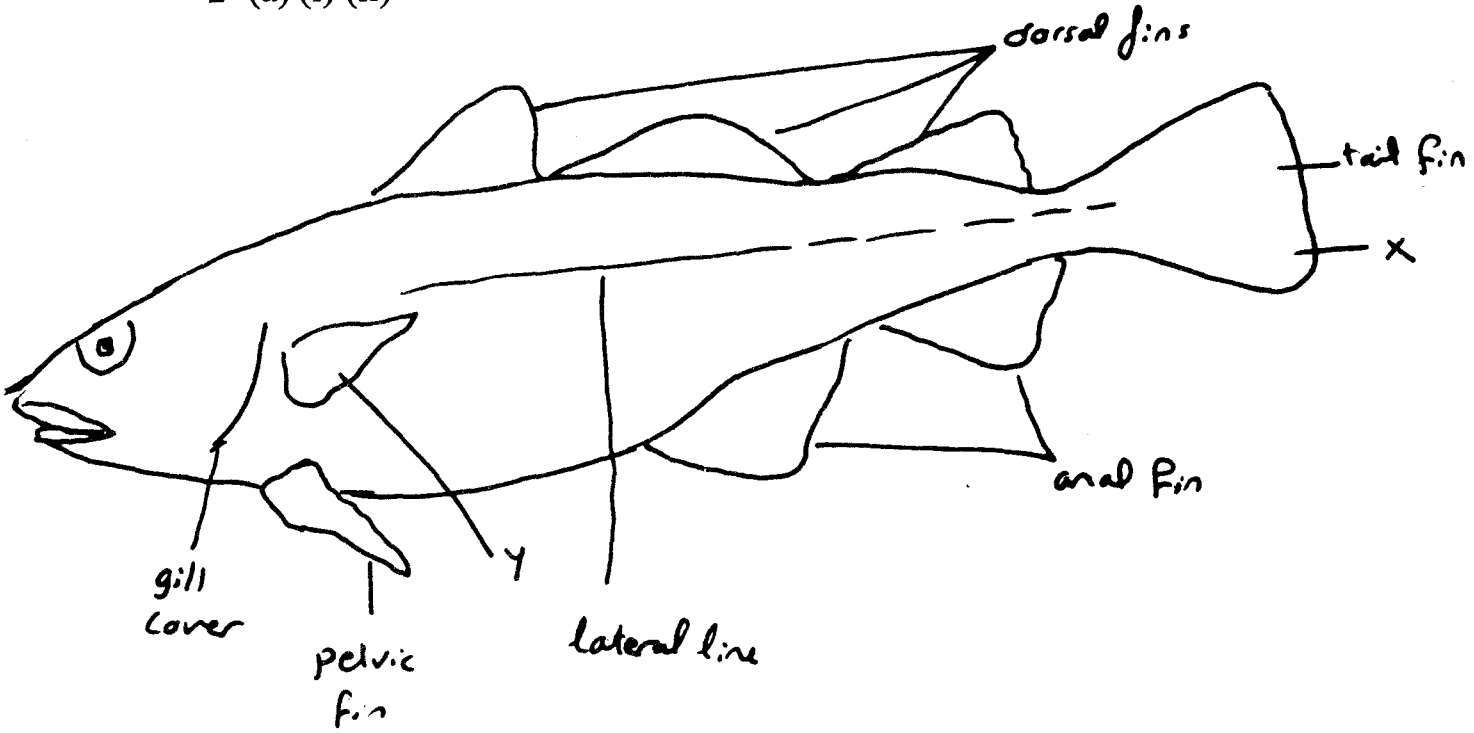
(ii) It became shorter and weak due to loss of water by osmosis as the water potential in the concentrated sugar solution is lower than that in the potato cells. This loss of water caused cells to shrink and to be plasmolysed

(iii)



(b) Water can be absorbed by the red blood cells because the water potential outside the cells is higher than the cell contents, therefore the cells become turgid, and then bursts, as red blood cells are not protected by a rigid cell wall.

2- (a) (i) (ii)



(iii) X – for forward movement in water
Y – for balance and to avoid rotting.

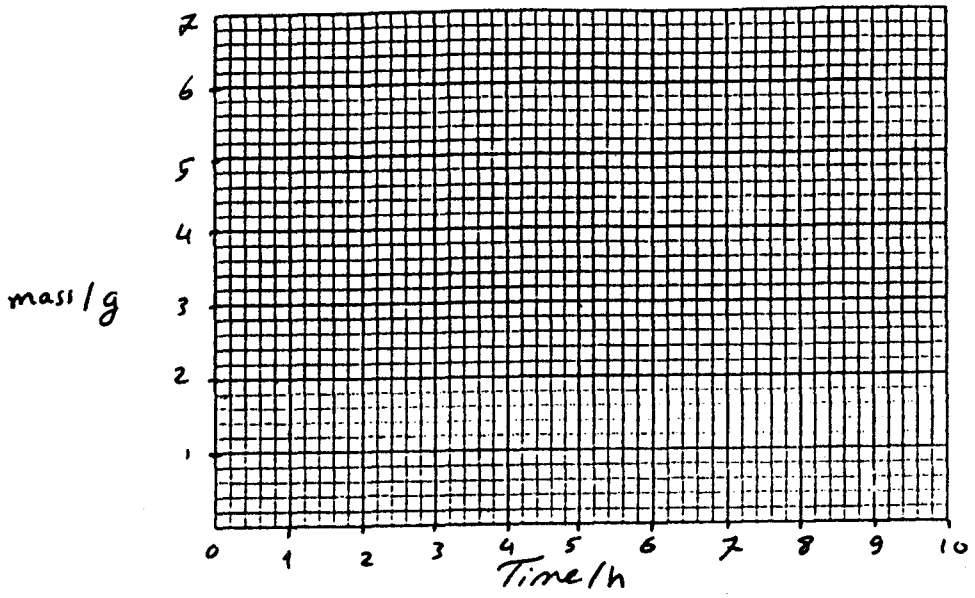
(iv) (indicate the gill cover)

(b) 17 cm
magnification $= \frac{\text{length in drawing}}{\text{actual length}}$

$= \frac{17}{70} = 0.24$

x 0.24

3- (a)



You can plot the four curves.

(b) (i)

leaf	mass lost / g
lowes surface	6.8 - 6.5 = - 0.3
upper surface	6.9 - 5.3 = 1.6
both surfaces	7 - 6.8 = 0.2
neither surfaces	6.5 - 4.7 = 1.8

neither surface

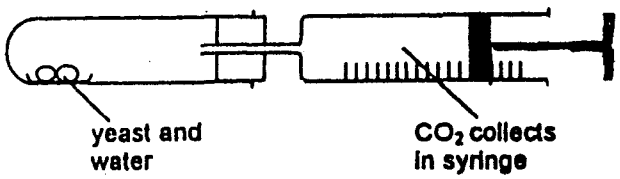
(ii) By transpiration which is the loss of water in the form of water vopour through stomata, this loss of mass is not replaced because leaves are detached.

(iii) Immerse this leaf in hot water you can observe bubbles evolve near the upper surface indicating the presence of stomata in the upper surface through which transpiration can occur.

4- (a) Budding which is a type of asexual reproduction.

(b) (i) water
suitable temperature
Nutrients

(ii)



(iii) Bubble the gas through clear lime water, carbon dioxide turns clear lime water milky.

Other way :

You can use pH indicator or hydrogen carbonate indicator.

June 2002

Paper 6

1- (a) (i) The contents of the tube increase in volume making the tube swell, bubbles can be seen which can also pass the walls of the tube while lime water around the tube becomes milky.

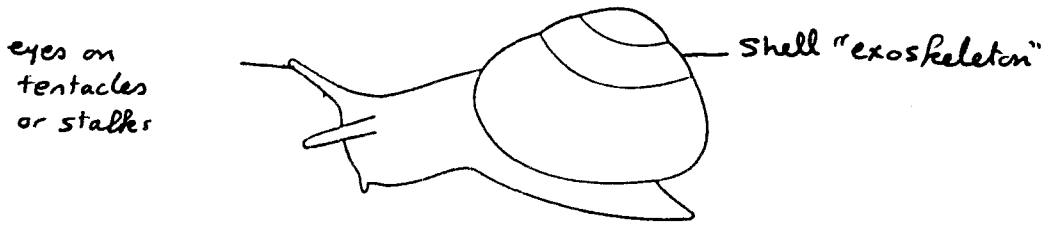
(ii) anaerobic respiration or fermintation.

(b) (i) Protein being of large molecules can not diffuse through the visking tubing therefore negative result is obtained in the contents of the beaker.

(ii) If positive the red colour changes to green, yellow, orange, red and finally brick red.

(iii) Yeast produced enzymes that act on sucrose to be digested into reducing sugar (monosaccharide), this sugar being of small molecules can diffuse through the visking tubing down its concentration gradient.

2- (a)



(b) molluscs.

3- (a) (i) - Young seedling will be wilted
- Normal healthy and upright.

(ii) 1. Two colyledons are shown.
2. Broad leaves with network of veins.

(b) Count the whole squares covered by the leaf then combine the number of part squares covered by the leaf.

(c) (i)

class size in cm^2	leaf area in cm^2 from shaded plot	leaf area in cm^2 from sunlit plot
2.5 – 2.9	-	**3**
3.0 – 3.4	-	**4**
3.5 – 9.3	-	**5**
4.0 – 4.4	**2**	**2**
4.5 - 4.9	**4**	-
5.0 – 5.4	**5**	-
5.5 –5.9	**2**	-
6.0 – 6.4	**1**	-

(ii) you can do it.

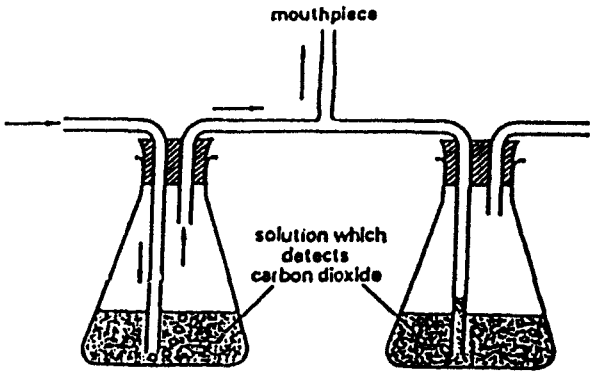
(d) (i) Use plants of the same species at the same age of development with a larger sample number.

(ii) To provide large surface area for trapping enough light for photosynthesis.

4- (a) Breath out fully so that an amount of the liquid is replaced by expired air, read the scale, repeat the procedure several times and take the average.

(b) 1. Difference in body mass.
2. Difference in fitness.
3. Smoking.

(c)

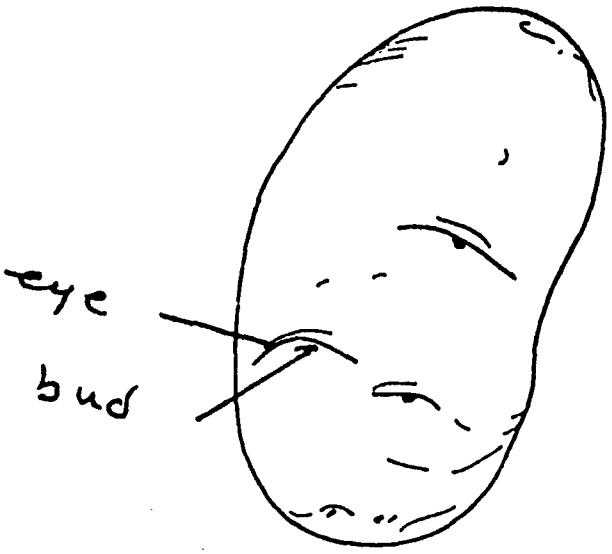


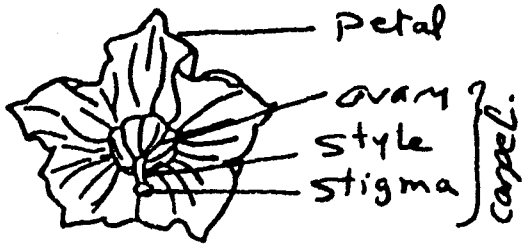
Use the mouth piece to breathes in and out slowly so that atmospheric air is allowed to pass through the first flask and then the expired air is forced through the second flask, in the second flask lime water turns milky indicating that exhaled air contains more CO_2.

November 2002

Paper 6

1- (a) (i)





(ii) tuber : asexual or vegetative reproduction.
flower : sexual reproduction.

(b) (i) length in drawing 8.8 mm.

Actual length $= \frac{8.8}{860}$

(ii) Photosynthesis.

(iii) Destarch a patted plant by placing it in dark for about 48 hours, test for starch to be sure that it is completely destarched. Expose it to light for suitable period of time and test for starch once more.

2- (a) (i) 1.1

(ii) 1.0 cm^3, because the value 1.5 is so for than the other values so the reliable average is that of the other four values.

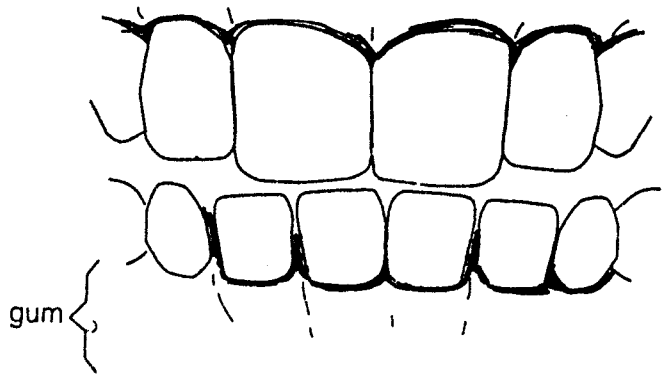
(b) (i) and (ii)

type of juice	lemon	apple	grapefruit	lime	grape
volume of juice used to decolourise DCPIP = p cm^3	0.3	0.8	0.3	0.4	0.9
ascorbic acid	3.33 g	1.25	3.33	2.50	1.11

(iii) Draw a bar chart.

(c) example lemon juice, take two equal samples of lemon juice and test for ascorbic acid using the formula in (question 2 a), one of the two samples stored in lab for 12 hours, test for ascorbic acid once more compare the results.

3- (a)



(b) (i) 5.2

(ii) Take a sample of plaque, dissolve it as you can, test for pH using universal indicator to determine its pH.

(c) By putting the bacteria produced from bacterial culture in a closed test tube joined to a thermometer and a gas syringe, the reading of the thermometer increases and by testing the collected gas using lime water it becomes milky indicating the process of respiration of bacteria.

4- (a) count the total number of the red blood cells and those of white blood cell then find the simple ratio.

(b) (i) - More cells in fig. 4.2 than fig. 4.1
- More white blood cells in fig. 4.2
- Higher ratio of white blood cells in fig. 4.2
- Greater variety of white blood cells in fig. 4.2

(ii) The sample in fig. 4.1 may be taken from anaemic person.

OR

The sample in fig. 4.2 is taken from a person suffering from a disease therefore more white blood cells are shown.

June 2003

Paper 6

1- (a) 1. Amount of sugar added.
2. Time taken until the measurement is taken.

(b) (i) Can be done.

(ii) Curve A shows a gradual increase in volume but the rate of increase is lowest between 20 and 60 min.
Curve B shows very slow increase in volume, it increased only 2 cm^3 along the 120 min.
Curve C shows rapid increase in volume till it reaches the maximum after 80 min.

(iii) Depends on your graph.

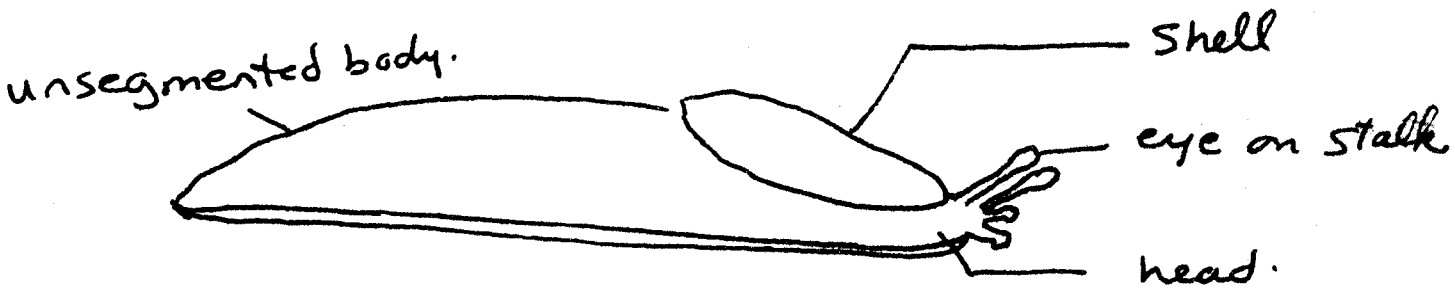
(iv) B contains no yeast, in A yeast respire producing carbon dioxide which becomes trapped in the dough leading to rapid increase in its volume.

(v) Substance X in sample C may be amylase which acts on the starch to be digested into simple sugar, which is used in increasing rate of respiration of yeast.
OR
X may be sodium hydrogen carbonate which decomposes releasing carbon dioxide that caused rapid increase in the volume of the dough.

2- (a) 1. Oxygen (for respiration of the embryo).
2. Suitable temperature (for the activity of the enzymes).

(b) In one cylinder tube, 5 grains of maize are placed on a piece of wet cotton and left uncovered in a similar cylinder, 5 grains of maize are placed on a piece of wet cotton with a substance that absorbs oxygen and the cylinder is closed tightly, both cylinders are left in the same temperature and the results are recorded.

3- (i)



(ii) Length in fig 3.1 8 cm.
in drawing 12 cm.

magnification $= \frac{12}{8} \times 1.5$

(iii) Similarity : Having shell.
Difference : shell in B is larger
Or in A body is spotted.

(iv) Mollusca.

4- (a) (i) By approaching a glowing split to a sample of gas, it relights.

(ii) Photosynthesis.

(iii) Volume $10\ cm^3$

rate $\frac{10}{5} = 2\ cm^3/hour.$

(iv) By placing the apparatus in dimly-lit room, and moving a lamp towards the opparation while heat filter is used, at each position of the lamp determine the rate of production of the gas such that the time taken for each position mast be equal to the other.

(b) (i) Colour : purple
explanation : Absorption of carbon dioxide by the pondweed during photosynthesis led to an increase in pH.

(ii) Colour : red
explanation : the carbon dioxide absorbed by photosynthesis of the pondweed is replaced by that produced by the shrimp.

(iii) Colour : yellow
explanation : the carbon dioxide produced by shrimps is more than that absorbed by the pondweed in photosynthesis.