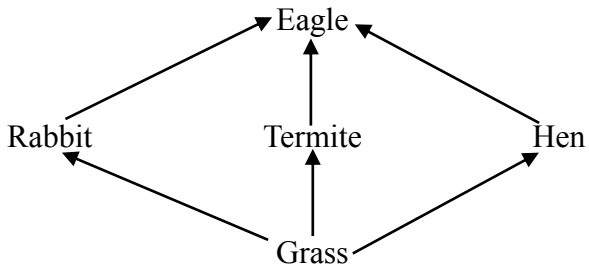
2019 UCE BIOLOGY PAPER ONE EXAMINATION

SECTION A (30 MARKS)

1. Which one of the following is a characteristic of monocotyledonous stem?
   A. Scattered vascular bundles. S.1 C I B page 129 & C I B:U page 129
   B. Vascular bundles arranged in a ring.
   C. Vascular bundles have cambium.
   D. Have distinct pith.
2. The lipase enzyme catalyzes the breakdown of
   A. fats. S.2 C I B page 94 & C I B:U page 302
   B. proteins.
   C. maltose.
   D. sucrose.
3. The kind of solution which would make a fully turgid plant cell placed in it to shrink is
   A. more dilute than the cell content.
   B. of the same concentration as the cell content.
   C. more concentrated than the cell content. S.2 C I B page 201 & C I B:U page 409
   D. less in quantity than the cell sap.
4. Which one of the following feature is common to both class insecta and class arachnida?
   A. Having three main body divisions.
   B. Possession of an exoskeleton. S.1 C I B page 60 & C I B:U page 60
   C. Having three pairs of legs.
   D. Possession of antennae.
5. Which one of the following vectors transmits yellow fever?
   A. Female *Anopheles* mosquito.
   B. *Culex* mosquito.
   C. Tsetse fly.
   D. ***Aedes mosquito. S.1 C I B page 195 & C I B:U page 195***
6. Which one of the following is a benefit of using manure?
   A. ***Preventing soil erosion. S.2 C I B page 36 & C I B:U page 244***
   B. Improving crumb structure of soil.
   C. Reducing population of harmful organisms in soil.
   D. Maintaining adequate soil cover.
7. The illustration below shows a food web.



Which one of the following organisms in the illustration above is a secondary consumer?

A. Hen
B. Grass
C. ***Eagle. S.4 C I B page 145 & C I B:U page 1003***
D. Termite

8. Which one of the following pairs is made up of **only** major elements in plant nutrition?
   A. Magnesium and calcium. ***S.2 C I B page 66 & C I B:U page 274***
   B. Molybdenum and iodine.
   C. Boron and chlorine.
   D. Manganese and copper.
9. Which of the following blood transfusion will lead to agglutination?

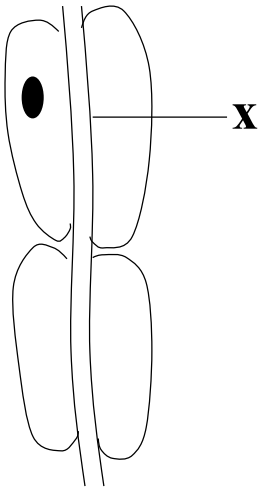
	Donor's blood group	Recipient's blood group
A	***AB***	***O*** ***S.2 C I B page 259 & C I B:U page 467***
B	B	AB
C	A	A
D	O	B

10. During expiration in a bony fish, the operculum is forced open when the
    A. floor of the buccal cavity is lowered.
    B. volume of the buccal cavity increases.
    C. pressure in the buccal cavity decreases.
    D. ***pressure in the buccal cavity increases. S.2 C I B page 287 & C I B:U page 495***
11. In which part of the nephron does reabsorption of sugars take place?
    A. Distal convoluted tubule.
    B. Loop of Henle.
    C. ***Proximal convoluted tubule. S.3 C I B page 5 & C I B:U page 575***
    D. Collecting duct.
12. Where is the image of a far object formed in the eye of a short sighted person?
    A. On the choroid.
    B. Behind the retina.
    C. ***In front of the retina. S.3 C I B page 41 & C I B:U page 611***
    D. On the blind spot.
13. A potted plant placed horizontally on a rotating clinostat continues to grow in a horizontal direction because auxins
    A. migrate to the tip of the shoot.
    B. are uniformly distributed in the shoot. S.3 C I B page 72 & C I B:U page 642

C. migrate to the dark side of the shoot.
D. migrate to the illuminated side of the shoot.

14. Which one of the following characteristics can be used to identify a cervical vertebra? Presence of
    A. Small neural canal and metapophysis.
    B. Long neural spine and large centrum.
    C. Small transverse processes and narrow neural spine.
    D. Vertebraterial canals and short neural spine. ***S.3 C I B page 101 & C I B:U page 671***
15. Which one of the following characteristics of flowers encourages cross pollination?
    A. *Being unisexual. S.3 C I B page 272 & C I B:U page 842*
    B. Being bisexual.
    C. Anthers above the stigma.
    D. Stamens and pistil remain enclosed within petals.
16. Which one of the following human characteristics exhibits discontinuous variations?
    A. Height.
    B. *Blood groups. S.3 C I B page 188 & C I B:U page 758*
    C. Weight.
    D. Skin colour.
17. The function of sodium hydrogen carbonate in an experiment to show that carbon dioxide is necessary for photosynthesis is to
    A. absorb carbon dioxide.
    B. reduce oxygen.
    C. produce water.
    D. *produce carbon dioxide. S.2 C I B page 57 & C I B:U page 265*
18. What is the effect of rapid elongation of hypocotyl during seed germination?
    A. Cotyledons remain underground.
    B. Plumule grows straight out of the ground.
    C. *Cotyledon is carried above the ground. S.4 C I B page 22 & C I B:U page 880*
    D. Hypocotyl straightens.
19. A normal man married to a normal woman had a haemophiliac child. Suggest the sex of the child with a reason.
    A. Female, because males do not suffer from haemophilia.
    B. Male, because he inherited the trait from the carrier father.
    C. Female, because she inherited the trait from the normal father.
    D. Male, because he inherited the trait from a carrier mother. ***S.3 C I B page 183 & C I B:U page 753***
20. Which one of the following pairs are correct products of aerobic respiration in both plants and animals?
    A. Lactic acid and water.
    B. Alcohol and carbon dioxide
    C. *Carbon dioxide and water. S.3 C I B page 101 & C I B:U page 671*
    D. Lactic acid and carbon dioxide.

21. Which one of the following responses are likely to occur in the human body when environmental temperature increases?
    A. ***Vasodilation. S.2 C I B page 338 & C I B:U page 546***
    B. Shivering.
    C. Contraction of the erector pili muscles.
    D. Increased metabolism.
22. The illustration below represents part of a sensory neuron.



What is the function of the part marked **X**? It
    A. ***is the pathway of the nerve impulse. S.3 C I B page 26 & C I B:U page 596***
    B. produces the myelin sheath.
    C. speeds up impulse transmission.
    D. carries impulse to the cell body.
23. Which one of the following is a function of oestrogen in humans?
    A. Causes Graafian follicle to develop.
    B. ***Repairs the uterine lining. S.3 C I B page 238 & C I B:U page 808***
    C. Causes degeneration of the corpus luteum.
    D. Causes ovulation.
24. Which one of the following is an adaptation of the arteries to transport blood under high pressure?
    A. Their innermost layer is smooth.
    B. ***They have thick and elastic walls. S.2 C I B page 249 & C I B:U page 457***
    C. They have wide lumen.
    D. Their walls are thin and inelastic.
25. Which one of the following bones is found in the human fore limb?
    A. Fibula
    B. Femur.
    C. Tibia.
    D. Ulna. ***S.3 C I B page 107 & C I B:U page 677***
26. Sperms in the mammalian male reproductive system are stored in the
    A. Urethra.
    B. Epididymis. ***S.3 C I B page 228 & C I B:U page 798***
    C. Seminiferous tubule.

D. Prostate gland.

27. Which one of the following characteristics belong to a fruit dispersed by water?
    A. Hooks.
    B. Wings.
    C. Fibrous mesocarp. ***S.4 C I B page 14 & C I B:U page 872***
    D. Pericarp with line of weakness.
28. Which one of the following conditions increases the rate of transpiration?
    A. ***High temperature. S.2 C I B page 211 & C I B:U page 419***
    B. Low light intensity.
    C. Still air.
    D. High atmospheric pressure.
29. The association between nitrogen fixing bacteria in the root nodules and the leguminous plant can best be described as
    A. ***Mutualism. S.4 C I B page 113 & C I B:U page 971***
    B. Commensalism.
    C. Parasitism.
    D. Competition.
30. All the following conditions result from deficiency of vitamins of the B group except
    A. Beriberi.
    B. Pellagra.
    C. Pernicious anaemia.
    D. ***Failure of blood to clot. S.2 C I B page 338 & C I B:U page 546***

SECTION B (40 MARKS)

C I B books have left the entire number 31 for you to practice your critical thinking ability, problem solving and graphical skills in order to create competency in you to make you a job creator and not just a diligent job seeker.

31. In an experiment, two glass tubes were filled with different soil samples **A** and **B**. The glass tubes were placed in a basin of water and left to stand for 5 days.
    The rise of water column in each soil sample was measured and recorded each day for 5 days as shown in the table below.
    Table showing rise of water column in soil samples **A** and **B**

Days	Rise of water column in cm	
	Soil sample A	Soil sample B
1	12	20
2	16	24
3	32	26
4	37	27
5	38	27

    (a) What soil factor was being investigated? (01 mark)

(b) Using the results in table 1, plot a graph showing the rise of water in the two soil samples **A** and **B**. (06 marks)

(c) Describe the rise of water through soil samples A and B as shown on the graph. (04 marks)

Soil sample **A**

Soil sample B

(d) Explain the differences in the water rise through the two soil samples. (04 marks)

(e) Using the rise of water column on the graph for day 1, suggest with a reason the type of soil samples A and B. (02 marks)

Soil sample A

Reason

Soil sample B

Reason

(f) What is the importance of the factors being investigated in plants? (03 marks)

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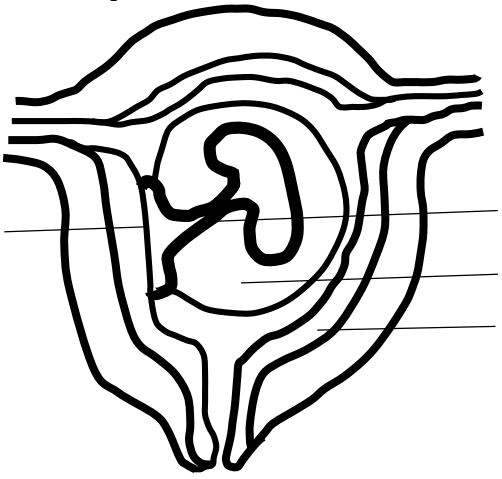
32. The illustration below is a diagram showing the uterus of a pregnant woman. Study it and answer questions that follow:



(a) Name the parts labeled A, B, C and D

A. Placenta ***S.3 C I B page 247 & C I B: U page 817***

B. Umbilical cord ***S.3 C I B page 247 & C I B: U page 817***

C. Amniotic fluid ***S.3 C I B page 247 & C I B: U page 817***

D. Uterine wall ***S.3 C I B page 247 & C I B: U page 817***

(b) Give any one function of each of the parts labeled A, B, C and D. (04 marks)

A. The placenta ensures that the mother's blood does not mix with that of the foetus so that her hormones does not interfere with the development of the foetus.

The placenta also ensures that the mother's high blood pressure does not damage the internal organs of the foetus. ***S.3 C I B page 243 & C I B: U page 813***

B. Blood from the embryo containing deoxygenated blood and other waste products travels to the placenta through the arteries known as umbilical arteries of the umbilical cord to be excreted by the mother.

Blood from the placenta containing oxygenated blood, hormones, antibodies, products of digestion, travels to the foetus through the veins known as umbilical veins of the umbilical cord to be assimilated by the foetus. ***S.3 C I B page 246 & C I B: U page 816***

C. The amniotic fluid protects embryo from mechanical injury by acting as shock absorbers.

The fluid protects embryo from dehydration.

It also distributes pressure equally over embryo. ***S.3 C I B page 246 & C I B: U page 816***

D. The uterine wall provides surface for the development of placenta. It provides surface for implantation of zygote to develop till birth.

The uterine wall protects the amniotic sac from mechanical damage.

The uterine wall contains muscles that contract rhythmically to facilitate birth of a mature foetus.

It also prepares the females body to receive a fertilized ovum.

It also breaks down during menstruation if the female body does not receive a fertilized ovum. ***S.3 C I B page 231 & C I B: U page 801***

(c) State any two adaptations of part **A** for its function. (2 marks)

The placenta has lots of capillary blood vessels which transport exchanged materials.

The placenta has very large surface area to volume ratio due the numerous finger-like chorionic villi for maximizing the exchange of materials between the mother and her foetus.

The placenta has thin permeable membrane for quick simple diffusion of materials.

The placenta has membranes that are always moist which enhances the dissolving of respiratory gases to facilitate their simple diffusion into the blood vessels for transportation.

The placenta has very many mitochondria for producing energy needed for active transport of materials once simple diffusion can no longer allow movement of materials for exchange to take place.

The membranes of the placenta are selectively permeable and therefore only certain materials are absorbed by the blood of the foetus. ***S.3 C I B page 247 & C I B: U page 817***

(d) Using letter X, indicate on the diagram the part that develops into a baby. (01 mark)

S.3 C I B page 247 & C I B: U page 817

(e) Name the hormone that enables part D to be efficient during pregnancy. (01 mark)

Progesterone hormone ***S.3 C I B page 247 & C I B: U page 817***

33. (a) What kind of response is demonstrated when maggots placed in a choice chamber move towards the wet part? (01 mark)

Tactic movement or tactic response. **S.3 C I B page 74 & C I B: U page 644**

(b) Give the importance of the response stated in (a) to the maggots. (02 marks)

The maggots find themselves a conducive environment.

The maggots are protected from desiccation.

The maggots are able to carry out gaseous exchange in the moist environment through simple diffusion. **S.3 C I B page 74 & C I B: U page 644**

(c) Explain any three tropic responses. (04 marks)

Phototropism is the growth movement by plants in response to light coming from a single direction.

For example, shoots and coleoptiles are positively phototropic i.e. grow towards light while roots are negatively phototropic i.e. grow away from light.

The phototropic reactions of stems are clearly of adaptive importance because it gives the plants greater exposure to available light. **S.3 C I B page 71 & C I B: U page 641**

Gravitropism is the growth movement by plants in response to gravity. For example, shoots and coleoptiles are negatively gravitropic i.e. grow away from gravity while roots are positively gravitropic i.e. grow towards gravity. The geotropic reactions of roots are clearly of adaptive importance because it gives the plants greater exposure to available nutrients in the soil for absorption. **S.3 C I B page 75 & C I B: U page 645**

Thigmotropism is the growth response of a plant or plant part to contact with the touch of an object or even the wind.

For example when a tendril makes contact with an object, the tendril curls around the object, sometimes within as little as 3 to 10 minutes.

In other plants, such as clematis, bindweed, and dodder, leaf petioles or unmodified stems twine around other stems or solid objects. **S.3 C I B page 77 & C I B: U page 647**

(d) Explain one significance of tropic responses in;

(i) Providing support to plants. (1.5 marks)

Through thigmotropism, the tendrils curling around objects, sometimes within as little as 3 to 10 minutes in order to provide extra support to the weak stems of the plant. **S.3 C I B page 77 & C I B: U page 647**

(ii) Aiding photosynthesis. (1.5 marks)

The phototropic reactions of stems give the plants greater exposure to available light to facilitate photosynthesis. **S.3 C I B page 71 & C I B: U page 641**

SECTION C (30 MARKS)

34. (a) Describe the different types of immunity in humans. (06 marks)

Passive immunity is the type of immunity which is acquired by the transfer of antibodies from one individual to another.

Naturally acquired passive immunity also called maternal passive immunity is when the maternal antibodies are passed to the baby through the placenta in the womb or through the breast milk by breast feeding after birth.

Artificially acquired passive immunity also called temporarily induced passive immunity is when the antibodies are transferred in the form of blood plasma and administered by artificial means such as the drip and injection from an immune to non-immune individual.

Active immunity is the type of immunity developed in an organism by its own production of antibodies in response to an exposure to antigen, pathogen or vaccine.

Naturally acquired active immunity is when an individual gets infected of a disease and recovers from it without any treatment.

Artificially acquired active immunity also called vaccination or immunization is when a person is inoculated i.e. takes a vaccine medication either orally or through injection.

Vaccines are substances consisting of a suspension of weakened or dead pathogens administered in our body in order to stimulate the production of antibodies. ***S.4 C I B page 80 & C I B: U page 938***

(b) Explain the role of blood in body defence. (04 marks)

Leucocytosis is the increase in number of white blood cells that occur upon infection especially bacterial infections. The number of WBCs increases the force for destroying the pathogens.

Phagocytosis (eating away pathogens) is the active engulfing of, killing, and destroying most pathogens by WBCs known as neutrophils, wandering microphages which are collectively known as phagocytes.

Inflammation is the body's defense against diseases in which WBCs leak out from the blood vessels into tissues to destroy pathogens by breaking them down (lysis).

Inflammation has 3 purposes i.e. destruction of pathogens, confinement of pathogens (walling off) and repair or replacement of damaged tissues.

Inflammation involves an increase in blood flow to site of infection or injury, increased permeability of tissue at a site of infection or injury, formation of blood clots and migration of phagocytes to the site of infection to kill all pathogens.

Antibodies produced by lymphocytes in response to the presence of antigens destroy the antigens so that normal health returns to the organism.

These antibodies destroy pathogens producing antigens by chemical break down of germs producing the antigens, clamping bacteria together, stopping them from reproducing and making them easy target for phagocytes to ingest and by lysis i.e. dissolving the pathogens to death. ***S.4 C I B page 78 & C I B: U page 936***

(c) Give any five ways in which the body immunity can be weakened. (05 marks)

HIV infection that are known to destroy white blood cells, hence weakening them, a condition known as acquired immune deficiency.

Malnutrition among the poor or poor nutrition among the rich. The antibodies produced by white blood cells are proteins in nature. Poor diet will therefore render white blood cells ineffective at producing antibodies.

Poor hygiene which exposes the body to too much pathogens that overwhelm the body's white blood cells hence weakening them.

Genetic factors since the white blood cells and antibodies are coded for by the genes. Failure of the genes to code for them will automatically weaken the immune system, a condition known as primary immune deficiency.

Excessive alcoholism

Smoking. ***S.4 C I B page 82 & C I B: U page 940***

35. (a) How is light from a nearby object focused on the retina of a human eye? (08 marks)

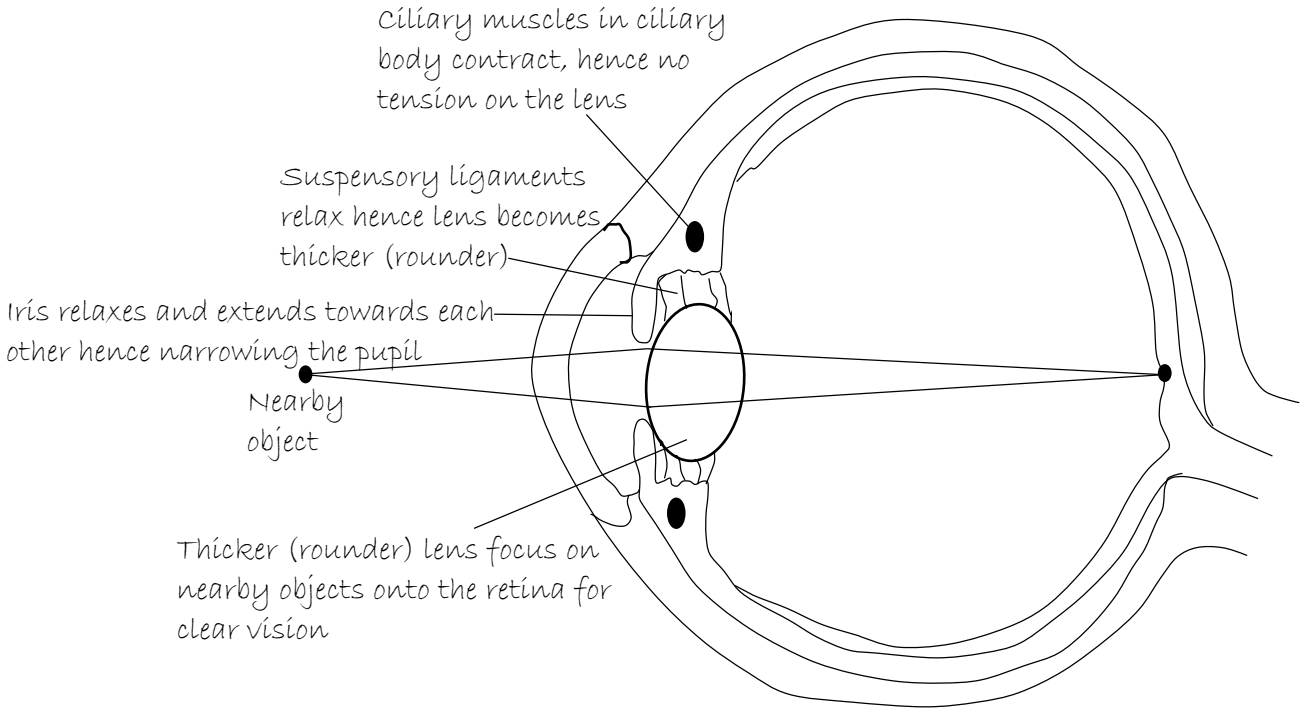
The ciliary muscles contract, giving the lens a larger diameter.

This removes the tension on the suspensory ligaments which, in turn, stop pulling on the lens.

Iris relaxes and extends towards each other hence narrowing the pupil

The lens becomes thicker (more convex).

The lens therefore focuses on nearby objects onto the retina for clear vision.



S.3 C I B page 40 & C I B: U page 610

(b) (i) Explain why a long sighted person cannot see near objects clearly. (03 marks)

This is because in long-sighted people, objects that are near will have their image coming to a focus at the back of the retina and the image thus appears blurred to the patient's sight, hence not seen well.

The image is formed at the back of the retina because of the relatively flat cornea causing weaker focusing power, flat lens also causing weaker focusing power.

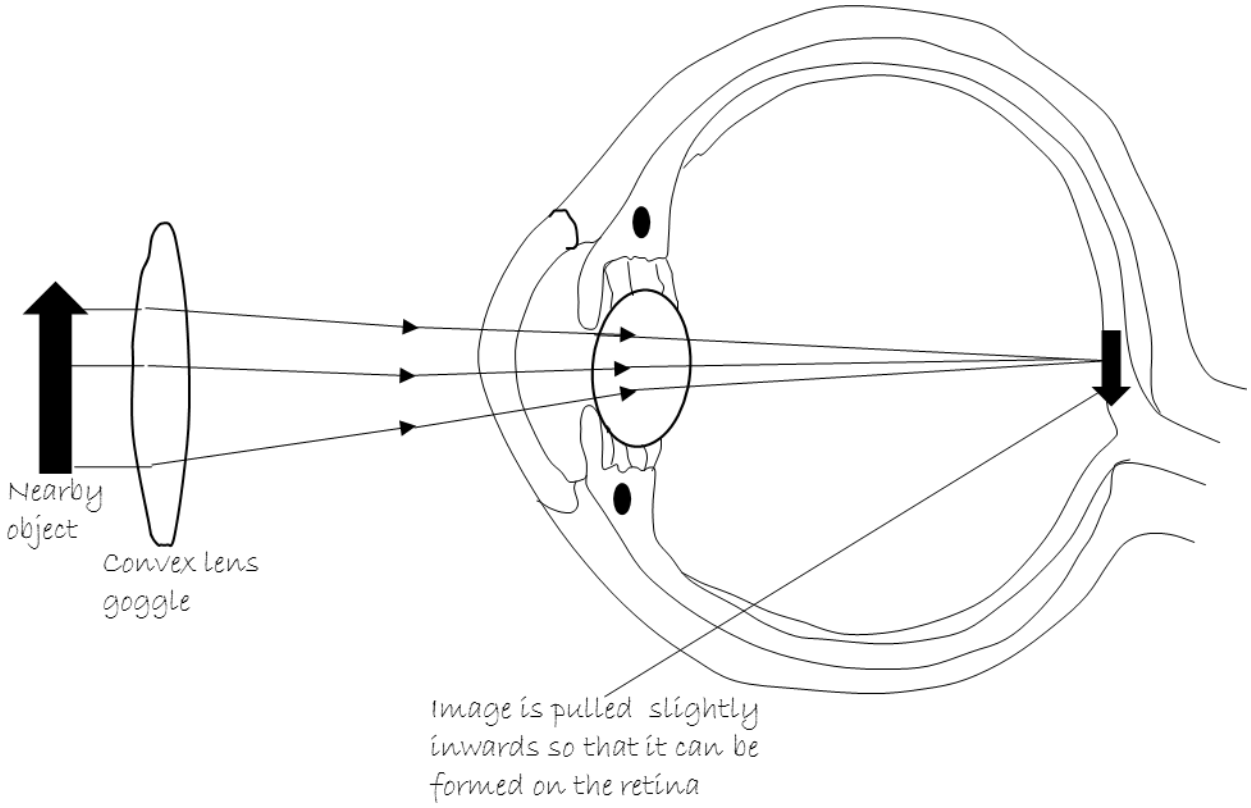
Decrease in the length of the eyeballs hence image forming at the back of the retina. ***S.3 C I B page 41 & C I B: U page 611***

(ii) Using a diagram, explain how long sightedness can be corrected. (04 marks)

The long sightedness is corrected by the patient putting on convex lens goggles.

The convex lens goggle pulls the image slightly inwards so that it can be formed on the retina, hence forming a clear image.

Diagram showing correction of long sightedness



S.3 C I B page 41 & C I B: U page 611

36. (a) Give the meaning of each of the following terms:

(i) Parasitism (2 marks)

Parasitism is a nutritional association between two organisms of different species in which one i.e. the parasite benefits while the host suffers some form of harm.

A parasite is therefore a living organism which establishes itself either on the surface or inside the body of a host, which must be much bigger, stronger and of different species from the parasite.

A host is an organism inflicted with some harm due to its association with a parasite. ***S.4 C I B page 114 & C I B: U page 972***

(ii) Symbiosis (2 marks)

Symbiosis is the close, long-term relationship between two or more organisms of different species.

Symbiosis generally includes all such interactions, whether harmful, helpful, or neutra1 to the interrelating organisms.

Therefore, there are three types of symbiosis depending on whether the relationship is harmful to one of the members, helpful to both members and or neutral to both members i.e. parasitism, mutualism and commensalism respectively. ***S.4 C I B page 111 & C I B: U page 969***

(b) How is tapeworm adapted to its parasitic mode of life? (08 marks)

Tapeworms have flat body which increases surface area for absorption of digested food materials.

They produce eggs that are resistant to the enzymes of the host and the hostile conditions of the stomach such as the concentrated hydrochloric acids and high temperatures.

Their body is designed in such a way that they fit into the alimentary canal of vertebrates. Such designs include absence of legs, arms, eyes etc.

They are hermaphrodites i.e. have both male and female organs for self-fertilization so as to avoid the hustles of finding mates.

They can respire anaerobically i.e. in the absence of oxygen like in the gut to survive in the body of the host.

They have suckers which they use to suck digested food from the gut of the host.

They have hooks that they use for attachment to the guts of the host.

They have a very resistant head called scolex and very resistant body segments called proglotids to resist enzymes that digest proteins in the guts of the host.

They also produce large quantities of mucus around their already resistant body to enhance resistance against the tough hydrochloric acids and protein enzymes.

They also have thick cuticles which provide resistance to the hostile hydrochloric acids and enzymes. ***S.4 C I B page 119 & C I B: U page 977***

(iii) Outline three control measures to prevent the spread of tapeworms in humans. (03 marks)

Proper cooking of meat especially pork and beef.

Proper disposal of human wastes such as faeces i.e.in the toilet or latrines.

Proper disposal of animal wastes such as dung into biofuel generation tanks.

Use of drugs known as albendazole that are sometimes called mabendazole to kill tapeworms in the gut.

Proper meat inspection by public health officers. ***S.4 C I B page 120 & C I B: U page 978***

37. (a) Describe how leaves of green plants are suited for photosynthesis. (10 marks)

Mosaic arrangement is when the leaves arrange themselves in a mosaic pattern i.e. in a way that leaves minimize overlapping one another so as to reduce the degree of shading on one another.

Leaves have large surface area to receive as much light as possible.

Leaves are held at an angle perpendicular to the sun's rays during which they ensure maximum light absorption.

Leaves are thin. If they were thicker, the upper layers would filter out all the light and the lower layers would not photosynthesize.

The cuticle and epidermis are transparent to allow light through to the photosynthetic mesophyll below.

The palisade mesophyll cells are packed with chloroplasts which trap maximum light.

The chloroplasts within the mesophyll cells can move. This allows them to arrange themselves in the best position within the best location within the cells for the efficient absorption of light.

The leaves of some plants like those of beans position their leaves horizontally in the morning hours and late evening hours so that plenty of light falls on the leaves but position their leaves almost vertically to avoid the very high temperatures at mid-day throughout the afternoon to reduce rate of water loss through transpiration.

As water is a liquid raw material for photosynthesis and as the sugar produced is carried away in solution, the leaf has to be adapted to manage this responsibility. For instance, a large central midrib which is possessed by most dicotyledonous leaves. The midrib contains a large vascular bundle comprising of xylem and phloem tissues which can carry out their roles of transportation to aid photosynthesis.

A network of small veins which are found throughout the leaves. These ensure that no cell is far from the xylem or phloem vessels and therefore all cells have a great supply of water for photosynthesis and the means of removing the sugars they produced.

Photo-tropism is when the shoots of plants grow towards light in order for their leaves to receive maximum light. This is because sunlight is a condition that must be present for photosynthesis to occur.

Etiolation is the rapid elongation of the plant shoots which are in dark places to ensure that leaves are brought up into the light as soon as possible. For example, the lush green herbaceous plants growing very tall in the shades like forest floor or under buildings. These plants grow weakly tall so that they can access sunlight before it is too late. ***S.2 C I B page 44 & C I B: U page 252***

(b) Explain how each of the following substances is utilized by a plant.

(i) Water absorbed. (02 marks)

Water is the only source of hydrogen for reducing the carbon dioxide which is an essential main step in the formation of sugars during photosynthesis.

The sugar produced is carried away in solution which therefore will require the use of water absorbed from the soil by root hairs. ***S.2 C I B page 44 & C I B: U page 252***

(ii) Food manufactured. (03 marks)

Some of the manufactured foods will be allocated to the immediate metabolic needs of the leaf itself like the maintenance of cell structure.

Some of the manufactured foods will be allocated to the synthesis of additional leaf biomass.

Most plants, especially dicots, store their manufactured foods as starch, with a smaller amount stored as sucrose.

About half of the newly manufactured foods are allocated for immediate export from the leaf via the phloem to the sink which includes the tubers, seeds, fruits, stems and even the leaves themselves in some plants. ***S.2 C I B page 50 & C I B: U page 258***