BIOLOGY 1 2012 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

By Yohana Lazaro

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i	ii	iii	iv	v	vi	vii	viii	ix	x
D	E	C	E	E	D	C	D	C	C

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i	ii	iii	iv	v	vi	vii	viii	ix	x
E	G	F	H	C	K	L	J	B	A

3.(a) A Biology laboratory is different from other school facilities such as classrooms and the library.

Some of the unique features of a biology laboratory are:

It keeps preserved specimens of organisms such as insects, microorganisms and plants.

It contains cages for keeping live specimens such as mice andrabbits.

It keeps models such as a model of the heart, eye, skin, kidneys,and ear.

It contains aquaria for keeping live aquatic animals such as fish.

It has charts with various diagrams and parts of living things.

It has special and delicate apparati such as microscope, dissectingkits, sweep nets, hand lenses.

(b) Steps involved in using a microscope:

Place the microscope on the laboratory bench or table makingsure it is not too close to the edge.

Position the microscope so thatthe arm faces you and the stage facesawayfrom you.

Mount the specimen on the microscope slide and cover it with acover slip.

Make sure that the low power objective lens is in line with theeyepiece lens.

Place the slide with the specimen on the stage. Hold it in placewith the stage clip.

While looking through the eyepiece, use your hand to adjust themirror so that the light is directed at the specimen or the stage.Always keep both eyes open when looking through the eyepiece.

Adjust the coarse adjustment knob to bring the specimen into focus.Adjust the fine adjustment knob to bring the specimen into sharpfocus. Total magnification = eyepiece magnification x objectivelens magnification.

Rotate the nosepiece to a higher power objective lens if you wantto observe more details on the specimen.

After using the microscope make sure that you clean it before storage.

4. (a) (i)First aid kit:is a small box which keeps medications andequipments used in providing First Aid.

(ii)Risks:are actions or behaviours which can result to harmfulconsequences to the life or

health of a person.

(iii)An accident:is an unexpected event which may lead to injury to a person.

(iv)Poisoning:An occasion when a person or animal consumesor inhales a substance which will harm his/her body.

(b) First aid to a person who has been stung by a bee

Remove the sting by scrapping gently using a blunt object suchas a plastic card

Do not use your fingers or a sharp objectbecause this will make the sting to release more venom into thebody. (Remember that, when a person is stung by a bee, the sting remains in the wound).

Wash the stung area with soap and water.

Apply baking soda paste on the stung area (use a ratio of 1teaspoon ofwater to 3 teaspoons of baking soda). The stingis acidic, baking soda is abase and so it neutralizes the acid.

Apply a cold compression on the affected area to relieve pain andswelling. If thevictim develops allergic reactions for examplenausea, diarrhoea, dizziness orswelling of the lips or throat, takethe person to hospital immediately.

5. (a) (i)Decomposersare organisms such as bacteria and fungi that feedon dead matter to break it down to simple substances.

(ii)Producersare organisms which can manufacture food substancesusing simple inorganic compounds such as carbon dioxide andwater. Examples of producers include green plants, photosyntheticbacteria and some algae.

(iii,) Parasites are organisms which live in or on another organism• (its host) and benefits while harming the host. An example is plasmodium that causes malaria in human beings.

(b)Comparative embryologyis a science of studying and comparingembryos of different organisms to try to establish their evolutionaryrelationship and so decide whether or not they belong to the samegroup/taxon.

At certain stages of embryonic development some groups of animalslook very similar e.g. embryos of fish, birds and mammals at oneembryonic stage all have a fish-like appearance i.e. all of them possessgill slits and two chambered heart. As they grow the embryos ofamphibians, reptiles, birds and animals diverge more and more fromfish-like appearance. The development of a frogs embryo towards adult frog is marked by the disappearance of gill slits and the tail. Lungs andlimbs are formed and the heart becomes three-chambered. As embryosof reptiles, birds and mammals develop toward adult form and theylose the gill slits. Their heart becomes three chambered and finally fourchambered in crocodiles, birds and mammals. The tail disappears in birds and humans. In all cases lungs and limbs are formed.

This kindof embryonic development suggests that all vertebrates arose from acommon ancestor. That ancestor had a fish-like morphology and mostprobably was aquatic.

6. (a)Transpirationis a process whereby plants lose water in form of vapourthrough stomata.

Factors affecting transpiration can be categorized into those arising fromplant features and those caused by environmental conditions.

Plant features

(i)The size of leaves:A large leaf has more stomata than a small leafand therefore plants with large leaves lose more water than thosewith small leaves.

(ii)An extensive root system:Plants that have extensive root systemsabsorb more water and therefore lose more water than those withfew roots.

(iii)Leaf cuticle:A thick cuticle resists water loss through transpirationwhile a thin cuticle makes water loss easily and faster.

(iv)Number of stomata:The more stomata a leaf has, the faster the rate of transpiration and vice versa.

(v)Position of stomata:Stomata on the upper surface of the leaf lo:more water than sunken stomata. Sunken stomata occur in piand so they are not exposed to moving air, thus they slow downtranspiration rate.

(vi)Epidermal hairs:These are tiny hairs on the leaf surface; thetrapwater on the surface of the leaves and so slowdown watEloss.

(vii)Size of substomatal air spaces:Large air spaces allows a fasterate of transpiration because the leaves can hold more watevapour. Smaller substomatal air spaces slow down the rate ctranspiration.

Environmental factors

(i)Temperature:Transpiration rate increases as environmentatemperature increases. So plants lose more water by transpiratiotin a hot environment than in a cold environment.

(ii)Relative humidity:Transpiration rate is higher when the ailis dry than when it is saturated with moisture. This is becausE saturated air reduces the concentration of gradient between thestomata and the outside environment.

(iii)Wind:Increased movement of air around a plantresults in high transpiration rate and vice versa.

(iv)Availability of soil moisture:When soil water is low plants beginto age prematurely resulting in leaf loss and reduced transpiration.

(v)Light:Increased sunlight increases transpiration rate as stomataopen in light and close in the absence of light. High light intensityalso increases the plants internal temperature and hence increasesthe rate of evaporation.

(vi)Atmospheric pressure:When atmospheric pressure is lowe.g. in high altitudes plants lose water more easily. The rate of transpiration is reduced in areas with high atmospheric pressure.

(b) Significance of transpiration

It helps to maintain transpiration pull which is important formaintaining a constant stream of water between the roots and theleaves.

It enables the loss of excess water from the plant.

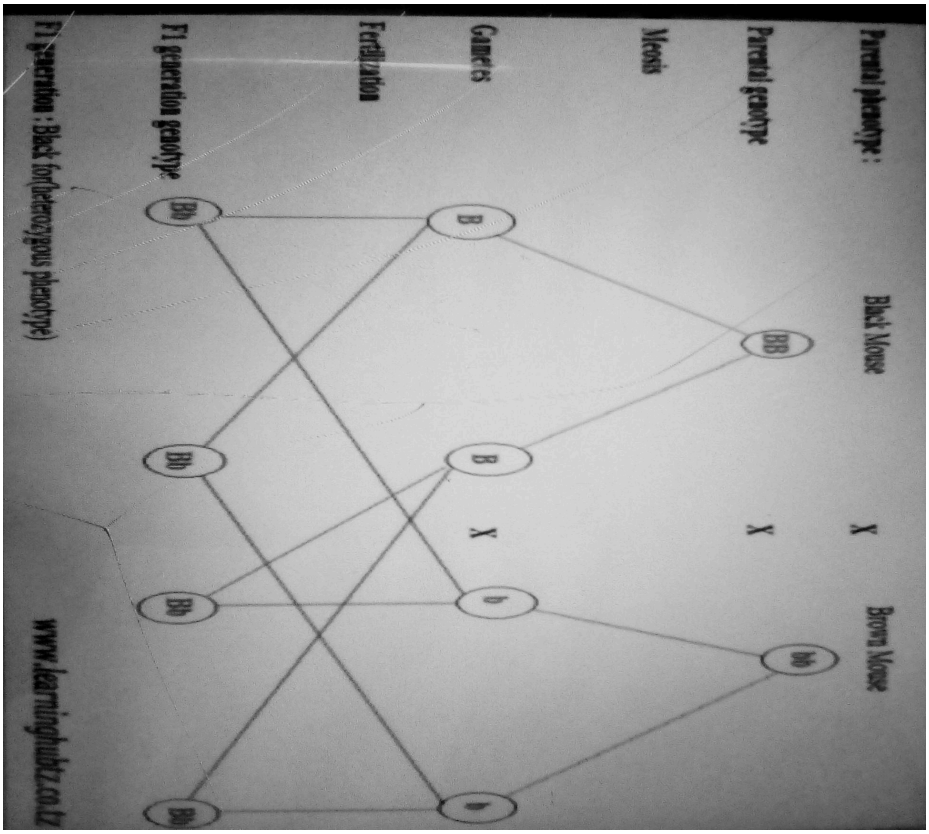
It enables absorption and distribution of water and mineral salts.

It helps to cool the plant.

7. (a) 1.4: B-Allele for black (for dominant gene)b-Allele forbrown (forrecessive gene)

(b) (i)Gene:is a section of a chromosome which controls a spun ncharacteristic in an organism.

(ii)



Recessive (gene):It refers to the trait or gene that cannot expressitself in the presence of a dominant trait.

It can only express itself when it exists alone in homozygous stall,(example tt).

(iii)Phenotype:is the external appearance of an organism.

8. (a) (i)Growthis defined as a permanent and irreversible increase in duidry mass of an orgasm. This is usually accompanied by increase insize and the amount of protoplasm in an organism.

(ii)Intercalary growthis a lengthwise growth in plants as a result calcell division in the meristem, located below the top of an organ forexample in the internodes of the stalks of grasses and at the baseof the leaves.

(b) Many factors that affect growth and development in humans art. due to lifestyle and environment. These include the following:.

(i)Availability of nutrients:Poor nutrition or bad feeding habitleads topoor growth.

(ii)Accumulation of toxic wastes in the body:This leads to stuntedgrowth as toxic wastes interfere with the normal physiologicalprocess.

(iii)State of health of the body:A body frequently attacked bydicpasps will be frail and grow slowly.

(iv)Growth hormone:Over secretion and under secretion of growthhormone affect growth of an organism.

(v)Genetic makeup:Genes controlling growth together with otherenvironmental factors may have an effect on the growth of anorganism.

(vi)Competition for limited resourcessuch as food, water, air andsunlight may affect the growth of an organism.

(vii)Psychological factorse.g. stress, anxiety, emotion, etc. affect thegrowth of an organism negatively.

9(a) A - OesophagusB - StomachC - Small intestine

D -RectumE - AppendixF - Anus

G - ColonH - DuodenumI - Pancreatic duct

J - PancreaseK - Bile duct.

(b) (i) Gastric juices

(ii) Hydrochloric acid and the enzymes pepsinogen and rennin.

10.(a) Movement:-Helps plants and animals to search for food and water.

Helps plants and animals escape from their enemies or adverse conditions.

Helps animals in search of suitable habitats andplants in search of favourable living conditions.

(b) Functions of the skeleton

Support and shape:The skeleton is a framework of bones whichprovides shape and support to the body. It also acts as the protectiveframework that is needed to keep the body organs safe.

Protection:The bones of the skeleton protect delicate internal organsand the soft tissues of the body, keeping the inner body safe fromtrauma due to injuries.

Movement:The bones are connected to skeletal muscles that allow thebody to move. Bones act as levers and when the muscles contract they pull on a bone and allow it to move.

Blood cells production:Blood cell formation (hemopoiesis) takesplace in the red bone marrow. Blood cells are essential to life and play ahuge role in keeping the body alive and healthy.

Mineral storage:Skeletal bones store phosphorous and calcium whichmay then he released when needed by the body.

11. Mechanism of gaseous exchange in mammals

Gaseous exchangeis the process of taking in oxygen and giving out carbondioxide from the body of a living organism across a respiratory surface.Gaseous exchange in mammals takes place as a result of inhalation orinspiration and exhalation (expiration). Inhalation is breathing in air intothe lungs. Exhalation is breathing out air from the lungs.

Events taking place during inhalation and exhalation are shown in the tablebelow.

INHALATION
VERSUS
EXHALATION

Inhalation	Exhalation
Inhalation is the action of inhaling or breathing in	Exhalation is the action of exhaling or breathing out
Diaphragm contracts and flattens by moving down	Diaphragm relaxes and becomes dome-shaped by moving up
External intercostal muscles contract and internal intercostal muscles relax	External intercostal muscles relax and internal intercostal muscles contract
Rib cage moves forward and outward due to the effect of intercostal muscles	Rib cage moves downward and inward due to the effect of intercostal muscles
Size of the chest cavity increases	Size of the chest cavity decreases
Air pressure inside the lungs reduces due to the increase of volume in the chest cavity	Air pressure inside the lungs increases due to the decrease of volume in the chest cavity
Air from the outside rushes into the lungs	Air goes out of the lungs
Lungs are inflated	Lungs are deflated
Oxygen is taken into the blood	Carbon dioxide is taken off from the blood
An active process since muscular contractions are involved	A passive process since no muscular contractions are involved

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12.Drug abuserefers to the non-medical use of a drug that interferes withthe health and productive life of an individual. This also involves takingpsychoactive or performance-enhancing drugs for a non therapeutic or nonmedical effects.

Examples of such drugs include marijuana (cannabis sativa), cocaine,tobacco, alcohol, heroin, etc.

Causes of drug abuse

Access and exposure to the use of drugs:Most drugs such as marijuanaare easily available in our setting and thus making them easily available to the youth risk group.

Lack of proper family upbringing:Many youths lack proper familyupbringing from their parents and the society around, making them proneto using drugs.

Lack of self acceptance:Some youths sometimes have a feeling that theyare inferior and to boost their confidence they tend to engage themselves inusing drugs.

Wrong notion:Some youths have a wrong notion that using marijuana orother forms of substance abuse makes them feel good, strong and forgettheir problems.

Lack of adequate education:Some youths lack adequate information about the effects of drugs.

Peer pressure:Youths of the same age tend to encourage each other intrying dangerous things like drugs especially when they learn from otherfellows who use them.

Fun:Some youths believe that using drugs is fun.

Poverty:Some people are poor and believe that the best way to escape frompoverty or just the thought of it is through taking drugs.

Unemployment:Some people engage in drug selling as a means to earnincome. In the process they may end up being drug users and affect morepeople around them.

Advice to the Tanzania Government on the ways of combating drug abuse inthe country:-

The Government should formulate and make a close follow up ofimplementation of policies and laws against drug dealers.

The Government should cooperate with various institutions in theprovision of education on harmful effects of drug abuse.

The Government should increase employment opportunities and selfemployment schemes as a means of reducing poverty and engagement in drug selling and use among youths.

13. Factors which contribute to irresponsible sexual behaviours:-

Poverty:Due to poverty youths are forced to engage in irresponsible sexualbehaviour as a means to obtain money for their living.

Peer pressure:Many youths engage in irresponsible sexual behaviourbecause of the influence they get from other youths who are already engagingin such behaviour in order to fit in.

Lack of sexual education:Youths lack enough sexual education about the effects of engaging in sex and how to abstain from such behaviours.

Lack of proper social upbringing:Many youths lack proper guidance fromparents and the society and therefore unknowingly engage in irresponsiblesexual behaviours.

Drug and alcohol use:Many youths engage in irresponsible sexualbehaviour because of the influence they get from drugs and alcohol.

Curiosity aboutsex: Many youths are curious about sex and this factordrives them into engaging in such irresponsible behaviours.

Effect of irresponsible sexual behavioiur

Spread of sexually transmitted diseases mostlyHIV/AIDSand otherSTDs such as gonorrhoea, and syphilis which can lead to death.

Increase in the number of unwanted pregnancies and abortions amongthe youth.

Increase in the number of school dropouts as a result of early pregnancy.Increase in the number of street children.

Death due to HIV/AIDS and other STDs such as syphilis