MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATIONS

BIOLOGY PRACTICALS

IN BIOLOGICAL PRACALS WE TEST MANY SKILLS OF WHICH SOME OF THEM ARE AS FOLLOWS:

(I) Problem solving skills
(II) Interpretation skills
(III) Drawing skills
(IV) Accurancy
(V) Neatness
(VI) Knowledge in graphical questions

PROBLEM SOLVING SKILLS

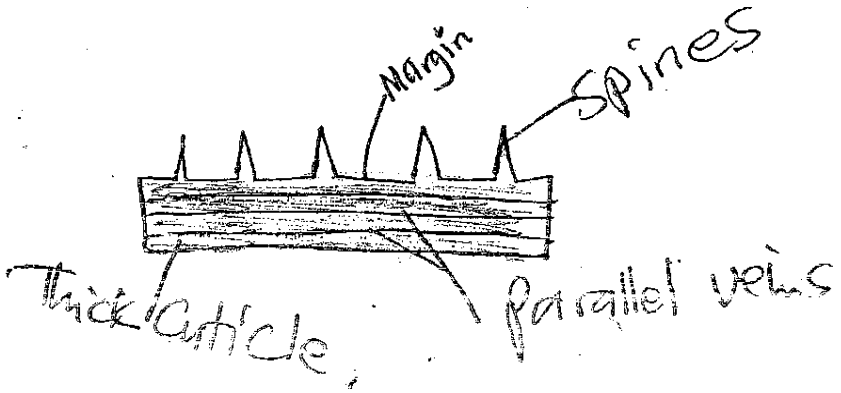
-You are provided with specimen X and Y .
X is a sisal leaf.
Y is a grass leaf.

NB: - Both have parallel veins
- Both are monocots , we know that because of the parallel veins

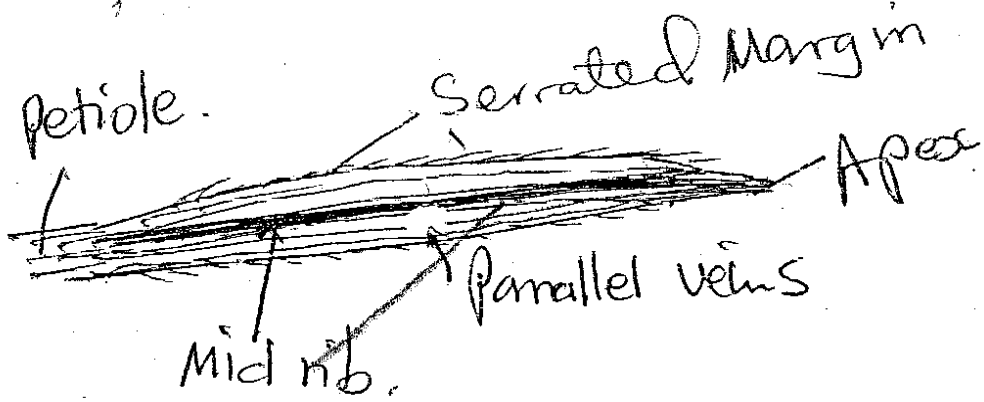
POSSIBLE QUESTIONS

(a) Draw those specimens and label and calculate the magnifications of your drawings
- A magnif9ication is the number of times in which the figure is adjusted in comparison with the real size of the specimen .
- A very small organization or specimen can be enlarged to a certain scale so as to be drawn and be seen as a figure on a paper. For instance the specimen may be enlarged twice its size and be drawn on paper .
- A very large organims may be reduce to half its original size and be drawn on paper .
- Drawings of the specimens given in the question above are as follows:

SISAL LEAF



A GRASS LEAF:



MAGNIFICIATIONS :

- Magnification is calculated by using a formular:

$$\textbf{Magnification} = \frac{\textbf{Length of the drawing}}{\textbf{Length of the specimen}}$$

$$\textbf{OR Magnification} = \frac{\textbf{Length of the image}}{\textbf{Length of the object}}$$

- This simphy means that it's a must for the students to measure the longest axis of he drawing or the image as well as the longest axis of the specimen or object
- Make sure you divide the two numbers accurately and give your answer in number of times.
- For example, assuming that the length of the drawing is 5cm and the length of the specimen is 10cm . This means that the size of the drawing is reduced to half the size of the real specimen or object .

Its magnification will be

$$= \frac{\textbf{5cm}}{\textbf{10 cm}} = \textbf{0.5 X}$$

NB: 0.5 X or X 0.5 **0.5 means ½** **X means times**

Therefore the magnification is real as zero point five times.

(b) If the magnification of the specimen X2 and the length of the specimen is 10 cm . Find the length of the drawing or the image.
In such kinds of questions you are supposed to consider the formular and substitute the number make the one to be found as a subject of the formular

SOLVING :

Magnification = $\frac{\text{Length of the drawing}}{\text{Length of the specimen}}$

In short M = $\frac{LD}{LS}$

$\therefore X 2 = \frac{LD}{10CM}$

$10\ CM \times 2 = \frac{LD \times 10CM}{10CM}$

$\therefore$ Length of the drawing = 20cm

DRAWING SKILLS

(i) You are required to draw exact figures as compared to the real specimens
- In exactness I mean out looking eg parts to be labeled etc.

(ii) You are required to use pencils when drawing. No use of pens in examination papers.

(iii) You are not required to use arrows when labeling parts of the drawings or figures but use lines .

(iv) Make sure that the lines do not cross each other. When labeling the parts of the figures in question.

(v) Be neat. Observation of neatness is a must for a candidate to be awarded more marks.

(vi) Avoid painting the figures unless if being told to do so eg shadding figures

(vii) Do not use different colours of pencils when drawing or labeling the figures

(viii) Point the exact part of the figures when labeling

DESCRIPTIONS:

- For example, a comparison between the desert plants and non desert plants .

SISAL LEAF:

- This is a desert plant for does withstand the dry conditions.

ADAPTATIONS OF ALL DESERT PLANTS INCLUDING SISAL LEAF /PLAN

(i) Have thick cuticles.
- These resist the sunlight energy to center the leaves. Transpiration is reduced an the water inside the leaves is used for a long period of time.

(ii) Have thick stems.
- These keep more water and enable these plants to withstand dry conditions

(iii) Have hairly bodies which provide shades to the plants and these reduce the rate of transpiration .

(iv) Have thorns : These prevent predators from damaging the plants.

(v) Others produce waxy materials

These play two roles ie.

- Reducing rate of transpiration
- Resisting the predators from damaging the plants in question.

OTHER PLANTS WHICH SURVIVE IN DRY CONDITIONS

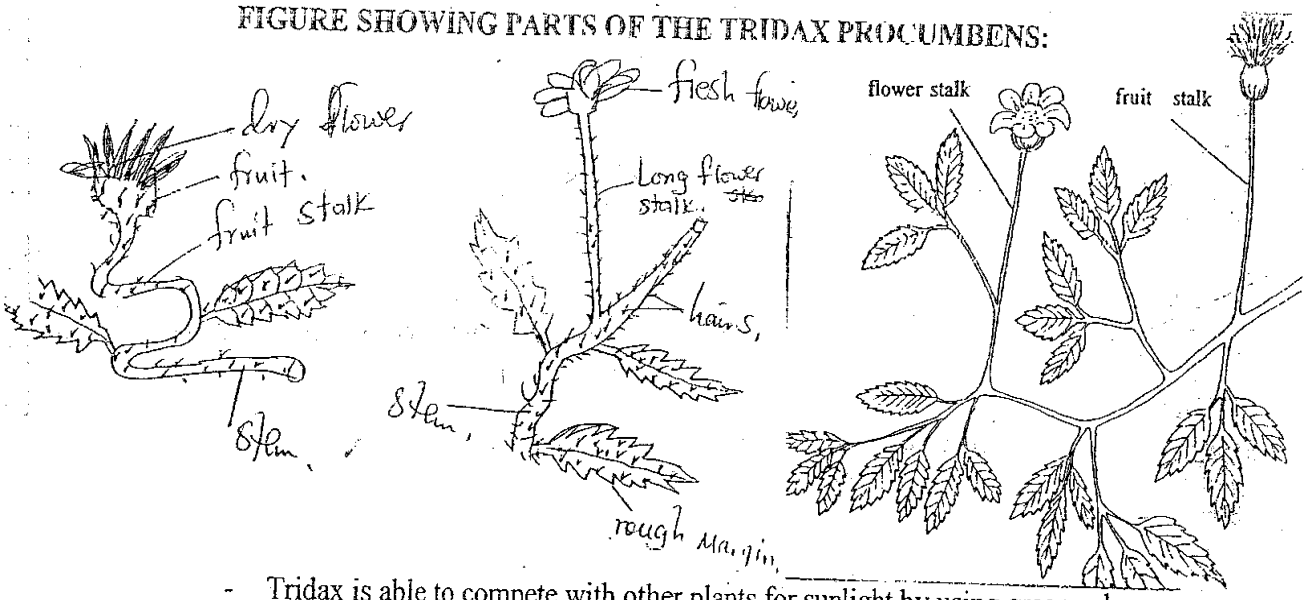
(A) Tridax procumbens
- We study this plant in biology the following reasons:

0.1 They grow / exist through out the year
0.2 They do have both desert plants and non desert plants characteristics
0.3 One plant is found in all stages at once eg growth stage , maturity stage , flowering stage and dried stage
0.4 They grow in dry type ~~of~~ condition of the soil eg fertile or infertile soil

- The most common things asked in MSCE examinations are :

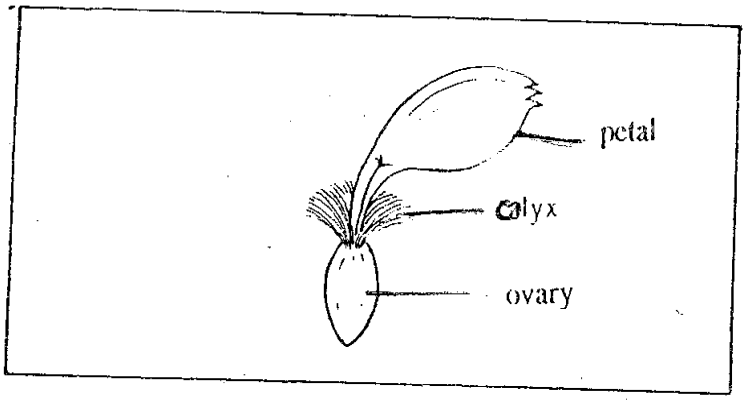
(i) Drawing ~~of plant~~ of the plant.
(ii) Parts of the plant drawn
(iii) Drawing of the flower
(iv) Drawing of the fruit
(v) How it is spread
(vi) How do you count number of the plants in an environment eg a given piece of land .

FIGURE SHOWING PARTS OF THE TRIDAX PROCUMBENS:



- Tridax is able to compete with other plants for sunlight by using green colour which trap sunlight . It also uses the long stems which over plants
- It has a long flower stalk which exposes the flower to the insects for pollination
- It has hairs which prevent it from being damaged by small predators eg insects.
- These hairs also prevent excessive transpiration
- It has a composite flower , it is called a composite flower because it is made up of many florets (small petal)
- There are two types of florets in it and these are: ray florets and tubular florets

A RAY FLORET:



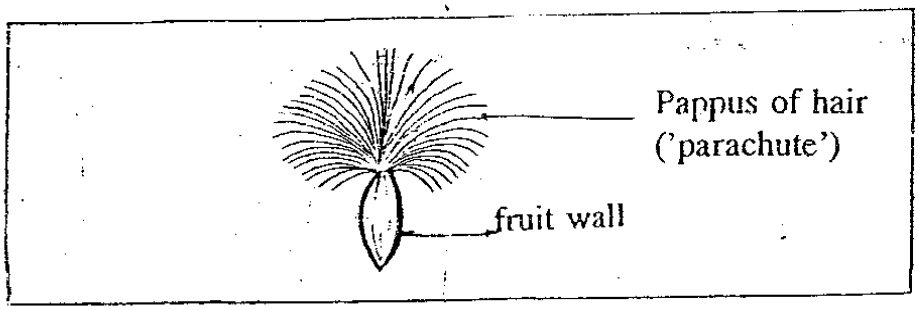
-A ray floret attracts insects for it is brightly coloured

A TUBULAR FLORET:

- This produce seeds
- Tridax procumbens avoids self pollination for it has the stigma allocated above the stamen while pollen grains are produced in stamens particularly in the anthers.

- The stigma ripens first than the stamen this results into cross pollination by use of insects.

TRIDAX FRUIT



- The dispersal of seeds or fruits is always through wind .This is possible because of the parachutes (pappus of hair)
- The fruit is blown away to the far distances for the fruits fly by use of these parachutes

TRIDAX AND ITS ENVIRONMENT

PREDATORS: it has tough leaves with hairs which protect it from damages caused by the predators eg. Small herbivores.

COMPETITORS:

- It succeeds the competition for light by ways:

(i) By creeping to other plants
(ii) By branching repeatedly to enlarge the surface area for sunlight absorption

POLLINATORS

- These plants depend on insect pollination reasons are that, the stigma is above the male plant anthers. The stigma ripens fast than anthers. The petals are brightly colored to attract the insects
- The flower stalks are very long to expose the flowers to the insects.

LIGHT

- This plant needs light for photosynthesis .It grows where there is short grass to get enough light not under tall trees or grasses.
- It has more chlorophyll on the upper side of the leaves for it is the part which receives the sunlight for photosynthesis ,

WATER

- This plant survives very well where there is shortage of water because of the following:

(i) In dry season, the number of leaves is reduced due to shedding off of leaves, this reduces the rate of transpiration and very, little water available is always enough for the plant.

(ii) For prolonged drought
- It survives in form of seeds

(iii) It has very thick cuticles, this also reduces rate of transpiration. This makes the plant to use little water available for photosynthesis.

(iv) These plants produce waxy materials which also reduce rate transpiration

MINERAL SALTS;

- It is able to grow in both fertile and infertile soils. It accommodate both diffusion and active transport systems eg When nutrients like minerals are few in the soil, the few molecules move against the concentration gradient by use of energy hence active transport.
- When there is high concentration of minerals in the soil, the move into the plants through diffusion process.

WIND

- This is a very important aspect in pollination this plant for it blows the fruits from one place to another

POSSIBLE FOOD CHAINS FROM THE TRIDAX PROCUMBENS

(i) Tridax → goat → man
(ii) Tridax → hare → leopard → Lion
(iii) Tridax → rabbit → man (any one)

HOW DO YOU COUNT TRIDAX PROCUMBENS IN THE FIELD

- Use the quadrat method
- Measure the field and find its area
- Extract a quadrat (small square) from the main square . Count how many small squares (quadrats) are in the large square (field) . Count how many plants are in the quadrat.
- Multiply number of quadrats by number of plants in the quadrat. The number that is found (product) is an estimate of plants in the whole field

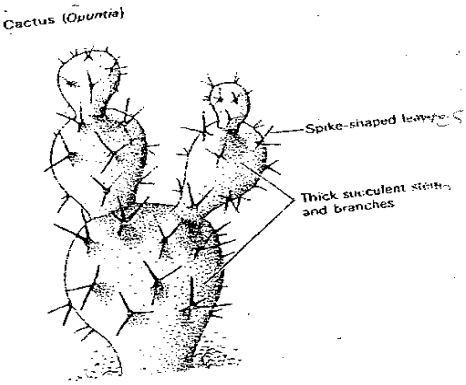
MAGNIFICATION OF TRIDAX

Any specimen which is not straight (it has foldings / bendings / meanders) can be measured by using strings. A string is used to measure the length of either a specimen or the drawing with meanders. This information from the string is transferred to the ruler to find the centimeters.
A formula is then followed after measurements.

(B) ANOTHER EXAMPLE OF DESERT PLANTS

The cucti plant
Cuctus plant is a plant which lots of thorns (non synthetic leaves) and has very thick stem.

Figure showing parts of the cuctus plant (cucti = plural)



Adaptations for it to survive in desert conditions:

- Full of hairs (thorns / spikes)
- Thick stems
- It is green, it makes food by using green colours (chlorophyll)

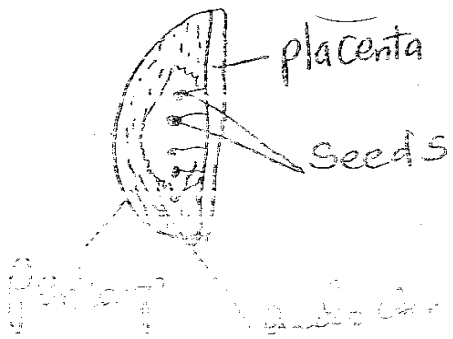
TOMATO FRUIT

This is also very suitable for practical questions in science subjects. .

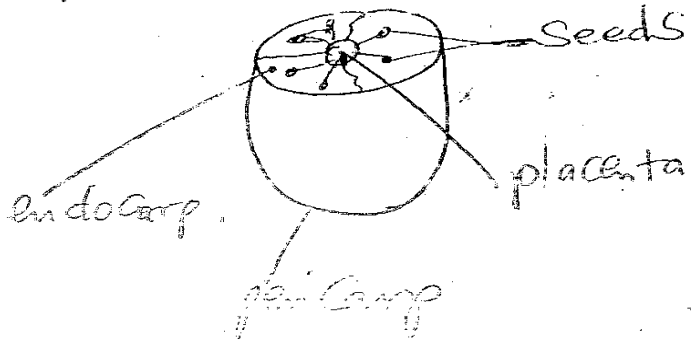
POINT OF CONCERN

.Figure showing its parts
.Factors, which enable its growth
.State of being a monocot or dicot.
.Nutrient status.
.Adaptations for survival in the environment

LONGTUDINAL SECTION



CROSS SECTION



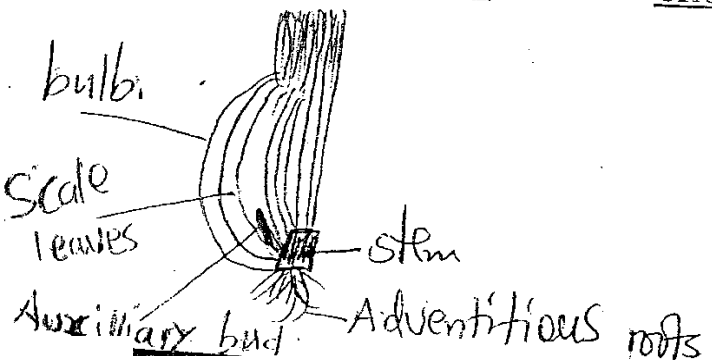
FUNCTIONS OF THE PARTS

- Seeds: Used for regeneration. Seeds germinate and grow into new plants
- Endocarp: Used as storage of food
- Placenta: Supplies food to the seeds
  Supporting the seeds
- Pericarp (out sheet) : protect internal parts
- This fruit is full of vitamins e.g B,A etc
- It has dicot seeds
- We know that it is a dicot because it has leaves which have branched veins. The venation is the main sign that it has dicot seeds.
- It requires moderate rainfall and temperature e.g 21
- It resists its self from higher temperature by using hairs which are all over its body
- The leaves are very hairy and this reduce temperature as well as reducing the rate of transpiration.
- It has rough margins in leaves.

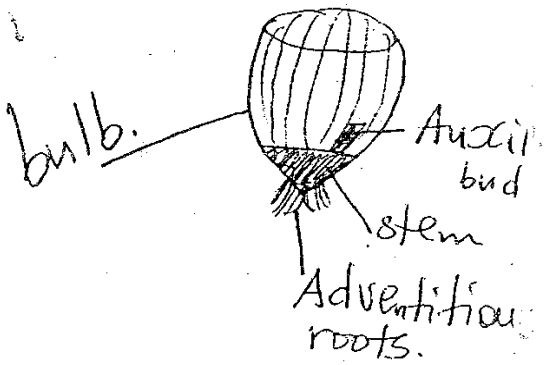
AN ONION BULB:

- This is called an onion bulb because it is formed the compilation of layers of scale leaves. Its shape is also like an electric bulb.
- This bulb is also full of vitamins, Carbohydrates etc

LONGITUDINAL SECTION



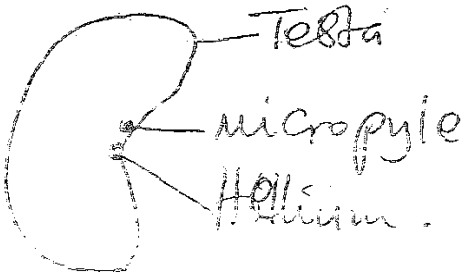
CROSS SECTION



A BEAN SEED

- Points of concern
- A drawing and its parts
- Function of each part labeled
- Nutrient status
- Genetics in different seeds of beans
  Variations
- Root system

PARTS OF THE BEAN SEED:

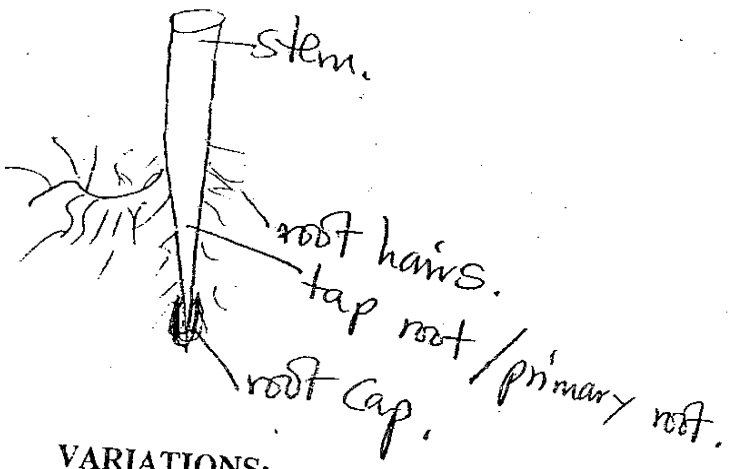


FUNCTION OF THE PARTS:

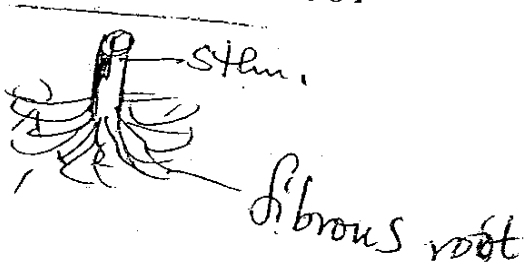
- Cotyledon : keeps /stores food nutrients
- Testa : controls the internal parts from damage
- Hellium:
- Micropyle:
- Radicle:
- It is a dicot . we know that it's a dicot because this seed has two visible dicotyledons.
- We can also identify it by looking at the venation. It is branched veins
- All the dicot plants have tap root system. All the monocot plants have fibrous root system which is also known as the shallow root system.

ROOT SYSTEMS:

TAP ROOT



FIBROUS /SHALLOW ROOT



VARIATIONS:

- Bean seed are different types because of the following reasons:

I. Heredity : transfer of characters from the parents to the offspring.
II. Environmental factors : if the soil is fertile the plant grows very well and produce plumpy seeds if the soil is not fertile the seeds are not plumpy

Example of hereditary variations are:

- Shape of the seeds
- Colours of the seeds
- Thickness of the testa
- Maturity length
- Production intensity (how many seeds are produced by one stem

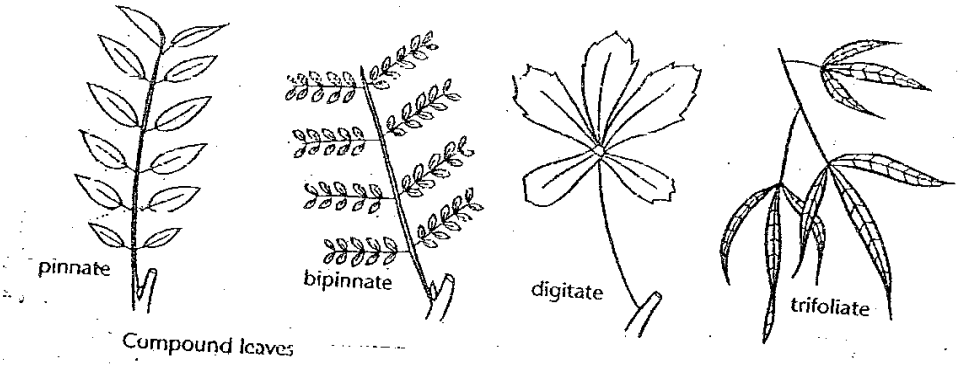
Examples of environmental variation are:

- Mass of the seeds
- Production intensity. This is when the soil is rich in nutrients.

LEAVES FOR THE BEANS

- The leaves have three segments or portions which are joined together

- Basing on the types of leaves by looking at the leaf shape, these leaves are under the trifoliate leaves.
- Tri- means three, tri- foliate means a leaf with three divisions in its margin
- The shape of the leaf



Compound leaves

- This leaf is also hairy

A MAIZE SEED:

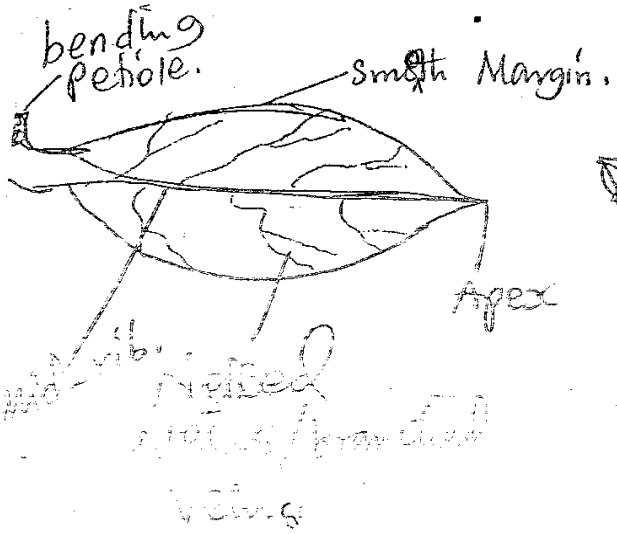
- This has only one cotyledon called the endocarp. This store, foods in the form of starch and protein which is stored between the testa and the endosperm.

FUNCTIONS:

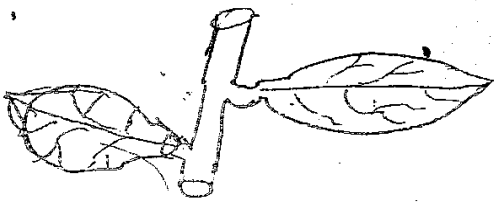
- Testa : controls the internal parts
- Endosperm: stores food (starch)
- It has leaves with parallel veins
- Helium :
- Plumule:

A MANGO LEAF /TWIG

ALEAF



A TWIG



- NB: when the plant has alternate leaf arrangement it means it's a adicot
- You can as well calculate the magnification by using the magnifiycation formula.
- This has a very smooth and thick cuticle which reduces the rate of transpiration
- Take your good time to observe the leaf arrangements as well as venation

A GROUND NUT

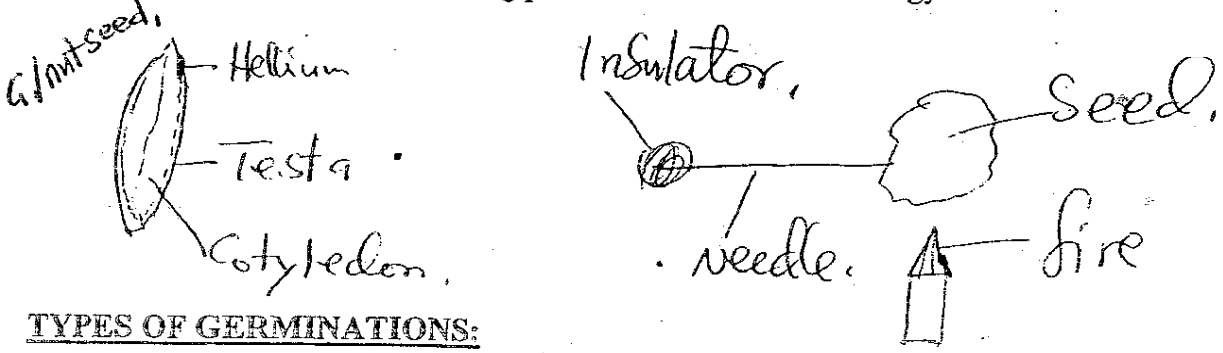
- This has two cotyledons
- This one is full of proteins and fats as well as Carbohydrates in form of starch but in small quantity.
- It is full of fats. It contains more energy.

EXPERIMENT WHICH SHOWS THAT A G/NUT HAS MORE FATS

- Grind the seeds and make the flour
- Take the flour and put it on the paper e.g a litmus paper(or A4 paper)
- Rub the flour on the transforms into translucent form, this means there is a large quantity of fats. If the paper remains opaque it means it has no
- It is a legume because it has some roundish structures called nodules where bacteria are kept. The bacteria fix nitrogen to be used by the plant.
- What happens is that, bacteria benefits from the plant by sucking juices as food, these bacteria release wastes which are full of nitrogen
- These wastes give nitrogen to the plant for green colour. These two organisms (a plant and a bacteria) are assisting each other for each one is benefiting from the other Bacteria find the nodules in roots as their homes while the plant is using nitrogen, this relationship is called mutualism
- It is also called Mutualistic symbiotic relationship.

COMPARISONS OF ENERGY LEVEL BETWEEN A BEAN SEED A MAIZE SEED AND THE G/NUT SEED

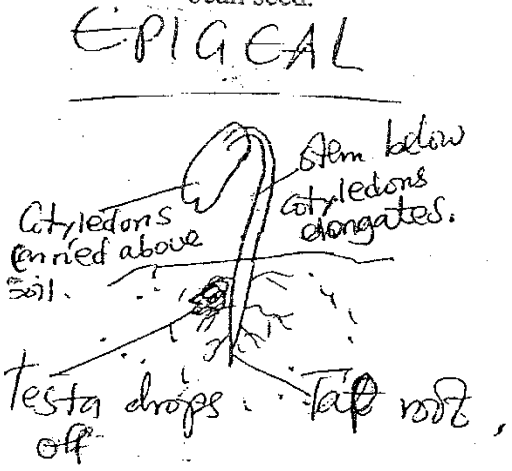
- If these three seeds are burnt on fire you find that the most easily burnt seed is the g/nut seed, seconded by a bean seed and the lost can be that of a maize seed.
- This simply means that the one which is easily burnt has little energy stored, and the one which burns after a long period of time has more energy than all.

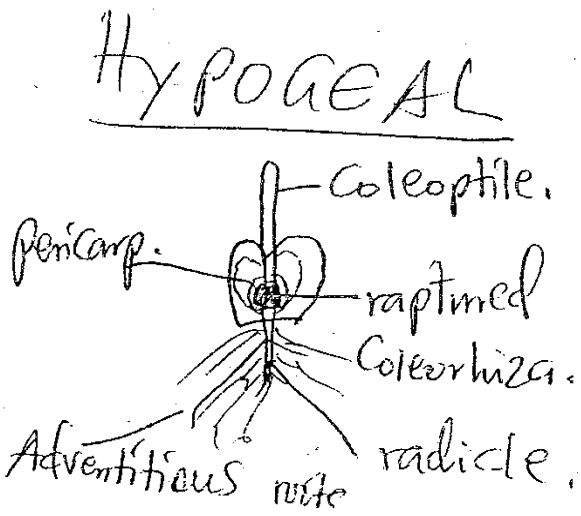


TYPES OF GERMINATIONS:

- There are two types of germination and these are:

1. hypogeal : This is when the cotyledon remains below the surface of the soil e.g. Maize
2. Epigeal : this is when the cotyledons are carried above the ground for example a bean seed.

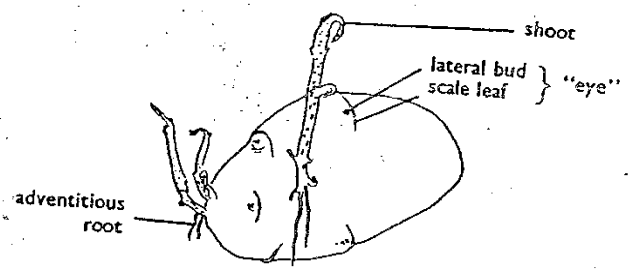




AN IRISH POTATO

- This is called a tube because it is a swallowed root so it is called a tube
- It is full of starch

PART OF THIS TUBER



- This tuber is called a stem because it is full buds and that it stores food e.g starch. It sprouts and firm young stems
- The main food staff in it is starch

PRACTICAL USE OF IT EXAMINATION

- Test for starch
- Osmotic movement of water into and out of it.

TEST FOR STARCH IN IT

- It is necessary to kill all the cells by boiling the tubers. Since it is not green in colour we can not include the alcohol. Boil it put it on the white tile where you can add iodine solution
- If the colour changes to blue –black or dark –blue it means there is starch in it
- Conducted this experiment with your teacher. Boiling aims at stopping all the chemical reactions.

OSMOSIS IN IRISH POTATOES

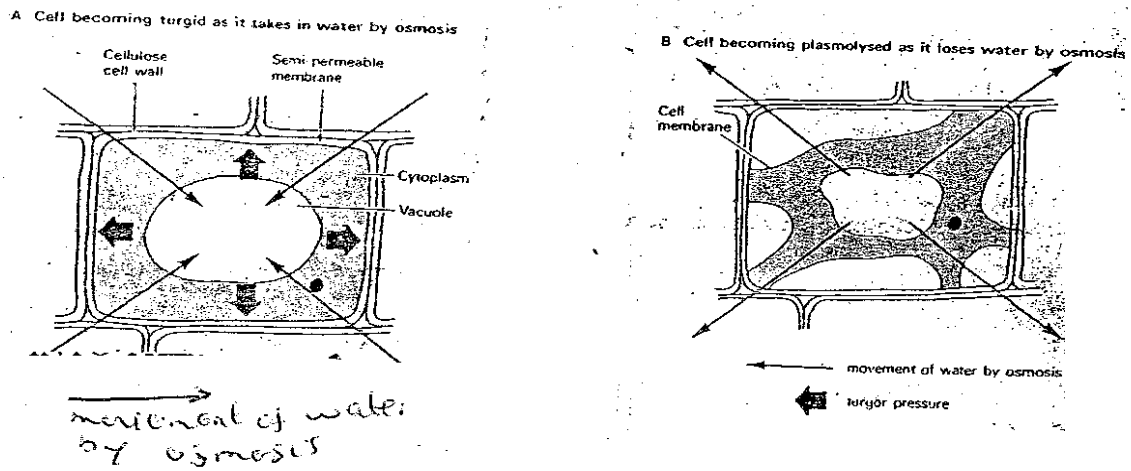
- A number of steps is followed and a number of experiments are conducted
-

EXPERIMENT 1:

- Peel the outer cover and cut it into pieces in form of slices with specific measurements e.g lengths, widths and thicknesses
- Take different beakers with three different concentrations of solutes in them.
- Solutes to be used can be either salt or sugar. Make sure you have a control experiment, that is a beaker without the solutes, should have zero percent solutes. Allow them to stay for hours.

EXPECTED RESULTS:

The slice from the highly concentrated solution, with high solution, will lose a lot of water through osmosis. Nature of cells will be as follows.



CONCLUSION:

- In cell A, the cell membrane is close to cell wall (a cell is turgid) because is full, of water
- In cell B. a cell membrane is far away from the cell wall because the cell has been plasmolysed (lost water) the cell has shrunk which is called flaccidity in cells.
- In cell A, water was going into the cell while in B, water was going out, both represent osmosis because they involved movement of water from a region of high water concentration to the region of low water concentration passing through a semipermeable membrane in this case the cell membrane . a cell wall is not se-permeable but fully permeable membrane because it has large pores, which allow both large and small particles or molecules to pass through.

2. The second expected result in the experiment above is as follows.
   - The slice in Zero percent will be more turgid because water will be going into the cell through osmosis

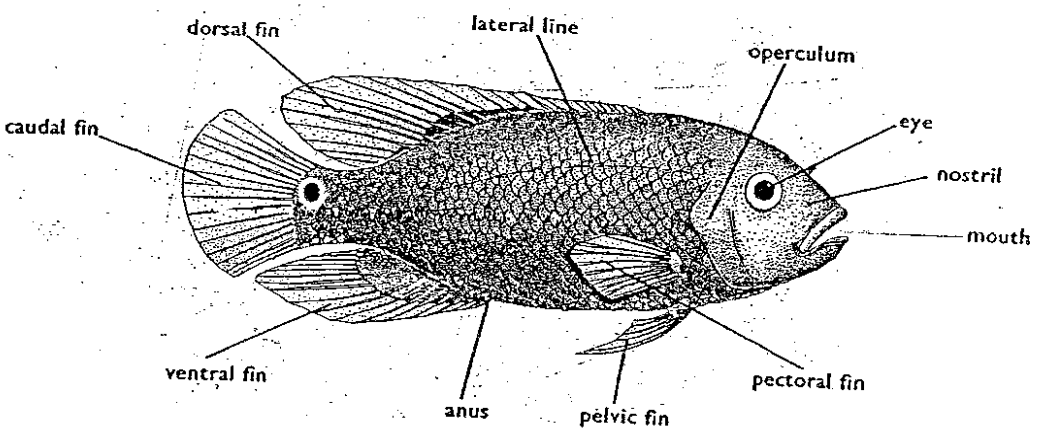
NB: In the cell which is loosing water the measurement are going to decrease.

- In the cell which is gaining water the measurement are going to increase.

A FISH

- Many things which are asked in this specimen and some of them as follows
- Drawing and parts of the fish
- Magnification
- Breathing mechanism
- Locomotion
- Nutricnt value in it

FISH AND ITS PARTS



- Magnification can be calculated by using the same magnification formula

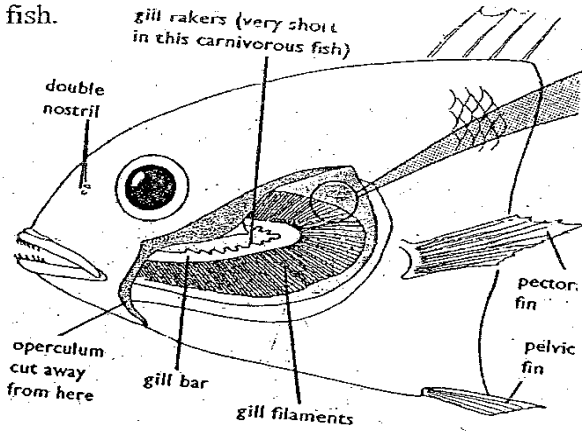
LOCOMOTION IN FISH

- Fish uses fins to defeat drag
- Fish uses its stream- lined shape to defeat the drag e.g by opening the mouth and allow water to enter hence reducing the pressure around the mouth.
- Fish uses its strong tail muscles to twist its tail sideways and produce movement
- Fish uses the direction of its scales to reduce friction hence became slipelly and this cases its forward movement
- The scales have pointed to the head hereby reducing the rate of friction

BREATHING IN FISH

- Fish uses its mouth in breathing and not nostrils
- It opens its mouth and allows water to enter. This water which enters into the mouth is full of oxygen, food and less carbon dioxide. When this water enters the mouth it passes through the gills, gills were naturally made lots of adaptations for gaseous exchange gills are full of filaments which arc also full of blood capillaries
- Oxygen diffuses into the gill filaments which are also called gill lamellae (lamella singular form) carbon dioxide diffuses out of the lamellae into the water. The gill covers open to allow water with carbon dioxide to go out.

- This means that the water which enters through the mouth is full of oxygen while water which goes out of the mouth through gills is full of carbon dioxide. This exchange of gases is the mode of breathing in fish because oxygen is then distributed to all parts of fish's body while carbon dioxide is expelled through the gills that is after the gill cover opens. The gill cover is also called the operculum.
- The figure showing the parts of the gills in fish.



GILL RAKERS:

- These filter the water and remove hard substances from the water and direct them to the alimentary canal e.g. food stuffs

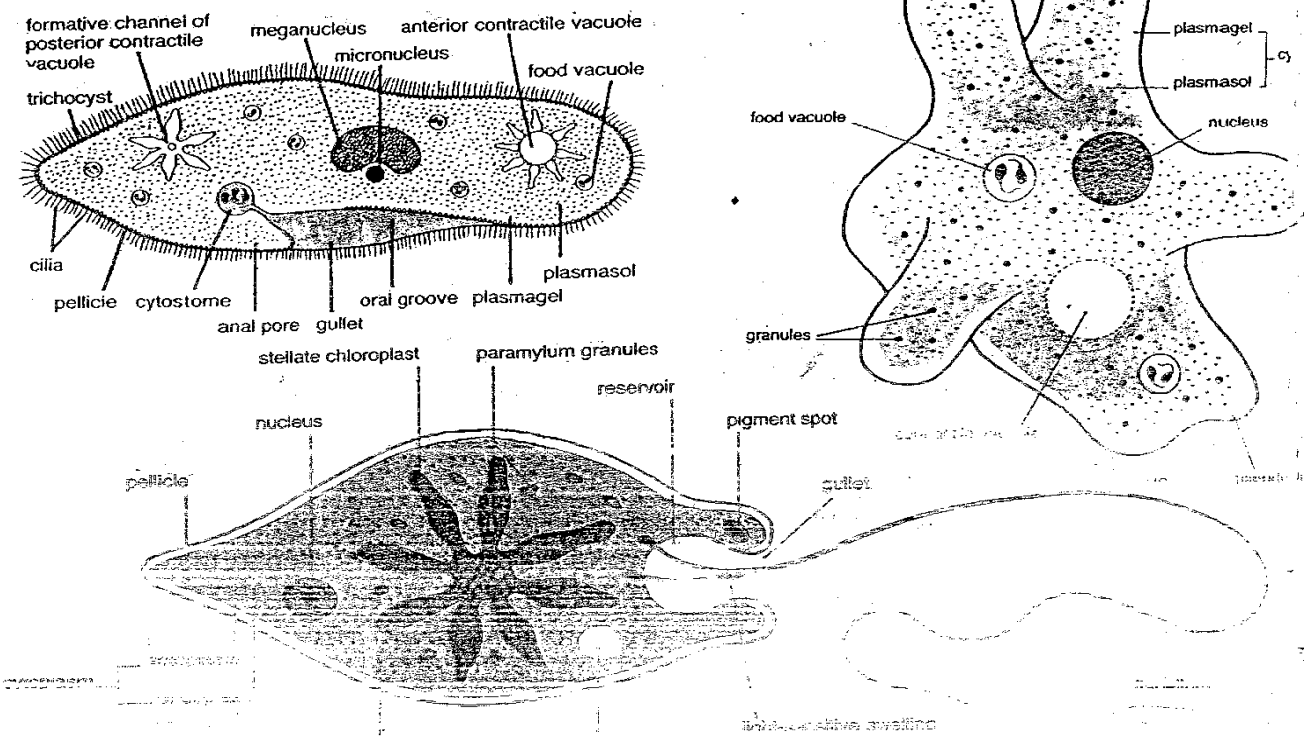
GILL BAR

- This supports the rakers and the lamellae / filaments.

GILL FILLAMENTS / LAMELLAE

- These are responsible for exchange of gases. Oxygen enters into these and carbon dioxide goes out of these lamellae. They are full of blood which is also full iron that attracts oxygen because of being of high affinity for oxygen. They are numerous, this adds the surface area for exhange of gases.

EUGLENA, AMOEBA AND THE PARAMECIUM



MOVEMENT IN THESE ORGANISM:

PARAMECIUM (PARAMECIA – PLURAL)

- This organism is surrounded by Cillia / hairs which flapped forward and backward to produce the movement. They beat the water. When the cilia bend backward it moves forward.
- This organism behaves like an animal as well as the plant.

LIKE AN ANIMAL

- It uses cilia to move from one place to another. Cilia work like legs in animals.
- It uses the oral groove as the gullet or oesophagus for swallowing the food stuffs
- It uses the exit as the anus where the wastes are released from the body of the paramecium.

LIKE A PLANT

- Large vacuole
- Has food vacuole

EUGLENA

- This organism behaves like both plant and animal in the following ways

LIKE AN ANIMAL

- Has a flagellum which is always twisted sideways to produce movement.
- Has an eye spot which is sensitive to light and this works like an eye in an animal

NB: It has lots of mitochondria for energy production e.g for movement etc

LIKE A PLANT

- It has chloroplast which are used for photosynthesis as plants do
- They are green in color.
- At least a larger vacuole as compared to that of an animal.

AMOEBA

- This organism moves through growth whereby there is elongation of the pseudopodia that are around its body.
- It has a very funny life in the sense that behaves different from other micro – organisms. The elongation of the pseudopod points to where food is found.
- When the pseudopod meets the poisonous substance this pseudopod develops a thick membrane which resist the entry of this chemical into the amoeba.
- The development of this thick membrane to resist / prevent the entry of this chemical substance is called cysting.
- If the amoeba cysts, it stays for more than ayear and wares out when the poison fades / ceases.

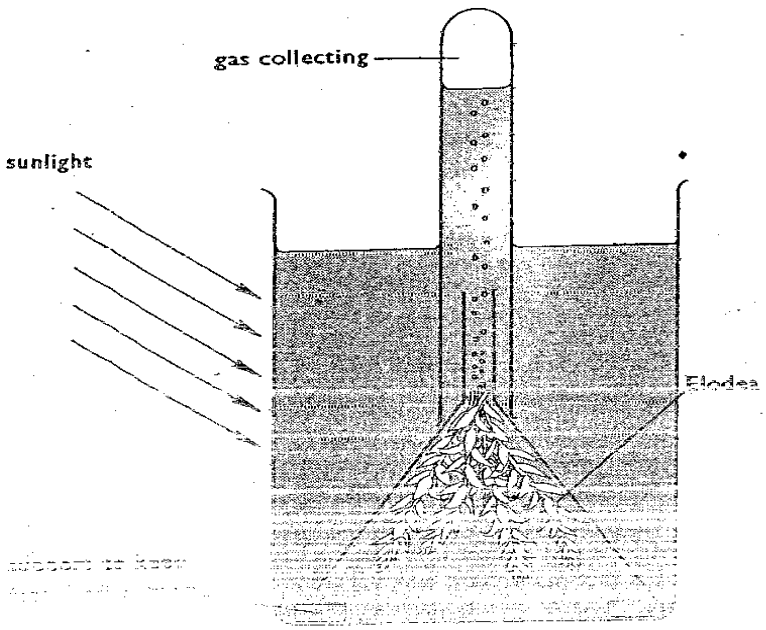
FEEDING

- In amoeba and euglena, food diffuses into their bodies through the outer membranes because they are one cell thick.
- Remember all these (amoeba, paràmecium and euglena) are examples of unicellular organisms which means they are made up of one cell. Food easily difusse into this simple bodies through their cell membranes.

REPRODUCTION

- All these organisms reproduce by binary fission. This ia also called multiple fission of the cells.
- They live in fresh water.

AN INVESTIGATION ON THE EFFECT OF LIGHT INTENSITY ON THE RATE OF GAS PRODUCTION FROM A SUBMERGED PONDWEED



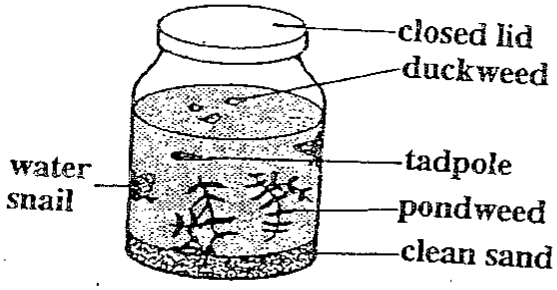
To show that oxygen is set free

- The gas produced and collected is oxygen which is produced after photosynthesi process.

LIGHT INTENSITY (CANDELAS)	NUMBER OF GAS BUBLES / MINUTE
0	0
50	5
100	9
200	15
250	17
300	19
350	20
450	20

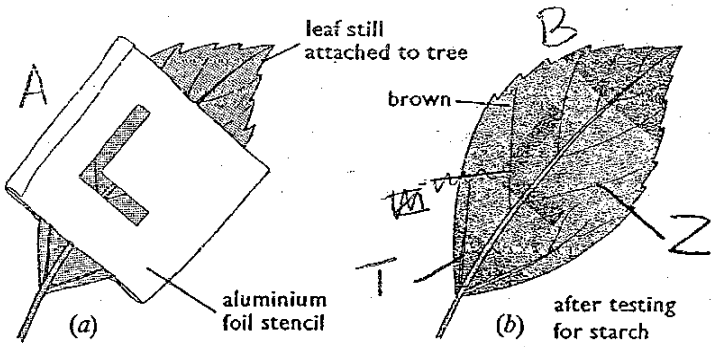
- The optimum light intensity for gas production is 350 candelas because this has resulted into maximum gas production eg 20 bubles / min. When the light intensity went as far as 450 candelas had no effect on the gas production the optimum was already reached.

ANOTHER SIMPLE EXPERIMENT ON THE INTERACTION AMONG THE AQUATIC ORGANISMS



- Apart from the feeding relationship these organisms depend on each other in the aquarium.
- The aquatic animals respire and release the carbon dioxide gas. This carbon dioxide is used by these aquatic plants as the raw material for photosynthesis. After this photosynthesis in plants oxygen is produced as a by – product. There is an exchange of gases among these organisms in the aquarium.
- All the above-mentioned organisms require oxygen for respiration in their cells.
- If all the oxygen gas can be depleted then there can be no respiration, all cells can die of suffocation. This depletion of oxygen can cause deaths to all the organisms in the aquarium.

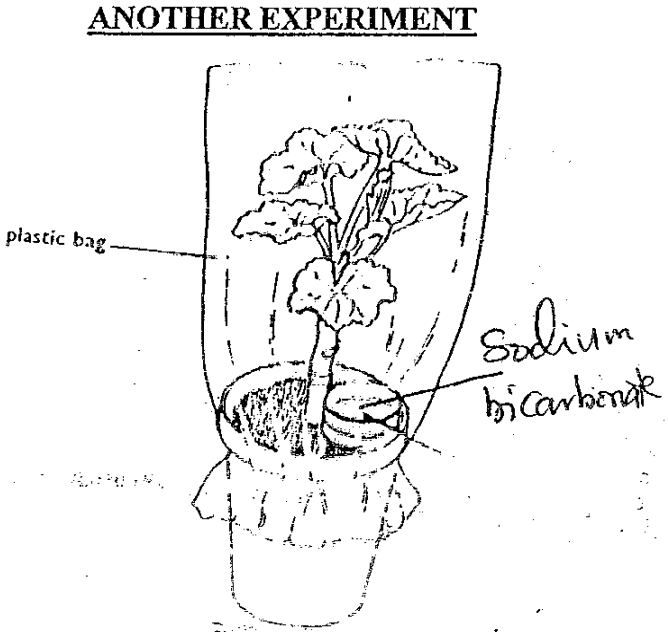
EXPERIMENT ON THE FACTORS NECESSARY FOR PHOTOSYNTHESIS

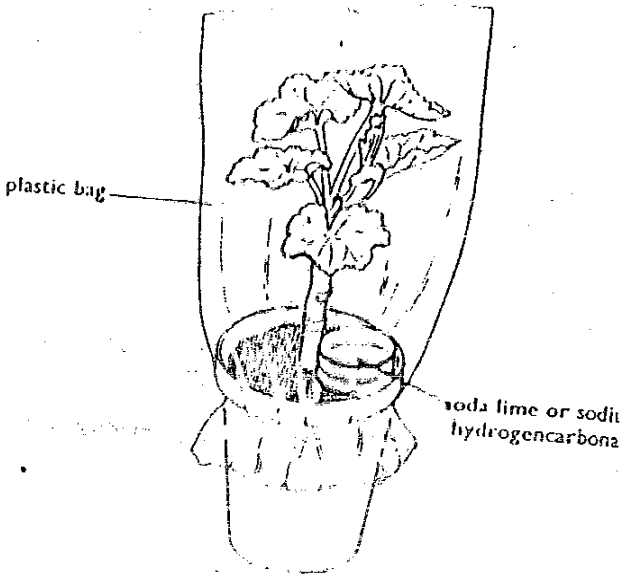


EXPECTED RESULTS

- In the experiment above, the plant labeled Z, was not allowed to received sunlight, this means that there is no photosynthesis
- If this leaf B can be tested for starch part labeled Z may show negative results (no starch) brown colour may be shown while part labeled T, can show positive results (blue – black or dark blue colour). This is showing that a sunlight is necessary for photosynthesis.
- We are assuming that the was attached to the stem and that it supplied with water and carbon dioxide.

ANOTHER EXPERIMENT





- In experiment M and N, everything is provided except the changes in gas supply

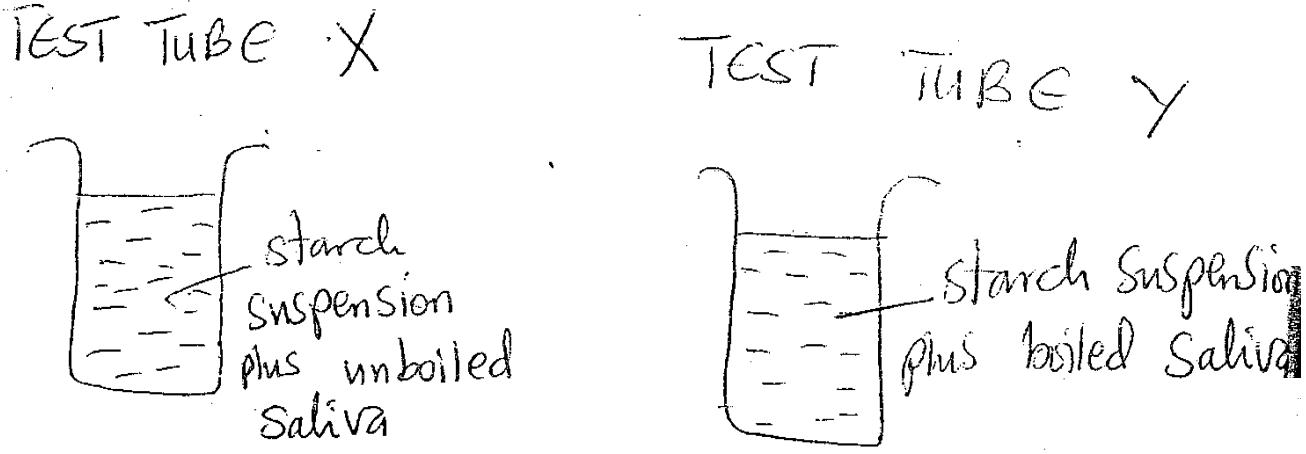
IN EXPERIMENT M:

- The potted plant is reducing water from the pot, light energy from the sunlight
- it is also supplied with carbon dioxide from the sodium bicarbonate.
- The sodium bicarbonate releases the carbon dioxide, photosynthesis is taking place without any problem.

IN EXPERIMENT

- Everything is also provided to the plant except carbon dioxide. The sodium hydroxide absorbers carbon dioxide, this is resulting into problems in this place to make its own food. If you can test for starch in N the result may be negative (blown colour).
- NB. In M the result may be different with N in the sense that in M the test for starch may be positive. The colour in M would be blue- black/ dark blue indicating that photosynthesis was taking place.

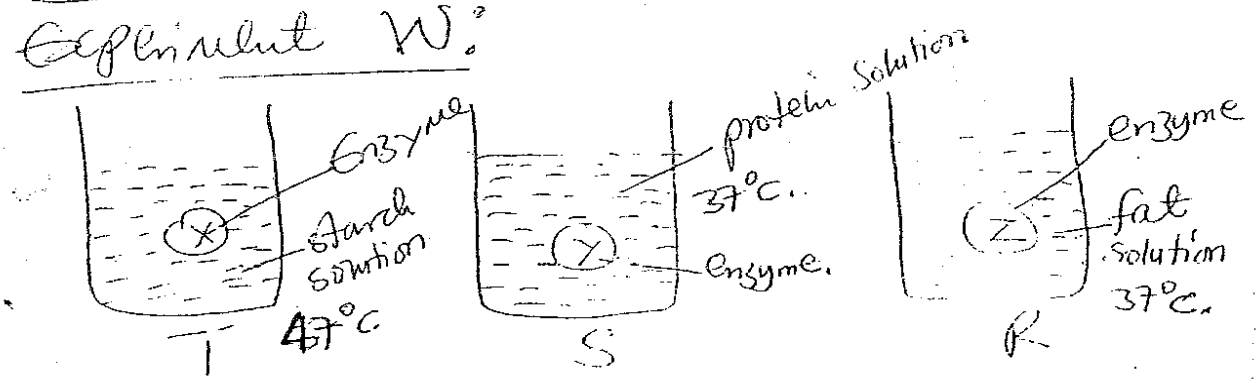
EXPERIMENT IN DIGESTION



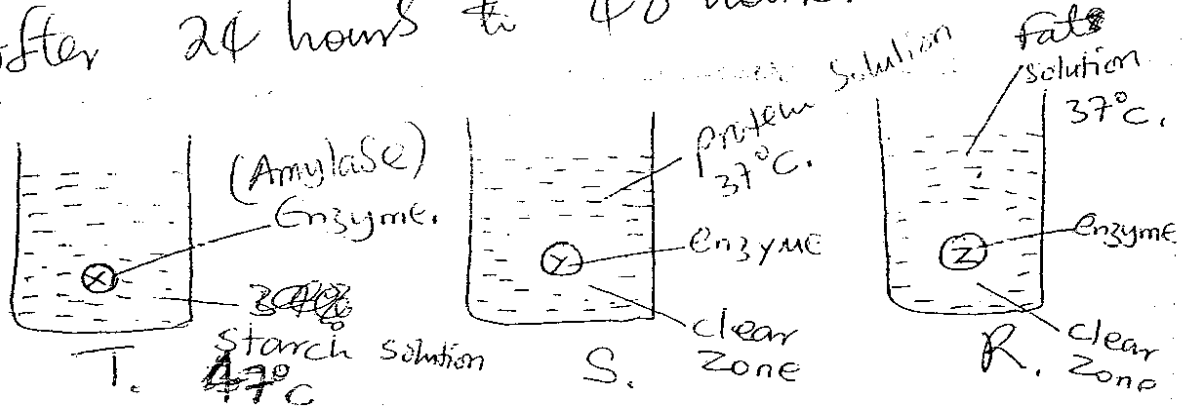
- The property of enzymes that is tested in the above experiment is the one about the effect of temperature on the work of enzymes.
- It says that very high temperature denatures the enzymes are denature, this means that in Y. the enzymes are denated/ killed therefore there is no digestion of starch.
- In X enzymes are normal, then starch is digested to maltose /glucose
- If both experiment were allowed to stay for 10minutes and above, them test for starch the expected result would be as follows.
- In X there would be no starch because the starch is digested to maltose/ glucose
- In Y the test for starch would have been positive result because boiled saliva is full of dead enzymes and digestion of starch is not possible. The colour would have been blue-black or dark blue.

DIGESTION OF PROTEIN AND FATS

Experiment W.



After 24 hours to 48 hours.

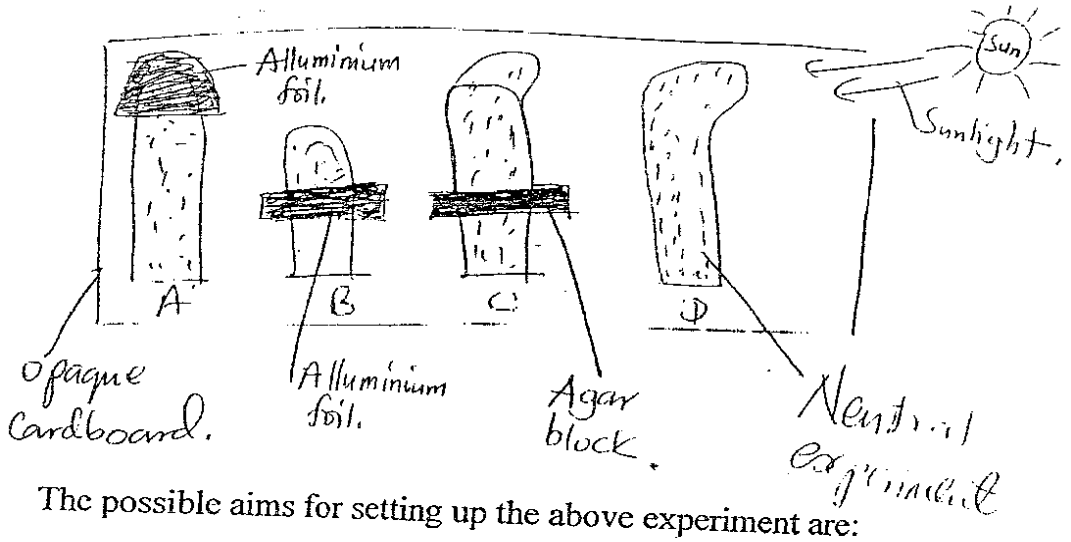


- The possible names of the enzymes labeled X, Y and Z are:
- X is amylase (given)
- Y is any protease either pepsin or trypsin
- Z is a lipase for it has digested fats.
- The aim for setting up this experiment is just to show the effected of temperature on enzymes work for example in experiment labeled T the temperature was 47oC and this was too much for the enzymes, the enzymes were donated and digestion did not take place.
- In R. and S donated and took because the experiments were set up at 37oC which is the normal body temperature for the human being
- The second aim of this experimental set up is to identify the names of the enzymes which have digested different food stuffs which have resulted into clear zones around them. The clear zones show that digestion has taken place around these enzymes

ANOTHER EXPERIMENT

- The possible name of the enzymes labeled W is the protease which digests protein e.g pepsin or trypsin. This is so because in egg white is the protein and the clear zone is indicating that digestion has take place around the enzymes.

EXPERIMENTS ON AUXIN FUNCTION



- The possible aims for setting up the above experiment are:

I. To check the effect of auxins to the growth of the coleoptiles.
II. To check the effect of light on the production of auxins in the tips of the coleoptiles.
III. To know the permeability between the aluminum foil and agar block.

- Assuming that the figures above show the result of the experimental set up which was to stay for 48 hours.
- The meaning of such result in the experimental set- up is as follows:

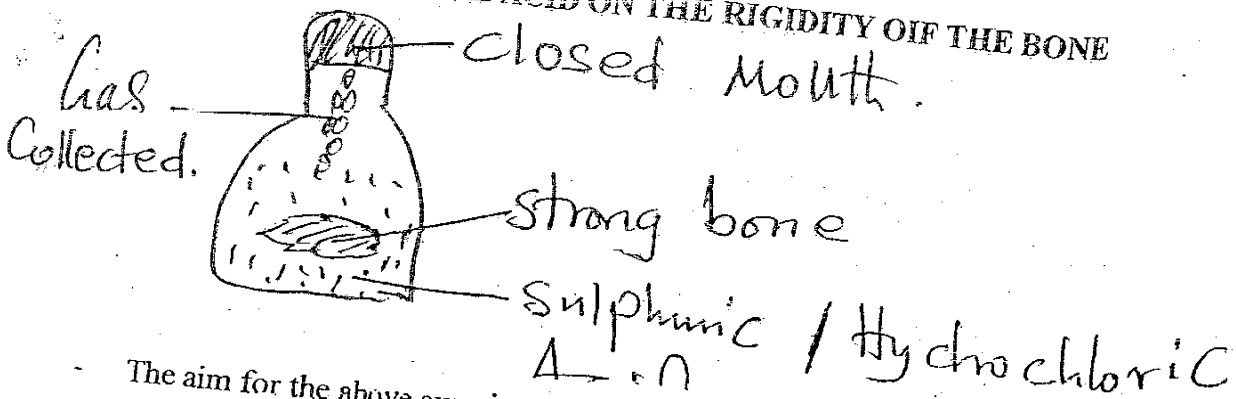
I. IN EXPERIMENT A
- The aluminium foil is providing a shade to the coleoptiles this darkness is encouraging production of auxins in the lips and auxins are encouraging growth in the tip of the coleoptiles grows straight because all over the tip is darkness(uniform darkness) hence uniform production of auxins

II. IN EXPERIMENT B
- The aluminium foil is blocking the auxins fat the tips from reaching the down part of this coleoptile. Growth is restricted in B. the foil is impermeable

III. IN EXPERIMENT C
- Auxins are produced in tip of the coleoptile C but also are able to pass through the orgar block because it is spongy and porous. Growth is possible in experiment C.

IV. IN EXPERIMENT D
- No any treatment is given to it except the provision of light to one side of the coleoptile which is resulting production of auxins to the part which is not given light and the illuminated part is not producing auxins. The cpleoptile grows towards light for it bends towards the light because this part is not growing.

THE EFFECTED OF THE ACID ON THE RIGIDITY OIF THE BONE



- The aim for the above experiment is to know the effect of the acid on the rigidity/ strength of the bone.
- Actually acids dissolve calcium. The bones are made up of calcium and phosphorus
- When a bone is immersed into the acid decompose and dissolve the calcium. This calcium dissolution makes the bone look more brittle in short it looks more flexible.
- There is carbon dioxide produced in this process because it is the decomposition process, it behalves like the anaerobes which respired without oxygen, it produces carbon dioxide gas,
- Dissolution of a bone in an acid takes place along period of time e.g 24 hours or over 24 hours time.

LOCOMOTION IN BIRDS

- Birds fly in the air except a small number of biords which are ve ry big and they don't fly but walk e.g the penguim, the Kiwi and some few birds.
- Bird fly by using wings which are covered by feathers.

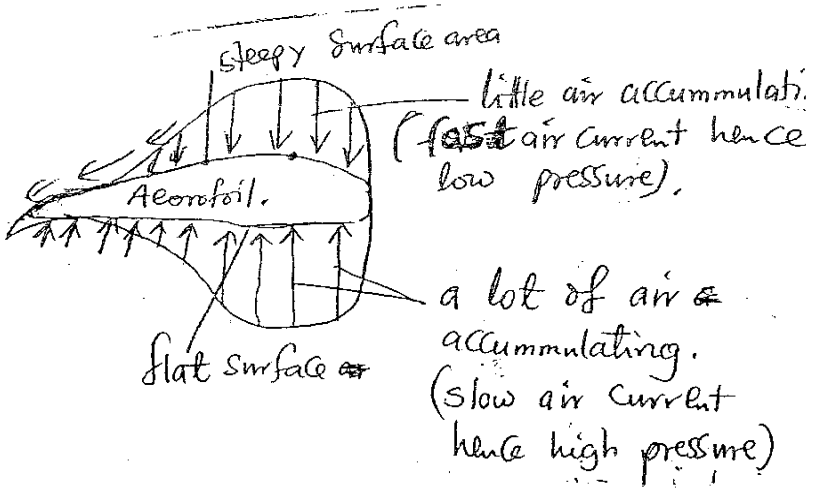
ADAPTATION OF A BIRD FOR FLYING

- Its stream lined shape defeats drag in the air
- Its strong pectoral muscles contract and relax to produce movement beca use they make the wings to flap.
- The whole birds is light and makes it able to into the air. The body is light because its air sacs in its lungs are very large in size and they contain a lot of air.
- Feathers provide provide aerofoil needed to generate lift when wings are flapped as well as the control surface of the tail
- Feathers are air resistant, this makes the bird flap and step over the air molecules to produce a lift.
- Feathers provide aerofoil shape which assist the bird to produce a lift

A LIFT

This is an upward movement of the bird. This becomes possible when the body defeats the pull of gravity. Acrofoil shape makes it easy for the body to produce lift

AEFOIL SHAPE



- The above draw shape is resulting into low pressure on the upper side and high pressure at the lower side, this high pressure pushes the body upwards.

FEATHERS:

- There are two main types feathers and these are:

a. Primary feathers which are also called the flight feathers
b. Secondary feathers . these are smaller primary feathers

NB There ara also other types of feathers and these are:

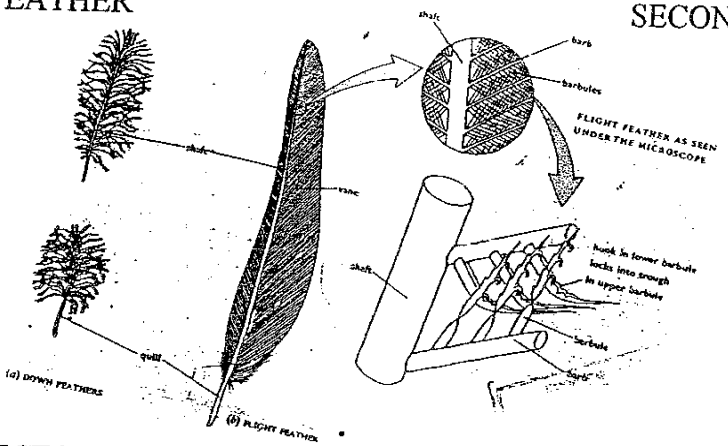
I. Contour feathers
- Contains cover the birds body and help to insulate and stream line it.

II. Filoplumes: these are small hair – like feathers.

PARTS OF THE FEATHER

FLIGHT FEATHER

SECONDARY FEATHER

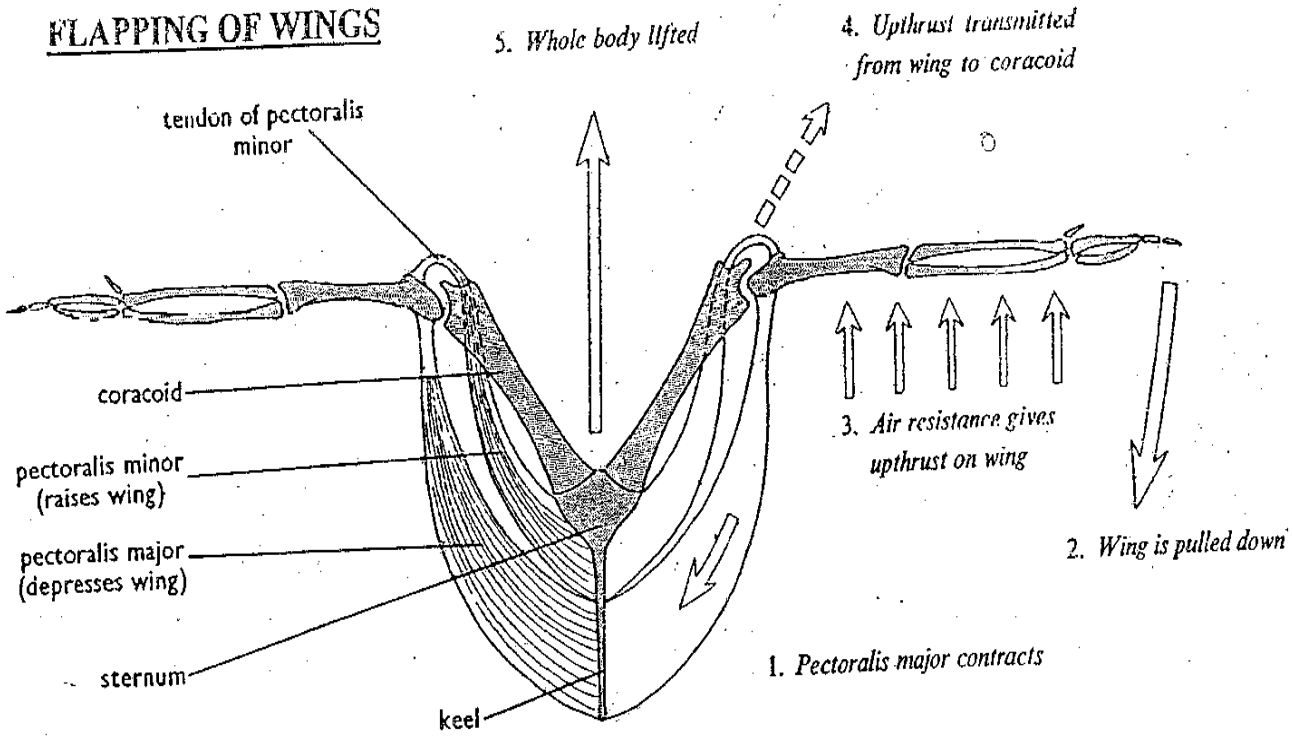


DIFFERENCES BETWEEN FLIGHT AND SECONDARY FEATHER

PRIMARY/ FLIGHT FEATHER	SECONDARY FEATHER

Large quill	Small quill
Even margin	Un even margin
Air resistant	No air resistant
Used for flying	Covering the bod

FLAPPING OF WINGS



ELEVATOR MUSCLE (MINORS)

- When they contract, the wings are raised hence upstroke. This produces down ward movement in a bird.
- When they relax, the wings are lowered hence down stroke. This produces upward movement called lift.

DEPRESSOR MUSCLES (MAJORS)

- When they contract, the wings go down hence down stroke, this produces a lift or upward movement to a bird.
- When they relax, the wings are raised hence up stroke, this produces downward movement in birds.

MAGNIFICATION OF FEATHER

- You still use the formula for the magnification

KEY OF IDENTIFICATION
(A DICOTOMOUS KEY)

This is a key which is used to identify the organisms , it is a good system that is used to name organisms

In trying to understand the key, the following facts are supposed to be well understood

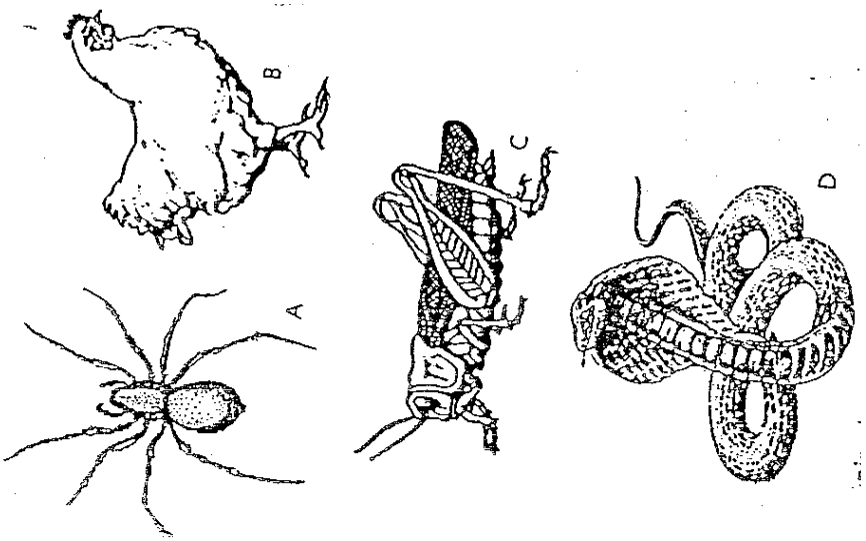
1. There are two sentences on each position
2. One of the two sentences is always a promise of what will come in the next step
3. One of the two sentences tells a name(an identification) of one organism
4. We use the world see 1,2,3 etc

The numbers in front of the sentences indicate the position or the step in the key not position of organism in their order of setting

5. This identification does not involve the sizes of the organisms
6. The most considered things are the appearances of the organisms
   The appearances we mean the characteristics of those organisms
7. Sometimes you are asked to design the key or asking you to interprate the already given key

Below is a key to be interpreted. Study it carefully.

1. Has legs .....see 2
   Have no legs .....Snake
2. Has no legs.....see
   Has two legs .....Chicken
3. Has six legs.....Grasshopper
   Has eight legs .....Spider



Using the key above as well as the figures or animals given name the organisms

NAMES ARE

A. .....Spider
B. .....Chicken
C. .....Grasshopper
D. .....Snake

Key number two

Construct a key using the organisms given below

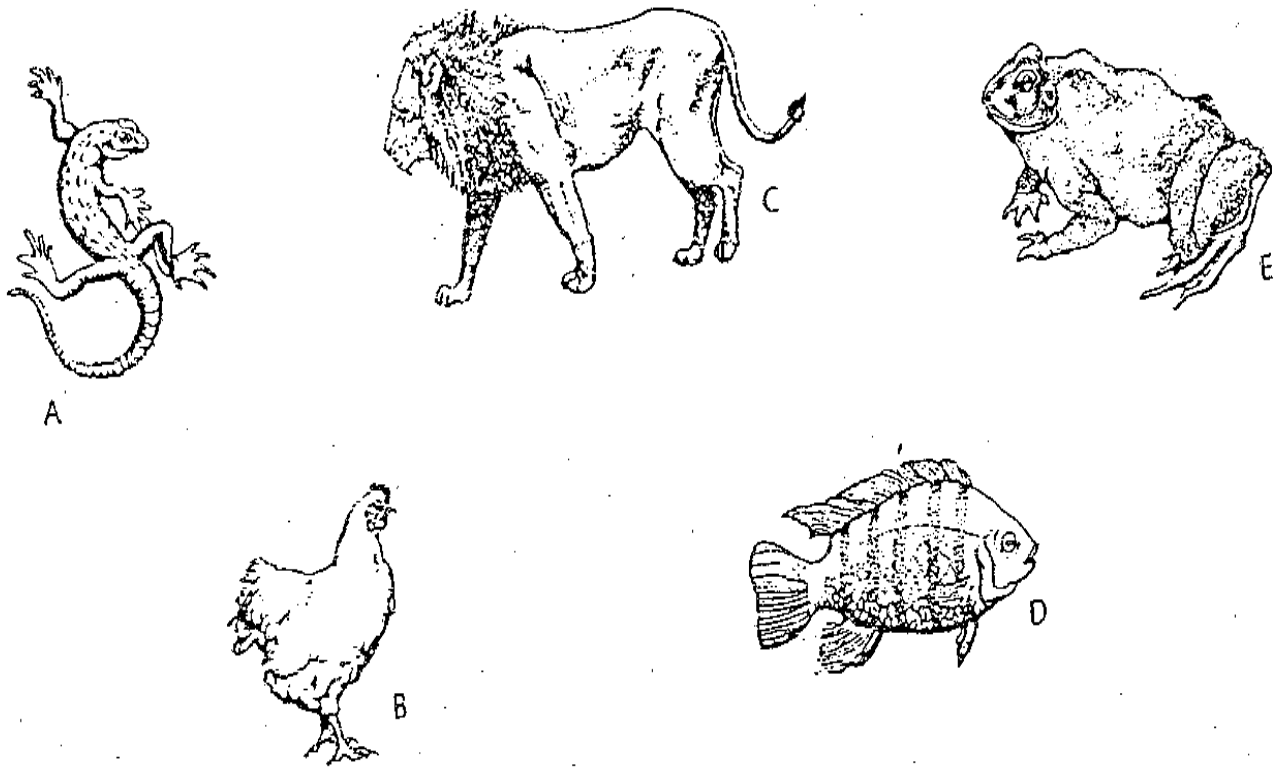
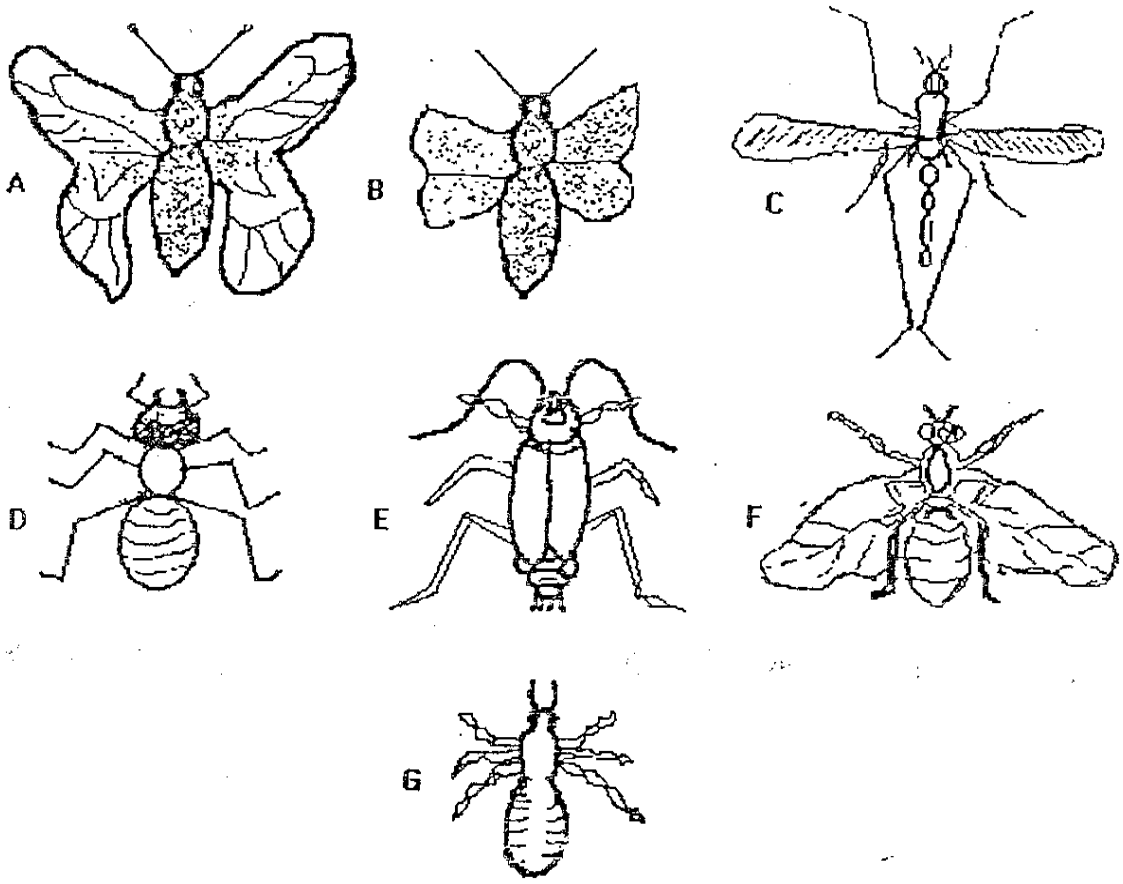


Figure 6.22 Some vertebrates

2. The figure shows diagrams of seven insects A, B, C, D, E, F and G.



Study the insects **A, B, C, D, E, F** and **G** and use the key below to identify the following insects: mosquito, moth, cockroach, butterfly, louse, ant, and housefly.

C B E A G D F

Insects
- No wings
  - with antenna _____
  - no antenna _____
- Wings
  - one pair of wings
    - narrow abdomen _____
    - wider abdomen _____
  - two pairs of wings
    - body not hairy _____
    - hairy body
      - clubbed antennae _____
      - pointed antennae _____

(7 marks)