553/1
BIOLOGY
Paper 1
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UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

BIOLOGY

Paper 1
Theory

SCORING GUIDE

Section A

1 a) Leaves, and Stems.

b) Photosynthesis. The cassava leaves eaten by the goats are the sites for photosynthesis prevents the manufacturing of food. Removal of leaves removes sites for entry of carbon dioxide gas which is a raw material for photosynthesis. The breaking of stems prevents transportation of another raw material for photosynthesis, water molecules, from soil to the point of food manufacturing, hence photosynthesis will not take place.

Transpiration. The rate of transpiration will greatly reduce since there are few/no leaves available which are sites for transpiration. The broken stem will cut off transpiration pull.

Translocation. The eaten stem barks and/or broken stems destroys the phloem tissues, hindering/preventing the movement of manufactured food from the sites of manufacture to parts where they are needed for respiration/growth/storage.

c) Food that should have been stored in the root tubers are instead used to facilitate growth of new plant parts. This consequently affects both the size and quality of root tubers leading to poor yields hence a need to compensate Mr. Nsamba..

The roles of the affected processes are;

- Photosynthesis makes food, stored in tubers, hence increasing the quality and quantity of yields.
- Transpiration allows movement of water up the plant, which is a raw material for photosynthesis.
- Translocation permits movement of food from sites of manufacture to other parts e.g. for growth, storage etc.

2. (a) The image of the snake was formed at the retina, impulses were sent to John's brain for interpretation. Impulse were sent to various structures e.g. adrenal glands, that released adrenaline hormone transported in blood to the heart causing the heart beat to increase. The adrenaline hormone also stimulated the intercostal muscles to increase the rate of breathing.

(b) The likely effects of John's lifestyle are;

- Mental illness/ disorder.
- Poor relationship with others.
- Increased crime / reckless behavior and isolation.
- Depression and anxiety.
- Organ failure e.g. malfunctioning liver.
- Infections and diseases e.g. breast/throat/colon/lung cancer, liver cirrhosis, stroke, high blood pressure, diabetes, chronic bronchitis etc.
- Inability to sustain financial needs.
- Poor memory.
- Bad company.

(c) John can change his lifestyle in the following ways;

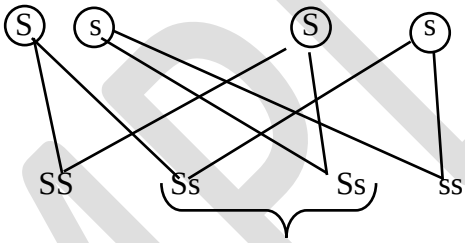
- Withdraw from bad peer group.
- Get professional help from a counsellor.
- Stop going to places where he is tempted to drink.
- Practice healthy habits to replace drinking and smoking.
- Go for rehabilitation.

3 a) Both parents are heterozygous.
Let S represent the allele for normal RBC shape.
Let s represent the allele for sickle cell shaped RBC.

Parental Phenotypes: Normal male Normal female
Parental genotypes: Ss X Ss

Meiosis

Gametes



Random fertilization:

Offspring genotypes: SS Ss Ss ss

Offspring phenotypes: Normal Carriers Sickler

There is ¼ chance of producing a child suffering from sickle cell disease. Hence the baby inherited a sickle cell gene from each of the parents. The parents look worried because they are both carriers, and carriers appear normal and do not show any physical symptom.b. the likely physical appearance of Mrs. Kasuru's baby boy

b)

- Loss of weight / muscle wasting.
- Retarded growth / stunted growth.
- Difficulty in vision.
- Swellings of hands / feet.
- Frequent fatigue.
- Reduced immunity / frequently falling sick.

c) How the family can manage their baby's condition

- Blood transfusion.
- Frequent and rapid rehydration of the baby.
- Regular checkup and medication.
- Timely treating of any infection.
- Preventing and treating stroke.
- Proper nutrition.

SECTION B

Part I

4. Flooding; leads to destruction of vegetation due to water logging which prevents roots from absorbing enough oxygen or cover vegetation cutting off photosynthesis.

Silting of swamp channels / rivers as a result of destruction of swamps; This affects aquatic animals by making water turbid, hindering visibility. It may also lead to death of animals.

Destruction of natural habitats of animals e.g. frogs, snakes etc. the dangerous animals may attach human / other organisms' settlements.

Sand mining creates deep stagnant water pools which can be risky to humans and other animals. The pools can also act as a breeding ground for vectors.

How to sustainably use the swamps

- Controlled sand mining.
- Controlled harvesting of raw materials from swamps e.g. papyrus.
- Planting trees in swamps to protect them from soil mass flow.
- Use alternative lands / areas to graze livestock.
- Desilting swamp channels.

Benefits / advantages of conserving natural resources in swamps

- Provides a good natural habitat for aquatic animals e.g. snakes, frogs etc.
- The swamp is a water catchment area; hence prevent flooding in settlement areas. It also maintains a stable water table for lakes.
- The swamps protect lakes and rivers from silting by filtering water before joining the main stream / water bodies.
- Availability of raw materials like papyrus, reeds etc. for crafts and constructions etc.
- Swamps provide water for home and industrial use.
- The fish and other animals in the swamp are sources of food to man and other animals.

5 *Environmental challenges in the community*

- Outbreak of diseases due to congestion / overcrowding / water born diseases.
- Encroachment of natural habitats for animals, which leads to attack by wild animals.
- Deforestation; in an attempt of getting firewood and wood for construction.
- Destruction of natural habitats for settlement and farming.
- Swamp reclamation / drainage for farming and settlement.
- Hunting of wild animals for food.
- Loss of biodiversity.
- Poor disposal of wastes.

How to minimize the effects of the challenge

- Afforestation / planting of trees which mature in a short time.
- Use alternative construction materials.
- Use alternative source of fuel other than firewood.
- Practice wetland edge cultivation.
- Sort domestic wastes into biodegradable and non-biodegradable for recycling.
- Have controlled hunting of wild animals.

Values / benefits of conserving the environment

- Forests are habitats for wild animals which are sources of food.
- Swamps provide raw materials like sand for construction, clay and papyrus for crafts.
- Forests release oxygen which is used by animals for respiration.
- Trees / forests trap / absorb carbon dioxide from the atmosphere hence reducing pollution and global warming.
- Swamps act as water catchment areas.

Part II

6

Experiences in town A.

- Increased body metabolism to especially generate sufficient energy required in jogging.
- Increased heart beat to circulate sufficient blood around the body to facilitate faster metabolism/respiration of food to supply energy.
- Increased breathing rate to ensure quick supply of oxygen to respiring tissues and remove accumulated carbon dioxide.
- Accumulation of lactic acid in the body as a result of vigorous exercise, which resulted into anaerobic respiration in the body.
- Sweating so as to remove excess heat generated during the exercise.

New experiences in town B

- Reduce oxygen intake presented difficulty in breathing due to too much carbon dioxide in air / pollution.
- Lung irritations causing coughing due to in halation of dust from polluted environment.
- Lung infections / diseases like emphysema presented with chest pain as a result of increased inhalation of polluted air.

Advise to manage challenges experienced in town B

- Go for medication to treat the respiratory complications.
- Change residence from town B to a less polluted area.
- Eat a balanced diet to boost the body's immunity to have self defense.
- Perform other physical activities that may not require exposure to polluted environment.
- Wear a mask, especially when not engaged in jogging since he is living in a polluted area.

7 *Processes are*; digestion, absorption, assimilation and respiration

Carbohydrates were digested in the mouth by salivary amylase, and in the duodenum by pancreatic amylase to maltose. Maltose was digested in the ileum to glucose molecules by maltase.

The glucose produced was absorbed in the walls of ileum/villi and transported in the bloodstream to the respiring tissues/body muscles.

The glucose was broken down during respiration to provide energy/ATP, water and carbon dioxide gas were produced in the process. The produced energy was used by Chesang's body/muscles to run and win the race.

Changes / challenges experienced by Chesang's body were;

- Accumulation of lactic acid in the muscles.
- Increased oxygen demand.
- Increased energy demand.
- Excess heat in the tissue/cells.
- Increased amount of carbon dioxide.

How Chesang came back home and her body remained in normal state.

- Excess carbohydrates stored as glycogen is converted to glucose which was respired hence providing Chesang energy to go back home.
- Deep breathing enabled her take excess oxygen to breakdown the accumulated lactic acid. Also to expel carbon dioxide from the body.
- Increased sweating to remove excess heat.
- Increased heart beat to transport the required materials and products to target organs.