O'LEVEL (SCIENCE)

CLASS DISCUSSION QUESTIONS. 17/04/ 2018

BIOLOGY

Instructions **MASTER all questions In all sections**

SECTION A

1. Which one of the following processes need energy?

   A. Osmosis B. Diffusion C. Plasmolysis D. Active transport

2. Which of the following parts of the stem is responsible for secondary thickening that occurs in most dicotyledonous plants?

   A. Pericycle B. xylem C. Vascular cambium D. Phloem

3. Which one of the following is most likely to be deficiency of magnesium in plants?

   A. Yellowing of leaves and stunted growth

   B. Poor root growth

   C. Weak stems

   D. Yellow spotted leaves

4. Fructose and glucose condense to form…

   A. Lactose B. Maltose C. galactose D. sucrose

SECTION B

5. An experiment was performed to find out how fast a plant photosynthesized as the concentration of carbon dioxide in the air around it was varied. The results were shown in the table.

CO_2 concentration by volume (%)	Rate of photosynthesis (arbitrary units)

	Low light intensity	High light intensity
0.00	0	0
0.02	20	33
0.04	29	53
0.06	35	68
0.08	39	79
0.10	42	86
0.12	45	89
0.14	46	90
0.16	46	90
0.18	46	90

a) Plot the results on the same set of axes on a graph paper. (10marks)

b) What is CO_2 concentration in normal air? (1marks)

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c) What is the rate of photosynthesis at this CO_2 concentration in high light intensity? (2marks)

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d) i) Describe the shape of the curve for the rate at low light intensity. (3marks)

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ii) Give an explanation for the shape of the curve described in d(i) above. (3marks)

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e) What is the relationship between light intensity and the rate of photosynthesis? (1mark)

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f) Suggest one way by which the rate of photosynthesis can be measured. (1mark)

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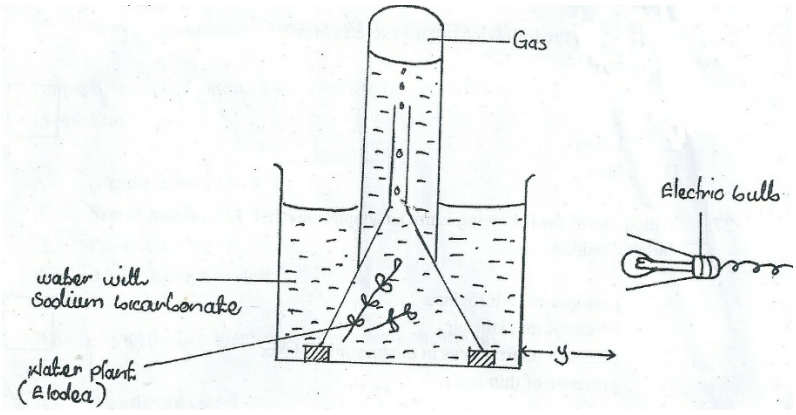
6. An experiment was set up to collect the gas produced when a green plant (*elodea*) in water with sodium bicarbonate was illuminated by light from a bulb in a dark room.



When the light source was placed at different distances (y increased) from the plant, the following results were obtained.

Distance (y) in cm of light source from plant	Volume of gas (cm^3/min)produced
2	1.00
4	0.50
6	0.35
8	0.25
10	0.20
12	0.18
14	0.16
16	0.12

(a) Using a graph paper, plot a graph of volume of a gas produced per minute against distance of the light source from the plant (y)
(6mks)

(b) Describe the relationship between the distance of light source from the plant and the volume of gas produced per minute.
(2mks)

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…….

(c) State the name of

(i) The process described (1mk)

……

(ii) The gas produced by the process (1mk)

…….

(d) How can the rate of the process be determined? (1mk)

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(e) What would happen to the volume of the gas produced per minute if

(i) Sodium bicarbonate was completely replaced by distilled water? (1mk)

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…….

(ii) The temperature of water was increased from 25^0C to 40^0C? (1mk)

…….

(f) Write down the equation to show the reaction taking place in the water plant (2mks)

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(g) Apart from light, state other three conditions and their effect/use to the above process

Condition use (3mks)

(i)……
……

(ii)……
…….

(iii)……
…….

(h) State two limiting factors to the above process (2mks)

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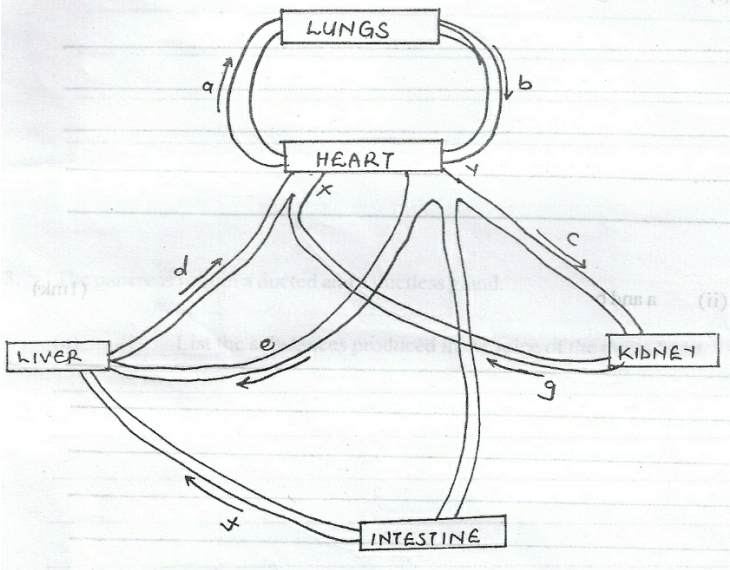
7. The figure below represents blood vessels, supplying selected organs. The arrows show the direction of blood flow.



(a) Name the labelled (a) to (f) (3mks)

a……..

b……..

c……..

d……..

e……..

f……..

(b) State the differences in the composition of blood in vessels.

(i) c and g (2mks)

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(ii) a and b (1mks)

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……

(iii) d and f (2mks)

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……
……

(c) Explain the difference in blood pressure in blood vessels x and y (2mks)

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8. The equation below summarizes the regulation of glucose in the liver.

Glucose $\underset{Y}{\overset{X}{\rightleftharpoons}}$ Glycogen

(a) Name the hormones X and Y (1mk)

(i) X …… (ii) Y……

(b) Name the gland which produces X and Y (½mk)

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(c) State three enzymes produced by the gland named in (b) (1½mks)

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……
……

(d) What disease is the person likely to suffer from if the gland named in (b) is faulty? (1mk)

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(e) For treatment of the disease named in (d), X is administered to the patient through injection. Why isn't X taken through the mouth? (1mk)

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(f) Give any other four functions of the liver (4mks)

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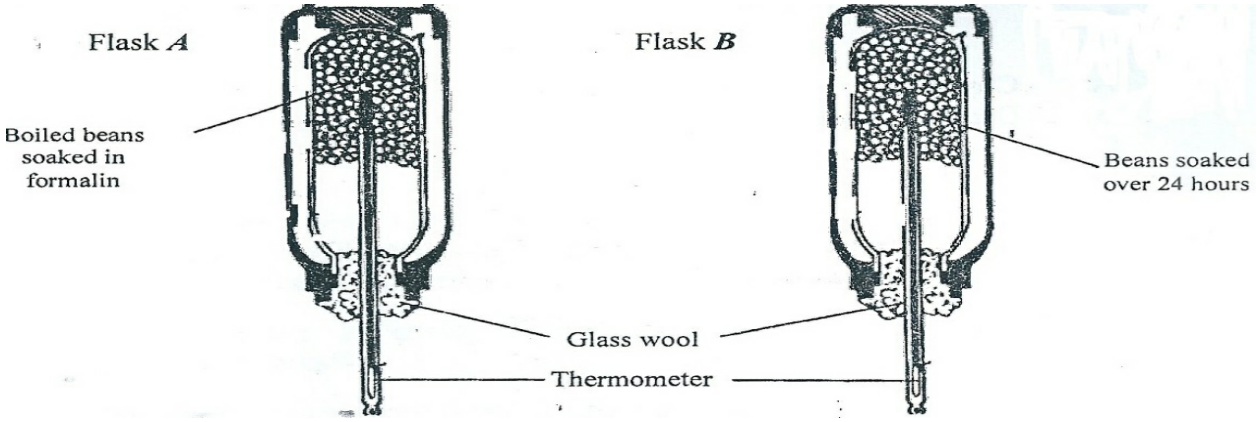
……
……
……

(g) Name the blood vessel that connects the liver and the ileum (1mk)

……

9. In an experiment, two sets of beans ***A*** and ***B*** obtained. The seeds in set A were boiled for 30 minutes and soaked in formalin. The seeds in set ***B*** were soaked for 24 hours. The two sets of beans were separately placed in vacuum flasks ***A*** and ***B***. Each flask was plugged with cotton wool and a thermometer inserted. The two flasks were clamped in an inverted position as shown in the figure below.



(a) What was the aim of the experiment?
(1mk)

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(b) Explain why the beans in flask A were

(i) Boiled for thirty minutes
(1mk)

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……

(ii) Soaked in formalin
(1mk)

……
……

(c) Why were the beans in flask **B** soaked for 24 hours?

(1mk)

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……..

(d) Explain why in the experiment;

(i) Vacuum flasks were used instead of conical flasks?
(1½mks)

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……..

(ii) The flasks were plugged with cotton wool instead of rubber bungs
(1½mks)

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(e) State three conditions that affect the process being investigated in the experiment.
(3mks)

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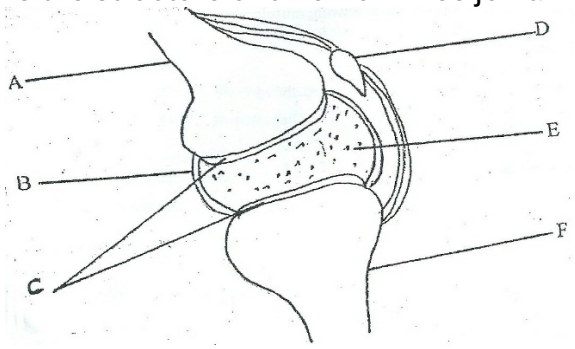
10. The diagram below shows the structure of a human knee joint.



(a) Name the parts A – F (3mks)

A…….. B……..

C…….. D……

E…… F…….

(b) What type of joint is this? Give a reason for your answer.
(2mks)

……

……

……..

(c) State the functions of parts C and E
(2mks)

C……

E……

(d) Name the bones that articulate with bones A and F labelled on the diagram
(2mks)

……
……

(e) State the skeletal system of the mammalian endoskeleton to which the structure in the diagram belongs
(1mk)

……..

SECTION C

11.(a) What are the adaptations of a gill for gaseous exchange?
(5mks)

(b) Describe the mechanism of gaseous exchange in a bony fish.
(10mks)

12. (a) Describe an experiment to demonstrate phototropism in plant shoots including the control.
(10marks)

(b) What is the importance of tropic responses to plants (5marks?)

13.(a) Describe the following types of joints giving two examples;
(6mks)

(i) Hinge joint
(ii) Ball and socket joint
(iii) Fixed joint

(b) With the help of diagrams, explain the action of antagonistic muscles in bringing about flexing and stretching of the fore limb of man.
(9mks)

14(a) State four reasons why birds fly? (2mks)

(b) In which ways are birds adapted for flight.
(07mks)

(c) With two examples in each case, describe the following types of skeletal systems.
(6mks)

(i) Endoskeleton
(ii) Exoskeleton
(iii) Hydrostatic skeleton

15.(a) Distinguish between endothermic and ectothermic organisms (2mks)

(b) What are the advantages of
(i) Endothermic (3mks)
(ii) Ectothermic conditions in animals (2mks)

(c) How do poikilotherms respond to;
(i) Increased environmental temperatures? (4mks)
(ii) Decreased environmental temperatures? (4mks)

16 a) Briefly describe the digestive processes that take place in
(i) the duodenum (5mks)
(ii) the ileum (4mks)
(b) How is ileum adapted to its function? (4mks)
(c) How is the absorbed food utilized by the animal? (2mks)

17(a) What is meant by the term placentation? (1mk)

(b) With the aid of diagrams, describe the following types of placentation in fruits. (14mks)

(i) Marginal placentation

(ii) Axile placentation

(iii) Free central placentation

(iv) Parietal placentation

18.(a) Describe an experiment to show that a leaf exposed to sunlight manufactures starch for the plant. (11mks)

(b) State any four modifications of leaves for any other functions
(4mks)

19. (a)(i) What is meant by diffusion? (2mks)

(ii) What factors affect the rate of diffusion? (5mks)

(b) What is the significance of diffusion in living organisms?
(4mks)

(c) Compare diffusion and osmosis
(4mks)

20.(a) Explain how a plant benefits from transpiration (4mks)

(b) Describe how plants in arid areas control excessive water loss.
(11mks)

END

"MASTERING BIOLOGY" *Prepared by: Katumwesigye Abert*

SUMMARY SECTION C **Any correction is accepted**

11. **a). Adaptations of a gill**

-Has Gill bar that provides an attachment and support to the gill filaments.

-Has gill raker: These are hard projections from the gill bar, that protect the gill filament by filtering out sand particles in water before reaching the gill filament;

-Has gill filaments: These are sites of gaseous exchange in the fish; They are finger-like projections that increase the surface area for gaseous exchange; They have a network of capillaries whose blood moves in the opposite direction with water (counter current flow) to maintain a high concentration gradient by carrying away the diffused gases; Filaments have a thin membrane to reduce diffusion distance of gases; They are well ventilated for easy diffusion of gases; They are numerous to increase the surface area;.

b). **mechanism of gaseous exchange in fish**

Inhalation

i. The mouth opens
ii. The floor of the mouth is lowered
iii. The volume in the mouth cavity increases
iv. The pressure inside the mouth cavity reduces below the atmospheric pressure
v. Water rushes into the mouth
vi. The operculum bulges out but the opercula flap presses onto the body and remains closed
vii. Volume in the gill chamber increases
viii. Pressure decreases in the gill chamber, allowing in water from the mouth cavity
ix. Water flows over the gill filaments
x. Oxygen diffuses from water through the gill filaments into the capillaries
xi. Carbon dioxide diffuses out of the capillaries into the water

Exhalation

i. The mouth closes

ii. The floor of the mouth is raised

iii. The volume in the mouth cavity reduces

iv. The pressure in the mouth cavity increases, forcing the water into the gill chambers

v. The operculum presses inwards

vi. The volume of the gill cavity reduces while the pressure increases

vii. The opercula flap opens

viii. Water is forced out of the gill chamber.

12 a) <u>Experiment to demonstrate phototropism in plant shoots.</u>

Materials

2 Potted plants, 2 opaque boxes, klinostat and Razor blade

Procedure

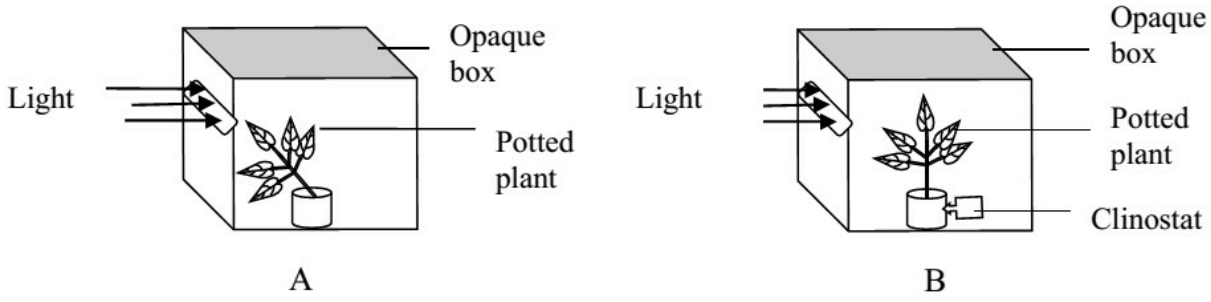
a) Get two opaque boxes and using a razor blade cut a small hole on one side of each.

b) Get two potted plants of equivalent size.

c) Place one in box A and another in box B but fixed on a klinostat to serve as the control experiment. Place both boxes in light and start the klinostat to rotate the plant in box B.

d) Leave the experiment for 3-4 days.

Setup



Control

Observation:

The shoot in A bent towards the direction of light while that in B continued to grow straight. **Explanation:**

Light coming from one direction in A made the stationary shoot to bend towards the direction of light. Because the shoot in B was rotating on a clinostat all of its sides

received equal amounts of light and there was no effect on growth.

Conclusion:

The shoot responds positively towards light.

b). Importance of tropisms to plants

1. It enables plants leaves to trap maximum sunlight by enabling plant shoots to grow upright.
2. It enables plants to become firmly anchored in the soil by the roots growing towards the ground.
3. It enables plant roots to absorb or obtain water which is necessary for plant growth.
4. It enhances fertilization in plants since the pollen tubes grow towards the chemicals of the embryo sac.
5. It enables climbing plants to gain support by twinning around the support.
6. Tropisms allow plant parts to alter direction in response to changing conditions in the environment.

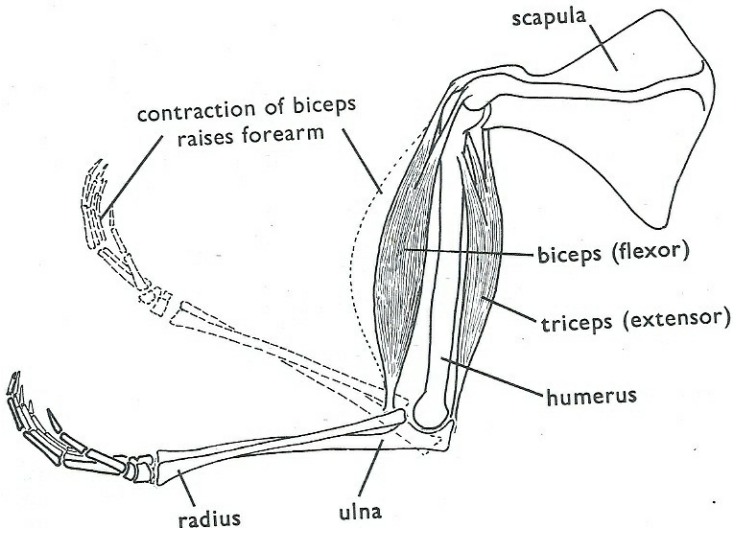
13. a). types of joints

i) **Hinge joint**. This allows movement in one plane for example in the elbow of the hand, in the knee, fingers and between the jaw and skull.

ii) **Ball and socket joint:** this allows movement in all directions. The hip and shoulder joints are ball and socket joints.

iii). Fixed joints: These are joints where no movement is possible for example the joints in the skull (sutures).

b). Movement of the arm at the elbow



The contraction of the biceps (flexor) muscle pulls the radius, which causes the arm to be

raised. This causes the elbow to bend (flex) hence the bending of the whole arm.
When the triceps (extensor) muscle contracts, it pulls the ulna thus straightening the arm.

Protractor	Pull the base of the limb forward.
Retractor	Pull the base of the limb backward

14.

a). <u>birds fly in order to;</u>

- ✓ Look for food
- ✓ Search for mates
- ✓ Avoid danger and catastrophes.
- ✓ Avoid competition with other animals

-Colonize new areas

b) <u>Adaptations of birds to fly</u>

1. They have hollow bones, which make them light in air.
2. They have feathers used for flight.
3. They have streamlined bodies due to lack of external ears and feathers face backward enabling them to minimize air resistance
4. They have an efficient respiratory system to provide the necessary oxygen for respiration by possessing air sacs.
5. They have large flight muscles, which move wings during flight.
6. Their fore limbs are modified into wings to provide a large surface area for flight.
7. They have good eyesight to dodge obstacles and correctly judge distance on landing.
8. They have an efficient circulatory system for quick transport of oxygen and nutrients.
9. They are warm blooded with a high metabolic rate to provide the required energy for flight.
10. They have a high red blood cell count for efficient transportation of oxygen.
11. They have the ability to fold legs away during flight to reduce air friction.

c).

i).<u>Endoskeleton</u>

This is a skeleton found inside the body of an organism. It's made up materials called bone and cartilages.

Cartilage is softer and elastic and it's the first part to form the skeleton in the embryos of all vertebrates and it's gradually replaced by bone as growth takes place. *Man, birds;*

ii).<u>Exoskeleton</u>

This is a skeleton found outside the body of an organism. The exoskeleton is made up of chitin

which is composed of polysaccharides and proteins that make it tough and rigid.
The exoskeleton is rigid and made up of nonliving material. It does not allow increase in size of an insect except for periods when it is shade during moulting. *cockroach, house fly*

iii) Hydrostatic skeleton

This is a type of skeleton made up of a water filled cavity. The cavity is surrounded by a set of antagonistic muscles the circular and longitudinal muscles. Locomotion is caused by compression of the fluid under high pressure by action of muscles on the fluid to form a rigid surface that offers support e.g. in *earthworms, hydra, sea anemones etc.*

15 a).Endothermic/Homoithermic organisms:

Endothermic organisms are those that are able to maintain a constant body temperature irrespective of the surrounding environmental temperature.

Ectothermic/poiklothermic organisms:

These are animals that cannot maintain a constant body temperature but their temperature changes with that of the environment.

b. i). advantages of being endothermic

1. They are always active because their temperature is maintained at an optimum temperature for enzyme activity.
2. They can live in a wide range of environments i.e. both hot and cold.
3. Their metabolic rate is maintained at a high rate due to the ability to maintain a constant body temperature.

ii). Advantages of being ectothermic

1. Low food consumption due to low metabolic rate.
2. Easy to control body temperature by only behavioral means.

c. i). During hot conditions, they lose heat by.

1. They rest on cold rocks to lose heat by conduction.
2. They rest on cold stones and in shades to lose heat.
3. They burrow in cracks and lose heat by radiation.
4. Aestivation. This is a state of long rest by burrowing underground or under rocks

during high temperatures.

5. Thermal gaping. This is the opening of the mouth to lose water by evaporation. This results into cooling. Thermal gaping occurs in crocodiles and a few other reptiles.

ii). <u>During cold conditions, they gain heat by;</u>

1. Resting on hot rocks to gain heat by conduction.
2. They rest under the sun to gain heat by radiation.
3. They rest near hot bodies to gain heat by radiation.
4. They burrow in hot sand to gain heat by conduction.
5. Basking in the sun to gain heat.
6. Hibernation. This is a state of long rest by burrowing into crevices and holes during extreme coldness.

NOTE

Disadvantages of being endothermic

1. Having a high rate of food consumption due to high rate of metabolism.
2. Maintaining the body temperature constant requires much energy.

Disadvantages of being ectothermic

1. They have limited body activity in cold environments.
2. Show response to stimuli due to low metabolic rate.

16

i). <u>In the duodenum</u>

The chyme from the stomach enters the duodenum in small quantities at a time regulated by the ***pyloric sphincter.*** There are access organs which provide secretions. They secret bile from the gall bladder and pancreatic juice from the pancreas

The arrival of food in the duodenum stimulates the production of a hormone called ***secretin*** from the pancreas and another hormone called ***cholecystokinin*** which stimulates secretion of **bile** from the gall bladder.

Bile is produced in the liver and stored in the gall bladder. It contains a number of salts which have a number of functions:

1. They neutralise acidic chyme to an alkaline pH
2. They emulsify fats
3. They remove excretory products like cholesterol
4. They react with fat soluble vitamins and cholesterol to make them water soluble and hence easier to remove

The secretions are alkaline thus stopping the action of pepsin and provides an ideal medium for enzymes in pancreatic juice to work. Pancreatic juice contains a number of enzymes which are called the *pancreatic enzymes.*

Enzymes	**Food acted upon**	**Products**
Trypsin	Proteins	Peptides and Amino acids
Pancreatic amylase	Starch	Maltose
Pancreatic lipase	Lipids	Fatty acids and glycerol

ii**). in the ileum**

This is where final digestion takes place.

Food moves down from the duodenum into the ileum by peristalsis.

The presence of food in the ileum stimulates the secretion of the ***intestinal juice, succus entericus by walls of the ileum***.

Succus entericus contains several enzymes which complete the process of digestion forming a milky fluid substance called ***chyle*** (food after final digestion is called **chyle**).

Enzymes	**Food and Upon**	**Products**
Sucrase	Sucrose	Glucose and fructose

Maltase	Maltose	Glucose and glucose
Lactase	Lactose	Glucose and galactose
Peptidase	Polypeptides	Amino acids
Lipase	Lipids	Fatty acids and glycerol

The composition of chyle is a group of soluble end products of digestion namely; Glucose, Fructose, Amino acids, Glycerol, Vitamins and Mineral salts.

Trypsin is also secreted in an **inactive** form, **trypsinogen** to prevent it from digesting the duodenum walls.

b).<u>The ileum shows various adaptions to suit the process of absorption which includes:</u>

1. It is long, wide and folded to provide a large surface area for maximum absorption of the soluble food substances into the blood stream.
2. It has numerous finger-like projections called villi which offer a large surface area for maximum absorption of soluble food substances into the blood stream.
3. Its epithelium has tiny projections on the cells called microvilli which further increase the surface area for efficient food absorption.
4. It has a thin epithelium which reduces the diffusion distance for the soluble food substances into the blood stream in order to allow a high rate of diffusion.
5. It has a permeable epithelium which allows movement of soluble food substances across it into the blood stream with minimum resistance.
6. Each villus has a dense network of blood capillaries which offer a large surface for the absorption of food materials and also allows the absorbed food materials to be rapidly carried away from the absorption area which maintains a steep diffusion gradient for more materials to be absorbed.
7. Each villus contains a lacteal, a branch of the lymphatic system in which fatty acids diffuse as well as glycerol, and become transported away from the gut.
8. Its cells have numerous mitochondria to produce sufficient energy for transport of food from the ileum to the blood.
9. It is line with a lot of mucus to prevent self-digestion.

c). Absorbed food utilized

1) Carbohydrates: (Glucose)

Glucose is mainly broken down in the process of respiration to provide energy for the body's metabolic process.

Excess glucose is stored as **Glycogen** (animal starch); however, the liver has the ability to re-covert back the glycogen to Glucose in periods of starvation.

2) Proteins

Amino acids are used in the synthesis of new proteins especially regulators like enzymes, and hormones.

Some Amino acids are used in body growth and repair and in absence of Glucose and Fats, Amino acids can instead be used in the process of respiration to produce energy.

Excess Amino acids are not stored in the liver, they are instead **deaminated** by the liver (removal of the Amino group) to form urea which is then passed on to the kidneys and excreted in urine.

Deamination is the removal of the amino group from Amino acids to form urea (which is a toxic waste product).

3) Lipids (Fatty acids & Glycerol)

Fatty acids and glycerol in the absence of Glucose can be oxidized to release energy. Fats produce much more energy compared to glucose considering the same amount by mass.

Fats are used for body insulation i.e. they prevent heat loss from the body which is an important temperature regulatory mechanism.

Lipids are used in the formation of structures like the cell membrane.

Excess fats and Glycerol are stored under the skin in the **adipose tissue.**

17.

a). Placentation This is the distribution of the placentae in the ovary or the arrangement of the seeds on the placenta within the ovary.

b). The types of placentation as shown in the table below.

Type of Placentation	Description	Diagram

Marginal	Ovules are situated at or near the margin of the ovary Beans, peas, cassia	
Axile	Ovules centrally located in the ovary with ovary divided into many chambers. Orange and tomato	
Parietal	Placenta is found on the inner wall of the fruit and the ovules are attached on the inner wall. Passion fruits pawpaw, cocoa	

Free central	Ovules located on the projection from the base of a one chambered fruit. Green pepper	

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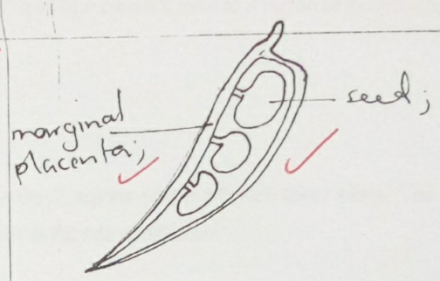
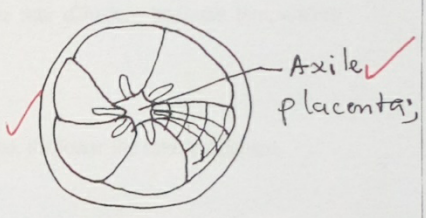
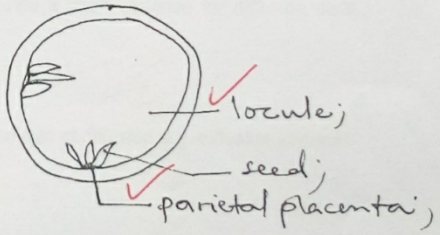
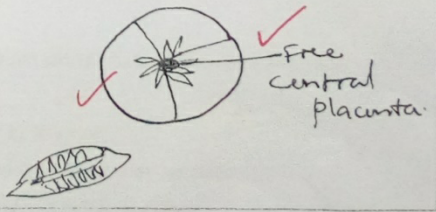
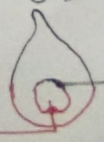
3½ placentation; is the distribution of placenta in the ovary or arrangement of the seeds on the placenta with in the ovary;

b) The types of placentation as shown in the table below.

Type of Placentation	Description	Diagram
Marginal	Ovules are situated at or near the margin of the ovary Beans, peas, cassia	 3½
Axile	Ovules centrally located in the ovary with ovary divided into many chambers. Orange and tomato	 3½
Parietal	Placenta is found on the inner wall of the fruit and the ovules are attached on the inner wall. Passion fruits pawpaw, cocoa	 3½
Free central	Ovules located on the projection from the base of a one chambered fruit. Green pepper	 3½

note
If Basal; → placenta arises from the base of ovary; fruit is usually single seeded; eg mango; Avocado;



15

18 a). An experiment to test leaf for starch

The presence of starch is evidence that photosynthesis has been taking place. **Apparatus:**

- A green leaf,
- water bath,
- Iodine solution,
- Water
- Ethanol (absolute alcohol (99%-OH),
- beaker,
- white surface or tile

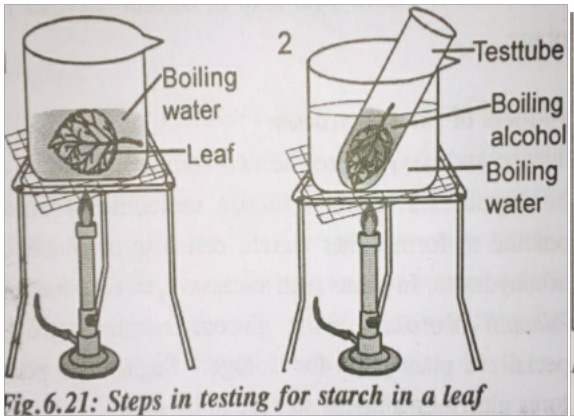


Fig.6.21: Steps in testing for starch in a leaf

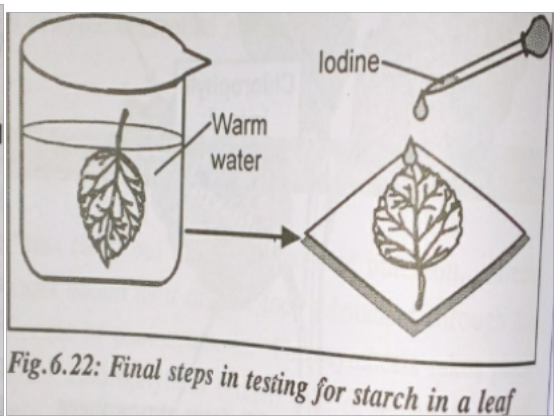


Fig.6.22: Final steps in testing for starch in a leaf

Procedure:

1) A leaf from a health plant which has been receiving sunlight is removed and placed in boiling water (water bath) for about 5 minutes. This softens the leaf cell wall protoplasm and makes it permeable to Iodine.
2) The leaf is then placed in a beaker containing 99% alcohol and boiled using a water bath until all the chlorophyll is dissolved out. The leaf becomes colourless and this makes detection of any colour changes possible and easier.
3) The leaf is then washed in hot water which softens it.
4) The leaf is now spread on a white surface tile and drops of iodine added on it.

Observation:

A blue black colour shows that starch is present.

NOTE: If the brown colour of iodine persists/ remains this shows that the leaf lacks starch or the starch is absent.

Conclusion:

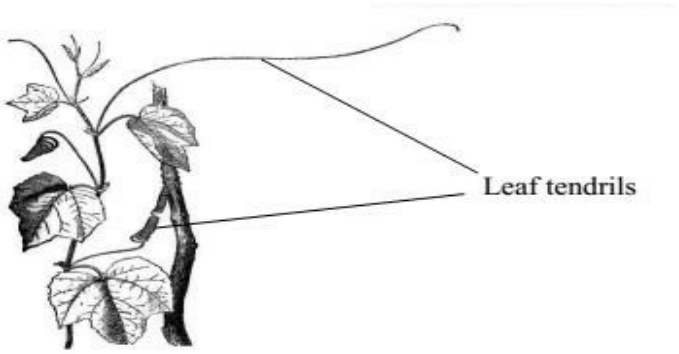
The presence of starch in a leaf shows that photosynthesis was taking place.

b). <u>Modification of leaves</u>

Leaves of some plants have become modified to perform other functions other than photosynthesis.

1. **Leaf tendrils**

These are slender wire like coil structures used as climbing organs in climbers for support. The leaf may be partly modified into a tendril.



2. **Leaf spines**

These are sharp pointed structures of certain plants modified for defense.

3. **Scale leaves**

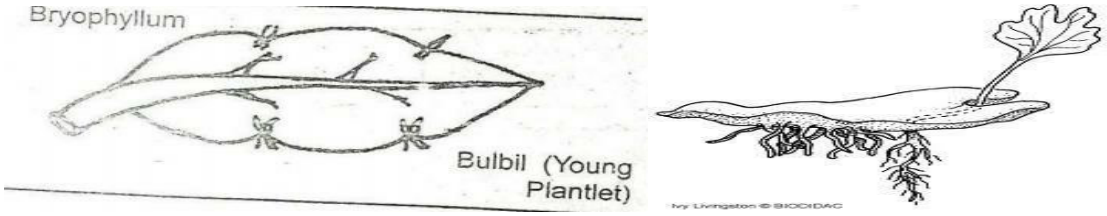
These are thin, dry membranous structures usually brown in colour and sometimes colourless. Their main function is to protect the axillary bud from mechanical injury and drying out. They are commonly found on underground stems. E.g. scale leaves of onions, rhizome and garlic.

4. **Insectivorous leaves**

These are modified leaves whose function is to capture and digest insects. Such plants are called insectivorous plants. Pitcher plants grow in soil with a deficiency of nitrogen/nitrates. They obtain nitrogen from insects. E.g. Venus fly trap, butter wort, sundew, bladder wort, nepenthes, and the pitcher.

5. Bryophyllum leaves

Leaves have series of buds at the end of vein. These buds grow into new plants (plantlet) when the leaf is mature.



19.

a) i). Diffusion This is the movement of molecules from a region of their high concentration to a region of their low concentration.

ii). Factors affecting the rate of diffusion

1) Concentration gradient

Concentration gradient is the difference in concentration between the 2 regions where diffusion takes place. The higher the concentration gradient between the two regions, the faster is the rate of diffusion.

2) Temperature

The higher the temperature of the substances (molecules), the faster is the rate diffusion, because temperature increases the kinetic energy of molecules.

3) Size/density of molecules

The smaller the molecules, the faster the rate of diffusion. The denser the particle, the lower the rate of diffusion.

4) Distance over which diffusion occurs

The shorter the distance between the two regions of different concentration, the greater is the rate of diffusion like the alveoli of lungs or the epithelial linings of the ileum are thin to provide a short distance for diffusion thus increasing the rate of diffusion.

5) Surface area over which diffusion occurs

The larger the surface over which diffusion is to take place, the faster is the rate of diffusion

e.g. diffusion surfaces like the ileum have numerous villi to increase the rate of diffusion.

b). Significance of diffusion to organisms

i) It helps substances to move in and out of cells.

ii) Plant root hairs take up some salts by diffusion

iii). Unicellular microorganisms like amoeba, take in oxygen and pass out carbon dioxide through the cell membrane by diffusion.

iv).Digested food e.g. simple sugars, amino acids, enter the blood from the gut by diffusion.

v).Once dissolved in blood, the food substances diffuse out of the blood into the cells where they are needed.

vi) Oxygen diffuses into blood and CO_2 out of blood in the lungs of mammals and gills of fish by diffusion.

vii) Waste products of metabolisms e.g. nitrogen containing substances like urea, diffuse out of the animal cells into blood.

20.a). **Importance of transpiration (functions / advantages)**

a) Results in the absorption of water and its movement up the plant to aid processes like photosynthesis.

b) Contribution to maintenance of continuous stream of water throughout the plant.

c) Transported water keeps the plant cells turgid and cools the plant.

d) Results in the movement of mineral salts up the plants to where they are needed.

b).arid plants to reduce water loss.

i) Shedding off of leaves in deciduous plants to reduce transpirations since most of it occur from the leaves

ii) Reducing the number, size and distribution of the stomata and only on lower epidermis

iii) Structural adjustments in stomata i.e. some plants have sunken stomata and others have hairy stomata which reduces evaporation from them.

iv) Reduction in leaf structure i.e. some plant leaf are reduced to narrow or thorny / spines structures that reduce surface area over which transpiration occurs.

v) Rolling of leaves to create a humid atmosphere around the stomata in order to reduce water loss.

vi) Possession to thick cuticle of the leaves to prevent water loss through it.

vii) Thick leaves that store water

viii) Changes in the rhythm of stomata opening i.e. they close during day and open at night when temperatures are very low.

ix) They shed off their leaves in extremely hot environment to cut down water loss.

x) Reversed opening and closing of stomata. Stomata open at night and close during the day when it's rate of transpiration is likely to be higher.

End

"The sky is the limit"